HUAWEI ME909u-523 LTE LGA Module

AT Command Interface Specification

Issue 02

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2014-05-27		Creation
02	2014-09-09	7.5	Updated the default value of `<service>` and property description for `AT+CGSMS` command
		12.1	Updated section 12.1: AT^HWNATQRY–Query the Network Mode
		14.1	Updated section 14.1: AT^NDISDUP–NDIS-Based Dialing
		16	Added chapter 16: Huawei Proprietary Interface: Firmware Update Interfaces
		17	Updated References and Acronyms and Abbreviations

Contents

1 Introduction

1.1 Scope

This document describes AT command interface specification that is supported by Huawei mobile broadband product ME909u-523 module.

Please read the Release Notes released with the firmware before using ME909u-523 module and this document.

1.2 Overview

This document describes certain AT commands (implemented by terminal devices) of international standards, according to the requirements of terminal devices. In addition, this document describes the proprietary AT command interfaces that are implemented by terminal devices. These 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 mobile terminal (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 Terminal Equipment (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 personal computer (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.

1.3 Organization

Chapter 2 "General Commands" to chapter 9 "SMS Service Interface" describe AT interfaces defined in international standards such as 3GPP and ITU-T.

Chapter 10 "Huawei Proprietary Interface: Mobile Termination Control and Status Interface" to chapter 16 "Huawei Proprietary Interface: Firmware Update Interfaces" describe Huawei proprietary interfaces.

1.4 Document Conventions

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

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

For example:

Saving upon Power-off	PIN
N	Y

The settings are described as follows:

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

1.5 AT Command Syntax

1.5.1 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.

AT command type	Sub-type	Syntax	Function
	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 a parameter.
	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>.

1.5.2 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.

1.5.3 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

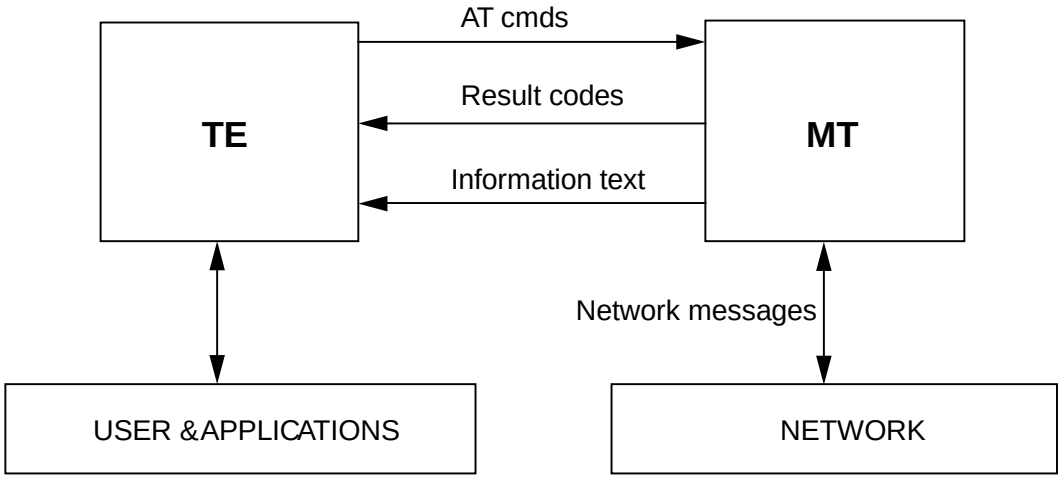
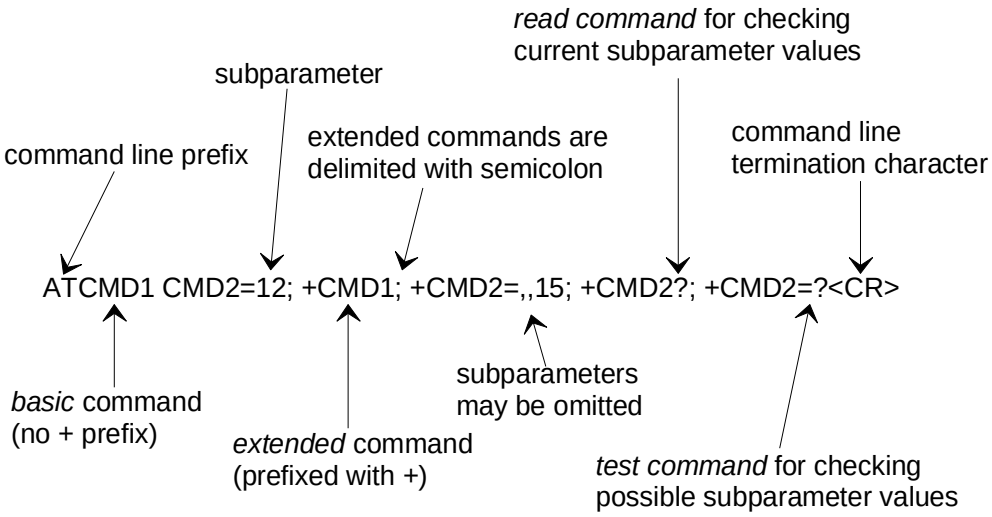


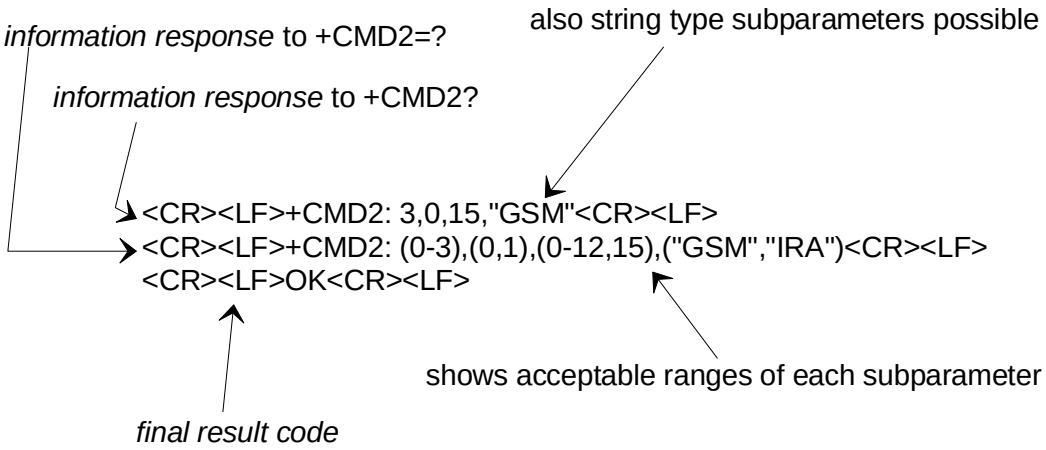
Figure 1-2 shows the basic organization format of the AT command line.

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.

1.6 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.

`ATD`	Can be aborted
`AT+CLCK`	Can be aborted
`AT+COPS`	Can be aborted except "`AT+COPS=?`"

1.7 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`".
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.

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 or not the MT echoes the characters received from the TE.

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

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 immediately returned 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

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 immediately returned 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`

Response: `OK`

2.4 A/–Repeat Previous Command Line

2.4.1 Command Syntax

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

2.4.2 Interface Description

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

2.4.3 Parameter Description

NA

2.4.4 Property Description

Saving upon Power-off	PIN
NA	N

2.4.5 Example

If the last command is:

Run: `AT+CGSN`

Response: `351782030028946`

`OK`

Run: `A/`

Response: `351782030028946`

`OK`

2.5 ATQ–Set Result Code Presentation Mode

2.5.1 Command Syntax

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

2.5.2 Interface Description

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

2.5.3 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.

2.5.4 Property Description

Saving upon Power-off	PIN
N	N

2.5.5 Example

Run: `ATQ0`

Response: `OK`

2.6 AT&W–Store User Settings

2.6.1 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>

2.6.2 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 as follows:

Command
E
V
Q
X
&C
&D
&S
S0
S7
S10
+IFC
+ICF

2.6.3 Parameter Description

None

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

Run: `AT&W`

Response: `OK`

2.7 AT&V–Query Current Configuration

2.7.1 Command Syntax

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

2.7.2 Interface Description

This command queries the current configuration.

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

2.7.3 Parameter Description

None

2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

Run: `AT&V`

Response:

```
&C: 1; &D: 2; &S: 0; E: 0; 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
```

2.8 ATV–Set the Response Format

2.8.1 Command Syntax

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

2.8.2 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>

2.8.3 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.

2.8.4 Property Description

Saving upon Power-off	PIN
N	N

2.8.5 Example

Run: `ATV1`

Response: `OK`

2.9 ATI–Request Identification

2.9.1 Command Syntax

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

2.9.2 Interface Description

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

Manufacturer (`AT+GMI`)

Product model (`AT+GMM`)

Software version (`AT+GMR`)

IMEI (`AT+GSN`)

Capability list (`AT+GCAP`)

About the details, please see 2.9.5 Example.

2.9.3 Parameter Description

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

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

2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

Run: ATI

Response:
```
Manufacturer: Huawei Technologies Co., Ltd.
Model: ME909u-523
Revision: 11.430.25.02.00
IMEI: 356112010004540
+GCAP: +CGSM,+DS,+ES

OK
```

2.10 AT+GCAP–Request Transmission Capacity Domain Identification

2.10.1 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>

2.10.2 Interface Description

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

Only the execution command is supported at present. The test command returns `OK`.

2.10.3 Parameter Description

None

2.10.4 Property Description

Saving upon Power-off	PIN
NA	N

2.10.5 Example

Run: `AT+GCAP`

Response: `+GCAP: +CGSM`

`OK`

In the returned value, `+CGSM` is the response text to show that some or all GSM commands of the present document are supported.

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

2.11.1 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>

2.11.2 Interface Description

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

2.11.3 Parameter Description

<manufacturer>: a string indicating the manufacturer information.

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

2.11.4 Property Description

Saving upon Power-off	PIN
NA	N

2.11.5 Example

Run: AT+CGMI

Response: Huawei Technologies Co., Ltd.

OK

2.12 AT+CGMM/+GMM–Request Model Identification

2.12.1 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>

2.12.2 Interface Description

This command queries the MT's model identification. Both AT+CGMM and AT+GMM query the MT's model ID. The model ID's value can be one or more lines of text, determined by the MT's manufacturer. The model ID is used to identify 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.

2.12.3 Parameter Description

<production_name>: product name.

2.12.4 Property Description

Saving upon Power-off	PIN
NA	N

2.12.5 Example

Product name: ME909u-523

Run: AT+CGMM

Response: ME909u-523

OK

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

2.13.1 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>

2.13.2 Interface Description

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

2.13.3 Parameter Description

<version>: software version, a string with up to 31 characters. The sequence 0<CR> or OK<CR> is not allowed in the response.

2.13.4 Property Description

Saving upon Power-off	PIN
NA	N

2.13.5 Example

Run: AT+CGMR

Response: 11.430.25.02.00

OK

2.14 AT+CGSN/AT+GSN–Request Product IMEI

2.14.1 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>

2.14.2 Interface Description

This command queries the MT's International Mobile station Equipment Identity (IMEI). AT+GSN and AT+CGSN have the same function and syntax.

2.14.3 Parameter Description

<sn>: the MT's IMEI. The returned IMEI is a string consisting of 15 digits described in the following table.

8 char	6 char	1 char
TAC	SNR	Spare

TAC: the type approval code assigned to the MT

SNR: the MT's serial number

Spare: spare digit

2.14.4 Property Description

Saving upon Power-off	PIN
NA	N

2.14.5 Example

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

Run: AT+CGSN

Response: 351548000225444

OK

2.15 AT+CSCS–Select TE Character Set

2.15.1 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)
<CR><LF>+CSCS: (list of supported <chset>s)<CR><LF><CR><LF>OK<CR><LF>

2.15.2 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.

2.15.3 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. Other character sets are listed below (only the "IRA", "GSM" and "UCS2" character sets are supported at present):

"GSM"	GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems.
"HEX"	Character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MT character set shall be done.
"IRA"	International reference alphabet (ITU–T T.50)
"PCCPxxx"	PC character set Code Page xxx
"PCDN"	PC Danish/Norwegian character set
"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.
"8859-n"	ISO 8859 Latin n (1–6) character set
"8859-C"	ISO 8859 Latin/Cyrillic character set
"8859-A"	ISO 8859 Latin/Arabic character set
"8859-G"	ISO 8859 Latin/Greek character set
"8859-H"	ISO 8859 Latin/Hebrew character set

Note:

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

2.15.4 Property Description

Saving upon Power-off	PIN
N	N

2.15.5 Example

Run: `AT+CSCS="IRA"`

Response: `OK`

Run: `AT+CSCS?`

Response: `+CSCS: "IRA"`

`OK`

Run: `AT+CSCS=?`

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

`OK`

2.16 AT+CIMI–Request IMSI

2.16.1 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>

2.16.2 Interface Description

This command queries the USIM or SIM card's International Mobile Subscriber Identity (IMSI).

2.16.3 Parameter Description

<IMSI>: the IMSI stored on the USIM or SIM card. It is a string consisting of decimal digits, as described in the following table.

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

MCC: Mobile Country Code

MNC: Mobile Network Code

MSIN: Mobile Subscriber Identification Number

2.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

2.16.5 Example

If the MCC is 123, the MNC is 45, and the MSIN is 12345678, then:

Run: `AT+CIMI`

Response:
```
1234512345678

OK
```

2.17 ATZ–Restore Factory Settings

2.17.1 Command Syntax

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

2.17.2 Interface Description

This command restores the parameters of the AT command to the user 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 . In addition to restoring the parameters of the AT command to their default values, the AT&W command can set the user value. If the user value is not set, the parameters are restored to the factory default values.

2.17.3 Parameter Description

<value>

0	Sets all AT commands' parameters to their default values.

Note:

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

2.17.4 Property Description

Saving upon Power-off	PIN
NA	N

2.17.5 Example

Run: ATZ0

Response: OK

2.18 AT&F–Restore Default AT Command Settings

2.18.1 Command Syntax

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

2.18.2 Interface Description

This command restores the parameters of the AT command in Table 2-1 to their default values, and also restores the baud rate between TE and MS to the default value.

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

Command
E
V
Q
X
&C
&D
&S
S0
S3
S4
S5
S7
S10
+IFC
+IPR

Notes:

- 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, too.
- +IPR and +IFC will restore their parameters to default values only when those commands are sent on the UART port.

2.18.3 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.

2.18.4 Property Description

Saving upon Power-off	PIN
NA	N

2.18.5 Example

Run: AT&F0

Response: 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>
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 indicating 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.

2 Enable the `+CME ERROR: <err>` result code and use verbose `<err>` values (default value).

`<err>`: see section 17.2 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=?`

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

`OK`

3 Call Control Commands and Methods

3.1 ATD–Dial Command

3.1.1 Command Syntax

ATD[<digits>][I/i][;]
Possible Response(s)
<CR><LF>OK<CR><LF>

3.1.2 Interface Description

This command is used to initiate a data service call.

3.1.3 Parameter Description

<digits>: the called phone number, ASCII characters. Valid characters are 0–9, '*', '#', and '+'. '+' is only allowed before a phone number, otherwise it will be ignored. The maximum length of the number for a 3GPP product cannot exceed 40 characters (excluding '+'). Invalid characters of the number are dealt allowing for platform differences.

Note:

PCUI port does not support connection operation and data transmission of data service, and it need to verify PIN when it is not an emergency call.

3.1.4 Property Description

Saving upon Power-off	PIN
NA	N

3.2 ATH–Hang Up Call

3.2.1 Command Syntax

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

3.2.2 Interface Description

This command is used to disconnect the MT from remote users under the single mode. When a multiparty call is hung up, each connected user is disconnected.

3.2.3 Parameter Description

<value>: an integer type value.

- If <value> is 0, all users are disconnected and OK is returned.
- If <value> is not 0, the connection cannot be disconnected, and ERROR is returned.
- If <value> is not specified, the command is equivalent to ATH0 (that is, ATH is equivalent to ATH0).

3.2.4 Property Description

Saving upon Power-off	PIN
NA	N

3.2.5 Example

- Disconnect the current connection:

Run: ATH

Response: OK

Run: ATH0

Response: OK

- Use the incorrect parameter:

Run: ATH1

Response: ERROR

4 Network Service Related Commands

4.1 AT+COPS–Select Operator

4.1.1 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>

4.1.2 Interface Description

This interface enables to query the network state and network selection mode currently registered by the MS.

The execution command enables to select the UMTS/EPS network automatically or manually.

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

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

Note:

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

4.1.3 Parameter Description

`<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>`:

0	Long format alphanumeric `<oper>`
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 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 BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD. Hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1).

`<stat>`:

0	Unknown
1	Available
2	Current

3 Forbidden

<AcT>: access technology selected

2 UTRAN

4 UTRAN w/HSDPA

5 UTRAN w/HSUPA

6 UTRAN w/HSDPA and HSUPA

7 E-UTRAN

4.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.1.5 Example

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

Run: `AT+COPS=?`

Response:
```
+COPS: (2,"HUAWEI TEST
W09","HTW09","46009",7),(1,"HUAWEI TEST
W09","HTW09","46009",2),,(0,1,2,3,4),(0,1,2)

OK
```

- Automatic search of network:

Run: `AT+COPS=0`

Response: `OK`

Note:

In the set command, that mode equals to 0 makes other parameters invalid.

