HUAWEI ME936 LTE M.2 Module
V100R001

AT Command Interface Specification

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2014-05-27		Creation
02	2014-09-25	2.8.1	Updated command syntax of `AT+CSCS`
		3.2.5	Updated example of `AT+CREG`
		4.6.5	Updated example of `AT+CPBW`
		5.4.3	Updated parameter description of `<rac>`
		5.5.4	Updated property description of `AT+CGREG`
		8.2.5	Updated example of `AT^BODYSARCFG`
		8.5.5	Updated example of `AT^BODYSARLTE`
		9.8.5	Updated example of `AT^CARDLOCK`
		10.2.4	Updated property description of `AT^SYSCFGEX`
		15.12.4	Updated property description of `AT^ANTMODE`

Contents

1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by Huawei Mobile Broadband product ME936 module.

Please read the Release Notes released with the firmware before using ME936 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 7 "Standard STK Interface Commands" describe AT interfaces defined in international standards such as 3GPP and ITU-T.

Chapter 8 "Huawei Proprietary Interface: BodySAR Interface Description" to chapter 15 "Huawei Proprietary Interface: Customer Production Line Tests Interface" describe Huawei proprietary interfaces.

1.4 Document Conventions

Throughout the document, the module are referred to as ME (Mobile Equipment), MS (Mobile Station), TA (Terminal Adapter) or DCE (Data Communication 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
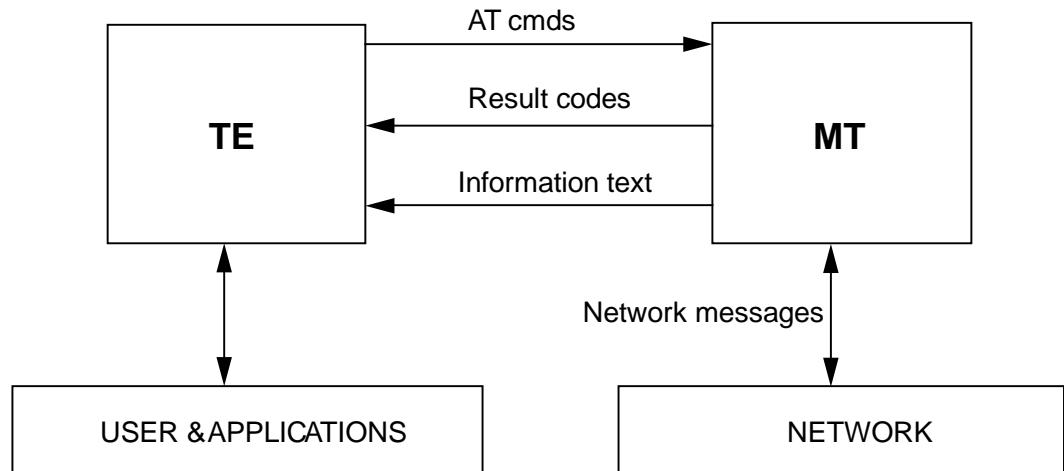
Figure 1-2 shows the basic organization format of the AT command line.

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

read command for checking
current subparameter values

subparameter

command line prefix

extended commands are
delimited with semicolon

command line
termination character

ATCMD1 CMD2=12; +CMD1; +CMD2=,,15; +CMD2?; +CMD2=?<CR>

basic command
(no + prefix)

extended command
(prefixed with +)

subparameters
may be omitted

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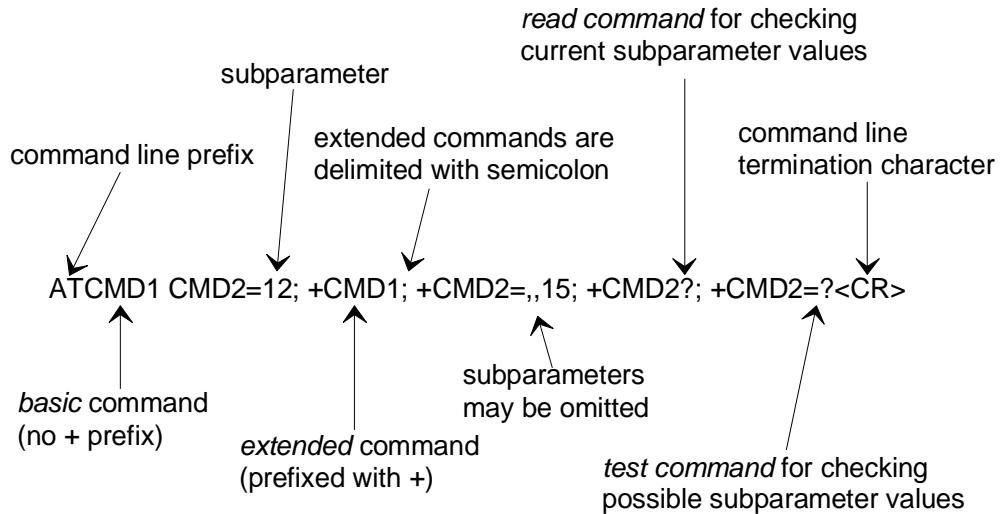
The returned value of the AT command consists of two parts: response message and result codes. Figure 1-3 shows an example of returned value of the AT command.

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

information response to +CMD2=?

also string type subparameters possible

information response to +CMD2?

<CR><LF>+CMD2: 3,0,15,"GSM"<CR><LF>
<CR><LF>+CMD2: (0-3),(0,1),(0-12,15),("GSM","IRA")<CR><LF>
<CR><LF>OK<CR><LF>

shows acceptable ranges of each subparameter

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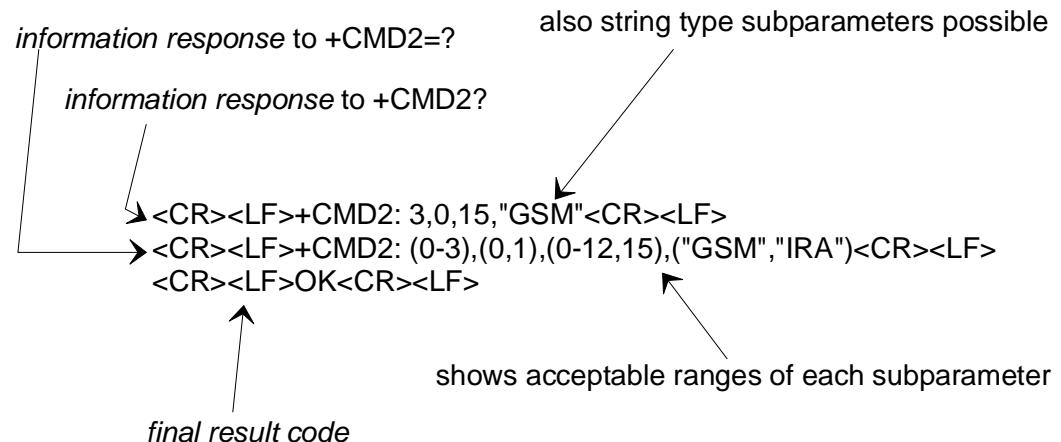
For the errors returned by all AT commands in this document, <CR><LF>ERROR<CR><LF> may be returned except errors defined by the AT command. Therefore, the error of <CR><LF>ERROR<CR><LF> will not be described in every command.

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".

2 General Commands

2.1 ATV–Set the Response Format

2.1.1 Command Syntax

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

2.1.2 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>

2.1.3 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.

2.1.4 Property Description

Saving upon Power-off	PIN
N	N

2.1.5 Example

Run: ATV1

Response: OK

2.2 ATI–Request Identification

2.2.1 Command Syntax

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

2.2.2 Interface Description

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

Manufacturer (`AT+GMI`)

Product model (`AT+GMM`)

Software version (`AT+GMR`)

ESN/IMEI (`AT+GSN`)

Capability list (`AT+GCAP`)

About the details, please see 2.2.5 Example.

2.2.3 Parameter Description

`<value>`:

0   Query the previously described MS ID information.

Note:

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

2.2.4 Property Description

Saving upon Power-off	PIN
NA	N

2.2.5 Example

Run: ATI

Response: Manufacturer: Huawei Technologies Co., Ltd.
              Model: ME936
              Revision: 11.110.07.04.00
              IMEI: 356112010004540
              +GCAP: +CGSM

              OK

2.3 AT+GCAP–Request Transmission Capacity Domain Identification

2.3.1 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>

2.3.2 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.

2.3.3 Parameter Description

None

2.3.4 Property Description

Saving upon Power-off	PIN
NA	N

2.3.5 Example

Run: AT+GCAP

Response: +GCAP: +CGSM

        OK

In the returned value, +CGSM indicates that the MS supports the GSM mode.

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

2.4.1 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>

2.4.2 Interface Description

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

2.4.3 Parameter Description

`<manufacturer>`: a string indicating the manufacturer information.

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

2.4.4 Property Description

Saving upon Power-off	PIN
NA	N

2.4.5 Example

Run: `AT+CGMI`

Response: `Huawei Technologies Co., Ltd.`

            `OK`

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

2.5.1 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>

2.5.2 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.

2.5.3 Parameter Description

`<production_name>`: product name.

2.5.4 Property Description

Saving upon Power-off	PIN
NA	N

2.5.5 Example

Product name: ME936

Run: `AT+CGMM`

Response: `ME936`

            `OK`

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

2.6.1 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>

2.6.2 Interface Description

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

2.6.3 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.

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

Run: AT+CGMR

Response: 11.103.35.00.00

            OK

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

2.7.1 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>

2.7.2 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.

2.7.3 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

2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

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

Run: AT+CGSN

Response: 351548000225444

              OK

2.8 AT+CSCS–Select TE Character Set

2.8.1 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>

2.8.2 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.

2.8.3 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).

2.8.4 Property Description

Saving upon Power-off	PIN
N	N

2.8.5 Example

Run:	AT+CSCS="IRA"
Response:	OK
Run:	AT+CSCS?
Response:	+CSCS: "IRA"
	OK
Run:	AT+CSCS=?
Response:	+CSCS: ("IRA","GSM","UCS2")
	OK

2.9 AT+CIMI–Request IMSI

2.9.1 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>

2.9.2 Interface Description

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

2.9.3 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

2.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

2.9.5 Example

If the MCC is 460, the MNC is 09, and the MSIN is 7552011825, then:

Run: `AT+CIMI`

Response: `460097552011825`

            `OK`

2.10 AT+CMEE–Report Mobile Termination Error

2.10.1 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>

2.10.2 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.

2.10.3 Parameter Description

<n>: an integer type value indicating the format of the error result code. The default value is 0. If <n> is not specified, it is equivalent to set <n> to 0.

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

<err>: see section 16.2 General CME Error List.

2.10.4 Property Description

Saving upon Power-off	PIN
N	N

2.10.5 Example

Run: AT+CMEE=2

Response: OK

Run: AT+CMEE?

Response: +CMEE: 2

           OK

Run:　　　　AT+CMEE=?

Response:　　+CMEE: (0,1,2)

OK

3 Network Service Related Commands

3.1 AT+COPS–Select Operator

3.1.1 Command Syntax

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

3.1.2 Interface Description

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

The execution command enables to select the GSM/UMTS/LTE 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.

3.1.3 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 up to 16 characters long and short format up to 8 characters (refer GSM MoU SE.13). Numeric format is the GSM Location Area Identification number (refer 3GPP TS 24.008 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

0   GSM

1   GSM Compact (not supported currently)

2   UTRAN

3   GSM w/EGPRS (not supported currently)

4   UTRAN w/HSDPA (not supported currently)

5   UTRAN w/HSUPA (not supported currently)

6   UTRAN w/HSDPA and HSUPA (not supported currently)

7   E-UTRAN

3.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.1.5 Example

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

Run: AT+COPS=?

Response: +COPS:
              (3,"CHN-UNICOM","UNICOM","46001",0),(3,"CHINA
              MOBILE","CMCC","46000",0),,(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>=0 makes other parameters invalid.

- Manual search of network:

Run: AT+COPS=1,2,"46000",0

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/LTE network when current setting is GSM ONLY mode which set by AT^SYSCFGEX.
- We cannot manually search the GSM/LTE network when current setting is WCDMA ONLY mode which set by AT^SYSCFGEX.
- We cannot manually search the GSM/UTRAN network when current setting is LTE ONLY 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",0	Command returns mode, format and registered operator.
	OK	

3.2 AT+CREG–Register Network

3.2.1 Command Syntax

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

```
AT+CREG=?
```

Possible Response(s)

<CR><LF>+CREG: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

3.2.2 Interface Description

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

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

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

3.2.3 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, and means two bytes of "0x00" and "0xC3").

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

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

0	GSM
1	GSM Compact (not supported currently)
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.

3.2.4 Property Description

Saving upon Power-off	PIN
N	Y

3.2.5 Example

- Enable the initiative report when network registration status change:

Run: AT+CREG=1

Response: OK

- Query the 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 0x000E0027, and the network mode is WCDMA, the terminal will receive the unsolicited reports:

Run: AT+CREG?

Response: +CREG: 2,1,"2513","000E0027",2

             OK

3.3 AT+CLCK–Facility Lock

3.3.1 Command Syntax

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

3.3.2 Interface Description

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

The test command returns the supported facilities.

3.3.3 Parameter Description

<fac>: specifies the target of this command.

"SC"   SIM card (if this parameter is set, MT will request the password during startup)

"AB"   All Barring services (applicable only for <mode>=0)

"AC"   All incoming barring services (applicable only for <mode>=0)

"AG"   All outgoing barring services (applicable only for <mode>=0)

"AI"   Bar All Incoming calls

"AO"   Bar All Outgoing calls

"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"OI"	Bar Outgoing International calls
"OX"	Bar Outgoing international calls except to home country
"FD"	SIM card or active application in the UICC (GSM or USIM) fixed dialing memory feature (reserved, not supported currently)
"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>: (not supported currently)

1	Voice (telephony)
2	Data
4	Fax
8	Short message service

3.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

Note：

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

3.3.5 Example

- Query the lock status of SIM:

Run: AT+CLCK="SC",2

Response: +CLCK: 0

            OK

- Set the lock status of SIM:

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

Response: OK

- Query the list of supported <fac>s:

Run: AT+CLCK=?

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

            OK

3.4 AT+CPWD–Change Password

3.4.1 Command Syntax

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

3.4.2 Interface Description

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

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

3.4.3 Parameter Description

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

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

3.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

Note：

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

3.4.5 Example

- Modify PIN2 of SIM:

Run:　　　　`AT+CPWD="P2","5678","8765"`

Response: OK

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

Run: AT+CPWD=?

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

OK

3.5 AT+CUSD–USSD Command

Users can run Unstructured Supplementary Service Data (USSD) commands using mobile devices to request specific services from the network, and the network also can send USSD commands to devices to implement specific services. Unlike SMS, USSD allows real-time bidirectional data exchange so that it can be used in services, such as stock information query. Currently, many value-added services, such as stock, lottery, weather forecast, and flight information query, are provided using USSD.

3.5.1 Command Syntax

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

3.5.2 Interface Description

This command provides control on the supplementary service USSD. It supports the operation originated from the network side or the terminal side.

`<n>` is used to disable/enable proactive reporting of URC. This reporting may be response to the terminal-originated service at the network side, or service request originated at the network side:

```
+CUSD: <m>[,<str>,<dcs>]
```

The definition of its parameters and the use of this command, see section 3.6 +CUSD–Unsolicitedly Report USSD of Network.

If the `<str>` field is provided in the delivered command, the message sent to the network side may the USSD request originated at the terminal side, or the response to the network-side request from the terminal. The response (USSD string) from the network will be included in the subsequent `+CUSD` result code.

Besides, `<n>`=2 is used to exit the current USSD session.

When the `<n>` takes on the default value, the execution command is equivalent to the set command `AT+CUSD=0`.

The test command returns all the supported values of `<n>`.

3.5.3 Parameter Description

`<n>`:

0	Disable the result code presentation to the TE
1	Enable the result code presentation to the TE
2	Cancel session

`<str>`: string type, USSD-string. Valid USSD characters are 0–9, '*' and '#'.

- When USSD is transmitted in coding mode (non-transparent mode), the value of `<str>` is set by running `AT+CSCS`. The MT will encode the value to the data that complies with the requirement specified by `<dcs>` and send the data to network side.
- When USSD is transmitted in transparent mode using Huawei's proprietary scheme, the value of `<str>` is not controlled by `AT+CSCS` and not encoded or decoded by the MT.

The MT can send USSD data that contains a maximum 160 bytes to the network side.

Note:
The transmission mode for USSD is set by running `AT^USSDMODE`.

`<dcs>`: integer type, USSD coding. The default value is 15 (see 3GPP TS 23.038 Cell Broadcast Data Coding Scheme in integer format).

When the AT command `AT^USSDMODE=0`, the UE only can support the GSM 7bit and 8bit data coding scheme, not support the UCS2 data coding scheme.

`<m>`:

0	No further user action required (network-initiated USSD-Notify, or no further information needed after terminal initiated operation)

1	Further user action required (network initiated USSD-Request, or further information needed after terminal initiated operation)
2	USSD session released by the network side
3	Other local clients have responded
4	Operation not supported (message returned from network)
5	Network connection timeout

3.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.5.5 Example

To set the character set on a terminal to IRA in non-transparent transmission mode by running `AT+CSCS`:

- Use USSD to query the phone number (given that the query code is *99#):

Run: `AT+CUSD=1,"99",15`

Response: `OK`

- Network response (if the phone number is 86139037601):

Response: `+CUSD: 0,"139037601",15`

The following figure illustrates the process of USSD service (the process of querying bank account balance is used as an example).

MS   USSDC   SP

PSSR: #101*1#(query account balance)   #101*1#(query account balance)

USSR: please input account   Please input account

USSR_RSP: 4000110067281234991   4000110067281234991

USSR: please input password   Please input password

USSR_RSP: 361327   RSP: 361327

PSSR_RSP: remnant$9533.2   Remnant$9533.2

USSR: wrong password. Input password   Wrong password. Input password.

USSR_RSP: 361329   RSP: 361329

PSSR_RSP: remnant$9533.2   Remnant$9533.2

Notes:

For intuitive description, the strings in the previous figure are not converted to codes.

- MT: mobile terminal
- USSDC: USSD center
- SP: the server that provides the service

3.6 +CUSD–Unsolicitedly Report USSD of Network

3.6.1 Command Syntax

URC
<CR><LF>+CUSD: <m>[,<str>,<dcs>]<CR><LF>

3.6.2 Interface Description

When the network responses to USSD originated by MT, or it requests USSD, or the network notifies USSD to MT. MT will unsolicitedly report "+CUSD: <m>[,<str>,<dcs>]" to TE.

3.6.3 **Parameter Description**

The definition of its parameters and the use of this command, see section 3.5 AT+CUSD–USSD Command.

3.6.4 **Property Description**

Saving upon Power-off	PIN
NA	Y

3.6.5 **Example**

If sending `AT+CUSD=1,"3133",15` to MT, an unsolicited report is presented automatically as follows (transparent mode):

Response: `+CUSD:`
`0,"CD69724A74EA1A385B6C9683CD6E3059AE3603",15`

4 Mobile Termination Control and Status Commands

4.1 AT+CFUN–Set Operation Mode

4.1.1 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>

4.1.2 Interface Description

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

The read command queries the current mode.

The test command returns the supported parameter values.

4.1.3 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)

4.1.4 Property Description

Saving upon Power-off	PIN
NA	N

4.1.5 Example

- Query the MT's current mode by using 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 test command:

Run: `AT+CFUN=?`

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

      `OK`

4.2 AT+CPIN–Enter PIN

4.2.1 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>

4.2.2 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.

If the current password required is PIN, run AT+CPIN=<pin> to verify PIN.

If the current password required is PUK, run AT+CPIN=<pin>[,<newpin>] to unblock the PIN. In "AT+CPIN=<pin>[,<newpin>]", <pin> is the SIM PUK, and <newpin> is the new PIN.

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.

4.2.3 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
PH-NET PIN	MT is waiting network personalization password to be given (If network PIN for +CPIN is supported, this field will be supported)

4.2.4 Property Description

Saving upon Power-off	PIN
NA	N

4.2.5 Example

- Read command:

Run: AT+CPIN?

Response: +CPIN: SIM PUK

OK

Note:

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

- Unblock the MT's PUK and set the new PIN code as "5678" (this SIM's PUK 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

4.3 AT+CSQ–Signal Quality

4.3.1 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>

4.3.2 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.

4.3.3 Parameter Description

<rssi>: received signal strength indication.

Network	<rssi>	GSM or UTRAN Cell Signal Strength
GSM& 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)

4.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.3.5 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),99`

                `OK`

4.4 AT+CPBS–Select Phonebook Memory Storage

4.4.1 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>

4.4.2 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.

4.4.3 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 (not supported currently)
"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.

4.4.4 Property Description

Saving upon Power-off	PIN
N	Y

4.4.5 Example

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

Run: AT+CPBS=?

Response: +CPBS: ("SM","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

4.5 AT+CPBR–Read Phonebook Entries

4.5.1 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>

4.5.2 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.

4.5.3 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 2.8 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>`.

4.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.5.5 Example

- Test command:

Run: `AT+CPBR=?`

Response: `+CPBR: (1-250),80,14`

            `OK`

Note:
The module will return the different value if the inserted SIM card's type are different.

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

4.6 AT+CPBW–Write Phonebook Entry

4.6.1 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>
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>

4.6.2 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 no location is free, +CME ERROR: memory full is returned.

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.

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.

4.6.3 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 `AT+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 2.8 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>`.

4.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.6.5 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),80,(128-255),16`

            `OK`

4.7 AT+CRSM–Restricted SIM Access

4.7.1 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>

4.7.2 Interface Description

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

4.7.3 Parameter Description

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

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 the SIM card; 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.

4.7.4 Property Description

Saving upon Power-off	PIN
NA	N

4.7.5 Example

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

Run: AT+CRSM=242

Response: +CRSM:
108,41,"62278202782183023F00A50D8001718302E573C104
800F55FF8A01058B032F0601C6069001008330101"

OK

Notes:

- SW1=108
- SW2=41
- SIM content="62278202782183023F00A50D8001718302E573C104800F55FF8A010 58B032F0601C606900100830101". The values are described in GSM 51.011.

- Test command:

  Run: `AT+CRSM=?`

  Response: `OK`

5 UMTS Packet Domain Commands

5.1 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.

5.1.1 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>[<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>

5.1.2 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.

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 value of `<cid>` is 20, and it will be used for default EPS bearer context.

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.

5.1.3 Parameter Description

`<cid>`:

1–20   Index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context. The PDP context in index 20 is used for LTE EPS default bearer, and it is not suggested to be used for packet data service.

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

"IP"   Internet Protocol

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

"IPV6"   IPV6 Protocol

"IPV4V6"   IPV4V6 Dual Stack

`<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

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

5.1.4 Property Description

Saving upon Power-off	PIN
Y	N

5.1.5 Example

Run: AT+CGDCONT=?

Response: +CGDCONT: (1-20),"IP",,,(0,1,2),(0,1,2,3,4)

            +CGDCONT: (1-20),"IPV6",,,(0,1,2),(0,1,2,3,4)

            +CGDCONT: (1-20),"IPV4V6",,,(0,1,2),(0,1,2,3,4)

            OK

Run: AT+CGDCONT?

Response: +CGDCONT: 20,"IPV4V6","","",0,0

             OK

Note:
> The MT saves one default PDP context, and the `<cid>` value of this context is 20.

Run: AT+CGDCONT=1,"IP","abc.com"

Response: OK

Note:
> This command saves one PDP context to the MT and the `<cid>` value is 1.

5.2 AT+CGACT–Activate or Deactivate PDP Context

5.2.1 Command Syntax

AT+CGACT=[<state>[,<cid>[,<cid>[,…]]]]
Possible Response(s)
<CR><LF>OK<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>

5.2.2 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.

5.2.3 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.

5.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.2.5 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

              OK

- Activate or deactivate PDP contexts:

Run: AT+CGACT=1,1

Response: OK

Run: AT+CGACT=0,1

Response: OK

5.3 AT+CGATT–Attach or Detach PS Domain

5.3.1 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>

5.3.2 Interface Description

The set command attaches the MT to, or detaches the MT from, the packet-switched (PS) domain service. After the command has been completed, the MT remains in V.25 ter 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 queries the current GPRS service state.

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

5.3.3 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.

5.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.3.5 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

5.4 AT+CGREG–PS Domain Registration Status

5.4.1 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>
AT+CGREG=?
Possible Response(s)
<CR><LF>+CGREG: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

5.4.2 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.

5.4.3 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>]].

Note:
AT+CGREG is equivalent to AT+CGREG=0.

<stat>:

0   Not registered, MT is not currently searching for a new operator to register with.

1   Registered, home network

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

<lac>: 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.

5.4.4 Property Description

Saving upon Power-off	PIN
N	Y

5.4.5 Example

Run: AT+CGREG?

Response: +CGREG: 0,1

             OK

Run: AT+CGREG=?

Response: +CGREG: (0-2)

             OK

5.5 AT+CGSMS–SMS Bearer Domain

5.5.1 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>
AT+CGSMS=?
Possible Response(s)
<CR><LF>+CGSMS: (list of supported <service>s)<CR><LF><CR><LF>OK<CR><LF>

5.5.2 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.

5.5.3 Parameter Description

<service>:

0   PS domain

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

Note:

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

5.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

5.5.5 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`

6 Normal Commands for SMS

6.1 AT+CPMS–Preferred Message Storage

6.1.1 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>

6.1.2 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.

6.1.3 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
"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 value is:

"SM"	(U)SIM card

<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.

6.1.4 Property Description

Saving upon Power-off	PIN
N	Y

6.1.5 Example

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

Run: AT+CPMS=?

Response: +CPMS: ("SM","BM"),("SM"),("SM","BM")

            OK

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

Run: AT+CPMS?

Response: +CPMS: "SM",0,23,"SM",0,23,"SM",0,23

            OK

- Set the storage type using the set command:

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

Response: +CPMS: 0,5,0,5,0,5

            OK

6.2 AT+CMGF–Message Format

6.2.1 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>

6.2.2 Interface Description

The set command sets the message format. The format is specified by <mode>, which can be either PDU mode or text mode. At present, the PDU mode are both used in 3GPP and 3GPP2. For details about the message format in PDU mode, see section 6.11 AT+CMGS–Send Message for 3GPP.

The read command returns the currently selected mode.

The test command returns available values of <mode>.

6.2.3 Parameter Description

<mode>:

0   PDU mode (default value)

1   Text mode (not supported currently)

Note:

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

6.2.4 Property Description

Saving upon Power-off	PIN
N	N

6.2.5 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.

6.3 AT+CNMI–New Message Indications to TE

6.3.1 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>

6.3.2 Interface Description

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

<mode> controls how NEW MESSAGE indications (including +CMT, +CMTI, +CDSI, and +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 (+CDSI or +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 3GPP, AT+CNMI is equivalent to AT+CNMI=0,0,0,0,0.

6.3.3 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>
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.
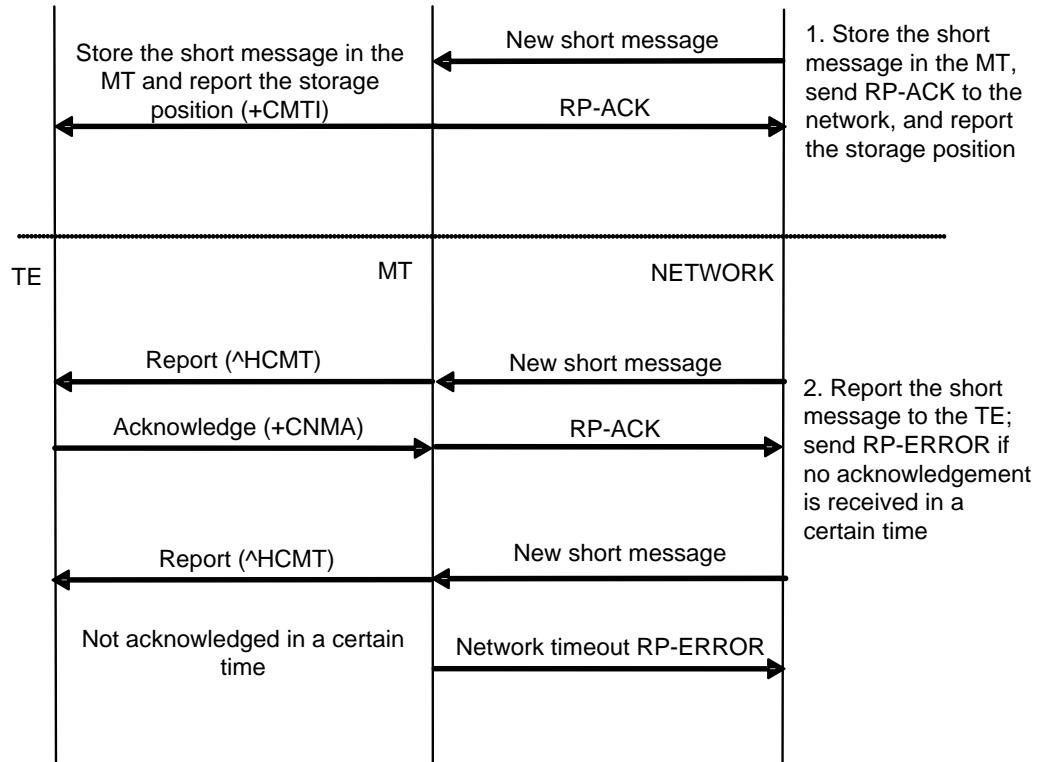
The following table describes the `<mt>` values and the corresponding indications.

`<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 6.11 AT+CMGS–Send Message.
- "+CMT & +CNMA" indicates that the TE is required to send the confirmation (+CNMA).

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

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

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

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

| 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 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 6-1 `<bm>` parameter

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

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

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

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

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

| 2 | Store message status reports to the MT and send the storage location to the TE using `+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 1 to 3 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>=1...3 is entered.

6.3.4 Property Description

Saving upon Power-off	PIN
N	N

6.3.5 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 AT+CMGL command; however, the TE cannot receive the indications.)

- Other commonly-used settings include:

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

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

6.4 AT+CNMA–New Message Acknowledgement

6.4.1 Command Syntax

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

6.4.2 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 6.3 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 6.11 AT+CMGS–Send Message, 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.

6.4.3 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
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	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.

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

<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 6-1 and Figure 6-2 illustrate the formats of the user data encoded using different schemes.

Figure 6-1 User data encoded using the default 7-bit encoding scheme
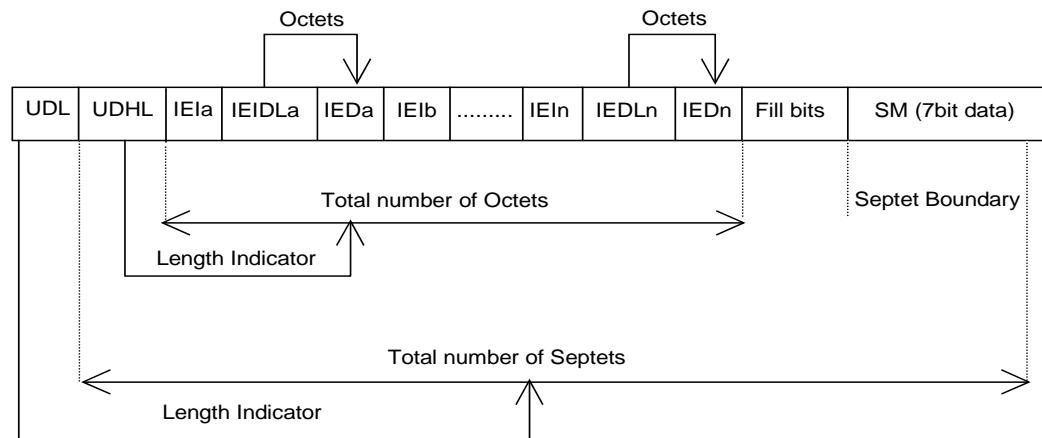
Figure 6-2 User data encoded using the 8-bit or UCS2 encoding scheme
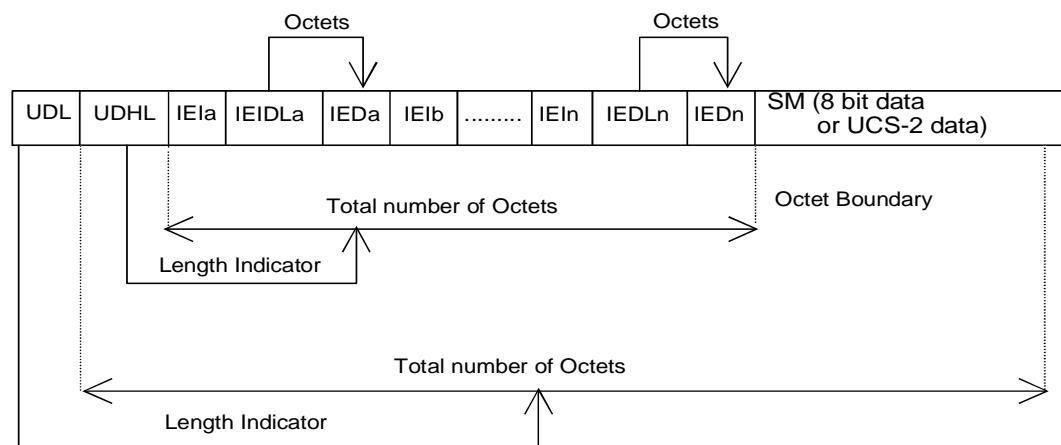
In Figure 6-1 and Figure 6-2 , IEI is short for Information Element Identifier.