- Manual search of network:

Run: `AT+COPS=1,2,"46000",2` `AT+CREG=1`, `AT+CGREG=1`, enable URC reporting.

Response: `OK`

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

Run: `AT+COPS?`

Response:
```
+COPS: 1

OK
```

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

Notes:

- We cannot manually search the UTRAN network when current setting is LTE ONLY (`<mode>`=03) mode which set by `AT^SYSCFGEX`.
- We cannot manually search the LTE network when current setting is WCDMA ONLY (`<mode>`=02) mode which set by `AT^SYSCFGEX`.
- `ERROR` will be returned in this situation.

- Query the status of the ME's network registration using the read command:

Run:	`AT+COPS?`	Queries the information of the network currently logged in.

Response:	`+COPS: 1,2,"46000",2`
	
	`OK`
		Returns mode, format and registered operator.

4.2 AT+CREG–Register Network

4.2.1 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>

4.2.2 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.

4.2.3 Parameter Description

<n>:

0	Disable network registration unsolicited result code +CREG.
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>: string type; two byte location area code or tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>: string type; four byte UTRAN/E-UTRAN cell ID in hexadecimal format.

<AcT>: integer type; access technology of the serving cell.

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

Notes:

- [1] 3GPP TS 44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.
- [2] 3GPP TS 25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

4.2.4 Property Description

Saving upon Power-off	PIN
N	Y

4.2.5 Example

- Enable the initiative report when network registration status change:

Run: `AT+CREG=1`

Response: `OK`

- Query the current network registration status:

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 0x E01F4, and the network mode is WCDMA, the terminal will receive the unsolicited reports:

Run: `AT+CREG?`

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

OK
```

4.3 AT+CLCK–Facility Lock

4.3.1 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> 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>

4.3.2 Interface Description

The execution command is used to lock, unlock or interrogate an MT or a network facility <fac>.

The test command returns the facilities supported.

4.3.3 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
"PN"	Network Personalization

Note:

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

`<mode>`: integer type; indicating operating mode.

0	Unlock
1	Lock
2	Queries status

`<status>`: integer type; indicating current status.

0	Not active
1	Active

`<passwd>`: string type; 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 (telephony) (not supported)
2	Data
4	Fax (not supported)
8	Short message service

4.3.4 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.

4.3.5 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=?`

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

OK
```

4.4 AT+CPWD–Change Password

4.4.1 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>

4.4.2 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.

4.4.3 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
"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; 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>: integer type maximum length of the password for the facility.

4.4.4 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.

4.4.5 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
```

4.5 AT+CNUM–Subscriber Number

4.5.1 Command Syntax

AT+CNUM
Possible Response(s)
<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>

4.5.2 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.

4.5.3 Parameter Description

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

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

<typex>: 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>: reference 27007-b10 subclause 6.7 (not supported currently)

<service>: integer type (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
5	Fax

All other values below 128 are reserved by the present document.

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

0	3.1 kHz
1	UDI

4.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.5.5 Example

- Run the following four commands to 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
```

- Run the following commands to clear the numbers:

Run: `AT+CPBS="ON"`

Response: `OK`

Run: `AT+CPBW=1`

Response: `OK`

Run: `AT+CPBW=2`

Response: `OK`

Run: `AT+CNUM`

Response: `OK`

5 Serial Interface Control Commands

5.1 AT+IPR–Set Fixed Data Rate

5.1.1 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>

5.1.2 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.

5.1.3 Parameter Description

The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. "19 200" or "115 200". 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.

Recommended default setting:

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

`AT+IPR` is equivalent to `AT+IPR=115200`.

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, the command is processed on the port and does not affect other ports. The command is validated.

5.1.4 Property Description

Saving upon Power-off	PIN
Y	N

5.1.5 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
```

Note:

ME909u-523 module does not support high-speed UART port (such as 230400, 460800, 921600, 1000000, 1500000, 2500000, 3000000, 3500000 and 4000000).

5.2 AT+IFC–Control Local Flow

5.2.1 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>

5.2.2 Interface Description

This extended-format compound parameter is used to control 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:

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

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.

5.2.3 Parameter Description

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

0	None
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)
4–127	Reserved for future standardization

Other 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
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 reserved for manufacturer-specific use.

Notes:

- DC1 is IA5 1/1; DC3 is IA5 1/3.
- Both AT+IFC=0,2 and AT+IFC=2,0 are not supported.

Recommended default settings:

For `<DCE_by_DTE>`: 0

For `<DTE_by_DCE>`: 0

`AT+IFC` is equivalent to `AT+IFC=0,0`

5.2.4 Property Description

Saving upon Power-off	PIN
N	N

5.2.5 Example

- None flow control:

Run: `AT+IFC=0,0`

Response: `OK`

- Query current control state:

Run: `AT+IFC?`

Response: `+IFC: 0,0`

`OK`

- List of supported parameters:

Run: `AT+IFC=?`

Response: `+IFC: (0,2),(0,2)`

`OK`

- Enable flow control:

Run: `AT+IFC=2,2`

Response: `OK`

6 Mobile Termination Control and Status Commands

6.1 AT+CFUN–Set Operation Mode

6.1.1 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>

6.1.2 Interface Description

The execution command is used to set the MT mode or restart the MT.

The read command is used to return the current mode.

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

6.1.3 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 (default value) (previous mode must not be offline).
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).

<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. Restrictions on the mode switching is not affected by the <fun> parameter)

6.1.4 Property Description

Saving upon Power-off	PIN
NA	N

6.1.5 Example

- Query the MT's current mode use the read command:

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, and use the set mode:

Run: `AT+CFUN=5,0`

Response: `OK`

- Which mode does MT support, use the read command:

Run: `AT+CFUN=?`

Response: `+CFUN: (0-1,4-7),(0-1)`

`OK`

6.2 AT+CPIN–Enter PIN

6.2.1 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>

6.2.2 Interface Description

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

The set command is used for verifying and unblocking PIN and PIN2 and PH-NET PIN.

If the current password required is PIN or PIN2 or PH-NET PIN, run `+CPIN=<pin>` to verify PIN or PIN2 or PH-NET PIN.

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.

6.2.3 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>: 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.
PH-NET PIN	MT is waiting for network personalization password to be given.

6.2.4 Property Description

Saving upon Power-off	PIN
NA	N

6.2.5 Example

- 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"). Use the set command:

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

Response: `OK`

- Try read command again:

Run: `AT+CPIN?`

Response: `+CPIN: READY`

`OK`

- Test command:

Run: `AT+CPIN=?`

Response: `OK`

6.3 AT+CSQ–Signal Quality

6.3.1 Command Syntax

AT+CSQ
Possible Response(s)
<CR><LF>+CSQ: <rssi>,<ber><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CSQ=?
Possible Response(s)
<CR><LF>+CSQ: (list of supported <rssi>s),(list of supported <ber>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 execution command returns received signal strength indication <rssi> and channel bit error rate <ber> from the MT. Refer to subclause 9.2 for possible <err> values in 3GPP TS 27.007.

The test command returns supported RSSI and BER values.

6.3.3 Parameter Description

<rssi>: received signal strength indication.

Network	<rssi>	UTRAN Cell Signal Strength
WCDMA	0	≤ –113 dBm
	1	–111 dBm
	2–30	–109 dBm to –53 dBm
	31	≥ –51 dBm
	99	Unknown or undetectable

`<ber>`: integer type; channel bit error rate (in percent) (not supported currently and only 99 can be displayed)

6.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.3.5 Example

- Query the MT's signal strength use the execution command:

Run: `AT+CSQ`

Response:
```
+CSQ: 19,99

OK
```

- Test command:

Run: `AT+CSQ=?`

Response:
```
+CSQ: (0-31,99),(0-7,99)

OK
```

6.4 AT+CPBS–Select Phonebook Memory Storage

6.4.1 Command Syntax

AT+CPBS=<storage>[,<reserved>]
Possible Response(s)

<CR><LF>OK<CR><LF> In case of an MT-related error: <<CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBS?
Possible Response(s)
<CR><LF>+CPBS: <storage>[,<used>,<total>]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBS=?
Possible Response(s)
<CR><LF>+CPBS: (list of supported <storage>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 selects phonebook memory storage <storage>, which is used by other phonebook commands. After the MT is restarted, the value of <storage> is restored to its default value "SM".

The read command returns currently selected memory and, optionally, the number of used locations and total number of locations in the memory.

The test command returns supported phonebook storages.

6.4.3 Parameter Description

<storage>: phonebook storage type.

"SM"	SIM/UICC phonebook
"ME"	NV phonebook (not supported by WCDMA datacard, supported by CDMA datacard and telephone) (not supported currently)
"ON"	Phone number in (U)SIM/UICC card
"EN"	Emergency number in (U)SIM/UICC card
"FD"	SIM/USIM fixdialing-phonebook. In the currently selected card slot, if a SIM card is present or if a UICC with an active GSM application is present, the information in EFFDN under DFTelecom is selected. If a UICC with an active USIM application is present, the information in EFFDN under ADFUSIM is selected. (not supported currently)

<reserved>: reserved.

<used>: an integer type value indicating the number of used locations in selected memory.

<total>: an integer type value indicating the total number of locations in selected memory.

6.4.4 Property Description

Saving upon Power-off	PIN
N	Y

6.4.5 Example

- Query the MT's phonebook storage which it supports, use the test command:

Run: `AT+CPBS=?`

Response:
```
+CPBS: ("SM","EN","ON")

OK
```

- Query the MT's current selecting memory, use the read command:

Run: `AT+CPBS?`

Response:
```
+CPBS: "SM",249,250

OK
```

- Select ON memory to storage phonebook, use the set command:

Run: `AT+CPBS="ON"`

Response: `OK`

6.5 AT+CPBR–Read Phonebook Entries

6.5.1 Command Syntax

AT+CPBR=<index1>[,<index2>]
Possible Response(s)

<CR><LF>[+CPBR: <index1>,<number>,<type>,<text>][[...][<CR><LF>+CPBR: <index2>,<number>,<type>,<text>]]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBR=?
Possible Response(s)
<CR><LF>+CPBR: (list of supported <index>s),[<nlength>],[<tlength>]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

6.5.2 Interface Description

The execution command returns phonebook entries in location number range <index1>... <index2> from the currently selected phonebook memory storage. The values of <index2> must be greater than the value of <index1>.

If <index2> is left out, only the phonebook entry at location <index1> is returned.

The test command returns the location range supported by the current storage and the maximum lengths of the <number> and <text> fields.

6.5.3 Parameter Description

<index1>, <index2>, <index>: integer type values that indicate the locations in the phonebook memory. The values of <index1> and <index2> must be smaller than or equal to the value of <total> returned in the response to the AT+CPBS? command; and the values of <index2> must be greater than the value of <index1>.

<number>: string type field of maximum length <nlength>, indicating the phone number.

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

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

<nlength>: an integer type value indicating the maximum length of field <number>.

<tlength>: an integer type value indicating the maximum length of field <text>.

6.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.5.5 Example

- Test command:

Run: `AT+CPBR=?`

Response:
```
+CPBR: (1-250),24,16

OK
```

Note:
Different SIMCARD will return different values.

- Query index 1's phonebook content (phone number="1234567890123", type=129, text=autoTestEdit), use the read command:

Run: `AT+CPBR=1`

Response:
```
+CPBR: 1,"1234567890123",129,"autoTestEdit"

OK
```

Note:
Please make sure that the phone book index which you query must have content.

6.6 AT+CPBW–Write Phonebook Entry

6.6.1 Command Syntax

AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBW?
Possible Response(s)
<CR><LF>+CPBW: <written_index><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

6.6.2 Interface Description

The execution command writes a phonebook entry in location number <index> in the currently selected phonebook memory storage. If the execution command contains only the <index> parameter, the phonebook entry at the location specified by <index> will be deleted. If <index> is left out, but <number> is given, the entry is written to the first free location in the phonebook.

If an entry is written successfully and <index> is not provided, +CPBW: <written_index> is returned, indicating the location of the entry. The <number> field cannot be null and the <text> field can be null.

If no location is free, +CME ERROR: memory full is returned. Phonebook entries can be written only when the phonebook storage type <storage> of the selected phonebook memory storage is "SM" or "ON". If the phonebook storage is of any other type, an error message will be returned, indicating that the write operation is not allowed.

If the UE is unable to display the full text or email, they are cut from the tail end.

The read command returns the latest value of <written_index> or returns –1 when the value of <written_index> is invalid.

Note:

After running the AT+CPBS command to change the current phonebook storage, you need to set <written_index> to an invalid value.

The test command returns:

- the location range supported by the current storage;
- the list of supported <type>s;
- the maximum lengths of the <number> (excluding '+') and <text> fields.

When writing a phonebook entry, ensure that the lengths of all fields do not exceed their maximum lengths.

6.6.3 Parameter Description

<index>: an integer type value that indicates the locations in the phonebook memory. The values of <index> must be smaller than or equal to the value of <total> returned in the response to the +CPBS? command.

<number>: string type field of maximum length <nlength>, indicating the phone number.

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

<text>: string type field of maximum length <tlength>, indicating the name of a phone number entry; character set as specified by command AT+CSCS–Select TE Character Set.

<nlength>: an integer type value indicating the maximum length of field <number>.

<tlength>: an integer type value indicating the maximum length of field <text>.

6.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.6.5 Example

- Use the set command to set phonebook memory index 1's value as follows: phone number="1234567890123", type=129, text="autoTestEdit":

Run: `AT+CPBW=1,"1234567890123",129,"autoTestEdit"`

Response: `OK`

- Query last setting phonebook memory's index, use read command:

Run: `AT+CPBW?`

Response:
```
+CPBW: 1

OK
```

- Test command:

Run: `AT+CPBW=?`

Response: `+CPBW: (1-250),24,(128-255),16`

`OK`

6.7 AT+CRSM–Restricted SIM Access

6.7.1 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>

6.7.2 Interface Description

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

6.7.3 Parameter Description

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

<P1>, <P2>, <P3>: integer type; these parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in GSM 51.011.

<data>: information in hexadecimal format

<pathid>: string type; 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; information from the SIM about the execution of the actual command.

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

6.7.4 Property Description

Saving upon Power-off	PIN
NA	N

6.7.5 Example

- Read the current state of SIM folder, use the set command:

Run: `AT+CRSM=242`

Response:
```
+CRSM:
108,41,"6227820278218302 3F00A50D8001718302E573C104
800F55FF8A01058B032F0601C606900100830101"

OK
```

Notes:

- SW1=108
- SW2=41
- SIM content="6227820278218302 3F00A50D8001718302E573C104800F55FF8A01058B032F0601C606900100830101" The values are described in GSM 11.11.

- Test command:

Run: `AT+CRSM=?`

Response: `OK`

6.8 AT+CCLK–Return Current Time of the Module

6.8.1 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>

6.8.2 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.

6.8.3 Parameter Description

<time>: string type value; format is "yy/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 then the three last characters of <time> are not returned by +CCLK? For yy, the valid years set is 2000-2100.

6.8.4 Property Description

Saving upon Power-off	PIN
NA	N

6.8.5 Example

Run: `AT+CCLK="13/01/06,01:14:09"`

Response: `OK`

Run: `AT+CCLK?`

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

`OK`

Run: `AT+CCLK=?`

Response: `OK`

7 UMTS Packet Domain Commands

7.1 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.

7.1.1 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>

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

Note:

If all PDP contexts are undefined, the default parameters of PDP context are returned. In which, the default values of <cid> are 1 and 16, and they 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.

7.1.3 Parameter Description

<cid>:

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

Note:

CID 15 is used to set AGPS PDP context.

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

"IP"	Internet Protocol
"PPP"	Point to point Protocol (not supported currently)
"IPV6"	IPV6 Protocol (not supported currently)

"IPV4V6" IPV4V6 Dual Stack (not supported currently)

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

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

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

0	Off
1	On
2	V.42bis
3	V.44 (not supported currently)

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

0	Off
1	On
2	RFC1144 (applicable for SNDCP only)
3	RFC2507
4	RFC3095 (applicable for PDCP only)

Notes:

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

7.1.4 Property Description

Saving upon Power-off	PIN
Y	N

7.1.5 Example

- Step 1

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
```

Note:

The test command lists the supported values of other parameters supported by "IP", "PPP", "IPV6" and "IPV4V6" Protocol. This product only supports "IP" Protocol.

- Step 2

Run:
```
AT+CGDCONT?
```

Response:
```
+CGDCONT: 1,"IP","","0.0.0.0",0,0
+CGDCONT: 16,"IP","","0.0.0.0",0,0

OK
```

Note:

The MT saves two PDP contexts, and the <cid> value of these contexts are 1 and 16.

- Step 3

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.