6.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.4.5 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

6.5 AT+CMGD–Delete Message

6.5.1 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>

6.5.2 Interface Description

The execution command deletes the message at location `<index>` in the storage `<mem1>`. For details about `<mem1>`, see section 6.1 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 6.5.3 . If the deletion fails, `+CMS ERROR: <err>` is returned.

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

6.5.3 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.

6.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.5.5 Example

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

  Run: `AT+CMGD=1`

  Response: `OK`

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

  Run: `AT+CMGD=1,4`

  Response: `OK`

6.6 AT+CSCA–Service Center Address

6.6.1 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>

6.6.2 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 6.11 AT+CMGS–Send Message.

6.6.3 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 6.11 AT+CMGS–Send Message.

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`.

6.6.4 Property Description

Saving upon Power-off	PIN
Y	Y

6.6.5 Example

Sets the service center number using the test command:

Run:　　　　`AT+CSCA="8613800688509",145`

Response:　`OK`

6.7 AT+CSMS–Select Messaging Service

6.7.1 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>

6.7.2 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.

6.7.3 Parameter Description

`<service>`: messaging service type.

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

`<mt>`, `<mo>`, `<bm>`: integer type values, 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)

6.7.4 Property Description

Saving upon Power-off	PIN
N	N

6.7.5 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`.

6.8 AT+CMGL–List Messages

6.8.1 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>+CMG
L:
<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>

6.8.2 Interface Description

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

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.

6.8.3 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 6.11 AT+CMGS–Send Message.

For the TPDU format of messages to be sent, see section 6.11 AT+CMGS–Send Message. 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 6.11 AT+CMGS–Send Message.

<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 6.11 AT+CMGS–Send Message.

<RP>: see the definition in section 6.11 AT+CMGS–Send Message.

<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 6.11 AT+CMGS–Send Message.

<DCS>: use data coding scheme. See the definition in section 6.11 AT+CMGS–Send Message.

<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 6.11 AT+CMGS–Send Message.

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

6.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.8.5 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.

6.9 AT+CMGR–Read Message

6.9.1 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>

6.9.2 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.

6.9.3 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 6.11 AT+CMGS–Send Message.

6.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.9.5 Example

Read the message stored in index 1 using the execution command:

Run: AT+CMGR=1

Response: +CMGR: 1,,25
             0891683108608805F9040D91683109730147F2000021507161
             72350005F4F29C4E03

             OK

Note:

In this example, the message is in PDU mode.

6.10 AT+CMGW–Write Message to Memory

6.10.1 Command Syntax

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

6.10.2 Interface Description

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

6.10.3 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 1 to the storage's maximum capacity.

For details about the PDU format, see section 6.11 AT+CMGS–Send Message.

6.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.10.5 Example

Run:	AT+CMGF=0
Response:	OK
Run:	AT+CMGW=56
Response:	>
Run:	07813108608805F911000B813109732008F70000FF30547419 347EBBE965371DF13683DAE5F93C7C2E83EE693A1A0427D741 ED37B90C3ABFCB7310BA2C2F8342<ctrl-Z>
Response:	+CMGW: 10
	OK

6.11 AT+CMGS–Send Message

6.11.1 Command Syntax

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>

6.11.2 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>(IRA 26).

6.11.3 Parameter Description

<length>: number of actually sent TPDU characters/2 in decimal format ranging from 0 to 9.

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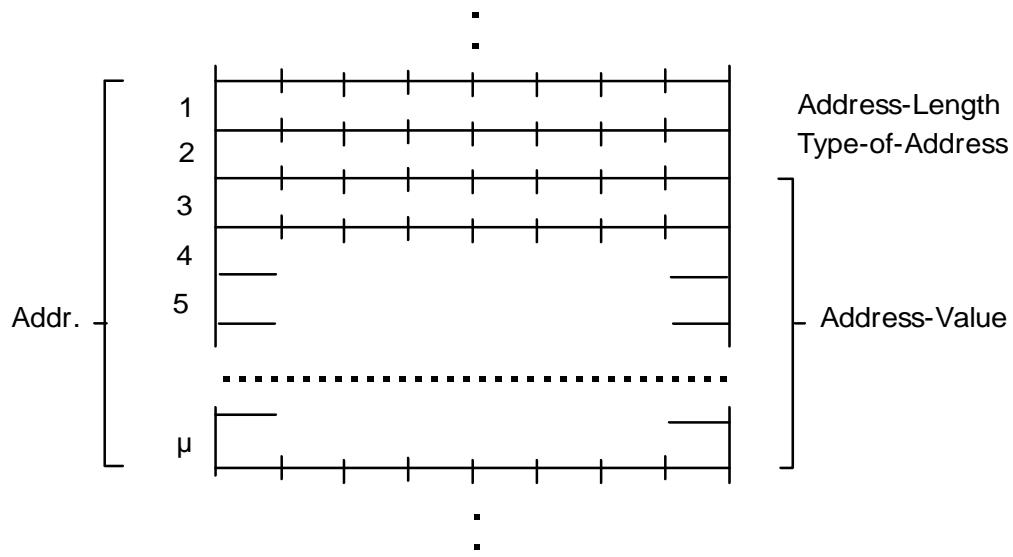
<sc_len>: length of <SCA>. It is composed of two characters. It indicates the number of characters occupied by <type_addr> and (<numbers>/2).

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

1	Type-of-number	Numbering-plan-identification
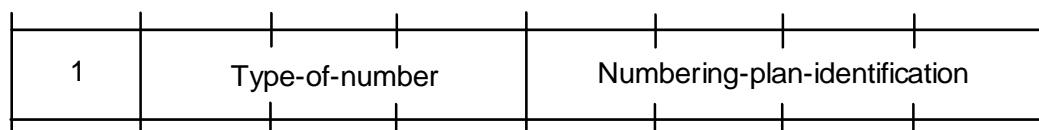
Values of Type-of-Number (bit 6–4) are defined as follows:

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.

n+1	Digit 2	Digit 1
n+2	Digit 4	Digit 3
n+3	1 1 1 1	Digit 5
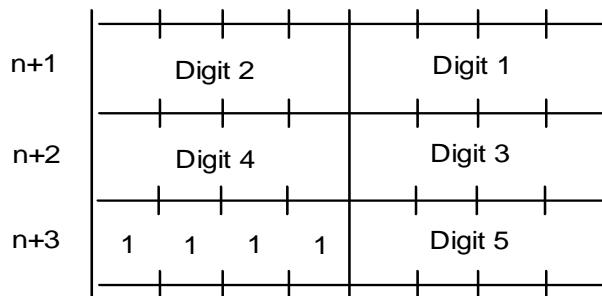
Note:

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								1 Oct	2 Oct~1 2 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0 Oct ~140 Oct
RP	UD HI	SR R	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0							

<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:

Bits 7…4			Bits 3…0
00xx	Bit 5	0: Message is not compressed.	Bit 1 Bit 0 message type indication. 0 0 Class 0, displayed on the user interface but not stored. A response is sent to the SC to acknowledge the

Bits 7…4			Bits 3…0
		1: Message is compressed. This is not supported currently.	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
	Bit 4	0: indicates that bit 1 and bit 0 are reserved.	
		1: indicates that bit 1 and bit 0 serve as the message type indication.	
0100 … 1011	reserved		
1100	The message content is discarded. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.		The settings of bits 3…0 are the same as those when bits 7…4=1101.
1101	The message is stored. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.		Bit 3　enables or disables message waiting indication. 0　disables message waiting indication 1　enables message waiting indication Bit 2　reserved. The value is 0. Bit 1　Bit 0　message type indication. 0　0　voice message waiting 0　1　fax message waiting 1　0　email message waiting 1　1　message of unknown type waiting
1110	The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.		The settings of bits 3…0 are the same as those when bits 7…4=1101.
1111	Data coding/message class		Bit 3　reserved. The value is 0. Bit 2　message encoding scheme. Its values are defined as follows: 0　GSM 7-bit encoding scheme; default.

Bits 7...4		Bits 3...0
		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>.

6.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.11.5 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`

6.12 AT+CMSS–Send Message from Storage

6.12.1 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>

6.12.2 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`.

6.12.3 Parameter Description

For the parameter description of this command, see section 6.11 AT+CMGS–Send Message.

6.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.12.5 Example

Send a stored short message in PDU mode.

Run: `AT+CMGF=0`

Response: `OK`

Run:	`AT+CMSS=8`	A short message whose status is 2 exists at the location whose index is 8.
Response:	`+CMSS: 21`	
	`OK`	

6.13 +CMTI–New SMS-DELIVER Indication

6.13.1 Command Syntax

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

6.13.2 Interface Description

This command indicates that a new message is received.

6.13.3 Parameter Description

`<mem>`:

"BM"	Broadcast message storage
"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.

6.13.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.13.5 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.

6.14 +CDSI–New SMS Status Report Indication

6.14.1 Command Syntax

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

6.14.2 Interface Description

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

6.14.3 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.

6.14.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.14.5 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`

6.15 +CMT–New Message Directly Deliver Indication

6.15.1 Command Syntax

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

6.15.2 Interface Description

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

6.15.3 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 6.11 AT+CMGS–Send Message.

6.15.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.15.5 Example

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

Response:	`+CMT: ,24`
	`0891683108608805F9240D916831`
	`09731128F50000411061518333000`
	`0462B1580C`
		Presents an indication, without solicitation, when the message storage is full.

Note:

In this example, the message is in PDU mode.

6.16 +CDS–SMS Status Report Indication Directly Displayed

6.16.1 Command Syntax

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

6.16.2 Interface Description

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

6.16.3 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 6.11 AT+CMGS–Send Message.

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

Abbr.	Reference	P1)	R2)
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).

6.16.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.16.5 Example

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

Response: +CDS: 26
              0891683108608805F906F80D91683109731128F54110615183
              33004110615183630000

Note:

In this example, the message is in PDU mode.

6.17 ^SMMEMFULL–Message Memory Full

6.17.1 Command Syntax

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

6.17.2 Interface Description

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

6.17.3 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 currently)

6.17.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.17.5 Example

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

Response: `^SMMEMFULL: "SM"`

7 Standard STK Interface Commands

7.1 +CUSATP–Unsolicitedly Report a UICC Proactive Command

7.1.1 Command Syntax

URC
<CR><LF>+CUSATP: <proactive_command><CR><LF>

7.1.2 Interface Description

The MT uses the unsolicited result code +CUSATP: <proactive_command> to notify TE that SIM card presents a proactive command.

7.1.3 Parameter Description

<proactive_command>: UICC proactive command, string type in hexadecimal character format, consisting of the full BER-TLV data object as defined in 3GPP TS 31.111, ETSI TS 102.221 and ETSI TS 102.223 protocols.

7.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

7.1.5 Example

Response:	+CUSATP: "D01A8103012300820281828D0B04 3C54494D452D4F55543E9102000A"	Unsolicitedly report a proactive command "GET INPUT".

7.2 AT+CUSATE–Send USAT Envelope

7.2.1 Command Syntax

AT+CUSATE=<envelope_command>
Possible Response(s)
<CR><LF>+CUSATE: <envelope_response>[,<busy>]<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CUSATE=?
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.2.2 Interface Description

This command is used to sent a USAT envelope command to UICC.

7.2.3 Parameter Description

<envelope_command>: an envelope command, string type in hexadecimal character format, consisting of the full BER-TLV data object as defined in 3GPP TS 31.111 , ETSI TS 102.221 and ETSI TS 102.223 protocols.

<envelope_response>: the response to an envelope command, string type in hexadecimal character format, consisting of the full BER-TLV data object as defined in 3GPP TS 31.111, ETSI TS 102.221 and ETSI TS 102.223 protocols. Empty if the UICC does not provide response data.

<busy>: integer type.

0	Indicates normal ending of the envelope command.
1	UICC responded with USAT is busy, retry to send the envelope command by the MT.
2	UICC responded with USAT is busy even after one or more retries by the MT.

7.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2.5 Example

Sent envelope command "MENU SELECTION" (MENU has been got by running the proactive command "SET UP MENU"); <busy> indicated "0" and envelope command perform successfully.

Run: AT+CUSATE="D30782020181900102"

Response: +CUSATE: "",0

            OK

7.3 AT+CUSATT–Send USAT Terminal Response

7.3.1 Command Syntax

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

7.3.2 Interface Description

This command is used to send a USAT terminal response to UICC.

7.3.3 Parameter Description

`<terminal_response>`: terminal response to a proactive command, string type in hexadecimal character format, consisting of the full BER-TLV data object as defined in 3GPP TS 31.111, ETSI TS 102.221 and ETSI TS 102.223 protocols.

7.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.3.5 Example

Sent the UICC proactive command `"DISPLAY TEXT"`, and terminal response `"Command Perform Successfully"` is responded.

Response:	`+CUSATP: "D0158103012100820281028D0404434154"`
Run:	`AT+CUSATT="8103012180820282281830100"`
Response:	`OK`

7.4 +CUSATEND–Unsolicitedly Report of Terminating a UICC Proactive Command Session

7.4.1 Command Syntax

URC
`<CR><LF>+CUSATEND<CR><LF>`

7.4.2 Interface Description

The MT uses the unsolicited result code `+CUSATEND` to notify TE that the proactive command session is terminated.

7.4.3 Parameter Description

None

7.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

7.4.5 Example

As the following, the proactive command is reported:

Response: +CUSATP:
"D04B8103012500820281820 50D53494D20536572766963657
3FF8F0D8750686F6E65206E756D6265728F0B8553656C66205
3657276658F10805370656369616C204E756D6265727318032
12421"

Then user send the terminal response:

Run: AT+CUSATT="81030125 8082028281830100"

Response: OK

Then the CUSATEND will be reported as following:

Response: +CUSATEND

8 Huawei Proprietary Interface: BodySAR Interface Description

8.1 AT^BODYSARON–Disable or Enable BodySAR

8.1.1 Command Syntax

AT^BODYSARON=<on>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^BODYSARON?
Possible Response(s)
<CR><LF>^BODYSARON: <on><CR><LF><CR><LF>OK<CR><LF>
AT^BODYSARON=?
Possible Response(s)
<CR><LF>^BODYSARON: (0,1)<CR><LF><CR><LF>OK<CR><LF>

8.1.2 Interface Description

The set command enables or disables the BodySAR function.

The read command queries the current BodySAR function status.

The test command checks the parameter value range supported by this command.

8.1.3 Parameter Description

<on>: state of BodySAR function

0	Disable Body SAR (default value)
1	Enable Body SAR

8.1.4 Property Description

Saving upon Power-off	PIN
N	N

8.1.5 Example

Run:	AT^BODYSARON=1
Response:	OK
Run:	AT^BODYSARON?
Response:	^BODYSARON: 1
	OK
Run:	AT^BODYSARON=?
Response:	^BODYSARON: (0,1)
	OK

8.2 AT^BODYSARCFG–Set the BodySAR Type

8.2.1 Command Syntax

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

```
<CR><LF>^BODYSARCFG: (list of supported
<state>s)<CR><LF><CR><LF>OK<CR><LF>
```

8.2.2 Interface Description

The set command sets the bodySAR type , including ON, OFF and AUTO.

The read command queries the current bodySAR type. If it is not set, the default value will be returned.