- Step 4

Run:
```
AT+CGDCONT?
```

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

OK
```

Note:

The response shows that the PDP context with <cid> 15 has been successfully saved to the MT at the previous step.

- Step 5

Run: AT+CGDCONT=15

Response: OK

Note:

This command uses to remove the PDP context with <cid> 15.

- Step 6

Run: AT+CGDCONT?

Response:
```
+CGDCONT: 1,"IP","","0.0.0.0",0,0
+CGDCONT: 16,"IP","","0.0.0.0",0,0

OK
```

Note:

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

- Step 7

Run: AT+CGDCONT=16

Response: ERROR

Note:

The PDP context with <cid> 16 cannot be removed. Because it is used to LTE attach.

7.2 AT+CGACT–Activate or Deactivate PDP Context

7.2.1 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>
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>

7.2.2 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 returns the defined PDP Activation state.

7.2.3 Parameter Description

<state>: integer type, 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 the AT+CGDCONT command.

7.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2.5 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?`

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

`OK`

- Activate or deactivate PDP contexts:

Run: `AT+CGACT=1,1`

Response: `OK`

Run: `AT+CGACT=0,1`

Response: `OK`

7.3 AT+CGATT–Attach or Detach PS Domain

7.3.1 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>

7.3.2 Interface Description

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

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

The read command returns the current GPRS service state.

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

7.3.3 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 execution command.

7.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.3.5 Example

- Query the value range of PS domain service states:

Run: AT+CGATT=?

Response: +CGATT: (0,1)

OK

- Query the current GPRS 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`

7.4 AT+CGREG–PS Domain Registration Status

7.4.1 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>

7.4.2 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 returns 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.

7.4.3 Parameter Description

<n>:

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

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

<ci>: string type; four-character cell ID in hexadecimal format.

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

0	GSM
1	GSM Compact
2	UTRAN
3	GSM w/EGPRS[1]
4	UTRAN w/HSDPA[2]

5	UTRAN w/HSUPA[2]
6	UTRAN w/HSDPA and HSUPA[2]
7	E-UTRAN

Notes:

[1] 3GPP TS 44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

[2] 3GPP TS 25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

`<rac>`: string type; one byte routing area code in hexadecimal format (not supported currently).

7.4.4 Property Description

Saving upon Power-off	PIN
N	Y

Note:

`AT+CGREG` is equivalent to `AT+CGREG=0`.

7.4.5 Example

Run: `AT+CGREG?`

Response:
```
+CGREG: 0,1

OK
```

Run: `AT+CGREG=?`

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

OK
```

7.5 AT+CGSMS–SMS Bearer Domain

7.5.1 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>

7.5.2 Interface Description

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

The read command returns the current SMS bearer domain.

The test command returns the supported parameter values.

7.5.3 Parameter Description

<service>:

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

7.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

7.5.5 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`

8 Normal Commands for SMS

8.1 AT+CPMS–Preferred Message Storage

8.1.1 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>

8.1.2 Interface Description

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

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

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

8.1.3 Parameter Description

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

"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>.

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.

8.1.4 Property Description

Saving upon Power-off	PIN
N	Y

8.1.5 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",2,40,"SM",2,40,"SM",2,40

OK
```

- Set the storage type using the test command:

Run: `AT+CPMS="SM","SM","SM"`

Response:
```
+CPMS: 2,40,2,40,2,40

OK
```

8.2 AT+CMGF–Message Format

8.2.1 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>
AT+CMGF=?
Possible Response(s)
<CR><LF>+CMGF: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

8.2.2 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 returns the currently selected mode.

The test command returns available values of <mode>.

8.2.3 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.

8.2.4 Property Description

Saving upon Power-off	PIN
N	N

8.2.5 Example

Set the message format to PDU format using the test command:

Run: `AT+CMGF=0`

Response: `OK`

Note:

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

8.3 AT+CNMI–New Message Indications to TE

8.3.1 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>

8.3.2 Interface Description

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

`<mode>` controls how NEW MESSAGE indications (including `+CMT`, `+CMTI`, `AT+CDSI`, and `AT+CDS`) are sent to the TE.

`<mt>` controls whether to directly send SMS-DELIVER indications to the TE, or to save them to the MT and then send the storage locations to the TE.

<bm> controls whether to directly send a new CBM to the TE, or save it to the MT and then send the storage location to the TE.

<ds> sets whether to send message status reports (AT+CDSI or AT+CDS).

The test command returns the supported parameter values.

Notes:

- 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 3GPP2, the values set in this command are reset to +CNMI: 1,1,0,2,0 after the MT is restarted.
- In 3GPP, AT+CNMI is equivalent to AT+CNMI=0,0,0,0,0.
- In 3GPP2, AT+CNMI is equivalent to AT+CNMI=1,1,0,2,0.

8.3.3 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.
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 three 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:

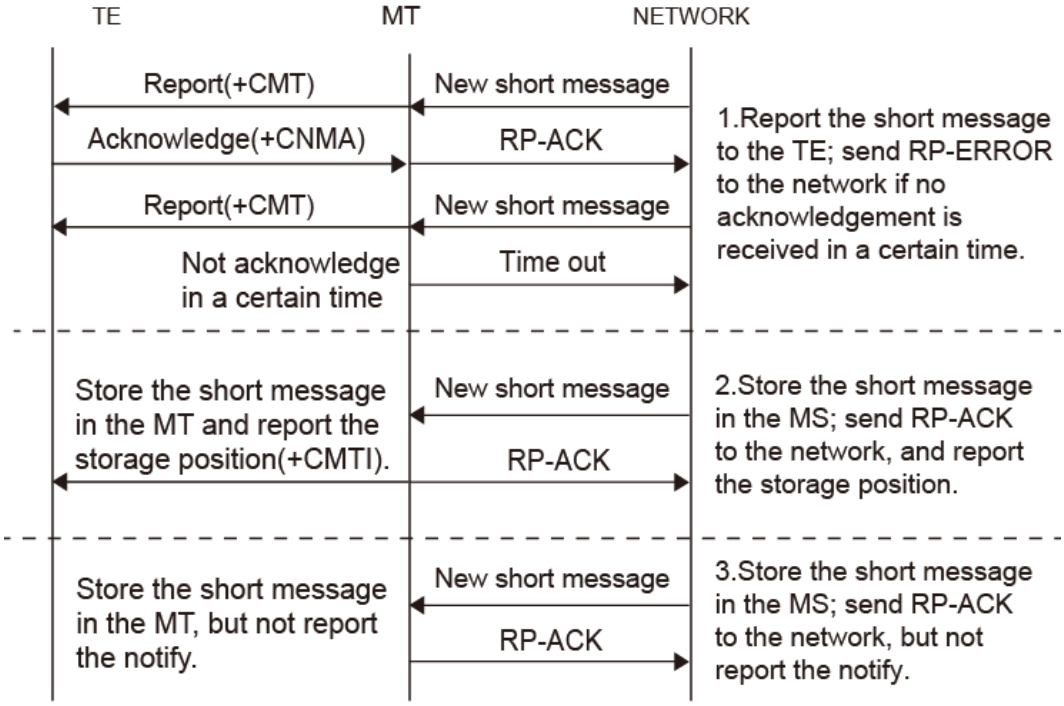
  `+CMT: [<reserved>],<length>`<CR><LF>`<pdu>`

- If TEXT mode enabled:

  `+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.



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

Notes:

- The SMS class is defined by the TP-DCS domain of the SMS. For details, see the description of <DCS> in 9.14.3 AT+CMGS–Send Message (PDU Mode).
- "+CMT & +CNMA" indicates that the TE is required to send the confirmation (+CNMA).

<bm>: set 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)

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

- If PDU mode enabled:

  +CBM: <length><CR><LF><pdu> (PDU mode enabled)

- If TEXT mode enabled:

  +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> (text mode enabled)

- 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 8-1 <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>: set 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.

`+CDS: <length>`<CR><LF>`<pdu>` (PDU mode enabled); or

`+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>` (text mode enabled)

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

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

`<bfr>`:

0 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` ranges from 0 to 2 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>` of 0 to 2 is entered.

8.3.4 Property Description

Saving upon Power-off	PIN
N	N

8.3.5 Example

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

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

8.4 AT+CNMA–New Message Acknowledgement

8.4.1 Command Syntax

If PDU mode (AT+CMGF=0): AT+CNMA[=<n>[,<length>[<CR>PDU is given <ctrl-Z/ESC>]]] If text mode (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)
If PDU mode (AT+CMGF=0): <CR><LF>+CNMA: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF> If text mode (AT+CMGF=1): <CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.4.2 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 section AT+CNMI–New Message Indications to TE.

Notes:

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

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.

8.4.3 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>`: 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

Notes:

- 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

Number of Octets	7	6	5	4	3	2	1	0	
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:

`<TP-MTI>`: 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 MT)
0	0	SMS-DELIVER (in the direction SC to MT)
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>`: 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>: 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 scheme	00	GSM 7-bit encoding scheme; default.
			01	8-bit encoding 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	Bit 3	0	Reserved

	by TE	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.

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

<TP-UD>: 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 8-1 and Figure 8-2 illustrate the formats of the user data encoded using different schemes.

Figure 8-1 User data encoded using the default 7-bit encoding scheme

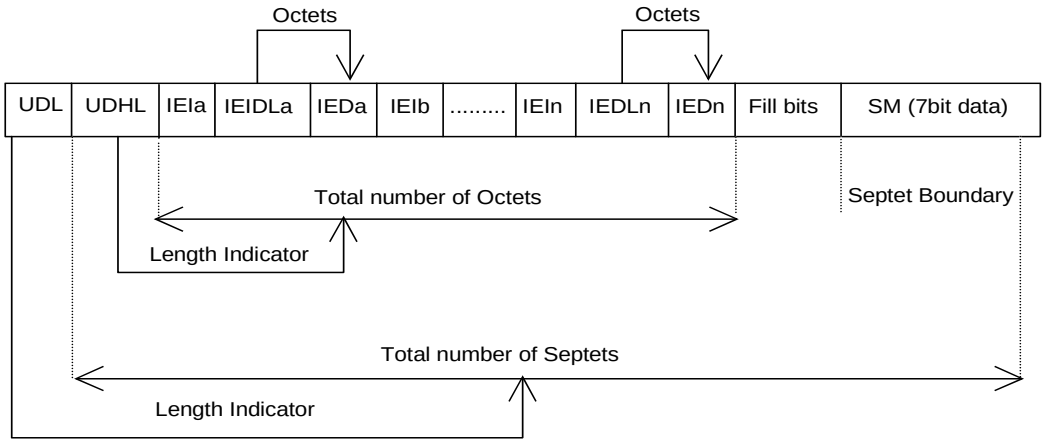
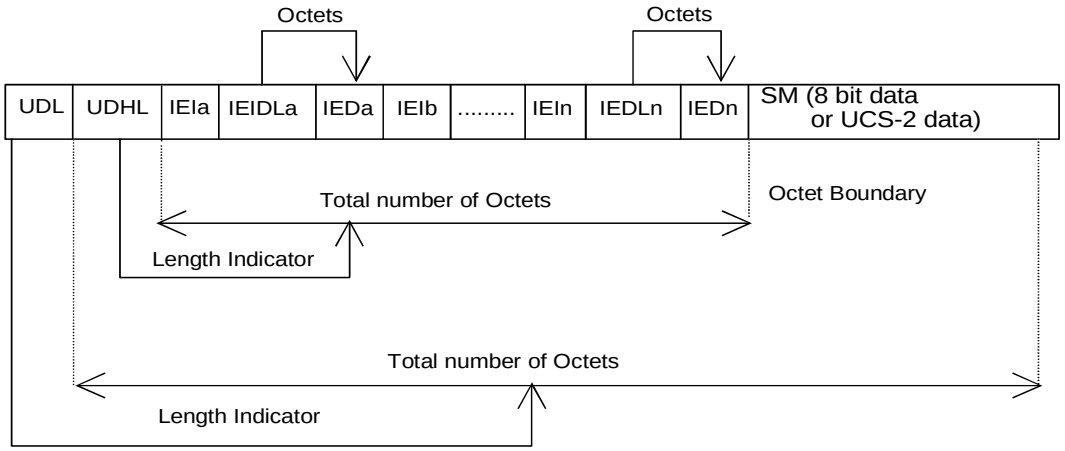


Figure 8-2 User data encoded using the 8-bit or **UCS2** encoding scheme



In Figure 8-1 and Figure 8-2 , IEI is short for Information Element Identifier.

8.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.4.5 Example

Firstly, set AT commands orderly as follows:

Run: `AT+CSMS=1`

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

`OK`

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

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`

8.5 +CMTI–New SMS-DELIVER Indication

8.5.1 Command Syntax

URC
<CR><LF>+CMTI: <mem>,<index><CR><LF>

8.5.2 Interface Description

This command indicates that a new message is received.

8.5.3 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)

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

8.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.5.5 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.

8.6 +CDSI–New SMS Status Report Indication

8.6.1 Command Syntax

URC
<CR><LF>+CDSI: <mem>,<index><CR><LF>

8.6.2 Interface Description

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

8.6.3 Parameter Description

<mem>:

"SM"	SIM/USIM SMS memory
"ME"	NV SMS memory (not supported currently)
"SR"	Status report storage (not supported currently)

<index>: integer type; location in the memory

8.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.6.5 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`

8.7 AT+CMGD–Delete Message

8.7.1 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>

8.7.2 Interface Description

The execution command deletes the message at location `<index>` in the storage `<mem1>`. For details about `<mem1>`, see section AT+CPMS–Preferred Message Storage. If `<delflag>` is set to a value other than 0, the MT ignores `<index>` and executes the command as specified by `<delflag>`. For details about the value definitions of `<delflag>`, see section 8.7.3 . If the deletion fails, `+CMS ERROR: <err>` is returned.

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

8.7.3 Parameter Description

`<index>`: 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.

8.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.7.5 Example

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

Run: `AT+CMGD=1`

Response: `OK`

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

Run: `AT+CMGD=1,4`

Response: `OK`

9 SMS Service Interface

9.1 +CMT–New Message Directly Deliver Indication

9.1.1 Command Syntax

URC
If PDU mode enabled: <CR><LF>+CMT: [<reserved>],<length><CR><LF><pdu><CR><LF> If Text mode enabled: <CR><LF>+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data><CR><LF>

9.1.2 Interface Description

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

9.1.3 Parameter Description

<reserved>: reserved.

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

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

For other parameters, see section AT+CMGS–Send Message (PDU Mode).

9.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.1.5 Example

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

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

Note:

In this example, the message is in Text mode. In PDU mode, PDU packets are presented.

9.2 +CDS–SMS Status Report Indication Directly Displayed

9.2.1 Command Syntax

URC
<CR><LF>+CDS: <length><CR><LF><pdu><CR><LF> (PDU mode enabled) or <CR><LF>+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF> (text mode enabled)

9.2.2 Interface Description

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

9.2.3 Parameter Description

<length>: integer type; length of PDU data

<pdu>: 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 section 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
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	

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

(2) Integer (I), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2-12 octets (2-12o).

For other parameters, see section AT+CMGS–Send Message (PDU Mode).

9.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.2.5 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: 6,116,"+8613903710742",145,"12/03/13,12:10:35+00","12/03/13,12:10:39+00",0`

Note:

In this example, the message is in Text mode.

9.3 AT+CSCA–Service Center Address

9.3.1 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> 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>

9.3.2 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 section AT+CMGS–Send Message (PDU Mode).

9.3.3 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.

9.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

9.3.5 Example

Sets the service center number using the test command:

Run: AT+CSCA="8613800688509",145

Response: OK

9.4 AT+CSMS–Select Messaging Service

9.4.1 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>

9.4.2 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.

9.4.3 Parameter Description

<service>: messaging service type.

0	3GPP TS 23.040, 3GPP TS 23.041 (messaging AT command syntax is compatible with GSM07.05 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, which 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)

9.4.4 Property Description

Saving upon Power-off	PIN
N	N

9.4.5 Example

Set messaging AT command syntax is compatible with GSM07.05 Phase 2+:

Run: AT+CSMS=1

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

`OK`

Note:

`<service>`=1 is required for `AT+CNMA`.

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

9.5.1 Command Syntax

`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>

9.5.2 Interface Description

The set command is used to select values (excluding the default valve) 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 returns the supported parameters.

The test command returns OK.

9.5.3 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.

9.5.4 Property Description

Saving upon Power-off	PIN
N	Y

9.5.5 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

9.6 AT+CMGL–List Messages (Text Mode)

9.6.1 Command Syntax

AT+CMGL[=<stat>]
Possible Response(s)

If text mode (AT+CMGF=1), 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 text mode (AT+CMGF=1), 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>

If text mode (AT+CMGF=1), 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 text mode (AT+CMGF=1), 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>

9.6.2 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.

When <stat> is not specified, the execution command is equivalent to the set command AT+CMGL="REC UNREAD".

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

9.6.3 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.

For details about other parameters, refer to GSM 07.05.

For other parameters, see section AT+CMGS–Send Message (PDU Mode).

Note:

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

9.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.6.5 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
```

Note:

In this example, the message is in Text mode.

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

9.7.1 Command Syntax

AT+CMGR=<index>
Possible Response(s)
If text mode (+CMGF=1), 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 text mode (+CMGF=1), 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 text mode (+CMGF=1), 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 text mode (+CMGF=1), 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 text mode (+CMGF=1), 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>

9.7.2 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.

The test command returns OK.

9.7.3 Parameter Description

<index>: integer type; location in the memory.

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

For other parameters, see section AT+CMGS–Send Message (PDU Mode).