The test command returns all supported values of `<state>`.

8.2.3 Parameter Description

`<state>`: the bodySAR type.

0	OFF state, indicating the bodySAR function is disabled.
1	ON state, indicating the bodySAR function is enabled. (default value)
2	AUTO state. If the PLMN number of inserted SIM card is in the bodySAR PLMN list configured in the module, the bodySAR function is enabled. Otherwise, the bodySAR function is disabled.

Note:
Only when the bodySAR function is enabled, AT^BODYSARON command can be used.

8.2.4 Property Description

Saving upon Power-off	PIN
Y	N

8.2.5 Example

Run:	`AT^BODYSARCFG=?`	
Response:	`^BODYSARCFG: (0,1,2)`	It indicates that there are three supported bodySAR types: ON, OFF and AUTO.
	`OK`	
Run:	`AT^BODYSARCFG=1`	Set the bodySAR type to be ON.
Response:	`OK`	
Run:	`AT^BODYSARCFG?`	Query the current bodySAR type.

Response: ^BODYSARCFG: 1

OK

8.3 AT^BODYSARWCDMA–Set the Maximum Tx Power Limit of WCDMA

8.3.1 Command Syntax

AT^BODYSARWCDMA=<power>[,<band>[,<power>,<band>]...]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^BODYSARWCDMA?
Possible Response(s)
<CR><LF>^BODYSARWCDMA: list of (<power>,<band>)s<CR><LF><CR><LF>OK<CR><LF>
AT^BODYSARWCDMA=?
Possible Response(s)
<CR><LF>^BODYSARWCDMA: (0-24),<band><CR><LF><CR><LF>OK<CR><LF>

8.3.2 Interface Description

The set command sets the maximum Tx power limit of WCDMA for each band. Set the maximum Tx power limit of WCDMA for selected band according to the value of band bit field, and you can send this command for several times and set the different power limit when the values of bands are set differently.

The read command queries the maximum Tx power limit of WCDMA for each band. If the parameter values are not set, the default values are displayed after the query.

The test command checks the band range supported by WCDMA and the parameter values supported by the maximum Tx power limit for each band.

8.3.3 Parameter Description

<power>: the maximum Tx power limit, integers ranging from 0 to 24 in dBm.

<band>: band bit field, 32-bit digit with hexadecimal. A binary bit indicates a frequency band. The value of binary bit is shown in the following table (or parameter superimposed values except 3FFFFFFF).

Parameters	Band
00000001	WCDMA_I_IMT_2100
00000002	WCDMA_II_PCS_1900
00000004	WCDMA_III_1700
00000008	WCDMA_IV_1700
00000010	WCDMA_V_850
00000020	WCDMA_VI_800
00000040	WCDMA_VII_2600
00000080	WCDMA_VIII_900
00000100	WCDMA_IX_1700
3FFFFFFF	All supported bands

[,<band>[,<power>,<band>]…]: indicates that select all supported bands when all parameters are default. The parameter can set several groups (less or equal to eight groups) of power at one time. One <power> is set according to <band> in the same group.

8.3.4 Property Description

Saving upon Power-off	PIN
Y	N

8.3.5 Example

Run:	AT^BODYSARWCDMA=?	
Response:	^BODYSARWCDMA: (0-24),0000009B OK	Indicate that the firmware supports WCDMA Band I, Band II, Band IV, Band V and Band VIII; the power is from 0 to 24.
Run:	AT^BODYSARWCDMA=20,00000001,18,0000000a	Indicate that set the maximum WCDMA I Tx power limit to 20 and the maximum WCDMA II and WCDMA IV Tx power limit to 18.
Response:	OK	

Run:	`AT^BODYSARWCDMA?`

Response:	`^BODYSARWCDMA:`
	`(20,00000001),(18,0000000a),(24,0`
	`0000090)`
	
	`OK`

Indicate that the current maximum WCDMA I Tx power limit is set to 20 and the maximum WCDMA II and WCDMA IV Tx power limit is set to 18, and other supported bands is set to 24.

8.4 AT^BODYSARGSM–Set the Maximum Tx Power Limit of GSM

8.4.1 Command Syntax

`AT^BODYSARGSM=<power>[,<band>[,<power>,<band>]...]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
`AT^BODYSARGSM?`
Possible Response(s)
<CR><LF>`^BODYSARGSM:` list of (`<power>`,`<band>`)s<CR><LF><CR><LF>`OK`<CR><LF>
`AT^BODYSARGSM=?`
Possible Response(s)
<CR><LF>`^BODYSARGSM: (0-33),`<band><CR><LF><CR><LF>`OK`<CR><LF>

8.4.2 Interface Description

The set command sets the maximum Tx power limit of GSM (GPRS and EGPRS) for each band single time-slot. Set the maximum Tx power limit of GSM for selected band according to the value of band bit field, and AP can send this command for several times and set the different power limit when the values of bands are set differently.

The read command queries the maximum Tx power limit of GSM (GPRS and EGPRS) for each band. If the parameter values are not set, the default values are displayed after the query.

The test command checks the band range supported by GSM (GPRS and EGPRS), and the parameter values supported by the maximum Tx power limit for each band.

Note:

The AT^BODYSARGSM command sets the maximum Tx power limit of GSM (GPRS and EGPRS) for each band in single time-slot. When the module changes into multi-slot configuration, the maximum Tx power limit of each time-slot will be reduced. The power reduction in multi-slot configuration is as follows.

Number of timeslots in uplink assignment	Reduction of maximum Tx power (dB)
1	0
2	3
3	5
4	6
5	7
6	8
7	8.5
8	9

8.4.3 Parameter Description

`<power>`: the maximum Tx power limit. Integer ranging from 0 to 33 in dBm.

`<band>`: band bit field, 32-bit digit with hexadecimal. A binary bit indicates a frequency band. The value of binary bit is shown in the following table (or parameter superimposed values except 3FFFFFFF).

Parameters(GPRS)	Parameters(EGPRS)	Band
00000001	00010000	GSM850
00000002	00020000	GSM900
00000004	00040000	GSM1800
00000008	00080000	GSM1900
3FFFFFFF		All supported bands

`[,<band>[,<power>,<band>]…]`: indicates that select all supported bands when all parameters are default. The parameter can set several groups (less or equal to eight groups) of power at one time. One `<power>` is set according to `<band>` in the same group.

8.4.4 Property Description

Saving upon Power-off	PIN
Y	N

8.4.5 Example

Run:	`AT^BODYSARGSM=?`	

Response:	`^BODYSARGSM: (0-33),000F000F`
	
	`OK`
		Indicate that the firmware supports GPRS850, GPRS900, GPRS1800 and GPRS1900, EGPRS850, EGPRS900, EGPRS1800 and EGPRS1900; the power is from 0 to 33.

Run:	`AT^BODYSARGSM=20`	Indicate that default value, set the maximum Tx power limit for the band supported by firmware to 20.
Response:	`OK`	
Run:	`AT^BODYSARGSM?`	

Response:	`^BODYSARGSM: (20,3FFFFFFF)`
	
	`OK`
		Indicate that the maximum Tx power limit for the band supported by firmware is set to 20.

8.5 AT^BODYSARLTE–Set the Maximum Tx Power Limit of LTE

8.5.1 Command Syntax

AT^BODYSARLTE=\<power>[,\<band>[,\<power>,\<band>]…]
Possible Response(s)
\<CR>\<LF>OK\<CR>\<LF>
AT^BODYSARLTE?
Possible Response(s)

<CR><LF>^BODYSARLTE: list of
(<power>,<band>)s<CR><LF><CR><LF>OK<CR><LF>

AT^BODYSARLTE=?

Possible Response(s)

<CR><LF>^BODYSARLTE: (0-24),<band><CR><LF><CR><LF>OK<CR><LF>

8.5.2 Interface Description

The set command sets the maximum Tx power limit of LTE for each band. Set the maximum Tx power limit of LTE for selected band according to the value of band bit field, and you can send this command for several times and set the different power limit when the values of bands are set differently.

The read command queries the maximum Tx power limit of LTE for each band. If the parameter values are not set, the default values are displayed after the query.

The test command checks the band range supported by LTE and the parameter values supported by the maximum Tx power limit for each band.

8.5.3 Parameter Description

<power>: the maximum Tx power limit. Integer ranging from 0 to 24.

<band>: band bit field, 64-bit digit with hexadecimal. A binary bit indicates a frequency band. The value of binary bit is shown in the following table (or parameter superimposed values except FFFFFFFFFFFFFFFF).

Parameters	Band
0000000000000001	band 1
0000000000000002	band 2
0000000000000004	band 3
0000000000000008	band 4
0000000000000010	band 5
0000000000000020	band 6
0000000000000040	band 7
0000000000000080	band 8
0000000000000100	band 9
0000000000000200	band 10
0000000000000400	band 11
0000000000000800	band 12
0000000000001000	band 13

Parameters	Band
0000000000002000	band 14
0000000000004000	band 15
0000000000008000	band 16
0000000000010000	band 17
0000000000020000	band 18
0000000000040000	band 19
0000000000080000	band 20
0000000000100000	band 21
0000000000200000	band 22
0000000000400000	band 23
0000000000800000	band 24
0000000001000000	band 25
0000000002000000	band 26
0000000004000000	band 27
0000000008000000	band 28
0000000010000000	band 29
0000000020000000	band 30
0000000040000000	band 31
0000000080000000	band 32
0000000100000000	band 33
0000000200000000	band 34
0000000400000000	band 35
0000000800000000	band 36
0000001000000000	band 37
0000002000000000	band 38
0000004000000000	band 39
0000008000000000	band 40
0000010000000000	band 41
0000020000000000	band 42
0000040000000000	band 43
0000080000000000	band 44

Parameters	Band
0000100000000000	band 45
0000200000000000	band 46
0000400000000000	band 47
0000800000000000	band 48
0001000000000000	band 49
0002000000000000	band 50
0004000000000000	band 51
0008000000000000	band 52
0010000000000000	band 53
0020000000000000	band 54
0040000000000000	band 55
0080000000000000	band 56
0100000000000000	band 57
0200000000000000	band 58
0400000000000000	band 59
0800000000000000	band 60
1000000000000000	band 61
2000000000000000	band 62
4000000000000000	band 63
8000000000000000	band 64
FFFFFFFFFFFFFFFF	All supported bands

[,<band>[,<power>,<band>]…]: indicates that select all supported bands when all parameters are default. The parameter can set several groups (less or equal to eight groups) of power at one time. One <power> is set according to <band> in the same group.

8.5.4 Property Description

Saving upon Power-off	PIN
Y	N

8.5.5 **Example**

Run:	`AT^BODYSARLTE=?`	

Response:	`^BODYSARLTE:`
	`(0-24),00000000000910DF`
	
	`OK`
		Indicate that the firmware supports band1, band2 and band3, band4, band5, band7, band8, band13, band17 and band20; the power is from 0 to 24.

Run:	`AT^BODYSARLTE=20`	Indicate that set the maximum Tx power limit of bands supported by firmware to 20.
Response:	`OK`	
Run:	`AT^BODYSARLTE?`	

Response:	`^BODYSARLTE: (20,FFFFFFFF`
	`FFFFFFFF)`
	
	`OK`
		Indicate that the maximum Tx power limit of bands supported by firmware is set to 20.

9 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

9.1 ^THERM–Thermal Protection Activated Unsolicited Report

9.1.1 Command Syntax

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

9.1.2 Interface Description

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

9.1.3 Parameter Description

`<ACTION>`: value that 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.

9.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.1.5 **Example**

- Indicates that the thermal protection is inactive:

Response: `^THERM: 0`

- Indicates that the thermal protection is active:

Response: `^THERM: 1`

9.2 AT^CURC–Set Presentation of Unsolicited Results

9.2.1 **Command Syntax**

AT^CURC=<mode>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
AT^CURC?
Possible Response(s)
<CR><LF>^CURC: <mode><CR><LF><CR><LF>OK<CR><LF>
AT^CURC=?
Possible Response(s)
<CR><LF>^CURC: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

9.2.2 **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.

9.2.3 **Parameter Description**

`<mode>:`

control mode for the presentation of unsolicited results.

0   The presentation of the unsolicited indications in Table 9-1 is disabled.

1   Enables the presentation of the unsolicited indications (default value).

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

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

Note:

The AT^CURC command cannot be used on the host with Windows 8 OS.

9.2.4 Property Description

Saving upon Power-off	PIN
N	N

9.2.5 Example

- To set <mode> to 0:

Run: AT^CURC=0

Response: OK

- Read command:

Run: AT^CURC?

Response: `^CURC: 0`

`OK`

- The test command:

Run: `AT^CURC=?`

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

`OK`

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

9.3.1 Command Syntax

AT^WAKEUPCFG=<n>[,<channel>[,<source>]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<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>

9.3.2 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.

9.3.3 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   Enables the channel controlled by the bit.

1   Disables the channel controlled by the bit.

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

0x01   PIN Wake-up

0x02   USB Remote Wakeup

0x04–0x80   Reserved

The default value of this parameter is 0x0003 (Wake up PIN+USB).

`<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   Enables the source controlled by the bit.

1   Disables the source controlled by the bit.

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

0x0001   Voice

0x0002   SMS

0x0004   Data

0x0008   UR (unsolicited report)

0x0010–0x8000   reserved

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

9.3.4 Property Description

Saving upon Power-off	PIN
Y	N

Notes：

- 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.
- The `AT^WAKEUPCFG` command cannot be used on the host with Windows 8 OS.

9.3.5 Example

- The set command if only support USB Remote Wakeup:

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

Response: `OK`

- Read command:

Run: `AT^WAKEUPCFG?`

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

            `OK`

- The test command:

Run: `AT^WAKEUPCFG=?`

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

            `OK`

9.4 AT^CPIN–Manage PIN

9.4.1 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>

9.4.2 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.

If the current password required is PIN, run AT^CPIN=<pin> to verify PIN.

If the current password required is PUK, run AT^CPIN=<pin>,<newpin> to unblock the PIN. In "AT^CPIN=[<pin>][,<newpin>]", <pin> is the SIM PUK, and <newpin> is the new PIN.

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.

9.4.3 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. PIN2 and PUK2 is not supported currently.

`<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.

9.4.4 Property Description

Saving upon Power-off	PIN
N	N

9.4.5 Example

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

Run: `AT^CPIN?`

Response: `^CPIN: SIM PIN,3,10,3,10,3`

            `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,,10,3,10,3`

            `OK`

Run: `AT^CPIN=?`

Response: `OK`

9.5 AT^RFSWITCH–Set the Flight Mode

9.5.1 Command Syntax

`AT^RFSWITCH=<SW state>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR:`<err><CR><LF>
`AT^RFSWITCH?`
Possible Response(s)
<CR><LF>`^RFSWITCH: <SW state>,<HW state>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR:`<err><CR><LF>
`AT^RFSWITCH=?`
Possible Response(s)
<CR><LF>`^RFSWITCH: (0-1),(0-1)`<CR><LF><CR><LF>`OK`<CR><LF>

9.5.2 Interface Description

This command switches the RF and saves the corresponding value, the query features including pin LGA interface PIN45 status query which determines the state of the hardware switch.

^RFSWITCH feature is equivalent to +CFUN function (the two values are 0 and 1), based on the values save the corresponding value.

`AT^RFSWITCH=0` is equivalent to `AT+CFUN=4`.

`AT^RFSWITCH=1` is equivalent to `AT+CFUN=1`.

9.5.3 Parameter Description

`<SW state>`: state of RF software switch, the valid value: 0 and 1.

0	The state of RF software switch is set to off.
1	The state of RF software switch is set to on.

`<HW state>`: state of RF hardware switch, the valid value: 0 and 1.

0	The state of RF hardware switch is set to off.
1	The state of RF hardware switch is set to on.

9.5.4 Property Description

Saving upon Power-off	PIN
Y	N

9.5.5 Example

Query the current state of RF switch: (return information for the current state of the hardware switch is open, the software switch is off)

Run: `AT^RFSWITCH?`

Response: `^RFSWITCH: 0,1`

          `OK`

9.6 ^RFSWITCH–Report the RF SWITCH State

9.6.1 Command Syntax

URC
<CR><LF>^RFSWITCH: <SW state>,<HW state><CR><LF>

9.6.2 Interface Description

This command reports the status of the W_DISABLE# pin (pin 45) and RF software switch. Once the W_DISABLE# pin or RF software switch changes, this command is reported.

9.6.3 Parameter Description

`<SW state>`: state of RF software switch, the valid value: 0 and 1.

0   The state of RF software switch is set to off.

1   The state of RF software switch is set to on.

`<HW state>`: state of RF hardware switch, the valid value: 0 and 1.

0   The state of RF hardware switch is set to off.

1   The state of RF hardware switch is set to on.

9.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.6.5 Example

When RF software and hardware are on and the status of RF software changes from on to off, the device will report the following:

Response: `^RFSWITCH: 0,1`

When RF software and hardware are on and the status of RF hardware changes from on to off, the device will report the following:

Response: `^RFSWITCH: 1,0`

9.7 AT^MSO–Shutdown Command

9.7.1 Command Syntax

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

9.7.2 Interface Description

This command powers off the MT. When the command is executed, the MT logs out of the network, saves subscriber data, and then shut down.

9.7.3 Parameter Description

None

9.7.4 Property Description

Saving upon Power-off	PIN
NA	N

9.7.5 Example

Run: `AT^MSO`

Response: `OK`

9.8 AT^CARDLOCK–Card Lock Administration

9.8.1 Command Syntax

AT^CARDLOCK?
Possible Response(s)
<CR><LF>^CARDLOCK: <status>,<times>,<operator>**<CR><LF><CR><LF>**OK**<CR><LF>** In case of an MT-related error: **<CR><LF>**+CME ERROR: <err>**<CR><LF>**
AT^CARDLOCK=<unlock_code>
Possible Response(s)
<CR><LF>OK**<CR><LF>** In case of an MT-related error: **<CR><LF>**+CME ERROR: <err>**<CR><LF>**
AT^CARDLOCK=?
Possible Response(s)
<CR><LF>OK**<CR><LF>**

9.8.2 Interface Description

`AT^CARDLOCK` command is used to unlock a SIM locked MT and query MT's SIM lock state. If the SIM locked MT is customized by the operator, MT can only use the SIM card specified by this operator (in the following description, a valid SIM card is a SIM card specified by the operator; an invalid SIM card indicates a SIM card not specified by the operator). When an invalid SIM card is installed on the MT, `<unlock_code>` is requested for unlocking the SIM lock. If the unlock code is not entered, SIM-related services, including network registration, calling, and messaging, are unavailable, but emergency calls are available.

The set command id used to unlock the MT's SIM lock. `<unlock_code>` specifies the unlock code for the MT. Each MT has a unique unlock code.

- If the correct unlock code is entered, the MT's SIM lock will be removed permanently. The MT can work with any SIM card and the unlock code will never be requested. After the MT's SIM lock is removed permanently or the MT's SIM lock is disabled, if a unlock code is entered, +CME ERROR: 3 will be returned.

- If the number of consecutive incorrect unlock code entry attempts exceeds 10 (the number of consecutive incorrect unlock code entry can be specified. Generally, it is 10), the MT's SIM lock will be locked permanently. The MT can only work with valid SIM card. After the MT's SIM lock is locked permanently, if a unlock code is entered again, +CME ERROR: 3 will be returned.

The read command queries the current SIM lock status and remaining number of unlock attempts.

- When the MT's SIM lock is locked permanently, no matter that the MT's SIM card is locked or not, 3 is returned for `<status>`.

- When the MT's SIM lock is removed permanently or the MT's SIM lock is disabled, no matter that the MT's SIM card is locked or not, 2 is returned for `<status>`.

- When the MT's SIM lock is enabled and the remaining number of unlock attempts exceeds 0, if there is not a SIM card installed on the MT, or a SIM card is invalid, or PIN code is not verified, 1 is returned for `<status>`.

Note:
An MT without IMEI will not be locked.

9.8.3 Parameter Description

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

1   Unlocked code needs to be provided.

2   Unlocked code does not need to be provided.

3   The module is locked forever.

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

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

24202   Netcom Norway locks this module.

46000   Mobile China locks this module.

0   No any operators lock this module.

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

9.8.4 **Property Description**

Saving upon Power-off	PIN
NA	N

9.8.5 **Example**

- If the SIM card is valid and the remaining number of unlock attempts is 10.

Run: AT^CARDLOCK?

Response: ^CARDLOCK: 2,10,0

             OK

- If the SIM card is invalid and the unlock code is 11111111.

Run: AT^CARDLOCK?

Response: ^CARDLOCK: 1,10,0

             OK

Run: AT^CARDLOCK="11111111"

Response: OK   The MT is unlocked and the
                                         SIM lock is removed
                                         permanently.

Run: AT^CARDLOCK?

Response: ^CARDLOCK: 2,10,0

             OK

- If the SIM card is invalid and the MT has been locked permanently.

Run: AT^CARDLOCK?

Response: `^CARDLOCK: 3,0,0`

`OK`

9.9 AT^HWCUST–Enable Custom Hardware Function

9.9.1 Command Syntax

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

9.9.2 Interface Description

This command is used to control the hardware pin and to enable or disable a specified hardware function.

9.9.3 Parameter Description

`<func>`: hardware function.

0	GNSS reference clock
1–255	Reserved

`<action>`: operation on the hardware pin. The value of `<action>` varies according to the value of `<func>`.

0	Disable output (default value).
1	Enable output.
2–255	Reserved

9.9.4 Property Description

Saving upon Power-off	PIN
N	N

9.9.5 Example

The following assumes that a module only supports the GNSS reference clock function:

- Enable the output of the GNSS reference clock function:

Run: `AT^HWCUST=0,1`

Response: `OK`

- Query the status of a specified hardware function:

Run: `AT^HWCUST?`

Response: `^HWCUST: (0,1)`

`OK`

- Query the present value range:

Run: `AT^HWCUST=?`

Response: `^HWCUST: (0,(0,1))`

`OK`

9.10 AT^ICCID–Query the ICCID

9.10.1 Command Syntax

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

9.10.2 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.

9.10.3 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 GSM11.11 protocol).

Byte 1:

| b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 |

LSB of Digit 1
MSB of Digit 1
LSB of Digit 2
MSB of Digit 2

Byte 2:

| b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 |

LSB of Digit 3
MSB of Digit 3
LSB of Digit 4
MSB of Digit 4

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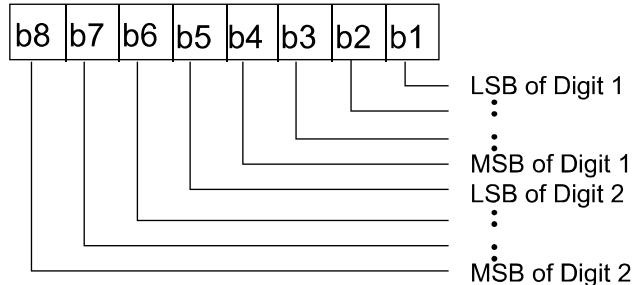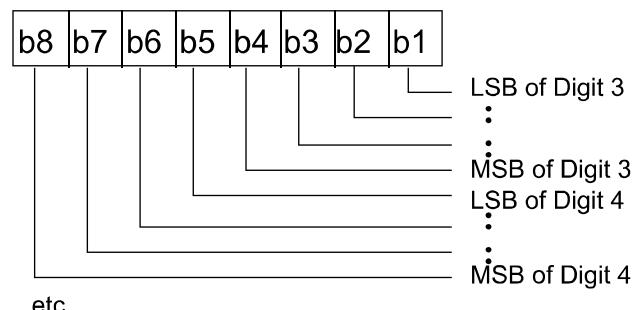
The bit sequence of the information obtained from the EF_{ICCID} file must be converted.

9.10.4 Property Description

Saving upon Power-off	PIN
NA	N

9.10.5 **Example**

Run:	AT^ICCID?	Query the ICCID of the SIM card of which the EF$_{ICCID}$ file contains the character string 98684006905725201069
Response:	^ICCID: 89860460097552020196 OK	

10 Huawei Proprietary Interface: Network Service Interfaces

10.1 AT^SYSINFOEX–Query Extended System Information

10.1.1 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>

10.1.2 Interface Description

This command queries the current system information, such as the system service status, domain, roaming status, system mode, and SIM card state.

10.1.3 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.

<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. |

<sysmode>: indicates the system mode. Its values are defined as follows:

0	NO SERVICE
1	GSM
2	CDMA (not supported currently)
3	WCDMA
4	TD-SCDMA (not supported currently)
5	WIMAX (not supported currently)
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
2	GPRS
3	EDGE
4–20	Reserved
41	WCDMA
42	HSDPA
43	HSUPA
44	HSPA
45	HSPA+
46	DC-HSPA+
47–60	Reserved
101	LTE
Other value	Reserved

`<submode_name>`: system sub-mode. (The 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+.

10.1.4 Property Description

Saving upon Power-off	PIN
NA	N

10.1.5 Example

Run:	`AT^SYSINFOEX`	

Response:	`^SYSINFOEX:`
	`2,3,0,1,0,3,"WCDMA",41,"WCDMA"`
	
	`OK`
		The response indicates that the UE is operating over a WCDMA network in WCDMA mode.

10.2 AT^SYSCFGEX–Configure Extended System

10.2.1 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>

10.2.2 Interface Description

This command sets the system mode, network access order, frequency band, roaming support, domain, and other features.

The read command queries the current system configuration.

The test command returns supported values as a compound value.

10.2.3 Parameter Description

<acqorder>: a string type value that specifies the network access order. Its value can be the following values:

"00"	Automatic
"01"	GSM
"02"	WCDMA
"03"	LTE
"99"	Not change

For example, the 03 value indicates LTE only.

The 99 value indicates no change of the network access order.

The 00 value indicates automatic network access order that is determined by the board.

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

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

00000080 (CM_BAND_PREF_GSM_DCS_1800)	GSM DCS systems
00000100 (CM_BAND_PREF_GSM_EGSM_900)	Extended GSM 900
00080000 (CM_BAND_PREF_GSM_850)	GSM 850
00200000 (CM_BAND_PREF_GSM_PCS_1900)	GSM PCS
00400000 (CM_BAND_PREF_WCDMA_I_IMT_2000)	WCDMA IMT 2100
00800000 (CM_BAND_PREF_WCDMA_II_PCS_1900)	WCDMA_II_PCS_1900
02000000 (CM_BAND_PREF_WCDMA_IX_1700)	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
0002000000000000 (CM_BAND_PREF_WCDMA_VIII_900)	WCDMA_VIII_900
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

`<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	
1	(CM_BAND_PREF_LTE_EUTRAN_BAND1)	LTE BC1
2	(CM_BAND_PREF_LTE_EUTRAN_BAND2)	LTE BC2
4	(CM_BAND_PREF_LTE_EUTRAN_BAND3)	LTE BC3
8	(CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE BC4
10	(CM_BAND_PREF_LTE_EUTRAN_BAND5)	LTE BC5
40	(CM_BAND_PREF_LTE_EUTRAN_BAND7)	LTE BC7
80	(CM_BAND_PREF_LTE_EUTRAN_BAND8)	LTE BC8
1000	(CM_BAND_PREF_LTE_EUTRAN_BAND13)	LTE BC13
10000	(CM_BAND_PREF_LTE_EUTRAN_BAND17)	LTE BC17
80000	(CM_BAND_PREF_LTE_EUTRAN_BAND20)	LTE BC20
40000000	(CM_BAND_PREF_NO_CHANGE) change	No band

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

<reserve1>: reserved field 1.

<reserve2>: reserved field 2.

10.2.4 Property Description

Saving upon Power-off	PIN
Y	Y

10.2.5 Example

Run: `AT^SYSCFGEX=?`

Response: `^SYSCFGEX:`
`("00","01","02","03","99"),((3fffffff,"All`
`Bands"),(2000000400180,"GSM900/GSM1800/WCDMA BC`
`VIII/WCDMA BC I"),(6A80000,"GSM850/GSM1900/WCDMA BC`
`V/WCDMA BC IV/WCDMA BC`
`II")),(0-2),(0-4),((7fffffffffffffff,"All`
`Bands"),(910DF,"LTE BC1/LTE BC2/LTE BC3/LTE BC4/LTE`
`BC5/LTE BC7/LTE BC8/LTE BC13/LTE BC17/LTE BC20"))`

`OK`

Run: `AT^SYSCFGEX?`

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

`OK`

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

Response: `OK`

10.3 AT^USSDMODE–Select USSD Mode

10.3.1 Command Syntax

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

10.3.2 Interface Description

The execution command selects the USSD mode. The setting of USSD mode selection made by this command is not saved in MT's NV memory, which means that the default USSD mode will be restored after the MT is restarted. This command shall be used to select the USSD mode when the client on a computer starts or shakes hands with the MT.

The read command returns the current USSD mode.

The test command returns the list of supported USSD modes.

10.3.3 Parameter Description

`<mode>`:

0   Select USSD non-transparent mode.

1   Select USSD transparent mode. (default value)

10.3.4 Property Description

Saving upon Power-off	PIN
N	N

10.3.5 Example

- Query the current USSD mode:

Run: `AT^USSDMODE?`

Response: `^USSDMODE: 1`

              `OK`

- Set USSD mode:

Run: `AT^USSDMODE=0`   Non-transparent mode

Response: `OK`

- Query the list of supported `<mode>`s:

Run: `AT^USSDMODE=?`

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

              `OK`

10.4 AT^EONS–Query the Service Provider Name and the EF$_{SPN}$ Information of the SIM Card

10.4.1 Command Syntax

AT^EONS=\<type\>[,\<plmn_id\>]
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>

10.4.2 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, 2, 3, 4, or 5.

- When <type> is set to 1, 2, 3, or 4:

The command format is AT^EONS=<type> or AT^EONS=<type>,<plmn_id>. If <plmn_id> is not included, information about the current registered network is returned.

In the response, <plmn_name1> indicates the long name, while <plmn_name2> indicates the short name. The value of <plmn_name1> or <plmn_name2> contains a maximum of 128 hexadecimal characters (32 valid characters). If a name exceeds the maximum length, the first 128 characters are retained. If <plmn_name1> or <plmn_name2> cannot be obtained, its value is left empty.

In the response, <spn_cond> and <spn> are handled as follows: If the SIM card for the current registered network has an 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>. In the response, the maximum number of hexadecimal characters that can be contained in the value of <plmn_name1> is 80 (20 valid characters). An empty value is returned for <plmn_name2>.

The response does not need to contain <spn_cond> or <spn>.

A UCS2 hexadecimal character string is converted using the big-endian encoding scheme. For example, character "A" is represented by 0041.

10.4.3 Parameter Description

<type>: operation type.

1	Automatic 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
2	Query the network name in the MM/GMM/EMM information.
3	Query the network name in the EFpnn file corresponding to the USIM EFopl.
4	Query the information saved in the internal network name list.
5	Automatic length limit mode.

Processing logic for <plmn_name1>:

1. If a long name exists and its length does not exceed the limit.

	(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.

	(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. For detailed format, see the description of the numeric `<oper>` field in the `AT+COPS` command in the 3GPP TS 27.007 protocol.

`<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.

10.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.4.5 Example

If the currently registered 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,"004800550041005700450049002000540045005300`
`0540020005700300039","0048005400570030 0039",3,"004`
`8005500410057004500 49"`

`OK`

Run: `AT^EONS=2`

Response:	`^EONS:` `2,46009,"0048005500410057004500490020005400450053000540020000570030000390020004E004500540057004F0052004B","00480054005700300039004E00450054",3,"004800550041005700450049"`
	`OK`
Run:	`AT^EONS=2,"46010"`
Response:	`^EONS: 2,46010,"","",3,"004800550041005700450049"`
	`OK`
Run:	`AT^EONS=5`

Response:	`^EONS:`
	`5,46009,"004800550041005700450049"`
	`,""`
	
	`OK`
		When network 46009 is an HPLMN or belongs to an EHPLMN, or in EF_{SPDI}.

	`^EONS:`
	`5,46009,"00480055004100570045004900200005400450053005400200005700300003"`
	`9",""`
	
	`OK`
		When network 46009 is not in an HPLMN, EHPLMN, or EF_{SPDI}.

Notes:

- "HUAWEI TEST W09" (UCS2 hexadecimal character string): 004800550041005700450049002000540045005300540020005700300039.
- "HTW09" (UCS2 hexadecimal character string): 00480054005700300039.
- "HUAWEI" (UCS2 hexadecimal character string): 004800550041005700450049.
- "HUAWEI TEST W09 NETWORK" (UCS2 hexadecimal character string): 00480055004100570045004900200054004500530054002000570030003900200004E0045 00540057004F0052004B.
- "HTW09NET" (UCS2 hexadecimal character string): 00480054005700300039004E00450054.