Note:

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

9.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.7.5 Example

Read the message stored in index 4 using the test command:

Run:
```
AT+CMGR=4
```

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

OK
```

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

9.8.1 Command Syntax

If text mode (+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>

9.8.2 Interface Description

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

9.8.3 Parameter Description

Text mode:

<oa/da>: 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 3.1)

<tooa/toda>: 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.

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
"STO SENT"	Stored sent message

The default value is "STO UNSENT".

9.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.8.5 Example

For examples of this command, see section AT+CMGS–Send Message (PDU Mode).

9.9 AT+CMGS–Send Message (Text Mode)

9.9.1 Command Syntax

If text mode (+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>

9.9.2 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.

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).

9.9.3 Parameter Description

<da>: 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 +CSCS. (3GPP TS 27.005 3.1)

<toda>: 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>: 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".

9.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.9.5 Example

Run:	AT+CMGF=1	Sets the message format to Text format.
Response:	OK	
Run:	AT+CSMP=,,0,8	Sets the data coding scheme to UCS2.
Response:	OK	
Run:	AT+CSCA="8613800688509",145	Sets the service center number.

Response:	OK	
Run:	AT+CSCS="UCS2"	Sets the TE's character set to UCS2 encoding.
Response:	OK	
Run:	AT+CMGS="00310033003300310032003300340035003600370038" > 534E4E3A \0x1A	Ends the message to the destination address "13312345678" that must be enclosed in double quotation marks. The message content is the UCS2 codes for the Chinese characters "华为". Press ctrl+z (0x1A) to stop entering message content and send the message.
Response:	+CMGS: 6 OK	The message is successfully sent.

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

9.10.1 Command Syntax

AT+CMSS=<index>[,<da>[,<toda>]]
Possible Response(s)
If text mode (+CMGF=1) and sending successful: <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>

9.10.2 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 +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned. See CMS Error List for a list of <err> values. This command should be aborted.

<da> is controlled by AT+CSCS.

9.10.3 Parameter Description

<scts>: 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 section AT+CMGS–Send Message (Text Mode).

9.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.10.5 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	

9.11 AT+CMGL–List Messages (PDU Mode)

9.11.1 Command Syntax

AT+CMGL[=<stat>]
Possible Response(s)

If in PDU mode and 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>

9.11.2 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.

Note:

When <stat> is not specified, the execution command is equivalent to the set command AT+CMGL=0.

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

9.11.3 Parameter Description

<stat>: message status.

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

<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 section AT+CMGS–Send Message (PDU Mode).

For the TPDU format of messages to be sent, see section 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 section 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 section AT+CMGS–Send Message (PDU Mode).

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

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

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

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

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

9.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.11.5 Example

List all the received unread messages using the execution command:

Run: `AT+CMGL=0`

Response:

```
+CMGL: 1,0,,25
0891683108608805F9040D91683109730147F2000021507161
72350005F4F29C4E03

OK
```

Note:

In this example, the message is in PDU mode.

9.12 AT+CMGR–Read Message (PDU Mode)

9.12.1 Command Syntax

AT+CMGR=<index>
Possible Response(s)
If in PDU mode and the command is executed successfully: <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)

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

9.12.2 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.

The test command returns OK.

9.12.3 Parameter Description

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

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

9.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.12.5 Example

Read the message stored in index 0 using the set command:

Run: AT+CMGR=0

Response: `+CMGR: 0,,25`

```
0891683108608805F9040D91683109730147F2000021507161
72350005F4F29C4E03

OK
```

Note:

In this example, the message is in PDU mode.

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

9.13.1 Command Syntax

If PDU mode (`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> 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>

9.13.2 Interface Description

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

9.13.3 Parameter Description

PDU mode:

`<length>`: 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>: storage status of the message.

Its values are defined as follows (in PDU mode, its default value is 2):

0	Received unread messages
1	Received read messages
2	Stored unsent messages
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 (that is, –1).

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

9.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.13.5 Example

Run: AT+CMGF=0

Response: OK

Run: AT+CMGW=56

Response: >

Run:
```
07813108608805F911000B813109732008F70000FF30547419
347EBBE965371DF13683DAE5F93C7C2E83EE693A1A0427D741
ED37B90C3ABFCB7310BA2C2F8342<Ctrl-Z>
```

Response:
```
+CMGW: 10

OK
```

9.14 AT+CMGS–Send Message (PDU Mode)

9.14.1 Command Syntax

If PDU mode (AT+CMGF=0):

```
AT+CMGS=<length><CR>
PDU is given<ctrl-Z/ESC>
```

Possible Response(s)
If PDU mode (AT+CMGF=0): <CR><LF>+CMGS: <mr>[,<ackpdu>]<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>

9.14.2 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).

9.14.3 Parameter Description

<length>: number of actually sent TPDU characters/2 in decimal format ranging from 0 to 9, and max not more than 178.

<mr>: 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.

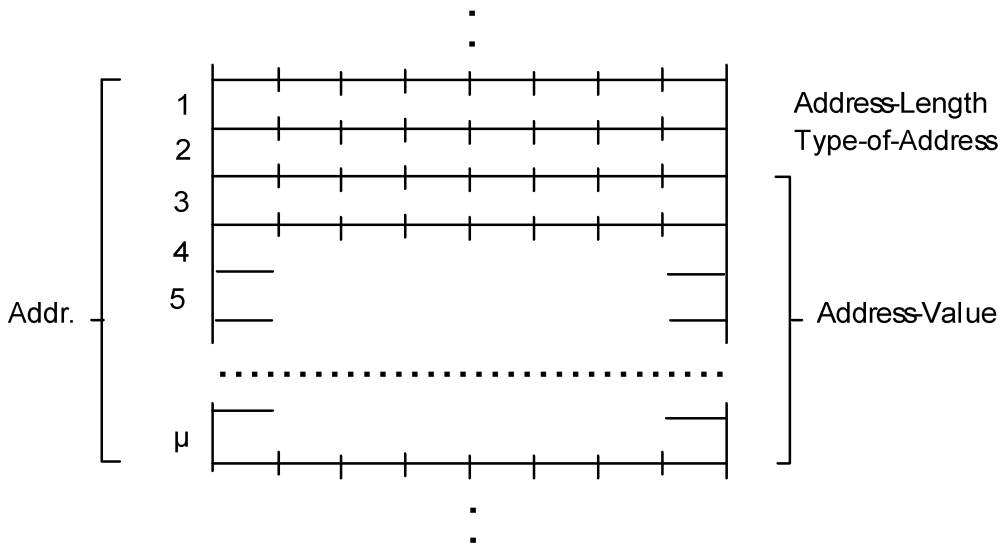
<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

<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.)

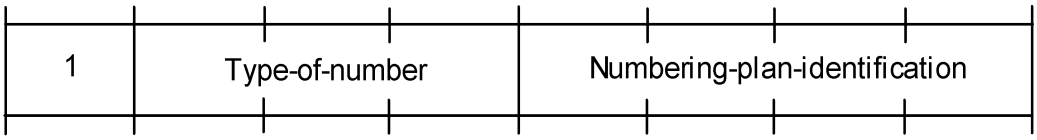
[<SCA>]			
<sc_len>	<type_addr>	<numbers>	TPDU

<SCA>: service center address (SCA). Its structure is illustrated in the following figure.



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

<type_addr>: 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.

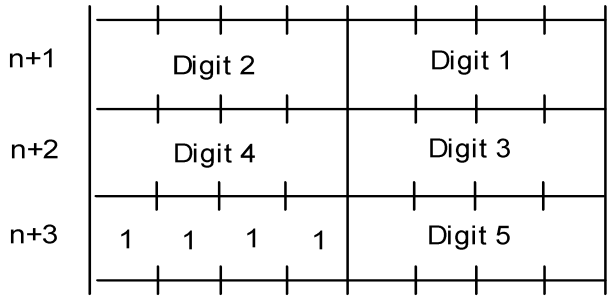
Values of Numbering-plan-identification (bits 3–0) are defined as follows:

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>`: 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.

1Octet								1Oct	2Oct~12Oct	1Oct	1Oct	1Oct	1Oct	0~140 Oct
RP	UDHI	SRR	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit7	Bit6	Bit5	Bit 4	Bit 3	Bit 2	Bit 1	Bit0							

<MTI>: message type.

Its values are defined as follows:

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. Its values are defined as follows:

0 Yes

1 No

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

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. Its values are defined as follows:

0 no

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

<UDHI>: user data header indication. Its values are defined as follows:

0 The user data segment contains message content only.

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

<SRR>: 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>: message ID ranging from 0 to 255.

<DA>: 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>: protocol identifier.

Its values are defined as follows:

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>: user data coding scheme.

Its values are defined as follows:

<table>
<tr><th colspan="3">Bits 7…4</th><th>Bits 3…0</th></tr>
<tr><td rowspan="5">00xx</td><td rowspan="3">Bit 5</td><td>0: Message is not compressed.</td><td rowspan="5">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 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</td></tr>
<tr><td>1: Message is compressed. This is not supported currently.</td></tr>
<tr><td rowspan="2">Bit 4</td><td>0: indicates that bit 1 and bit 0 are reserved.</td></tr>
<tr><td>1: indicates that bit 1 and bit 0 serve as the message type indication.</td></tr>
<tr><td>0100
…
1011</td><td colspan="2">reserved</td><td></td></tr>
<tr><td>1100</td><td colspan="2">The message content is discarded. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.</td><td>The settings of bits 3…0 are the same as those when bits 7…4=1101.</td></tr>
<tr><td>1101</td><td colspan="2">The message is stored. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.</td><td>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</td></tr>
<tr><td>1110</td><td colspan="2">The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.</td><td>The settings of bits 3…0 are the same as those when bits 7…4=1101.</td></tr>
</table>

Bits 7…4		Bits 3…0
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 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>: 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>: 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 TS 07.07); type of address given by <tooa>.

<alpha>: string type alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific; used character set should be the one selected with command Select TE Character Set +CSCS (see definition of this command in 3GPP TS 27.007).

<scts>: 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+CMGW–Write Message to Memory (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.

9.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.14.5 Example

The SMS center number is 13902900. The target number is 13901000453. The content is 0x53 0x4E 0x4E 0x3A (Huawei UCS2 code).

If the +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 +CSCA command.)

  AT+CMGS=17 (CR)

  >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 <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 +CSCA command.)

If the +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

9.15 AT+CMSS–Send Message from Storage (PDU mode)

9.15.1 Command Syntax

AT+CMSS=<index>[,<da>[,<toda>]]
Possible Response(s)
If PDU mode (AT+CMGF=0) and sending successful: <CR><LF>+CMSS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF> If sending fails: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMSS=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

9.15.2 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. See chapter Message Service Failure Result Code for a list of <err> values. This command should be aborted.

<da> is limited by AT+CSCS.

9.15.3 Parameter Description

<index>: 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 in3GPP TS 27.007 [9]); 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) default is 145, otherwise default is 129)

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

9.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.15.5 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	

10 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

10.1 AT^CURC–Set Presentation of Unsolicited Results

10.1.1 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>

10.1.2 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 lists the supported control mode for the presentation of unsolicited results.

10.1.3 Parameter Description

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

0	The presentation of the unsolicited indications in Table 10-1 is disabled.
1	Enable the presentation of the unsolicited indications (default value).

Table 10-1 List for the presentation of unsolicited results when `AT^CURC=0`

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

10.1.4 Property Description

Saving upon Power-off	PIN
N	N

10.1.5 Example

- To set `<mode>` to 0:

Run: `AT^CURC=0`

Response: `OK`

- To set `<mode>` to 1:

Run: `AT^CURC=1`

Response: `OK`

- Query the current mode:

Run: `AT^CURC?`

Response: `^CURC: 1`

`OK`

10.2 ^SYSSTART–Unsolicitedly Report Module Startup

10.2.1 Command Syntax

URC
<CR><LF>^SYSSTART<CR><LF>

Note:

This command is only reported on UART PORT.

10.2.2 Interface Description

This unsolicited indication is used to notify the TE when the ME is powered on or reset.

10.2.3 Parameter Description

None

10.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.2.5 Example

This unsolicited indication is used to notify the TE when the ME is powered on or reset:

Response: `^SYSSTART`

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

10.3.1 Command Syntax

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

10.3.2 Interface Description

This command is used to enable and disable the module's Remote Wake-up feature, and to set the wake-up channels and sources for the feature.

10.3.3 Parameter Description

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

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

<channel>: sets Remote Wake-up channels.

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

0	Disables the channel controlled by the bit.
1	Enables the channel controlled by the bit.

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

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

`<source>`: sets Remote Wake-up sources.

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

0	Disables the source controlled by the bit.
1	Enables the source controlled by the bit.

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

0x0001	Voice (not supported)
0x0002	SMS
0x0004	Data
0x0008	UR (unsolicited report)
0x0010–0x8000	reserved

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

10.3.4 Property Description

Saving upon Power-off	PIN
Y	N

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.

10.3.5 Example

- The set command if only support USB Remote Wakeup:

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

Response: `OK`

- Read command:

Run: `AT^WAKEUPCFG?`

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

`OK`

- The test command:

Run: `AT^WAKEUPCFG=?`

Response: `^WAKEUPCFG: (0-1),(0-3),(0-15)`

`OK`

10.4 AT^ICCID–Query the ICCID

10.4.1 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>

10.4.2 Interface Description

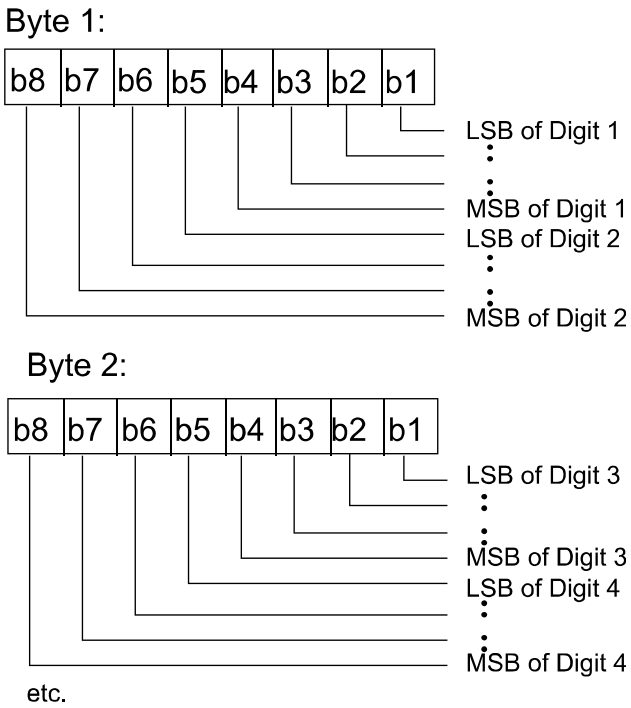
This command is used to query the integrated circuit card identity (ICCID) of a SIM card no matter the PIN is entered or not.

10.4.3 Parameter Description

`<iccid>`: ICCID, which is a string containing up to 20 characters.

Note:

The ICCID uniquely identifies an integrated circuit (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).



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

10.4.4 Property Description

Saving upon Power-off	PIN
NA	N

10.4.5 Example

Run: `AT^ICCID?`

Query the ICCID of the SIM card of which the EFICCID file contains the character string 98684006905725201069

Response:

```
^ICCID: 89860460097552020196

OK
```

10.5 AT^CPIN–Manage PIN

10.5.1 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>,[<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>

10.5.2 Interface Description

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

The set command is used for verifying and unblocking 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 "^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.

10.5.3 Parameter Description

<pin>,<newpin>: string type values with length 4–8 that must be enclosed in double quotation marks. Characters allowed in these fields are 0–9, otherwise ERROR 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
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>: remaining number of PUK entry attempts. The maximum number of PUK entry attempts is 10.

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

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

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

10.5.4 Property Description

Saving upon Power-off	PIN
N	N

10.5.5 Example

- The read command returns a string indicating a password is required:

Run: `AT^CPIN?`

Response: `^CPIN: SIM PIN`

`OK`

- The set command is used for verifying and unblocking PIN:

Run: `AT^CPIN=”1234”`

Response: `OK`

- The read command returns a string indicating a password is not required:

Run: `AT^CPIN?`

Response: `^CPIN: READY`

`OK`

Run: `AT^CPIN=?`

Response: `OK`

10.6 AT^MSO–Shutdown Command

10.6.1 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>

10.6.2 Interface Description

This command powers off the MT. When the command is executed, the MT will wait a few seconds which the `<value>` figured out, and then log out of the network, save subscriber data, and finally shut down. If executing `AT^MSO`, the MT will not wait. These actions can be cancelled when the MT is waiting.

10.6.3 Parameter Description

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

10.6.4 Property Description

Saving upon Power-off	PIN
NA	N

10.6.5 Example

Run: `AT^MSO`

Response: `OK`

Run: `AT^MSO=15`

Response: `OK`

Run: `AT^MSO=?`

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

`OK`

10.7 AT^IOCTRL–Control the GPIO

10.7.1 Command Syntax

`AT^IOCTRL=<sel>,<options>,<value>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`ERROR`<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>
```

10.7.2 Interface Description

This command is used to control the GPIO's actions. The command can set the GPIO to high voltage or low voltage, and can query the GPIO current state. By default, the GPIO is set to input GPIO, and voltage is low.

The test command returns supported values as compound value.

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

GPIO PIN:	5	4	3	2	1
LGA PIN:	105	55	51	109	113

10.7.3 Parameter Description

`<sel>`: enable GPIOs.

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

`<options>`: set the GPIO's mode.

…00000	All GPIO input mode
…00001	GPIO1 output mode, others are input mode
…00010	GPIO2 output mode, others are input mode
……	Set some GPIO's mode
…11111	All GPIO output mode

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

…00000	All GPIO are set LOW
…00001	GPIO1 is set HIGH, others are LOW
…00010	GPIO2 is set HIGH, others are LOW
……	Set some GPIO's value
…11111	All GPIO are set HIGH

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

10.7.4 Property Description

Saving upon Power-off	PIN
N	N

10.7.5 Example

- Run the following command to get the GPIO state:

Run: `AT^IOCTRL?`

Response:
```
^IOCTRL: 00000,00000

OK
```

- Run the following command to set the GPIO state:

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

Response: `OK`

10.8 AT^ADCREADEX–Query the ADC Value

10.8.1 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 <n>s) <CR><LF><CR><LF>OK<CR><LF>

10.8.2 Interface Description

This command is used to query the analog to digital converter (ADC) value of the ADC pin. The obtained value is the raw data without unit conversion. The number of ADC pins varies with products.