10.5 AT^HCSQ–Query and Report Signal Strength

10.5.1 Command Syntax

`AT^HCSQ?`
Possible Response(s)

`<CR><LF>^HCSQ:`
 `<sysmode>,<value1>,<value2>,<value3>,<value4><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><CR><LF>`

10.5.2 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.

10.5.3 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
"WCDMA"	WCDMA/HSDPA/HSPA mode
"LTE"	LTE mode

`<value1>`, `<value2>`, `<value3>`, `<value4>`: the following table lists the signal strength type corresponding to each service mode.

`<sysmode>`	`<value1>`	`<value2>`	`<value3>`	`<value4>`
"NOSERVICE"				
"GSM"	gsm_rssi			

<sysmode>	<value1>	<value2>	<value3>	<value4>
"WCDMA"	wcdma_rssi	wcdma _rscp	wcdma_ecio	
"LTE"	lte_rssi	lte_rsrp	lte_sinr	lte_rsrq

<gsm_rssi>, <wcdma_rssi>, <lte_rssi>: an integer indicating the received signal strength. These parameters are available for GSM, 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. These parameters are available for WCDMA.

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

10.5.4 Property Description

Saving upon Power-off	PIN
NA	N

10.5.5 Example

Run: `AT^HCSQ=?`

Response: `^HCSQ: "NOSERVICE","GSM","WCDMA","LTE"`

      `OK`

Run: `AT^HCSQ?`

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

      `OK`

10.6 ^SRVST–Service State Change Indication

10.6.1 Command Syntax

URC
<CR><LF>^SRVST: <srv_status><CR><LF>

10.6.2 Interface Description

When the state of a service is changed, the MT uses this command to unsolicitedly send the new service state to the TE.

10.6.3 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

10.6.4 Property Description

Saving upon Power-off	PIN
N	N

10.6.5 Example

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

Run: AT+COPS=1,2,"46009",0

Response: ^SRVST: 0

            ^MODE: 0,0

            ^RSSI: 99

            ^MODE: 3,3

            ^RSSI: 8

            ^SRVST: 1

            ^RSSI: 25

            ^SRVST: 2

            OK

10.7 ^SIMST–SIM Card State Change Indication

10.7.1 Command Syntax

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

10.7.2 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.

10.7.3 Parameter Description

`<sim_state>`: indicates the state of the SIM card.

0	Invalid SIM card.
1	Valid SIM card.
2	Invalid SIM card in CS domain.(not supported currently)
3	Invalid SIM card in PS domain. (not supported currently)
4	Invalid SIM card in PS domain and CS domain. (not supported currently)
240	ROMSIM version. (not supported currently)
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.

10.7.4 Property Description

Saving upon Power-off	PIN
NA	N

10.7.5 Example

Run:	AT+CPIN="1234"
Response:	OK
	^SIMST: 1,0

11 Huawei Proprietary Interface: GPS Service Interfaces

11.1 AT^WPDOM–Set Operation Mode

11.1.1 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>

11.1.2 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.

11.1.3 Parameter Description

<mode>: operation mode. The default value is 5.

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	MSA. The MS-assisted positioning mode, which is one of Assisted Global Positioning Systems (AGPS), 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.
5	MSB. The network needs to provide positioning assistance information, and the MS calculates the position information.

11.1.4 Property Description

Saving upon Power-off	PIN
Y	N

11.1.5 Example

- Query the value range of operation mode:

Run: `AT^WPDOM=?`

Response: `^WPDOM: (0,1,5)`

            `OK`

- Query the current operation mode:

Run: `AT^WPDOM?`

Response: `^WPDOM: 5`

            `OK`

- Set the operation mode:

Run: `AT^WPDOM=0`

Response: `OK`

Run: `AT^WPDOM=1`

Response: `OK`

Run: `AT^WPDOM=5`

Response: `OK`

11.2 AT^WPDST–Set Session Type

11.2.1 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>

11.2.2 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.

11.2.3 Parameter Description

<type>: session type. The default value is 1.

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 AT^WPDFR.

11.2.4 Property Description

Saving upon Power-off	PIN
N	N

11.2.5 Example

- Query the value range of session type:

  Run: AT^WPDST=?

  Response: ^WPDST: (0-1)

             OK

- Query the current session type:

  Run: AT^WPDST?

  Response: ^WPDST: 1

             OK

- Set the session type:

  Run: AT^WPDST=0

  Response: OK

11.3 AT^WPDFR–Set Positioning Frequency

11.3.1 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>

11.3.2 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.

Note:

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

11.3.3 Parameter Description

<num>: reported times of NMEA sentences including valid positioning information The value ranges from 0 to 65535, and the default value is 0. 0 specified limitless positioning.

<time>: time interval to report NMEA sentences. The time interval of this parameter ranges from 1s to 1800s, and the default time interval is 1s.

Note:

On Linux system or systems like Linux, it is recommended to set <time> to be less than the SS (Selective Suspend) time which is set by the system. This is to avoid the following situation that may happen: because the system comes into the SS state, NEMA data cannot be reported to the host during the GPS position. About that how to set the SS time on Linux system, please refer to *Guide to Kernel Driver Integration in Android for Huawei Modules* V1.2.9 or later.

11.3.4 Property Description

Saving upon Power-off	PIN
N	N

11.3.5 Example

- Query the value range of positioning frequency:

Run: `AT^WPDFR=?`

Response: `^WPDFR: (0-65535),(1-1800)`

            `OK`

- Query the current positioning frequency:

Run: `AT^WPDFR?`

Response: `^WPDFR: 0,1`

            `OK`

- Set the positioning frequency Failure

Run: `AT^WPDST=0`

Response: `OK`

Run: `AT^WPDFR=20,2`

Response: `+CME ERROR: operation not supported`

- Set the positioning frequency Success

Run: `AT^WPDST=1`

Response: `OK`

Run: `AT^WPDFR=20,2`

Response: `OK`

11.4 AT^WPURL–Set AGPS Server Address and Port on the 3GPP Network

11.4.1 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>

11.4.2 Interface Description

The set command is used to set the address of the AGPS server on the 3GPP 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.

11.4.3 Parameter Description

`<url>`: address of the AGPS server in the 3GPP server. It is a URL address or an IP address. (without quotation marks)

Note:

Port of the AGPS server is not allowed to be 0.

11.4.4 Property Description

Saving upon Power-off	PIN
Y	N

11.4.5 Example

Set the address of the AGPS server:

Run:	`AT^WPURL=SUPL.GOOGLE.COM:7276`	Set the address of the AGPS server.
Response:	`OK`	

11.5 AT^WPDIM–Delete Auxiliary Data

11.5.1 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>

11.5.2 Interface Description

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

11.5.3 Parameter Description

<mode>: deletion type.

0   Cold start, this option clears all data that is currently stored in the internal memory of the GPS receiver including position, almanac, ephemeris, and time.

1   Warm start, this option clears the ephemeris. The almanac is retained.

2   Hot start, this option does not clear anything. The almanac and ephemeris are retained.

3   GPSOneXTRA, this option clears the XTRA data. (not supported currently)

4   PGPS, this option clears the PGPS data. (not supported currently)

11.5.4 Property Description

Saving upon Power-off	PIN
NA	N

11.5.5 Example

- Query the value range of delete auxiliary data mode:

Run: AT^WPDIM=?

Response: ^WPDIM: (0-2)

OK

- Set the deletion mode:

Run: AT^WPDIM=1

Response: OK

11.6 AT^WPDGP–Start Positioning Session

11.6.1 Command Syntax

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

11.6.2 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 set again.

11.6.3 Parameter Description

None

11.6.4 Property Description

Saving upon Power-off	PIN
NA	N

11.6.5 Example

- Set PD session failed:

Run: AT^WPDGP

Response: +CME ERROR: GPS function disabled

- Set PD session success:

Run: AT^WPDGP

Response: OK

11.7 AT^WPEND–Terminate Positioning Process

11.7.1 Command Syntax

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

11.7.2 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.

11.7.3 Parameter Description

None

11.7.4 Property Description

Saving upon Power-off	PIN
NA	N

11.7.5 Example

- Terminate the PD session successfully:

  Run: AT^WPEND

  Response: OK

- PD Session is not on going, Terminate Failure:

  Run: AT^WPEND

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

12 Huawei Proprietary Interface: STK Interface

12.1 AT^STSF–Configure the Mode of STK

12.1.1 Command Syntax

AT^STSF=\<Mode>[,\<RawMode>]
Possible Response(s)
\<CR>\<LF>OK\<CR>\<LF> In case of an MT-related error: \<CR>\<LF>+CME ERROR: \<err>\<CR>\<LF>
AT^STSF?
Possible Response(s)
\<CR>\<LF>^STSF: \<Mode>[,\<RawMode>]\<CR>\<LF>\<CR>\<LF>OK\<CR>\<LF>
AT^STSF=?
Possible Response(s)
\<CR>\<LF>^STSF: (list of supported \<Mode>s)[, (list of supported \<RawMode>s)]\<CR>\<LF>\<CR>\<LF>OK\<CR>\<LF>

12.1.2 Interface Description

The set command is used to configure STK, including:

* Enable and disable the function of STK
* Set the mode of STK

The read command returns the current value of \<Mode> and \<RawMode> (if supported this parameter).

The test command returns supported modes as a compound value and a list of supported <RawMode> (if supported this parameter).

12.1.3 Parameter Description

<Mode>:

0	Disable STK
1	Enable STK

<RawMode>:

0	Raw data mode (not supported currently)
1	Common mode (not supported currently)
2	Standard raw data mode

Notes:

- Parameters of <Mode> are saved when MT is powered off. Parameters of <RawMode> are not saved when MT is powered off.
- <RawMode> is a optional parameter. Some Huawei modules do not support this parameter. When <RawMode> is in standard raw data mode, which indicates customers should comply with the relative AT interface specification of STK in 3GPP TS 27.007 R11.
- <RawMode> has no fixed default value. Default value in different platforms may vary. If modules use with the old dashboard that does not support STK modes conversion, the default value is 1. If modules do not use with the old dashboard and support standard raw data mode, the default value is 2.

12.1.4 Property Description

Saving upon Power-off	PIN
Y	N

12.1.5 Example

- Disable STK:

  Run: AT^STSF=0

  Response: OK

- Parameter setting error:

  Run: AT^STSF=3,0

  Response: ERROR

- Active STK and set STK to standard raw data mode:

Run: AT^STSF=1,2

Response: OK

12.2 AT^CUSATM–Query the Main Menu

12.2.1 Command Syntax

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

12.2.2 Interface Description

This command is used to query STK main menu information. After UICC sends the proactive command "SETUP MENU" to MT, TE can use AT^CUSATM to query the content of the proactive command "SETUP MENU". If UICC does not send the proactive command "SET UP MENU" to MT, <setup_menu> is empty when TE query the content of the proactive command "SETUP MENU".

12.2.3 Parameter Description

<setup_menu>: UICC proactive command, string type in hexadecimal character format, consisting of the full BER-TLV data object (which is the proactive command "SETUP MENU" sent by UICC) as defined in 3GPP TS 31.111, ETSI TS 102.221 and ETSI TS 102.223 protocols.

12.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

12.2.5 Example

Query the main menu:

Run: AT^CUSATM?

Response:

```
^CUSATM:
"D0818A8103012500820281828511805168740390IA005500
530049004D53618F0D01444953504C415920544558548F0A0
247455420494E4B45598F0A0347455420494E5055548F0A04
4D4F52452054494D458F0A05504C415920544F4E458F0E065
04F4C4C20494E54455256414C8F0807524546652455348F13
0853454E442053484F5254204D455353414745"
```

```
OK
```

HUAWEI ME936 LTE M.2 Module
AT Command Interface Specification

Huawei Proprietary Interface: Tunable
Antenna Interface

13 Huawei Proprietary Interface: Tunable Antenna Interface

13.1 AT^ANTENCFG–Set Tunable Antenna

13.1.1 Command Syntax

AT^ANTENCFG=<mode>,<pattern>[,<band>[,<pattern>,<band>[...]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^ANTENCFG?
Possible Response(s)
<CR><LF>^ANTENCFG: <CR><LF><mode>: <pattern>,<band>[,<pattern>,<band>[...]][[<CR><LF><mode>: <pattern>,<band>[,<pattern>,<band>[...]]][…]]<CR><LF><CR><LF>OK<CR><LF>
AT^ANTENCFG=?
Possible Response(s)
<CR><LF>^ANTENCFG: (list of supported<mode>s),(list of supported <pattern>s),(list of supported <band>s)<CR><LF><CR><LF>OK<CR><LF>

13.1.2 Interface Description

The set command sets the antenna tuner configuration for each band of every mode.

The read command queries the antenna tuner configuration of each band of all modes.

The test command queries the parameter values supported by the command.

13.1.3 Parameter Description

<mode>: the mode of network.

0	GSM
1	WCDMA
3	LTE

<pattern>: the configuration of antenna tuner. Pattern bit field, 8-bit digit with hexadecimal. A binary bit indicates a ANTCTL pin.

Bit[4-7]	Bit[3]	Bit[2]	Bit[1]	Bit[0]
reserved	ANTCTL3	ANTCTL2	ANTCTL1	ANTCTL0

0	Low Level
1	High Level

<band>: band bit field, 64-bit digit with hexadecimal. A binary bit indicates a frequency band. The value of binary bit is shown in the following table

Table 13-1 The value of <band> when <mode>=0

Parameters	Band
0000000000000001	GSM850
0000000000000002	GSM900
0000000000000004	GSM1800
0000000000000008	GSM1900
…	…
FFFFFFFFFFFFFFFF	All supported bands

Table 13-2 The value of <band> when <mode>=1

Parameters	Band
0000000000000001	WCDMA_I_IMT_2100
0000000000000002	WCDMA_II_PCS_1900
0000000000000004	WCDMA_III_1700
0000000000000008	WCDMA_IV_1700
0000000000000010	WCDMA_V_850

Parameters	Band
0000000000000020	WCDMA_VI_800
0000000000000040	WCDMA_VII_2600
0000000000000080	WCDMA_VIII_900
0000000000000100	WCDMA_IX_1700
0000000000000200	WCDMA_X
0000000000000400	WCDMA_XI
0000000000000800	WCDMA_XII
0000000000001000	WCDMA_XIII
0000000000002000	WCDMA_XIV
0000000000004000	WCDMA_XV
0000000000008000	WCDMA_XVI
0000000000010000	WCDMA_XVII
0000000000020000	WCDMA_XVIII
0000000000040000	WCDMA_XIX
…	…
FFFFFFFFFFFFFFFF	All supported bands

Table 13-3 The value of <band> when <mode>=3

Parameters	Band
0000000000000001	band 1
0000000000000002	band 2
0000000000000004	band 3
0000000000000008	band 4
0000000000000010	band 5
0000000000000020	band 6
0000000000000040	band 7
0000000000000080	band 8
0000000000000100	band 9
0000000000000200	band 10
0000000000000400	band 11

Parameters	Band
0000000000000800	band 12
0000000000001000	band 13
0000000000002000	band 14
0000000000004000	band 15
0000000000008000	band 16
0000000000010000	band 17
0000000000020000	band 18
0000000000040000	band 19
0000000000080000	band 20
…	…
FFFFFFFFFFFFFFFF	All supported bands

[,<band>[,<pattern>,<band>]…]: Indicates that select all supported bands when all parameters are default. One <pattern> is set according to <band> in the same group.

Note:

On the ME936 module, the parameter can set several groups (less or equal to nine groups) of pattern at one time.

13.1.4 Property Description

Saving upon Power-off	PIN
Y	N

13.1.5 Example

Run: AT^ANTENCFG=?

Response:	`^ANTENCFG:`
	`(0,1,3),(0-15),(000000000000000F`
	`,000000000000009B,00000000000910`
	`DF)`
	
	`OK`
		Indicate that the module supports GSM , WCDMA and LTE. The pattern is from 0 to 15. The module supports GSM 4 bands, WCDMA BC1, BC2, BC4, BC5, BC8, and LTE band1, band2, band3, band4, band5, band7, band8, band13, band17 and band20.

Run:	`AT^ANTENCFG=0,1,2,2,4`	Set the antenna tuner configuration of GSM900 to be 1 and GSM1800 to be 2.
Response:	`OK`	
Run:	`AT^ANTENCFG?`	

Response:	`^ANTENCFG:`
	`0:0,0000000000000009,1,000000000`
	`0000002,2,0000000000000004`
	`1:0,000000000000009B`
	`3:0,00000000000910DF`
	
	`OK`
		Indicate that the current configuration of GSM900 is 1, GSM1800 is 2, and other bands are 0.

14 Huawei Proprietary Interface: M.2 Interface

14.1 AT+XTSM–Set Thermal Sensor with the Threshold

14.1.1 Command Syntax

AT+XTSM=<temp_sensor_id>[,<AlarmID>[,[<TripPointTemp>,<Hysteresis>][,<sampling_period>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+XTSM=?
Possible Response(s)
<CR><LF>+XTSM: (list of supported <temp_sensor_id>s),(list of supported <AlarmId>s),(list of supported <TripPointTemp>s),(list of supported <Hysteresis>s),(list of supported <sampling_period>s)<CR><LF><CR><LF>OK<CR><LF>

14.1.2 Interface Description

This command configures thermal sensors with the threshold break points.

The set command enables or disables the alarms for particular sensor.

The test command returns the possible values of thermal sensor monitoring option, alarm ID range for trip point, hysteresis and sampling period.

14.1.3 Parameter Description

<temp_sensor_id>: temperature sensor ID. Currently only RF sensor is supported.

0   RF sensor

`<AlarmID>`: alarm ID value, ranging from 1 to 10.

`<TripPointTemp>`: minimum value is 0 and maximum value is 119000 in MilliDegC. The actual temperature is `<TripPointTemp>` minus 20000 MilliDegC. For example, when `<TripPointTemp>` is 0, the actual temperature is -20000 MilliDegC, and also the `<TripPointTemp>` 119000 is corresponding to 99000 MilliDegC.

`<Hysteresis>`: minimum value is 100, maximum value is 99000 in MiliDegC. `<Hysteresis>` can be used only with `<TripPointTemp>`.

`<sampling_period>`: polling interval in millisecond, minimum value is 1000, maximum value is 4294967293.

14.1.4 Property Description

Saving upon Power-off	PIN
NA	N

14.1.5 Example

Run:	`AT+XTSM=0,1,50000,3000,2000`	Set the alarm ID, tripPointTemp value, hysteresis value, and sampling period
Response:	`OK`	
Run:	`AT+XTSM=?`	Test the available value ranges of these parameters

Response:	`+XTSM:`
	`0,(1-10),(0-119000),(100-99000),(1000-4294967293)`
	
	`OK`	

Run:	`AT+XTSM=0,3,76000,5000`	Set the alarm ID, tripPointTemp value, and hysteresis value
Response:	`OK`	
Run:	`AT+XTSM=0,10,,30000`	Set the sampling period
Response:	`OK`	
Run:	`AT+XTSM=0,10`	Delete one alarm
Response:	`OK`	
Run:	`AT+XTSM=0`	Delete all alarms
Response:	`OK`	

14.2 +XTS–Unsolicitedly Present of the Threshold Reached

14.2.1 Command Syntax

URC
<CR><LF>+XTS: <temp_sensor_id>,<AlarmId>,<OnOff>,<Temp><CR><LF>

14.2.2 Interface Description

The URC will be displayed if the threshold is crossed and it gets enabled if user has set any alarm.

14.2.3 Parameter Description

<temp_sensor_id>: temperature sensor ID. Currently only RF sensor is supported.

0   RF sensor

<AlarmID>: alarm ID value, ranging from 1 to 10.

<OnOff>:

1   When temperature is rising and it crosses trip point temperature.

0   When it goes below (trip point temperature minus hysteresis).

<Temp>: current temperature value in MiliDegC.

14.2.4 Property Description

Saving upon Power-off	PIN
NA	N

14.2.5 Example

Run:	AT+XTSM=0,1,50000,3000, 2000	Set the alarm ID, tripPointTemp value, hysteresis value, and sampling period
Response:	OK	

Response:	+XTS: 0,1,1,31000	MT will unsolicitedly report when the temperature rises to 31°C from the temperature that is lower than 30°C.
Response:	+XTS: 0,1,0,26500	MT will unsolicitedly report when the temperature drops to 26.5°C from the temperature that is higher than 30°C.

14.3 AT+XTAMR–Query the Current Temperature of a Thermal Sensor

14.3.1 Command Syntax

AT+XTAMR=<temp_sensor_id>
Possible Response(s)
<CR><LF>+XTAMR: <temp_sensor_id>,<temp><CR><LF><CR><LF>OK<CR><LF>

14.3.2 Interface Description

This command returns the current temperature value of particular thermal sensor.

14.3.3 Parameter Description

<temp_sensor_id>: temperature sensor ID. Currently only RF sensor is supported.

0   RF sensor

<temp>: current temperature value in MiliDegC.

14.3.4 Property Description

Saving upon Power-off	PIN
NA	N

14.3.5 Example

Run: AT+XTAMR=0

| Response: | `+XTAMR: 0,40000` | The current temperature of RF sensor is 40°C. |
| | `OK` | |

14.4 AT+XADPCLKFREQINFO–Query Adaptive Clock Frequency Info

14.4.1 Command Syntax

`AT+XADPCLKFREQINFO=<n>`
Possible Response(s)
`<CR><LF>`OK`<CR><LF>`
`AT+XADPCLKFREQINFO?`
Possible Response(s)
`<CR><LF>`+XADPCLKFREQINFO: `<n>`**<CR><LF><CR><LF>**OK**<CR><LF>**
`AT+XADPCLKFREQINFO=?`
Possible Response(s)
`<CR><LF>`+XADPCLKFREQINFO:`<centFreq>,<freqSpread>,<noisePower>`[;`<centFreq>,<freqSpread>,<noisePower>`[...]]**<CR><LF><CR><LF>**OK**<CR><LF>**

14.4.2 Interface Description

This command returns the list of frequency information structures. The frequency information includes the center frequency of the channel number, frequency spread of the channel number and the noise power referred at antenna.

The set command enables or disables the `+XADPCLKFREQINFO` URC.

The read command reads the status of enabling/disabling the `+XADPCLKFREQINFO` URC.

The test command returns the list of available frequency information. The test command can be used only after running `AT+XADPCLKFREQINFO=1`.

14.4.3 Parameter Description

`<n>`:

0   Disable the `+XADPCLKFREQINFO` URC (default value)

1   Enable the `+XADPCLKFREQINFO` URC

<centFreq>:the center frequency of the channel number in Hz. This is host receiver channel frequency.

<freqSpread>: the frequency spread of the channel number in Hz. This is host receiver channel frequency spread.

<noisePower>: the noise power referred at antenna in dBm, at the reported center frequency, and integrated over a bandwidth equal to reported frequency spread. This value shall be zeroed if not used.

14.4.4 Property Description

Saving upon Power-off	PIN
N	N

14.4.5 Example

Run:	AT+XADPCLKFREQINFO?	Read the status of enabling/disabling the +XADPCLKFREQINFO URC.
Response:	+XADPCLKFREQINFO: 0 OK	
Run:	AT+XADPCLKFREQINFO=1	Enable the +XADPCLKFREQINFO URC.
Response:	OK	
Run:	AT+XADPCLKFREQINFO=?	Query the list of frequency information available: centFreq, freqSpread, and noisePower.
Response:	+XADPCLKFREQINFO: 21476000,5000000,0 OK	

14.5 +XADPCLKFREQINFO–Unsolicitedly Present of Adaptive Clock Frequency Info

14.5.1 Command Syntax

URC

`<CR><LF>+XADPCLKFREQINFO:`
`<centFreq>,<freqSpread>,<noisePower>[[;<centFreq>,<freqSpread>`
`,<noisePower>][...]]<CR><LF>`

14.5.2 Interface Description

The URC displays the adaptive clock frequency information.

14.5.3 Parameter Description

`<centFreq>`: the center frequency of the channel number in Hz. This is host receiver channel frequency.

`<freqSpread>`: the frequency spread of the channel number in Hz. This is host receiver channel frequency spread.

`<noisePower>`: the noise power referred at antenna in dBm, at the reported center frequency, and integrated over a bandwidth equal to reported frequency spread. This value shall be zeroed if not used.

14.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.5.5 Example

Response:	`+XADPCLKFREQINFO:` `21476000,5000000,0`	Unsolicitedly report the frequency information: centFreq, freqSpread, and noisePower.

15 Huawei Proprietary Interface: Customer Production Line Tests Interface

15.1 AT^TMODE–Set the Operating Mode

15.1.1 Command Syntax

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

15.1.2 Interface Description

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

15.1.3 Parameter Description

<test_mode>: test mode.

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

1	Non-signaling mode, performing RF-related non-signaling control.
	(In non-signaling mode, RF circuits on the module are disabled by default.)
3	Restart mode, instructing the module to perform a soft reset.

<status>: module switching status.

0	Switching is in progress.
1	Switching is complete.

Note:

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

15.2 AT^FCHAN–Set Non-signaling Channels

15.2.1 Command Syntax

AT^FCHAN=<mode>,<band_switch>,<channel>
Possible Response(s)
<CR><LF>OK<CR><LF>   In case of an MT-related error: <CR><LF>ERROR<CR><LF>
AT^FCHAN?
Possible Response(s)
<CR><LF>^FCHAN:<mode>,<band_switch>,<ul channel>,<dl channel><CR><LF><CR><LF>OK<CR><LF>

15.2.2 Interface Description

This command sets the uplink/downlink channel for a specific frequency band in debugging state. After the setting, the module automatically sets the uplink/downlink channel accordingly. This command is used in non-signaling mode (AT^TMODE=1) and returns the error code 0 in other modes.This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.2.3 Parameter Description

<mode>: mode.

0	WCDMA
3	GSM
6	FDD LTE

<band switch>: frequency band. For details, see 16.5 Mapping Between Operating Bands and band_switch Values.

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

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

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

15.3 AT^TSELRF–Select RF Channel

15.3.1 Command Syntax

AT^TSELRF=<path>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
AT^TSELRF?
Possible Response(s)
<CR><LF>^TSELRF:<number><CR><LF><CR><LF>^TSELRF:<path><CR><LF>[…]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

15.3.2 Interface Description

This command sets the RF channel for a module. It takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not

be saved upon a power-off. This command is used in non-signaling mode
(AT^TMODE=1).

15.3.3 **Parameter Description**

<path>: specific RF channel number, ranging from 0 to 255.

0	All channels
1	GSM channel (including EDGE/GPRS/EGSM channel collections)
2	WCDMA main channel
3	WCDMA diversity receive channels (In diversity mode, the transmit channel is the main channel and the receive channel is the diversity receive channel. The same below.)
9	FDD-LTE main channel
10	FDD-LTE diversity channel
11	FDD-LTE MIMO

<number>: total number of channels supported by the product.

15.3.4 **Example**

Run:	AT^TSELRF?
Response:	^TSELRF:7
	^TSELRF:0
	^TSELRF:1
	^TSELRF:2
	^TSELRF:3
	^TSELRF:9
	^TSELRF:10
	^TSELRF:11
	OK
Run:	AT^TSELRF=1
Response:	OK

15.4 AT^FRXON–Enable a Receiver in Non-signaling Mode

15.4.1 Command Syntax

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

15.4.2 Interface Description

This command enables or disables a receiver in debugging state. If the product does not support the command, `OK` is returned. This command is used in non-signaling mode (`AT^TMODE=1`) and returns the error code `0` in other modes. This command needs to be executed after the non-signaling channel is set (`AT^FCHAN`). This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.4.3 Parameter Description

`<switch>`: enabled/disabled status of a receiver.

0   Disable the receiver.

1   Enable the receiver.

15.5 AT^FLNA–Set the LNA Level of a Receiver

15.5.1 Command Syntax

AT^FLNA=<level>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

```
AT^FLNA?
```

Possible Response(s)

`<CR><LF>^FLNA:<level><CR><LF><CR><LF>OK<CR><LF>`

```
AT^FLNA=?
```

`<CR><LF>^FLNA:<total level>[,<support level>,...]<CR><LF><CR><LF>OK<CR><LF>`

15.5.2 Interface Description

This command sets the LNA level for a receiver at a frequency band in debugging state. If the product does not support the command, `OK` is returned. This command is used in non-signaling mode (`AT^TMODE=1`) and returns the error code `0` in other modes. This command needs to be executed after the non-signaling channel is set (`AT^FCHAN`). It is used for testing receivers in system tests. This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.5.3 Parameter Description

`<level>`: LNA level, a one-byte string, ranging from 0 to 255. 0 indicates the highest gain level.

`<total level>`: total number of receiver gain levels.

`<support level>`: gain levels supported (all supported gain levels are displayed, with commas separated in an ascending order of numerals).

15.6 AT^FRSSI–Obtain the Current Channel RSSI

15.6.1 Command Syntax

```
AT^FRSSI?
```

Possible Response(s)

`<CR><LF>^FRSSI:<rvalue><CR><LF><CR><LF>OK<CR><LF>`

In case of an MT-related error:
`<CR><LF>ERROR<CR><LF>`

15.6.2 Interface Description

This command reads the RSSI value in debugging mode, with no need for an SIM/USIM card. It must be executed after the command `AT^FCHAN` is run. If the product does not support the command, `OK` is returned. This command is used in

non-signaling mode (`AT^TMODE=1`) and returns the error code `0` in other modes. This command needs to be executed after the non-signaling channel is set (`AT^FCHAN`) and command `AT^FRXON` is set. This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.6.3 Parameter Description

`<rvalue>`: read RSSI value, represented by a positive value (receiver signals are all low-power signals, although positive RSSI values have no application scenarios for actual network signals), accurate to 0.1 dBm customized value. If the current RSSI is –85.1 dBm, the value range is 851.

15.7 AT^FWAVE–Set the Waveform in Non-signaling Mode

15.7.1 Command Syntax

AT^FWAVE=<type>,<amplitue_dbm_percent>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

15.7.2 Interface Description

It generates signals with the specified waveform in non-signaling mode. If the product does not support the command, an error is returned. `AT^FCHAN` is run to set the frequency point. This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.7.3 Parameter Description

`<type>`: type of the radiated waveform.

0	Continuous wave (monophonic)
1	WCDMA modulation signal
2	GSM modulation signal
3	EDGE modulation signal
5	LTE modulation signal

`<amplitude_dbm_percent>`: power of the radiated waveform, in a unit of 0.01. For 10 dBm transmit power, the parameter value is 1000.

15.8 AT^FTXON–Enable the Transmitter in Non-signaling Mode

15.8.1 Command Syntax

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

15.8.2 Interface Description

This command enables/disables a transmitter in non-signaling mode. If the product does not support the command, `OK` is returned. This command is used in non-signaling mode (`AT^TMODE=1`) and returns the error code `0` in other modes. This command needs to be executed after the non-signaling channel is set (`AT^FCHAN`). This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

15.8.3 Parameter Description

`<switch>`: enabled/disabled status of a transmitter.

0	Disable the transmitter
1	Enable the transmitter

15.9 AT^GNSSCNO–Request GPS CN0

15.9.1 Command Syntax

AT^GNSSCNO
Possible Response(s)

```
<CR><LF>^GNSSCNO: <svs>,<cno>[<CR><LF>^GNSSCNO:
<svs>,<cno>[...]]<CR><LF><CR><LF>OK<CR><LF>
```

15.9.2 Interface Description

This command is used to query satellites' CNR (Carrier-to-Noise Ratio) and their corresponding numbers during the GPS positioning.

15.9.3 Parameter Description

`<svs>`: satellite numbers, which identify the positioning systems.

0–32	GPS
33–64	SBAS
64–96	Glonass

`<cno>`: GPS CNR; the valid value is a positive number and the unit is 1 db.