10.8.3 Parameter Description

`<id>`: the query ID. The meanings is followings:

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

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

10.8.4 Property Description

Saving upon Power-off	PIN
N	N

10.8.5 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
```

10.9 AT^LEDCTRL–LED GPIO PIN Control

10.9.1 Command Syntax

`AT^LEDCTRL=<mode>[,<stat>,<index>,<ON_duration1>,<OFF_duration1>[,<ON_duration2>,<OFF_duration2>]]`
Possible Response(s)
In case of successful execution: <CR><LF>`OK`<CR><LF>

In case of failed execution: <CR><LF>ERROR<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>

10.9.2 Interface Description

The set command controls the blinking mode for modules. When the <mode> parameter is set to 0, the blinking function of modules is disabled; when the <mode> parameter 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.

10.9.3 Parameter Description

<mode>: blinking mode.

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

<stat>: 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

Parameter Value	Service Status
00000008	Network disconnection during connecting
00000010	Registration success in GSM mode
00000020	Radio bearer establishment success in GSM/GPRS/EDGE mode
00000040	Data transmission in GSM/GPRS/EDGE mode
00000080	Registration success in WCDMA mode
00000100	Radio bearer establishment success in WCDMA mode
00000200	Data transmission in WCDMA mode
00000400	Radio bearer establishment success in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00000800	Data transmission in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00001000	Registration success in LTE mode
00002000	Dial-up success in LTE mode
00004000	Data transmission in LTE mode
3FFFFFFF	All service states

`<index>`: 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. 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. 0: Deactivate the corresponding GPIO pin of the LED indicator and the pin was pulled down during a blinking period. ME909U-523 uses only one pin.

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>`: indicates the duration for first pulling up the GPIO pin of the LED indicator specified by the `<index>` parameter during a blinking period. It is an integer and ranges from 1 to 100 (unit: 100 ms).

`<OFF_duration1>`: indicates the duration for first pulling down the GPIO pin of the LED indicator specified by the `<index>` parameter during a blinking period. It is an integer and ranges from 1 to 100 (unit: 100 ms).

`<ON_duration2>`: indicates the duration for second pulling up the GPIO pin of the LED indicator specified by the `<index>` parameter during a blinking period. It is an integer and ranges from 1 to 100 (unit: 100 ms).

<OFF_duration2>: indicates the duration for second pulling down the GPIO pin of the LED indicator specified by the <index> parameter during a blinking period. It is an integer and 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.

10.9.4 Property Description

Saving upon Power-off	PIN
Y	N

10.9.5 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),00007fff,(0-1),(1-100),(1-100),(1-100),(1-100)

OK
```

Note:

If a 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.

11 Huawei Proprietary Interface: SMS Service Interface

11.1 ^SMMEMFULL–Message Memory Full

11.1.1 Command Syntax

URC
<CR><LF>^SMMEMFULL: <mem_type><CR><LF>

11.1.2 Interface Description

When the message storage is full, this unsolicited indication is sent.

11.1.3 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 (not supported)

11.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.1.5 Example

When the message storage is full, this unsolicited indication is sent:

Response: `^SMMEMFULL: "SM"`

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.

12.1.3 Parameter Description

<cur_mode>: current network mode, value range: 00–99 (decimal)

00	Reserved
01	GSM (not supported)
02	CDMA (including 1x and EVDO) (not supported)
03	WCDMA

04 TD-SCDMA (not supported)

05 WiMAX (not supported)

06 LTE

07 WiFi (not supported)

……

99

`<sup_mode>`: 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)

Bit1 CDMA (including 1x and EVDO) (not supported)

Bit2 WCDMA

Bit3 TD-SCDMA (not supported)

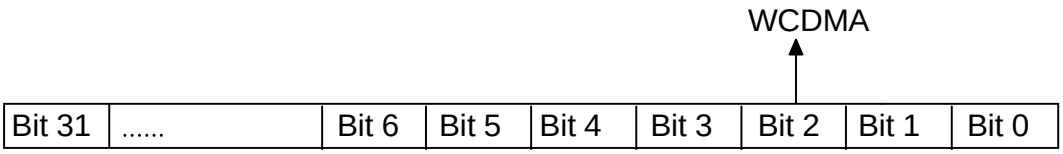
Bit4 WiMAX (not supported)

Bit5 LTE

Bit6 WiFi (not supported)

……

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=?`

Response:
```
^HWNATQRY: 36

OK
```

The returned value 36 indicates that the terminal supports WCDMA and LTE.

Bit31	……	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	ALL 0	0	1	0	0	1	0	0

12.2 ^HWNAT– Indicate Network Mode Change

12.2.1 Command Syntax

URC
<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>: current network mode, value range: 00-99 (decimal)

00 Reserved

01 GSM (not supported)

02 CDMA (including 1x and EVDO) (not supported)

03 WCDMA

04 TD-SCDMA (not supported)

05 WiMAX (not supported)

06 LTE

07 WiFi (not supported)

……

99

12.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.2.5 Example

The terminal's network mode changes to WCDMA mode:

Response: `^HWNAT: 03`

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 is the system service domain.

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

<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

Note:

If UE treats SIMCARD as invalid, <sim_state> return value can be 0 or 4.

<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.

Its values are defined as follows:

0	NO SERVICE
1	GSM (not supported)
2	CDMA (not supported)
3	WCDMA
4	TD-SCDMA (not supported)
5	WIMAX (not supported)
6	LTE

Note:

If the returned <sysmode> value is not within the valid range (0–6), it will be deemed as <sysmode>=3 (WCDMA).

<sysmode_name>: a string type value indicating the system mode name corresponding to <sysmode>.

For example, if <sysmode>=3, <sysmode_name>="WCDMA".

<submode>: indicates the system sub-mode.

Its values are defined as follows:

0	NO SERVICE
1	GSM (not supported)
2	GPRS (not supported)
3	EDGE (not supportedT)
4–20	(No defined)
21	IS95A (not supported)
22	IS95B (not supported)
23	CDMA2000 1X (not supported)
24	EVDO Rel0 (not supported)
25	EVDO RelA (not supported)
26	EVDO RelB (not supported)
27	HYBRID (CDMA2000 1X) (not supported)
28	HYBRID (EVDO Rel0) (not supported)
29	HYBRID (EVDO RelA) (not supported)
30	HYBRID (EVDO RelB) (not supported)
31	eHRPD Rel0 (not supported)
32	eHRPD RelA (not supported)
33	eHRPD RelB (not supported)
34	Hybrid (eHRPD Rel0) (not supported)
35	Hybrid(eHRPD RelA) (not supported)
36	Hybrid(eHRPD RelB) (not supported)
37-39	Reserved (not supported)
41	WCDMA
42	HSDPA
43	HSUPA
44	HSPA
45	HSPA+
46	DC-HSPA+ (not supported)

47-60	Reserved
61	TD-SCDMA (not supported)
62	HSDPA
63	HSUPA
64	HSPA
65	HSPA+
66-80	Reserved
81	802.16e (not supported)
82-100	Reserved
101	LTE
Other value	Reserved

`<submode_name>`: system sub-mode. (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 45, the value of `<submode_name>` is HSPA+.

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,,3,"WCDMA",41,"WCDMA"

OK
```

The response indicates that the UE is operating over a WCDMA network in WCDMA 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>
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)
"02"	WCDMA
"03"	LTE
"04"	CDMA 1X (not supported)
"05"	TD-SCDMA (not supported)
"06"	Wimax (not supported)

"07"	CDMA EVDO (not supported)
"99"	Not change

For example, the 03 value indicates LTE only.

The 0302 value indicates the order of LTE->WCDMA, without GSM.

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.

In case that <acqorder> is a combination list with muti-network, currently, HUAWEI products does not support contain both CDMA (that is 04 CDMA 1X and 07 CDMA EVDO)and WCDMA (that is 02 WCDMA) mode.

`<band>`: a hexadecimal value that specifies the frequency band, which is related to the system mode and dependent on the board performance.

The possible values of `<band>` are the following values and their combinations (excluding 0x3FFFFFFF and 0x40000000):

00800000 (CM_BAND_PREF_WCDMA_II_PCS_1900)	WCDMA_II_PCS_1900
2000000	AWS
04000000 (CM_BAND_PREF_WCDMA_V_850)	WCDMA_V_850
3FFFFFFF (CM_BAND_PREF_ANY)	Any band
40000000 (CM_BAND_PREF_NO_CHANGE)	Band not changed
00680380	Automatic

`<band_name>`: a string type value indicating the frequency band name

`<roam>`: indicates whether roaming is supported.

0	Not supported
1	Supported
2	No change
3	Roam only

Note:

When `<roam>` is set to 3 (Roam only), which indicates that firmware can be only registered to the roaming network.

`<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)	Any frequency band	
2	(CM_BAND_PREF_LTE_EUTRAN_BAND2)	LTE BC2
8	(CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE BC4
10	(CM_BAND_PREF_LTE_EUTRAN_BAND5)	LTE BC5
10000	(CM_BAND_PREF_LTE_EUTRAN_BAND17)	LTE BC17
40000000	(CM_BAND_PREF_NO_CHANGE)	No band change

Note:

For MT that do not support LTE, <lteband> and <lteband_name> are left out in the response. In 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>,

OK

When AT^SYSCFGEX= is executed, <lteband> is null or unchanged.

^SYSCFGEX=<acqorder>,<band>,<roam>,<srvdomain>,,<reserve1>,<reserve2>

<lteband_name>: a string type value indicating the LTE frequency band name

<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","02","99"),((6800000,"WCDMA
BCII/WCDMA BCIV/WCDMA BCV"),(3fffffff,"All
Bands")),(0-3),(0-4),((1001a,"LTE BC2/LTE BC4/LTE
BC5/LTE BC17"),(7ffffffffffffff,"All Bands"))

OK
```

Run: AT^SYSCFGEX?

Response:
```
^SYSCFGEX: "00",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF

OK
```

Run: AT^SYSCFGEX="02",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF,,

Response: OK

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 is used to query 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 and 5 currently.

- When <type> is set to 1:
  - 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 EFspn file that is not empty, the content of the EFspn 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.
  - 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 UCS-2 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>: operation type.

1 For 3GPP mode, the priority for <plmn_name1> and <plmn_name2> is as follows:

(1) Information saved in the EFpnn file corresponding to the USIM EFopl

(2) Information released from the network side (MM/GMM/EMM information)

(3) 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 EFspdi) and EFspn Is Valid	Roaming and RPLMN Is Not Listed in EFspdi) or EFspn 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 EFspdi) and EFspn Is Valid	Roaming and RPLMN Is Not Listed in EFspdi) or EFspn Is Invalid
<plmn_name1> returns	SPN	Short name

3. In other cases:

	(Non-Roaming or RPLMN Is Listed in EFspdi) and EFspn Is Valid	Roaming and RPLMN Is Not Listed in EFspdi) or EFspn 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 EFpnn file corresponding to the EFopl
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>`: PLMN ID of the network, without double quotation marks. For detailed format, see the description of the numeric `<oper>` field in the +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>`: integer, ranging 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, 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 and short names delivered by network 46009 are "HUAWEI TEST W09 NETWORK" and "HTW09NET" respectively.

Run: `AT^EONS=1`

Response:

```
^EONS:
1,46009,"00480055004100570045004900200054004500530
054002000570030003 9","00480054005700300039",3,"004
8005500410057004500 49"

OK
```

Run: `AT^EONS=5`

Response:	^EONS: 5,46009,"004800550041005700450049","" OK	When network 46009 is an HPLMN or belongs to an EHPLMN, or in EFspdi.
Response:	^EONS: 5,46009,"0048005500410057004500490020005400450053005400200057003000039","" OK	When network 46009 is not in an HPLMN, EHPLMN, or EFspdi.

Notes:

- "HUAWEI TEST W09" (UCS-2 hexadecimal character string): 0048005500410057004500490020005400450053005400200057003000 39
- "HTW09" (UCS-2 hexadecimal character string): 00480054005700300039
- "HUAWEI" (UCS-2 hexadecimal character string): 004800550041005700450049
- "HUAWEI TEST W09 NETWORK" (UCS-2 hexadecimal character string): 0048005500410057004500490020005400450053005400200057003000390020004E0045 00540057004F0052004B
- "HTW09NET" (UCS-2 hexadecimal character string): 0048005400570030003900 4E00450054

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
<CR><LF>^HCSQ: <sysmode>[,<value1>[,<value2>[,<value3>[,<value4>[,<value5>]]]]]<CR><LF>

12.6.2 Interface Description

This command is used to query and report 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 indicating the service mode in which the MT will unsolicitedly report the signal strength.

"NOSERVICE"	NOSERVICE mode
"GSM"	GSM/GRPS/EDGE mode (not supported)
"WCDMA"	WCDMA/HSDPA/HSPA mode
"LTE"	LTE mode
"CDMA"	CDMA mode (not supported)
"EVDO"	EV-DO/eHRPD mode (not supported)
"CDMA-EVDO"	CDMA/EV-DO (eHRPD) mode (not supported)

Note:

The CDMA-EVDO mode is a new mode supported by the MT. This mode is required because a multi-mode MT may be connected to CDMA and EV-DO networks at the same time. In CDMA-EVDO mode, the MT reports the signal strength of both networks. The query result is in the same format as the unsolicited report. If the MT reports the signal strength several times, the application layer device, after receiving the first report, works out and refreshes the signal strength bars displayed to users based on the MT's calculation. The application layer device makes the second calculation after it receives the second report from the MT, and the number of signal strength bars displayed to users may change.

`<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"					
"WCDMA"	wcdma_rssi	wcdma _rscp	wcdma_ecio		

"LTE"	lte_rssi	lte_rsrp	lte_sinr	lte_rsrq	

<wcdma_rssi>, <lte_rssi>: an integer indicating the received signal strength. These parameters are available for WCDMA and LTE mode respectively.

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

<wcdma_rscp>: an integer indicating the received signal code power. This parameter is available for WCDMA mode.

0	rscp < –120 dBm
1	–120 dBm ≤ rscp < –119 dBm
2	–119 dBm ≤ rscp < –118 dBm
…	
94	–27 dBm ≤ rscp < –26 dBm
95	–26 dBm ≤ rscp < –25 dBm
96	–25 dBm ≤ rscp
255	unknown or undetectable

<wcdma_ecio>: an integer indicating the downlink carrier-to-interference ratio. This parameter is available for WCDMA mode.

0	Ec/Io < –32 dB
1	–32 dB ≤ Ec/Io < –31.5 dB
2	–31.5 dB ≤ Ec/Io < –31 dB
…	
63	–1 dB ≤ Ec/Io < –0.5 dB
64	–0.5 dB ≤ Ec/Io < 0 dB
65	0 dB ≤ Ec/Io
255	unknown or undetectable

<lte_rsrp>: an integer indicating 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 indicating 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 indicating 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
…	
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","GSM","WCDMA","LTE","CDMA","EVDO","CDMA-EVDO"

OK
```

Run: `AT^HCSQ?`

Response:
```
^HCSQ: "WCDMA",30,30,58

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 is used to query the international mobile equipment identity and software version (IMEISV) of the board.

12.7.3 Parameter Description

<imeisv>: 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 characters	6 characters	2 characters

16 digits IMEISV		
TAC	SNR	SVN

TAC: type approval code

SNR: serial number

SVN: software version number

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
```

Notes:

- 35452404001109: the first 14 characters of the board IMEI
- 17: SVN

12.8 ^SRVST–Service State Change Indication

12.8.1 Command Syntax

URC
<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 unsolicited send the new service state to the TE.

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 sends AT+COPS set command to MT, the state of a service is changed, the MT unsolicited sends this indication to the TE.

Run: AT+COPS=1,2,"46009",2

Response:

```
^HWNAT:03

^MODE:5,4

+CREG: 1,"2513","E0027", 2

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
<CR><LF>^SIMST: <sim_state>[,<lock_state>]<CR><LF>

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
```

12.10 AT^NWTIME–Query Presentation of Network System Time

12.10.1 Command Syntax

AT^NWTIME?
Possible Response(s)
If the command is successfully executed: <CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<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?`

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

OK
```

12.11 ^NWTIME–Unsolicitedly Report Network System Time

12.11.1 Command Syntax

URC
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF>

12.11.2 Interface Description

This command is used to unsolicitedly report 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

12.11.5 Example

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

Response: `^NWTIME: 11/12/20,12:31:34+32,00`

13 Huawei Proprietary Interface: GPS Service Interfaces

13.1 AT^WPDOM–Set Operation Mode

13.1.1 Command Syntax

AT^WPDOM=<mode>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^WPDOM?
Possible Response(s)
<CR><LF>^WPDOM: <mode><CR><LF><CR><LF>OK<CR><LF>
AT^WPDOM=?
Possible Response(s)
<CR><LF>^WPDOM: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

13.1.2 Interface Description

This command is used to set operation mode in the positioning process.

The set command is available before or after the session is positioned. Parameters cannot be modified during the positioning process. Otherwise, an error message is returned.

The read command is used to read the current operation mode.

The test command is used to return the value range of the operation mode.

13.1.3 Parameter Description

<mode>: operation mode. The default value is 0.

0 Standalone only. In this mode, no network assistance is required, and an MS can be in or not in the network coverage area. This mode can be used to position the session without SIM cards.

1 Network only. The MS-assisted positioning mode, which is one of Assisted Global Positioning Systems (A-GPSs), is used here. The MS needs to communicate with PDE or PDM upon each positioning, and the PDE or PDM calculates position information. In this operation mode, the PDE or PDM needs to be accessed, and network coverage is required. When the GPS fails in this mode, this mode is not automatically switched to the standalone mode for positioning.

2 Speed optimal. The positioning data with the optimal speed is obtained, that is, the minimum TTF mode is used. The speed optimal mode is only MS-based in UMTS.

3 Accuracy optimal. The positioning data with the optimal accuracy is obtained. The accuracy optimal mode is only MS-assisted in UMTS.

4 Data optimal. The MS uses the minimum PDE data interaction mode with the network side. The data optimal mode is only standalone in UMTS.

5 MS-bases only. The network needs to provide positioning assistance information, and the MS calculates the position information. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning.

6 gpsOneXTRA, which is the enhanced mode of standalone. Before the GPS searches the satellite, the GPS downloads the ephemeris data from the Internet. The orbit equation contained in the ephemeris data can save the time during data demodulation.

7 Low Accuracy MSA. The terminal originates an MSA positioning session with extremely low positioning accuracy in bad weather. The server side determines the positioning mode. Some positioning modes are directly converted into cell ID for positioning. Some positioning modes are converted to cell id after the MSA positioning session fails. The other positioning modes are never converted into cell ID. (In this operation mode, a specified QoS positioning session is originated, and the user does not need to set the QoS parameters.)

<err>: error type prompts

Error code	Description
4	operation not supported
276	GPS function disabled
277	Standalone disabled

Error code	Description
278	AGPS disabled
279	gpsOneXTRA disabled
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.1.4 Property Description

Saving upon Power-off	PIN
N	N

13.1.5 Example

- Query the value range of operation mode:

Run: `AT^WPDOM=?`

Response:
```
^WPDOM: (0-7)

OK
```

- Query the current operation mode:

Run: `AT^WPDOM?`

Response:
```
^WPDOM: 0

OK
```

- Set the operation mode:

Run: `AT^WPDOM=0`

Response: `OK`

Run: `AT^WPDOM=1`

Response: `OK`

Run: `AT^WPDOM=2`

Response: `OK`

13.2 AT^WPDST–Set Session Type

13.2.1 Command Syntax

AT^WPDST=<type>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^WPDST?
Possible Response(s)
<CR><LF>^WPDST: <type><CR><LF><CR><LF>OK<CR><LF>
AT^WPDST=?
Possible Response(s)
<CR><LF>^WPDST: (list of supported <type>s) <CR><LF><CR><LF>OK<CR><LF>

13.2.2 Interface Description

This command is used to set the session type of the positioning operation.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command is used to read the current session type.

The test command is used to return the value range of the session type.

13.2.3 Parameter Description

<type>: session type. The default value is 0.

0	Provides a single positioning operation.
1	Provides tracing positioning. The positioning value is obtained using the designated frequency. The positioning frequency is set by running AT^WPDFR.
2	Provides the last positioning information, but does not execute the satellite searching operation. (not supported currently)
3	Downloads data. Allows the MS to download the ephemeris/almanac data and the coarse position a-priori data. This setting makes the MS ready for obtaining future positioning information, and is applicable only to the CDMA network. (not supported currently)

<err>: error type prompts

Error code	Description
4	operation not supported
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.2.4 Property Description

Saving upon Power-off	PIN
N	N

13.2.5 Example

- Query the value range of session type:

Run: `AT^WPDST=?`

Response:
```
^WPDST: (0-2)

OK
```

- Query the current session type:

Run: `AT^WPDST?`

Response:
```
^WPDST: 0

OK
```

- Set the session type:

Run: `AT^WPDST=0`

Response: `OK`

Run: `AT^WPDST=1`

Response: `OK`

Run: `AT^WPDST=3`

Response: `+CME ERROR: Invalid parameter`

13.3 AT^WPDFR–Set Positioning Frequency

13.3.1 Command Syntax

AT^WPDFR=<num>[,<time>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^WPDFR?
Possible Response(s)
<CR><LF>^WPDFR: <num>[,<time>]<CR><LF><CR><LF>OK<CR><LF>
AT^WPDFR=?
Possible Response(s)
<CR><LF>^WPDFR: (list of supported <num>s),(list of supported <time>s)<CR><LF><CR><LF>OK<CR><LF>

13.3.2 Interface Description

This command is used to set the positioning frequency in the tracing positioning session.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command is used to read the current positioning frequency.

The test command is used to return the value range of the positioning frequency.

Note:

This command can be used to set the positioning frequency only after the session type is set to tracing positioning by AT^WPDST.

13.3.3 Parameter Description

<num>: number of positioning operations triggered by the designated MS. The value ranges from 1 to 65535, and the default value is 65535.

<time>: valid positioning time interval. This parameter can be set only when the positioning number triggered by the designated MS is greater than 1. The valid positioning time interval of this parameter ranges from 1s to 1800s, and the default time interval is 1s.

<err>: error type prompts

Error code	Description
4	operation not supported
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.3.4 Property Description

Saving upon Power-off	PIN
N	N

13.3.5 Example

- Query the value range of positioning frequency:

Run: `AT^WPDFR=?`

Response:
```
^WPDFR: (1-65535),(1-1800)

OK
```

- Query the current positioning frequency:

Run: `AT^WPDFR?`

Response:
```
^WPDFR: 65535,1

OK
```

- Set the positioning frequency
  - Failure

Run: `AT^WPDST=0`

Response: `OK`

Run: `AT^WPDFR=20,2`

Response: `+CME ERROR: operation not supported`

- Success

Run: `AT^WPDST=1`

Response: `OK`

Run: `AT^WPDFR=20,2`

Response: `OK`

13.4 AT^WPQOS–Set QoS

13.4.1 Command Syntax

`AT^WPQOS=<performance>,<accuracy>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF> In case of an MS-related error: <CR><LF>`+CMS ERROR: <err>`<CR><LF>
`AT^WPQOS?`
Possible Response(s)
<CR><LF>`^WPQOS: <performance>,<accuracy>`<CR><LF><CR><LF>`OK`<CR><LF>
`AT^WPQOS=?`
Possible Response(s)
<CR><LF>`^WPQOS: (`list of supported `<performance>`s`),(`list of supported `<accuracy>`s)<CR><LF><CR><LF>`OK`<CR><LF>

13.4.2 Interface Description

This command is used to set the QoS value of the positioning request, including satellite searching time limit and accuracy threshold.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command is used to read the current satellite searching time limit and accuracy threshold.

The test command is used to return the value range of the satellite searching time limit and accuracy threshold.

13.4.3 Parameter Description

<performance>: indicates the response time during the measurement of the GPS pseudorange. The unit is second. The value ranges from 1 to 255.

1–255 The upper time limit of the GPS satellite searching. Note that this value range is not the time of the whole session. In addition to the time for satellite searching, the time of the whole session includes the time for demodulating the ephemeris data and calculating the position.

<accuracy>: GPS accuracy threshold. The unit is meter. The value ranges from 25 to 1000, and the default value is 50.

<err>: error type prompts

Error code	Description
4	operation not supported
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.4.4 Property Description

Saving upon Power-off	PIN
N	N

13.4.5 Example

- Query the value range of QoS parameter:

Run: `AT^WPQOS=?`

Response:
```
^WPQOS: (1-255),(25-1000)

OK
```

- Query the current settings:

Run: `AT^WPQOS?`

Response:
```
^WPQOS: 255,50

OK
```

- Set the QoS parameter:

Run: `AT^WPQOS=255,50`

Response: `OK`

Run: `AT^WPQOS=0,50`

Response: `+CME ERROR: Invalid parameter`

Run: `AT^WPQOS=255,20`

Response: `+CME ERROR: Invalid parameter`

13.5 AT^WPDGL–Set GPS Session Lock

13.5.1 Command Syntax

`AT^WPDGL=<option>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT^WPDGL?`
Possible Response(s)
<CR><LF>`^WPDGL: <option>`<CR><LF> <CR><LF>`OK`<CR><LF>
`AT^WPDGL=?`
Possible Response(s)
<CR><LF>`^WPDGL: (`list of supported `<option>`s`)`<CR><LF><CR><LF>`OK`<CR><LF>

13.5.2 Interface Description

This command is used to set a GPS session lock.

The set command is used to set whether to disable the mobile-initiated (MI) session and the mobile-terminated (MT) session. The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command is used to read the current GPS session lock mode.

The test command is used to return the value range of the session lock type.

13.5.3 Parameter Description

<option>: GPS session lock type. The values are as follows:

0	Enable MI and MT
1	Disable MI and enable MT
2	Enable MI and disable MT
3	Disable MI and MT

Note:

Even if MT session is disabled, the SUPL END message is returned when the module receives SUPL INIT message from the network, which may cause the flow fee.

<err>: error type prompts

Error code	Description
4	operation not supported
100	Unknown
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.5.4 Property Description

Saving upon Power-off	PIN
Y	N

13.5.5 Example

- Query the value range of the session lock's type:

Run: `AT^WPDGL=?`

Response:

```
^WPDGL: (0-3)

OK
```

- Query the current GPS session lock type:

Run: `AT^WPDGL?`

Response: `^WPDGL: 0`

`OK`

- Set the GPS session lock type:

Run: `AT^WPDGL=1`

Response: `OK`

13.6 AT^GPSTYPE–Query GPS Type

13.6.1 Command Syntax

AT^GPSTYPE?
Possible Response(s)
<CR><LF>^GPSTYPE: <type><CR><LF><CR><LF>OK<CR><LF>

13.6.2 Interface Description

The read command is used to query the GPS type supported by the board.

13.6.3 Parameter Description

<type>: an integer indicating GPS type that is described as bit. Bit 1 indicates support, and bit 0 indicates not support. The default value is 15.

Bit	Bit3	Bit2	Bit1	Bit0
GPS Type	gpsOneXTRA	User plane	Control plane	Standalone

bit0: whether to support standalone

bit1: whether to support control plane

bit2: whether to support user plane

bit3: whether to support gpsOneXTRA (XTRA and Standalone must be supported simultaneously)

<err>: error type prompts

Error code	Description
4	operation not supported
100	unknown

13.6.4 Property Description

Saving upon Power-off	PIN
NA	N

13.6.5 Example

If the module supports all GPS types:

Run: `AT^GPSTYPE?`

Response: `^GPSTYPE: 15` The binary digit of 15 is 1111.

`OK`

13.7 AT^WGNSS–Set Positioning System

13.7.1 Command Syntax

`AT^WGNSS=<pdsystem>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
`AT^WGNSS?`
Possible Response(s)
<CR><LF>`^WGNSS: <pdsystem>`<CR><LF><CR><LF>`OK`<CR><LF>
`AT^WGNSS=?`
Possible Response(s)
<CR><LF>`^WGNSS: (`list of supported `<pdsystem>`s`)`<CR><LF><CR><LF>`OK`<CR><LF>

13.7.2 Interface Description

This command is used to set the positioning system in the positioning process.

The set command is used to set whether to adopt the GPS system or a global navigation satellite system (GNSS) system. The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

When `AT^WGNSS=0` (GPS system type), the following NMEA sentences are reported during the positioning process: $GPGGA, $GPGSA, $GPGSV, $GPRMC and $GPVTG.

When `AT^WGNSS=1` (GNSS system type), the following NMEA sentences are reported during the positioning process: $GPGGA, $GPGSA, $GPGSV, $GPRMC, $GPVTG, $GNGNS, $GNGSA and $GLGSV.

The format of these NMEA sentences comply with NMEA0183 protocol.

The read command is used to read the current positioning system type.

The test command is used to return the value range of the positioning system type.

13.7.3 Parameter Description

`<pdsystem>`: positioning system type. The default value is 0. Switching the positioning system type takes effective after the board is reset. The values are as follows:

0	GPS
1	GNSS

`<err>`: error type prompts

Error code	Description
4	operation not supported
100	Unknown
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.7.4 Property Description

Saving upon Power-off	PIN
Y	N

13.7.5 Example

- Query the value range of positioning system's type:

Run: `AT^WGNSS=?`

Response:
```
^WGNSS: (0-1)

OK
```

- Query the current positioning system type:

Run: `AT^WGNSS?`

Response:
```
^WGNSS: 0

OK
```

- Set the positioning system type:

Run: `AT^WGNSS=1`

Response: `OK`

13.8 AT^WPURL–Set AGPS Server Address and Port on the WCDMA Network

13.8.1 Command Syntax

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

13.8.2 Interface Description

The set command is used to set the address of the AGPS server on the WCDMA network. The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command is used to read the address of the current AGPS server.

13.8.3 Parameter Description

`<url>`: address of the AGPS server in the WCDMA server. It is a DNS address or an IP address. (without quotation marks)

`<err>`: error type prompts

Error code	Description
4	operation not supported
100	Unknown
278	AGPS disabled
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.8.4 Property Description

Saving upon Power-off	PIN
Y	N

13.8.5 Example

Set the address of the AGPS server:

Run:	`AT^WPURL=XXX:XXX`	Set the address of the AGPS server.
Response:	`OK`	

13.9 AT^WPDGP–Start Positioning Session

13.9.1 Command Syntax

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

13.9.2 Interface Description

This command is used to enable the GPS function. Only one positioning operation is allowed within the same period. When the GPS function is enabled, an error message is returned if this command is run again.

13.9.3 Parameter Description

<err>: error type prompts

Error code	Description
4	operation not supported
276	GPS function disabled
277	Standalone disabled
278	AGPS disabled
279	gpsOneXTRA disabled
283	PD session is ongoing
287	GPS locked

13.9.4 Property Description

Saving upon Power-off	PIN
NA	N

13.9.5 Example

- Set PD session failed:

Run: `AT^WPDGL=1`

Response: `OK`

Run: `AT^WPDGP`

Response: `+CME ERROR: GPS locked`

- Set PD session success:

Run: `AT^WPDGL=0`

Response: `OK`

Run: `AT^WPDGP`

Response: `OK`

13.10 AT^WPEND–Terminate Positioning Process

13.10.1 Command Syntax

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

13.10.2 Interface Description

This command is used to end the GPS session. When no positioning session is available or the positioning session is in off status, an error message is returned if this command is run.

13.10.3 Parameter Description

<err>: error type prompts

Error code	Description
4	operation not supported
284	PD session is in off status

13.10.4 Property Description

Saving upon Power-off	PIN
NA	N

13.10.5 Example

- Terminate the PD session successfully:

Run: `AT^WPEND`

Response: `OK`

- PD Session is not on going, Terminate Failture:

Run: `AT^WPEND`

Response: `+CME ERROR: PD session is in off status`

13.11 AT^WPDIM–Delete Auxiliary Data

13.11.1 Command Syntax

AT^WPDIM=<mode>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^WPDIM=?
Possible Response(s)
<CR><LF>^WPDIM: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

13.11.2 Interface Description

The set command is used to delete the auxiliary positioning data inside a board. This command is available after the MGP search engine is closed. The deletion operation cannot be performed when the MGP search engine is open.

The test command is used to return the supported deletion type.

13.11.3 Parameter Description

<mode>: deletion type.

0	Cold start
1	Warm start
2	Hot start
3	GPSOneXTRA. If the module does not support the XTRA mode, this parameter is not supported.

Note:

After execute AT^WPDIM=3, only the XTRA file will be deleted. The ephemeris or almanac data will not be deleted.

<err>: error type prompts

Error code	Description
4	operation not supported
279	GPSOneXTRA disabled
281	Invalid parameter
282	Unable to delete data
285	Too many parameters
289	MGP receiver is ongoing

13.11.4 Property Description

Saving upon Power-off	PIN
NA	N

13.11.5 Example

- Query the value range of delete auxiliary data mode:

Run: AT^WPDIM=?

Response: ^WPDIM: (0-3)

OK

- Set the deletion mode:

Run: `AT^WPDIM=1`

Response: `OK`

13.12 AT^XTRATIME–Inject XTRA Time

13.12.1 Command Syntax

`AT^XTRATIME=<timeMsecUpper>,<timeMsecLower>,<timeUncMsec>,<refToUtcTime>,<forceFlag>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

13.12.2 Interface Description

This command is used to inject time information into a board after the GPS tool obtains the time information from the SNTP server. The injected time is the accumulative time value from 00:00:00, January 6, 1980 to the current time, and the unit is millisecond. If the injection request is sent, `OK` is returned.

Note:

`OK` indicates that the injection request is sent, but does not indicate that the time information is injected into the board. The successful time injection information is reported by `^TIMESETRULT`.

The set command is available before or after the session is positioned. Otherwise, an error message is returned.

13.12.3 Parameter Description

`<timeMsecUpper>`: high 32 bits of time value; at least greater than 235..

`<timeMsecLower>`: low 32 bits of time value

`<timeUncMsec>`: uncertainty of time. It indicates the time difference between sending a request to the SNTP server and receiving a response from the SNTP server.

`<refToUtcTime>`: reference time. The default value is 1. Available values as follows:

0	GPS time

1 UTC time

`<forceFlag>`: indicates whether to inject the time information into the board in a mandatory manner. The default value is 0 no matter whether the GPS time evaluation is improved. Available values as follows:

0 No

1 Yes

`<err>`: error type prompts

Error code	Description
4	operation not supported
100	Unknown
277	Standalone disabled
279	gpsOneXTRA disabled
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters

13.12.4 Property Description

Saving upon Power-off	PIN
N	N

13.12.5 Example

Inject XTRA time:

Run: `AT^XTRATIME=235,250,0,0,1`

Response: `OK`

13.13 ^TIMESETRULT–Notify XTRA Time Injection

13.13.1 Command Syntax

URC
<CR><LF>`^TIMESETRULT: <status>`<CR><LF>

13.13.2 Interface Description

This command is used by the board to notify the GPS tool of the time injection after the GPS tool injects the XTRA time into the board.

13.13.3 Parameter Description

`<status>`: indicates whether the XTRA time is successfully injected. The values are as follows:

0	Injection succeeds
1	Injection fails

13.13.4 Property Description

Saving upon Power-off	PIN
NA	N

13.13.5 Example

If XTRA time have been injected successfully:

Response: `^TIMESETRULT: 0`

13.14 AT^XTRADATA–Inject Auxiliary XTRA Data

13.14.1 Command Syntax

AT^XTRADATA=<total>,<index>,<item>,<length>,<xtra_dc_status>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

13.14.2 Interface Description

This command is used by the GPS tool to inject the auxiliary data file packets into the board after the GPS tool obtains the auxiliary data file from the XTRA server and packets them. `OK` is returned if the request for injecting the auxiliary XTRA data is sent.

Note:

`OK` indicates that the injection request is sent, but does not indicate that the auxiliary XRTA data is injected into the board. The successful XRTA data injection information is reported by `AT^TIMESETRULT`.

The set command is available before or after the session is positioned. Otherwise, an error message is returned. The time information must be injected before the XRTA data.

Note:

The length of the data transmitted from the APP side to the board side cannot exceed 1024 bytes. The total length of the auxiliary data file cannot exceed 45*1024 bytes.

13.14.3 Parameter Description

`<total>`: the total number of the auxiliary data file packets, ranging from 10 to 1000

`<index>`: current packet index, ranging from 1 to the value of `<total>`

`<item>`: content of the auxiliary data file (without quotation marks)

`<length>`: byte of the transmitted auxiliary data file and the value must be the same as the length of item.

`<xtra_dc_status>`: indicates whether the downloading succeeds. The values are as follows:

0	Fails
1	Succeeds

`<err>`: error type prompts

Error code	Description
4	operation not supported
100	Unknown
277	Standalone disabled
279	gpsOneXTRA disabled
281	Invalid parameter
283	PD session is ongoing
285	Too many parameters
290	No time information

13.14.4 Property Description

Saving upon Power-off	PIN
Y	N

13.14.5 Example

The total number of the auxiliary data file packets is 155; the current packet index is 1; the content of the auxiliary data file is 011b……1f00; the byte of the transmitted auxiliary data file is 512; 1 indicates downloading succeeds.

Run:

```
AT^XTRADATA=155,1,011b060201100148f9d77800009af606
8a2047e789068a202fbf00061c0100251407100f0e0d0c0b0a
0c370810100f0e0d0c0a090e5308110f0e0e0c0c09080d9602
0b05020303c21f010004bb240ba2fd5600a10cda001a4cc400
25576fffbe55ab00dc0003068b0200595724fdadfd4300a10c
b50019d4d9ff8b41cb00021b9d018d0000068b03007b0b24f8
55fd2700a10d1cffea7edd002fb1280007990d000a0001068b
040051c824fd0efd4300a10de9001a86820021c5e2007fdb71
00610003068b050016372405d7fd4500a10c6b004525c0000b
dcc3004fd4a3fed8ffff068b0600396524fce3fd2e00a10d15
ffed9544ffe727cc00564c87001f00,512,1
```

Response:

```
OK
```

13.15 ^DATASETRULT–Notify XTRA Data Injection

13.15.1 Command Syntax

URC
<CR><LF>^DATASETRULT: <status><CR><LF>

13.15.2 Interface Description

This command is used by the board to notify the GPS tool of the XTRA data injection after the GPS tool injects the XTRA data into the board.

13.15.3 Parameter Description

<status>: indicates whether the XTRA data is successfully injected. The values are as follows:

0 XTRA data injection succeeds.

1	The cyclic redundancy check (CRC) performed for the XTRA data CRC fails.
2	Incorrect XTRA data length.
3	Invalid time range.
4	XTRA data injection fails.
50	The number of the XTRA data file packets does not reach the total number, waiting for further injection.

13.15.4 Property Description

Saving upon Power-off	PIN
NA	N

13.15.5 Example

If auxiliary XTRA data have been injected successfully:

Response: `^DATASETRULT: 0`

13.16 AT^XTRASTA–Query XTRA Data Status

13.16.1 Command Syntax

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

13.16.2 Interface Description

This command is used to judge the XTRA data status on the board before the GPS tool obtains the auxiliary data file from the XTRA server. OK is returned after this command is run.

Note:

OK indicates that the request for judging the XTRA data status is sent. The XRTA data status information is reported by AT^XDSTATUS.

This command only supports set command. The set command is available before or after the session is positioned and when the time information is saved inside the board. Otherwise, an error message is returned.

13.16.3 Parameter Description

`<err>`: error type prompts

Error code	Description
4	operation not supported
100	Unknown
277	Standalone disabled
279	gpsOneXTRA disabled
283	PD session is ongoing
290	No time information

13.16.4 Property Description

Saving upon Power-off	PIN
NA	N

13.16.5 Example

Query the XTRA data status:

Run: `AT^XTRASTA`

Response: `OK`

13.17 ^XDSTATUS–Notify XTRA Data Status

13.17.1 Command Syntax

URC
<CR><LF>^XDSTATUS: <year>,<month>,<day>,<hour><CR><LF>

13.17.2 Interface Description

This command is used by the board to notify the GPS tool of the XTRA data status after the GPS tool sends the request for querying the XTRA data status to the board.

13.17.3 Parameter Description

`<year>`,`<month>`,`<day>`,`<hour>`: specific start time of the XTRA data (UTC time); the time limit is accurate to hour. If the current day is beyond the seven days specified after the start time of the XTRA data, the XTRA data expires, and the XTRA data is invalid. If the board contains no valid XTRA data, 0,0,0,0 is returned.

13.17.4 Property Description

Saving upon Power-off	PIN
NA	N

13.17.5 Example

If `AT^XTRASTA` command has been executed successfully:

Response: `^XDSTATUS: 0,0,0,0`

13.18 ^POSEND–Report Positioning End Information

13.18.1 Command Syntax

URC
<CR><LF>`^POSEND: <reason>,<leftfixnum>`<CR><LF>

13.18.2 Interface Description

This command is used to report the ending reason and the left positioning times when the positioning ends and the positioning session is over.

Note:

During the tracing positioning, this command will not be reported if users end the session between two positionings.

13.18.3 Parameter Description

<reason>: positioning end reason

–1	Normal end
0	Session ended due to phone going offline
1	Session ended due to no service
2	Session ended due to no connection with PDE
7	Session ended due to connection failure with PDE
9	User ended the session
12	Session ended due to timeout (i.e., for GPS search)
15	Session ended due to an error in fix
16	Session rejected from PDE
18	Ending session due to E911 call
20	Ending because BS information is stale
21	Session ended due to VX LCS agent authorization failure
22	Session ended due to unknown system error
23	Session ended due to unsupported service
24	Subscription violation
25	The desired fix method failed
28	Network indicated a normal ending of the session
29	No error specified by the network
31	Session ended due to position server not available
32	Network reported an unsupported version of protocol
33	Mapped to corresponding SS-MOLR-error error code
34	MO-LR unexpected error
35	MO-LR Data missing
36	MO-LR facility not supported
37	MO-LR subscription violation
38	MO-LR position method failure
39	MO-LR undefined error
43	Position response Nongood (NG) reception (LIS side system anomaly)
44	Position response NG reception (beyond the LSU maximum session count)
45	Position response NG reception (MS side setting information failure)

46	Session interruption NG reception (LIS side system anomaly)
47	Session interruption NG reception (MS side setting information failure)
48	Abnormal response reception
49	T04 timer timed out
50	T03 timer timed out
51	T02 timer timed out
52	IS-801 timer timed out
53	LR reject reception
54	AA reject reception
55	EPH reject reception
56	ALM reject reception
57	Seed reject reception
58	IS-801 sequence error
59	PPP establish trial failure
60	Network link disconnection after PPP established (MS-initiated)
61	Network link disconnection after PPP established (server-initiated)
62	GPS data request response NG reception (LIS side system anomaly)
63	GPS data request response NG reception (beyond LSU maximum session count)
64	GPS data request response NG reception (MS side setting information)
65	GPS data request interruption NG reception (LIS side system)
66	GPS data request interruption NG reception (MS side setting information)
67	T20 timer timed out
68	T21 timer timed out
901	No fix with download the data
911	MSA (MSB auto) – No fix with download the data

`<leftfixnum>`: left positioning times

13.18.4 Property Description

Saving upon Power-off	PIN
NA	N

13.18.5 Example

If user ended the PD session:

Response: `^POSEND: 9,0`

14 Huawei Proprietary Interface: ECM Interfaces

14.1 AT^NDISDUP–NDIS-Based Dialing

14.1.1 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>

14.1.2 Interface Description

This command implements NDIS-based dialing. This command can be used only when an NDIS port is available.

14.1.3 Parameter Description

<cid>:

1	Call ID. It can be set only to 1 at present. (It may be increased to 16 later.)

`<connect>`:

0	The connection is disabled
1	The connection is set up

`<APN>`: access point name (0 to 99 bytes).

`<username>`: user name in the format of character strings (0 to 255 bytes).

`<passwd>`: password in the format of character strings (0 to 255 bytes).

`<authpref>`: authentication reference.

0	No authentication
1	PAP authentication
2	CHAP authentication
	MsChapV2 (not supported currently)

14.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.1.5 Example

Run: `AT^NDISDUP=1,1,"1234"`

Response: `OK`

Run: `AT^NDISDUP?`

Response: `OK`

Run: `AT^NDISDUP=?`

Response:
```
^NDISDUP: (1-16),(0-1)

OK
```

14.2 ^NDISSTAT–Unsolicited Report of Connection Status

14.2.1 Command Syntax

URC
<CR><LF>^NDISSTAT: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]]<CR><LF>

14.2.2 Interface Description

When the device connection status changes, the MT proactively indicates this to the TE.

14.2.3 Parameter Description

<stat>: connection status. Its values are as follows.

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/unspecified error

The values of other error codes are 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>: 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>: character string value.

"IPV4"

"IPV6" (not supported)

14.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.2.5 Example

- IPv4 changes from the connected state to the disconnected state:

Response: ^NDISSTAT: 0,33,,"IPV4"

- IPv4 changes from the disconnected state to the connected state:

Response: ^NDISSTAT: 1,,,"IPV4"

14.3 AT^NDISSTATQRY–Query the Connection Status

14.3.1 Command Syntax

AT^NDISSTATQRY?
Possible Response(s)
<CR><LF>^NDISSTATQRY: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]]<CR><LF><CR><LF>OK<CR><LF>

14.3.2 Interface Description

The TE delivers this command to query the ECM (NDIS/WWAN) connection status of the MT.

14.3.3 Parameter Description

<stat>: connection status. Its values are as follows:

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/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>`: 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>`: character string value.

"IPV4"

14.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.3.5 Example

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?`

Response:

```
^NDISSTATQRY: 1,,,"IPV4"

OK
```

15 Huawei Proprietary Interface: Temperature Protection

15.1 AT^CHIPTEMP–Query the Temperature of the PA/SIM/Battery/Crystal Oscillator Command

15.1.1 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>

15.1.2 Interface Description

This command queries temperature on hardware spots, such as GSM PA, WCDMA PA, LTE PA, SIM card slot, battery, and crystal oscillator.

15.1.3 Parameter Description

<G PAtemp>: an integer indicates the GSM PA chip's current temperature.

65535	Not supported currently

<W PAtemp>: an integer indicates the WCDMA PA chip's current temperature.

65535 Not supported currently

<L PAtemp>: an integer indicates the LTE PA chip's current temperature.

65535 Not supported currently

<SIMtemp>: an integer indicates the current temperature of the SIM card.

65535 Not supported currently

<BATTERYtemp>: an integer indicates the current temperature of the battery.

65535 Not supported currently

<CRYSTALtemp>: an floating point number indicates the crystal's current temperature.

–400 to 1200 The crystal's current temperature in the unit of 0.1°C

<G PAtemp Range>: integer, indicating the temperature range of the GSM PA chip in the unit of 0.1°C.

(65535-65535) Not supported currently

<W PAtemp Range>: integer, indicating the temperature range of the WCDMA PA chip in the unit of 0.1°C.

(65535-65535) Not supported currently

<L PAtemp Range>: integer, indicating the temperature range of the LTE PA chip in the unit of 0.1°C.

(65535-65535) Not supported currently

<SIMtemp Range>: integer, indicating the temperature range of the SIM card slot in the unit of 0.1°C.

(65535-65535) Not supported currently

<BATTERYtemp Range>: integer, indicating the temperature range of the battery in the unit of 0.1°C.

(65535-65535) Not supported currently

<CRYSTALtemp Range>: integer, indicating the temperature range of the crystal oscillator in the unit of 0.1°C.

–400 to 1200 The crystal oscillator temperature range

Notes:

- If the query of a component's temperature fails, 65535 is returned.
- The temperature unit is 0.1°C. For example, if the returned value range is from –400 to 1200, the temperature ranges from –40°C to 120°C.
- 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.

15.1.4 Property Description

Saving upon Power-off	PIN
NA	N

15.1.5 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),(65535-65535),(-400-1200)`
	
	`OK`
		The response indicates the temperature ranges on hardware spots.

15.2 AT^THERMFUN–Enable or Disable the Temperature Protection Function Command

15.2.1 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>
AT^THERMFUN=?
Possible Response(s)
<CR><LF>^THERMFUN: (list of supported <switch>s)<CR><LF><CR><LF>OK<CR><LF>

15.2.2 Interface Description

This command is used to enable or disable the temperature protection function.

- If the temperature protection function is enabled, the module performs the operation to disable the PA when the temperature reaches the threshold.
- If the temperature protection function is disabled, the module does not perform the operation to disable the PA 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

15.2.3 Parameter Description

<switch>: integer, indicating the switch for enabling or disabling the temperature protection function.

0	Disable the temperature protection function.
1	Enable the temperature protection function. (default value)

Notes:

- The default value is 1. The parameter value changes to 1 upon power-off.
- A parameter value takes effect immediately after setting.

15.2.4 Property Description

Saving upon Power-off	PIN
NA	N

15.2.5 Example

Run: AT^THERMFUN=?

Response: `^THERMFUN: (0-1)`

`OK`

Run: `AT^THERMFUN?`

Response: `^THERMFUN: 1`

`OK`

Run: `AT^THERMFUN=1`

Response: `OK`

15.3 ^THERM–Thermal Protection Activated Unsolicited Report

15.3.1 Command Syntax

URC
<CR><LF>`^THERM: <ACTION>`<CR><LF>

15.3.2 Interface Description

This command is used to send an unsolicited report to the host when the thermal protection is active/inactive according temperature. This command is affected by AT command `^CURC` (if exists).

15.3.3 Parameter Description

`<ACTION>`: indicates whether thermal protection takes effect. The possible values are defined as below:

0	Indicates that the thermal protection is inactive.
1	Indicates that the thermal protection is active.

15.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.3.5 Example

- Indicates that the thermal protection is inactive:

Response: `^THERM: 0`

- Indicates that the thermal protection is active:

Response: `^THERM: 1`

15.4 ^THERMEX–Thermal Protection State Changed Unsolicited Report

15.4.1 Command Syntax

URC
<CR><LF>^THERMEX: <pre_state>,<cur_state><CR><LF>

15.4.2 Interface Description

This command is used to send an unsolicited report to host when thermal protection state changed according temperature.

15.4.3 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

15.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.4.5 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`

16 Huawei Proprietary Interface: Firmware Update Interfaces

16.1 AT^FOTAMODE–Set Operation Mode

16.1.1 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>

16.1.2 Interface Description

The set command is used to set the modes (manual or automatic) for version detection, download, and update, enable or disable resumable data transfer, and specify the interval between version detections.

The read command is used to query the modes of version detection, download, and update, status of resumable data transfer, and interval between version detections.

The test command is used to return the supported parameter ranges.

16.1.3 Parameter Description

<dectect_mode>: specifies the version detection mode. The default value is 1. Available values are:

0	Manual detection. In this mode, the user manually checks whether a new version is available for the module.
1	Automatic detection. In this mode, the module checks whether a new version is available after the specified interval ends.

<download_mode>: specifies the version download mode. The default value is 0. Available values are:

0	Manual download. In this mode, the module starts to download the detected new version only after the user confirms the download operation.
1	Automatic download. In this mode, the module starts the download process upon detection of a new version.

<update_mode>: specifies the update mode. The default value is 0. Available values are:

0	Manual update. In this mode, the module starts the update only after the user confirms the update operation.
1	Automatic update. In this mode, the module starts the update once the download is complete.

<en_resume>: enables or disables resumable data transfer is supported. The default value is 1.

0	Disables resumable data transfer.
1	Enables resumable data transfer.

<period>: integer; specifies the interval between version detections. Value unit: day. The value range is 1 to 65535. This parameter is available only when <dectect_mode> is 1. The default value is 7. If <dectect_mode> is 1, <period> must be specified.

Notes:

- 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.

16.1.4 Property Description

Saving upon Power-off	PIN
Y	N

16.1.5 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`

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

Response: `ERROR`

16.2 AT^FOTACFG–Set FOTA Connection Parameters

16.2.1 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>

16.2.2 Interface Description

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

16.2.3 Parameter Description

<APN>: specifies the APN. Its value is a string with double quotation marks, consisting of a maximum of 99 bytes. It can be omitted.

<username>: specifies the user name. Its value is a string with double quotation marks, consisting of a maximum of 31 bytes. This parameter can be omitted, but only when <password> is also omitted.

<password>: specifies the password. Its value is a string with double quotation marks, consisting of a maximum of 31 bytes. This parameter can be omitted, but only when <username> is also omitted.

<auth_type>: indicates the authentication mode. The default mode is Challenge Handshake Authentication Protocol (CHAP). This parameter is not supported when 3GPP2 is used. The authentication mode is determined based on the negotiation between the module and network. Available values are:

0	No authentication
1	Password Authentication Protocol (PAP)
2	CHAP

16.2.4 Property Description

Saving upon Power-off	PIN
Y	N

16.2.5 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`

16.3 AT^FOTADET–Manually Detect a New Version

16.3.1 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>

16.3.2 Interface Description

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

Note:

In order to protect the FOTA server, if `AT^FOTADET` is repeatedly executed within three hours, only the version information detected for the first time is returned.

16.3.3 Parameter Description

None

16.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.3.5 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, the following is returned:

Run: `AT^FOTADET`

Response: `OK`

- If the module detects a new version, the following is returned:

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, the following is returned:

Response: `^FOTASTATE: 14`

- If the command fails to be executed because the module is processing other service or the Firmware Over-the-Air (FOTA) status is incorrect, the following is returned:

Run: `AT^FOTADET`

Response: `+CME ERROR: FOTA is in collision state`

- If the command fails to be executed because of failure to set up a network connection or connection to the server, the following is returned:

Response: `^FOTASTATE: 13,18`

16.4 AT^FOTADL–Manually Download a New Version

16.4.1 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>
`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>

16.4.2 Interface Description

The set command is used to start or stop a version download.

The test command is used to query the control mode available for version downloads.

16.4.3 Parameter Description

<n>: specifies the control mode for version downloads. Available values are:

0	Cancel a download, deletes the downloaded file, and restores the FOTA status to idle state.
1	Start a download or resumes data transfer.
2	Run this command to download Pause manually.

16.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.4.5 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

Response: OK

^FOTASTATE: 30

^FOTASTATE: 40

16.5 AT^FWUP–Start a FOTA Update

16.5.1 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>

16.5.2 Interface Description

This command is used to start a Firmware FOTA update.

16.5.3 Property Description

Saving upon Power-off	PIN
NA	N

16.5.4 Example

- If a new version has been downloaded to the module, run ^FWUP to start the update. The module then reports an OK message and starts the update.

Run: `AT^FWUP`

Response: `OK`

`^FOTASTATE: 50`

- If the update succeeds:

Response: `^FOTASTATE: 90`

- If the update fails:

Response: `^FOTASTATE: 80,55`

16.6 AT^FOTASTATE–Report the FOTA Status

16.6.1 Command Syntax

AT^FOTASTATE?
Possible Response(s)
<CR><LF>^FOTASTATE: <status><CR><LF><CR><LF>OK<CR><LF>
URC
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>

16.6.2 Interface Description

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

16.6.3 Parameter Description

<status>: indicates the current status. Its value is an integer. Available values are:

10	Idle
11	Querying
12	New version found
13	New version query failed
14	No version found
20	Download failed
30	Download progressing
31	Download Pending. This value indicates that the module has a download task that is not yet complete after the module restarts. If resumable data transfer has been enabled, the module resumes the download
40	Download Complete

50	Ready to update
60	Update Progressing
80	Update failed
90	Update successful

`<version>`: indicates the software version number. Its value is a string containing a maximum of 31 characters, which exclude 0<CR> or OK<CR>.

`<description>`: indicates the software description. Its value is a string with a valid character in English and a maximum of five entries. The entries are separated by semicolon, and each contains 255 characters or less.

`<packet_size>`: indicates the number of bytes in the update package.

Valid values of `<version>`, `<description>`, and `<packet_size>` are unsolicitedly reported when `<status>` is 12. If `<status>` is not 12, empty values are returned.

`<error_code>`: indicates the reason for a version query failure. Its value is an integer. This parameter is available only when `<status>` is 13, 20, or 80.

16.6.4 Property Description

Saving upon Power-off	PIN
Y	N

16.6.5 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`

16.7 AT^FOTADLQ–Query Download Status of Update Files

16.7.1 Command Syntax

AT^FOTADLQ
Possible Response(s)
[<CR><LF>^FOTADLQ: <index>,<file_name>,<dl_size>,<file_size>[<CR><LF>^FOTADLQ: <index>,<file_name>,<dl_size>,<file_size>[...]]<CR><LF>]<CR><LF> OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

16.7.2 Interface Description

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

16.7.3 Parameter Description

`<index>`: indicates the file sequence number. Its value ranges from 1 to 10.

`<file_type>`: indicates the file type. Its value is a string with double quotation marks.

"FIRMWARE1"	Firmware differential file

`<dl_size>`: indicates the number of downloaded bytes. Its value is an integer.

`<file_size>`: indicates the number of total bytes. Its value is an integer.

16.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.7.5 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.

Run: `AT^FOTADLQ`

Response: `^FOTADLQ: 1,"FIRMWARE1",0,255638`

`OK`

16.8 AT^FWLOAD–Perform a Local Upgrade

16.8.1 Command Syntax

AT^FWLOAD=<update_type>
Possible Response(s)
<CR><LF>><CR><LF>(1K-Xmodem ctrl character)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

16.8.2 Interface Description

This command is used to specify the upgrade type, transmit the upgrade file into the module using 1K-Xmodem, and start the upgrade. The following table lists the ports supported by the full and differential upgrades.

Upgrade type	UART port	MODEM port	PCUI port
Full upgrade	x	x	√
Differential upgrade	x	x	√

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. When you do so, refer to the following baud rates supported by the full differential upgrades.

Note:

During a local update, if module restarts, the Host needs re-open the port to receive the data sent by the module. Meanwhile, in order to avoid some adverse impact, other ports cannot perform other operations, and the Host cannot transmit data through PCUI port and UART port in the full updates.

16.8.3 Parameter Description

`<update_type>`: an integer, specifying the upgrade type.

0	Full upgrade
1	Differential upgrade

The 1K-XMODEM protocol is used to transmit update files.

16.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.8.5 Example

- Local differential upgrade

Run: `AT^FWLOAD=1`

Response:
```
>
C

OK
```

The board restarts, and the upgrade starts.

Response: `^FWLSTATE: 90`

- Local full upgrade

Run: `AT^FWLOAD=0`

Response:
```
>
C
```

The board restarts, and the upgrade starts.

Response: `^FWLSTATE: 90`

Note:

After the data transmit is normally end in during full updates, `OK` will not be reported.

16.9 ^FWLSTATE–Report the Upgrade Status

16.9.1 Command Syntax

URC
<CR><LF>^FWLSTATE: <state>[,<error_code>]<CR><LF>

16.9.2 Interface Description

During an update, the board reports the current update status after `AT^FWLSTATE` is executed.

16.9.3 Parameter Description

`<state>`: an integer, specifying the current upgrade status.

80	Update failed
90	Update succeeded

`<error_code>`: an integer, specifying the cause of the upgrade failure. See the error list in appendix 16.12.2 .

16.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.9.5 Example

- Local full upgrade

Run: `AT^FWLOAD=0`

Response: >
C

- The board restarts, and the upgrade starts.

Response: ^FWLSTATE: 90

16.10 ^FOTASMS–Unsolicitedly Reporting After Receiving a FOTA Message

16.10.1 Command Syntax

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

16.10.2 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.

Notes:

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

16.10.3 Parameter Description

None

16.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.10.5 Example

None

16.11 AT^FOTAP-Update Policy

16.11.1 Command Syntax

AT^FOTAP=<policy>
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: <policy><CR><LF><CR><LF>OK<CR><LF> If link has not been open: <CR><LF>OK<CR><LF>
AT^FOTAP=?
Possible Response(s)
<CR><LF>^FOTAP: (list of supported <policy>s)<CR><LF><CR><LF>OK<CR><LF>

16.11.2 Interface Description

The set command is used by the host computer to allow or reject an update. If the host computer allows an update, the FOTA module will perform the update.

The read command is used to query the modes of version detection, download, and update, status of resumable data transfer, and interval between version detections.

The test command is used to return the supported parameter ranges.

16.11.3 Parameter Description

<policy>: integer type value, update policy.

0	Reject FOTA updates.
1	Allow FOTA updates.

16.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.11.5 Example

Run: `AT^FOTAP=1`

Response: `OK`

Run: `AT^FOTAP=?`

Response:

```
^FOTAP: (0-1)

OK
```

16.12 Appendix

16.12.1 CME ERROR Values and String Text for the FOTA Feature

<err> code	String Text
1502	Operation failed due to unknown error
1503	Previous command is not complete
1504	Error command parameters
1505	Operation not supported
1512	The network has not been opened yet
1513	The network has been opened already
1514	Fail to open network
1515	The link has not been established yet
1517	Fail to establish link
1518	Fail to bind the specified port
1519	Fail to connect to the specified address
1520	Invalid domain name
1521	Fail to resolve DNS
1523	File type is not correct

<err> code	String Text
1524	File source is not correct
1555	FOTA is in collision state
1602	Fail to send data because TE cancel
1603	Fail to send data because retry times are bigger than 10
1604	Fail to send data because file tag is error
1605	Fail to send data because packet number is error
1606	Fail to send data because the protocol is not 1K-Xmodem
1607	Invalid port for fwload mode
1608	Fail to send data because file crc or subfile crc is error
1609	Fail to send data because update type is error
1610	Fail to send data because model product is error
1611	Fail to send data because source version is error
1612	Fail to send data because some tag length is error
1613	Fail to send data because file num error
1614	Fail to send data because open subfile failed
1615	Fail to send data because write subfile to flash error

16.12.2 The Values and Descriptions of Causing the Upgrade Failure for the FOTA Feature

<err> code	Description
01	Operation failed due to unknown error
02	Previous command is not complete
03	Error command parameters
04	Operation not supported
05	Operation failed due to system error
11	The network has not been opened yet
12	The network has been opened already
13	Fail to open network
14	The link has not been established yet
15	The link has been established already

<err> code	Description
16	Fail to establish link
17	Fail to bind the specified port
18	Fail to connect to the specified address
19	Invalid domain name
20	Fail to resolve DNS
21	Http server error
22	File type is not correct
23	File source is not correct
51	Fail to get filelist file
52	MD5 check failed
54	FOTA is in collision state
101	Fail to send data because TE cancel
102	Fail to send data because retry times are bigger than 10
103	Fail to send data because input file 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

<err> code	Description
157	Fail to write xnv
158	Fail to backup nv
159	Fail to restore nv

17 Appendix

17.1 List of URC Commands

URC	Function
+CMTI	New SMS-DELIVER indication
+CMT	New message directly deliver indication
+CDSI	New SMS status report indication
+CDS	SMS status report indication directly displayed
+CUSATP	Unsolicitedly report a UICC proactive command
+CUSATEND	Unsolicitedly report of terminating a UICC proactive command session
^SMMEMFULL	Message memory full
^IPSTATE	Indicate TCP/UDP data link state
^TIMESETRULT	Notify XTRA time injection
^DATASETRULT	Notify XTRA data injection
^XDSTATUS	Notify XTRA data status
^POSITION	Notify positioning result
^POSEND	Report positioning end information
^WNINV	Notify NI positioning
+CREG	Notify the current registration status
+CGREG	Notify PS Domain Registration Status
^RFSWITCH	Report the RFSWITCH State
+XADPCLKFREQINFO	Unsolicitedly Present of Adaptive Clock Frequency Info
^SIMST	SIM Card State Change Indication

URC	Function
^DSDORMANT	Dormant State Indication (CDMA only)
^HWNAT	Indicate Network Mode Change
^IPDATA	Notificate Arrival Data
^SRVST	Service State Change Indication
^THERM	Thermal Protection Activated Unsolicited Report
^HCSQ	Report system mode and Signal Strength
^HCMT	Report a New Short Message(CDMA only)
^HCDS	Report a New Status Report Short Message(CDMA only)
^HCMGSS	Report Successful Short Message Sending (text mode)(CDMA only)
^HCMGSF	Report Short Message Sending Failure(CDMA only)
^HCMGS	Unsolicitedly Present of Successfully Sending a Short Message (PDU mode)(CDMA only)
^FOTASTATE	Report the FOTA Status
^FWLSTATE	Report the Upgrade Status
^SYSSTART	Unsolicitedly report module startup(Only for the HUAWEI specified client)
^NWTIME	Unsolicitedly report network system time(Only for the HUAWEI specified client)
^RSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^MODE	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")
^HRSSILVL	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^HDRRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^CRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
+CEREG	Notify the current LTE registration status
^ANLEVEL	(Only for the HUAWEI specified client)

URC	Function
^WPDCP	(Only for the HUAWEI specified client)
^NDISEND	(Only for the HUAWEI specified client)
^OTACMSG	(Only for the HUAWEI specified client)
^NDISSTAT	Unsolicited Report of Connection Status
^LOCCHD	Unsolicited Report of Connection Status(Only for the HUAWEI specified client)
^DATAVALIDITY	(Only for the HUAWEI specified client)
^WPDDL	(Only for the HUAWEI specified client)
^BOOT	(Only for the HUAWEI specified client)
^STIN	(Only for the HUAWEI specified client)
^ECLSTAT	(Only for the HUAWEI specified client)
^CSNR	(Only for the HUAWEI specified client)
^SIMFILEREFRESH	(Only for the HUAWEI specified client)
^WPDOP	(Only for the HUAWEI specified client)
^DSFLOWRPT	(Only for the HUAWEI specified client)
^ECCLIST	(Only for the HUAWEI specified client)
^ACTIVEBAND	(Only for the HUAWEI specified client)
+CTZV	Notify the time zone is changed
^EARST	(Only for the HUAWEI specified client)
+CBMI	New CBM indication
+CBM	New CBM directly deliver indication
^ERRRPT	Specified error code indication(Only for the HUAWEI specified client)

17.2 General CME Error List

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

Table 17-1 General "CME ERROR" Codes

Numeric mode	Verbose mode
0	phone failure

Numeric mode	Verbose mode
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
41	network personalization PUK required
42	network subset personalization PIN required

Numeric mode	Verbose mode
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
263	unknown class
264	unknown network message

Numeric mode	Verbose mode
273	Minimum TFT per PDP address error
274	Duplicate TFT eval prec index
275	Invalid TFT param combination

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 GPS related "CME ERROR" Codes (Huawei proprietary)

Numeric mode	Verbose mode
276	GPS function disabled
277	Standalone disabled
278	AGPS disabled
279	gpsOneXTRA disabled
280	Cell-ID disabled
281	Invalid parameter
282	Unable to delete parameters
283	PD session is ongoing
284	PD session is in off status
285	too many parameters
286	invalid server address
287	GPS locked

Numeric mode	Verbose mode
288	GPS type not supported
289	MGP receiver is ongoing

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
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

Numeric mode	Verbose mode
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 References

The following list is most of the references for this document.

[1] 3GPP TS 23.040

[2] 3GPP TS 23.038

[3] 3GPP TS 23.003

[4] 3GPP TS 24.008

[5] 3GPP TS 25.331

[6] 3GPP TS 27.007

[7] 3GPP TS 27.005

[8] 3GPP TS 31.102

[9] 3GPP TS 44.060

[10] GSM MoU SE.13

[11] ITU–T E.212 Annex A

17.5 Acronyms and Abbreviations

Acronym or Abbreviation	Full spelling
3GPP	Third Generation Partnership Project
AT	ATtention
APN	Access Point Name
BER	Bit Error Rate
CHAP	Challenge Handshake Authentication Protocol
CLIP	Call Line Identifier Presentation

Acronym or Abbreviation	Full spelling
CS	Circuit Switched (CS) domain
CUG	Closed User Group
DCE	Data Circuit-terminating Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
IWF	Interworking Function
MCC	Mobile Country Code
ME	Mobile Equipment
MNC	Mobile Network Code
MS	Mobile Station
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
NMEA	National Marine Electronics Association
PAP	Password Authentication Protocol
PD	Position Determination
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PUK	PIN Unblocking Key

Acronym or Abbreviation	Full spelling
PS	Packet Switched (PS) domain
QoS	Quality of Service
RPLMN	Registered PLMN
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address
SDU	Service Data Unit
SIM	GSM Subscriber Identity Module
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
TA	Terminal Adapter
TE	Terminal Equipment
TPDU	Transfer Protocol Data Unit
UIM	User Identity Module
URC	Unsolicited Result Code
USIM	Universal Subscriber Identity Module
USSD	Unstructured Supplementary Service Data
VP	Validity Period
UTRAN	Universal Terrestrial Radio Access Network
WCDMA	Wideband CDMA