15.9.4 Example

1. If no satellites are searched:

Run: `AT^GNSSCNO`

Response: `OK`

2. If satellites are searched:

Run: `AT^GNSSCNO`

Response: `^GNSSCNO: 20,25`
            `^GNSSCNO: 24,27`

            `OK`

15.10 AT^PWRCFG–Configure the Maximum Tx Power

15.10.1 Command Syntax

`AT^PWRCFG=<mode>,<pdm>[,<band>[,<pdm>,<band>][…]]`
Possible Response(s)
`<CR><LF>OK<CR><LF>`
In case of an MT-related error: `<CR><LF>ERROR<CR><LF>`
`AT^PWRCFG?`
Possible Response(s)

<CR><LF>^PWRCFG: list of (<CR><LF><mode>: (<pdm>,<band>)s<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
AT^PWRCFG=?
Possible Response(s)
<CR><LF>^PWRCFG: list of supported (<CR><LF><mode>, list of supported <pdm>, list of supported <band>)s<CR><LF><CR><LF>OK<CR><LF>

15.10.2 Interface Description

This interface is used to set and query the maximum Tx power of each band.

The set command sets the maximum Tx power for each band. These setting values are saved upon power-off and take effect after reset. Whether they are backed up and recovered during the upgrade or not depends on customer requirements. The default is not backed up and recovered.

The read command queries the current maximum Tx power of each band.

The test command returns the supported parameter values.

There will be Tx power backoff in GPRS and EDGE for each band time-slot. For details, please refer to the product's AT command interface specification.

15.10.3 Parameter Description

<mode>: an integer value that indicates the network mode.

0   GSM

1   WCDMA

2   CDMA (not supported currently)

3   LTE

4   TDSCDMA (not supported currently)

<pdm>: the maximum Tx power. The unit is 0.1 dbm, and the range is from x to y. X means the minimum value among all bands' maximum Tx power defined by the product specifications, and y means the maximum value. In fact, the range of maximum Tx power may be different between different platforms and bands. For details, please refer to the product's AT command interface specification. If <pdm> is not specified, the default value returned is the maximum Tx power defined by the product specifications.

<band>: band bit field, 64-bit digit with hexadecimal. A binary bit indicates a frequency band. The value of binary bit is shown in the following tables (or parameter superimposed values except FFFFFFFFFFFFFFFF), which is related to the <mode> value.

Table 15-1 <mode>=0 (GSM)

Parameters	Band
0000000000000001	GPRS 850
0000000000000002	GPRS 900
0000000000000004	GPRS 1800
0000000000000008	GPRS 1900
0000000000010000	EDGE 850
0000000000020000	EDGE 900
0000000000040000	EDGE 1800
0000000000080000	EDGE 1900
FFFFFFFFFFFFFFFF	All supported bands

Table 15-2 <mode>=1 (WCDMA)

Parameters	Band
0000000000000001	WCDMA_I_IMT_2000
0000000000000002	WCDMA_II_PCS_1900
0000000000000004	WCDMA_III_1700
0000000000000008	WCDMA_IV_1700
0000000000000010	WCDMA_V_850
0000000000000020	WCDMA_VI_800
0000000000000040	WCDMA_VII_2600
0000000000000080	WCDMA_VIII_900
0000000000000100	WCDMA_IX_1700
FFFFFFFFFFFFFFFF	All supported bands

Table 15-3 <mode>=2 (CDMA)

Parameters	Band
0000000000000001	BC0 A
0000000000000002	BC0 B
0000000000000004	BC1
0000000000000008	BC2

Parameters	Band
0000000000000010	BC3
0000000000000020	BC4
0000000000000040	BC5
0000000000000080	BC6
0000000000000100	BC7
0000000000000200	BC8
0000000000000400	BC9
0000000000000800	BC10
0000000000001000	BC11
0000000000002000	BC12
0000000000004000	BC13
0000000000008000	BC14
0000000000010000	BC15
0000000000020000	BC16
0000000000040000	BC17
0000000000080000	BC18
0000000000100000	BC19
FFFFFFFFFFFFFFFF	All supported bands

Table 15-4 <mode>=3 (LTE)

Parameters	Band
0000000000000001	band 1
0000000000000002	band 2
0000000000000004	band 3
0000000000000008	band 4
0000000000000010	band 5
0000000000000020	band 6
0000000000000040	band 7
0000000000000080	band 8
0000000000000100	band 9
0000000000000200	band 10

Parameters	Band
0000000000000400	band 11
0000000000000800	band 12
0000000000001000	band 13
0000000000002000	band 14
0000000000004000	band 15
0000000000008000	band 16
0000000000010000	band 17
0000000000020000	band 18
0000000000040000	band 19
0000000000080000	band 20
0000000000100000	band 21
0000000000200000	band 22
0000000000400000	band 23
0000000000800000	band 24
0000000001000000	band 25
0000000002000000	band 26
0000000004000000	band 27
0000000008000000	band 28
0000000010000000	band 29
0000000020000000	band 30
0000000040000000	band 31
0000000080000000	band 32
0000000100000000	band 33
0000000200000000	band 34
0000000400000000	band 35
0000000800000000	band 36
0000001000000000	band 37
0000002000000000	band 38
0000004000000000	band 39
0000008000000000	band 40
0000010000000000	band 41

Parameters	Band
0000020000000000	band 42
0000040000000000	band 43
0000080000000000	band 44
0000100000000000	band 45
0000200000000000	band 46
0000400000000000	band 47
0000800000000000	band 48
0001000000000000	band 49
0002000000000000	band 50
0004000000000000	band 51
0008000000000000	band 52
0010000000000000	band 53
0020000000000000	band 54
0040000000000000	band 55
0080000000000000	band 56
0100000000000000	band 57
0200000000000000	band 58
0400000000000000	band 59
0800000000000000	band 60
1000000000000000	band 61
2000000000000000	band 62
4000000000000000	band 63
8000000000000000	band 64
FFFFFFFFFFFFFFFF	All supported bands

Table 15-5 <mode>=4 (TDSCDMA)

Parameters	Band
0000000000000001	band A
0000000000000002	band B
0000000000000004	band C
0000000000000008	band D

Parameters	Band
0000000000000010	band E
0000000000000020	band F

[,<band>[,<pdm>,<band>]......]: indicates that select all supported bands when these parameters are not specified. The parameter can set several groups of power at one time. One <pdm> is set according to <band> in the same group. The number of groups which can be supported is different between different platforms.

15.10.4 Property Description

Saving upon Power-off	PIN
Y	N

15.10.5 Example

- Set the maximum Tx power of all GSM bands to be 33 dbm:

Run: AT^PWRCFG=0,330

Response: OK

- Set the maximum Tx power of WCDMA Band I, Band II and Band IV to be 24 dbm, WCDMA Band V and Band VIII to be 24.5 dbm:

Run: AT^PWRCFG=1,240,000000000000000B,245,0000000000000
               090

Response: OK

- Query the current maximum Tx power of each band:

Run: AT^PWRCFG?

Response: ^PWRCFG:

0: 330,FFFFFFFFFFFFFFFF

1: 240,000000000000000B,245, 000000000000090

3: 230,FFFFFFFFFFFFFFFF

Indicates that the maximum Tx power of all GSM bands is 33 dbm; WCDMA Band I, Band II and Band IV is 24 dbm; WCDMA Band V and Band VIII is 24.5 dbm; LTE bands is 23 dbm.

OK

- Query the supported parameter values:

Run: AT^PWRCFG=?

| Response: | `^PWRCFG:`
`0,(260-335),00000000000F0`
`00F`
`1,(235-250),0000000000000`
`09B`
`3,(230-250),0000000000091`
`0DF`

`OK` | Indicates that the product supports GSM, WCDMA and LTE network. The range of GSM Tx power is from 26 dbm to 33.5 dbm. The range of WCDMA Tx power is from 23.5 dbm to 25 dbm. The range of LTE Tx power is from 23 dbm to 25 dbm. The supported GSM bands are GPRS 850, GPRS 900, GPRS1800, GPRS1900, EDGE850, EDGE900, EDGE1800 and EDGE1900. The supported WCDMA bands are Band I, Band II, Band IV, Band V and Band VIII. The supported LTE bands are Band 1, Band 2, Band3,Band 4, Band 5 and Band 7,Band 8,Band 13,Band 17,Band 20. |

15.11 AT^PWRCFGON–Enable the Maximum Tx Power Configuration

15.11.1 Command Syntax

`AT^PWRCFGON=<op>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`ERROR`<CR><LF>
`AT^PWRCFGON?`
Possible Response(s)
<CR><LF>`^PWRCFGON: <status>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`ERROR`<CR><LF>
`AT^PWRCFGON=?`
Possible Response(s)
<CR><LF>`^PWRCFGON:` list of supported `(<op>`s`)`<CR><LF><CR><LF>`OK`<CR><LF>

15.11.2 Interface Description

This interface is used to enable the function of manually configuring the maximum Tx power. The setting value is saved upon power-off, but not backed up and recovered during the upgrade.

The read command queries the current status of the maximum Tx power configuration function.

The test command returns the supported parameter values.

15.11.3 Parameter Description

`<op>`:

0   Disable the function of manually configuring the maximum Tx power.

1   Enable the function of manually configuring the maximum Tx power.

`<status>`:

0   The function that manually configures the maximum Tx power is disabled.

1   The function that manually configures the maximum Tx power is enabled.

15.11.4 Property Description

Saving upon Power-off	PIN
Y	N

15.11.5 Example

Enable the maximum Tx power configuration function:

Run: `AT^PWRCFGON=1`

Response: `OK`

15.12 AT^ANTMODE–Set Operation Mode of Main and AUX Antennas

15.12.1 Command Syntax

AT^ANTMODE=<ant_mode>[,<nw_mode>]
Possible Response(s)

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

In case of an MT-related error:

<CR><LF>ERROR<CR><LF>

AT^ANTMODE?
Possible Response(s)
<CR><LF>^ANTMODE: <ant_mode>,<nw_mode><CR><LF>[^ANTMODE: <ant_mode>,<nw_mode><CR><LF>][...]<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
AT^ANTMODE=?
Possible Response(s)
<CR><LF>^ANTMODE: (list of supported <ant_mode>s),(list of supported <nw_mode>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>

15.12.2 Interface Description

The set command sets the operation mode of main and AUX antennas on different networks.

The read command queries the current operation mode of main and AUX antennas on different networks.

The test command returns the list of operation modes of main and AUX antennas supported by the module.

15.12.3 Parameter Description

<ant_mode>: the operation mode of main and AUX antennas.

0   The main and AUX antennas are all enabled. (default value)

1   The main antenna is enabled.

2   The AUX antenna is enabled.

<nw_mode>: the network. If the parameter is not specified, it equals to <nw_mode>=0.

0   All networks (default value)

2   WCDMA

3   LTE

Note:

When testing the AUX antenna on the WCDMA network, the parameter `<ant_mode>` should be set to 2. It is the limitation of the ME936.

15.12.4 Property Description

Saving upon Power-off	PIN
N	N

15.12.5 Example

Enable the main antenna and all networks

Run: `AT^ANTMODE=1,0`

Response: `OK`

15.13 AT^CUSTNVCLR–Clear Customer Nonvolatile Value

15.13.1 Command Syntax

AT^CUSTNVCLR
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

15.13.2 Interface Description

This command sets the firmware to clear the customer nonvolatile value. After the firmware clears the customer nonvolatile value, the firmware will restart and restore to the factory default value.

Customers can restore the nonvolatile values to the value range allowed by `AT^CUSTNVCLR` via the following commands:

AT command	Function	Field
AT^ANTENCFG	Tunable antenna	Platform
AT^BODYSARWCDMA	bodySAR-WCDMA	Platform

AT command	Function	Field
AT^BODYSARGSM	bodySAR-GSM	Platform
AT^BODYSARLTE	bodySAR-LTE	Platform
AT^WAKEUPCFG	Power management	Platform
AT^PWRCFGON	Switch for Max. Tx. power	Platform
AT^PWRCFG	Configuration for Max. Tx. power	Platform
AT^MTCAUTOSEL	Multi carrier	Platform
AT^SETPORT	USB Port	Platform
AT^WPDOM	GPS	protocol
AT^WPURL	GPS	protocol

15.13.3 Property Description

Saving upon Power-off	PIN
N	N

15.13.4 Example

Restore the customer nonvolatile value to the factory default value:

Run: AT^CUSTNVCLR

Response: OK

16 Appendix

16.1 List of URC Commands

URC	Function
+CLIP	CLIP notifications
+CCWA	Call waiting notifications
+CRING	Indicate incoming call
+CSSI	Supplementary service notifications
+CSSU	Supplementary service notifications
+CUSD	Unsolicitedly report USSD of network
+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
^ORIG	Indicate the origination of a call
^CONF	Ringback tone indication
^CONN	Call connection indication
^CEND	Call end indication
^SMMEMFULL	Message memory full
^IPSTATE	Indicate TCP/UDP data link state
^TIMESETRULT	Notify XTRA time injection

URC	Function
^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
^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")

URC	Function
^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)
^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

URC	Function
+CBM	New CBM directly deliver indication
^ERRRPT	Specified error code indication (Only for the HUAWEI specified client)
+XTS	Unsolicitedly Present of the Threshold Reached

16.2 General CME Error List

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

Table 16-1 General "CME ERROR" Codes

Numeric mode	Verbose mode
0	phone failure
1	no connection to phone
2	phone adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted(not supported currently. If no SIM is inserted, return SIM failure)
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index

Numeric mode	Verbose mode
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
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

Numeric mode	Verbose mode
134	service option temporarily out of order (#34)
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
257	network rejected request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not available
263	unknown class
264	unknown network message
273	Minimum TFT per PDP address error
274	Duplicate TFT eval prec index
275	Invalid TFT param combination

Table 16-2 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 16-3 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
288	GPS type not supported
289	MGP receiver is ongoing

16.3 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

Numeric mode	Verbose mode
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
...511	other values in range 256...511 are reserved
512...	manufacturer specific

16.4 Final Result Code

Final Result Code	No.	Description
OK	0	A command is executed, and there is no error.
CONNECT	1	A connection is established.
RING	2	An incoming call is originated.
NO CARRIER	3	A connection is terminated.
ERROR	4	There is a common error.
NO DIALTONE	6	There is no dialing tone.

Final Result Code	No.	Description
BUSY	7	The peer is busy.
NO ANSWER	8	Timeout occurs when the connection is complete, and there is no reply.
+CME ERROR: <err>		The error type is specified by <err>.
+CMS ERROR: <err>		It is a short message-related error.
COMMAND NOT SUPPORT	numeric is not supported	The command is not supported.
TOO MANY PARAMETERS	numeric is not supported	Too many parameters in the issued command

Note:

The final result code is the termination flag of an AT command.

16.5 Mapping Between Operating Bands and band_switch Values

Operating Band		band_switch
GSM	EGSM900	6
	DCS1800	2
	GSM850	7
	PCS1900	1
	GSM450	9
	GSM750	17
WCDMA	I	0
	II	1
	III	2
	IV	15
	V	7
	VI	8
	VII	10

Operating Band		band_switch
	VIII	6
	IX	3
	X	14
	XI	5
	XII	4
	XIII	9
	XIV	11
	XV	12
	XVI	13
	XVII	16
	XVIII	17
	XIX	18
	XX	19
	XXI	20
	XXII	21
	XXIII	22
	XXIV	23
	XXV	24
CDMA	BC0	32
	BC1	1
	BC2	21
	BC3	8
	BC4	25
	BC5	9
	BC6	24
	BC7	16
	BC8	2
	BC9	6
	BC10	20
	BC11	31
	BC12	33

Operating Band		band_switch
	BC13	0
	BC14	26
	BC15	15
	BC16	28
	BC17	18
LTE	1	0
	2	1
	3	2
	4	3
	5	7
	6	21
	7	10
	8	6
	9	13
	10	14
	11	5
	12	16
	13	17
	14	19
	15	Reserved
	16	Reserved
	17	18
	18	8
	19	22
	20	20
	21	23
	24	4
	25	31
	26	Reserved
	27	Reserved
	28	Reserved

Operating Band		band_switch
	29	Reserved
	30	Reserved
	31	Reserved
	32	Reserved
	33	25
	34	24
	35	12
	36	9
	37	26
	38	15
	39	27
	40	11
	41	28
	42	29
	43	30
TD-SCDMA	A	0
	F	1

16.6 References

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

[1] 3GPP TS 23.038

[2] 3GPP TS 23.040

[3] 3GPP TS 24.008

[4] 3GPP TS 25.331

[5] 3GPP TS 27.007

[6] 3GPP TS 31.102

[7] 3GPP TS 31.111

[8] 3GPP TS 44.060

[9] ETSI TS 102.221

[10] ETSI TS 102.223

[11] GSM MoU SE.13

[12] ITU-T E.212

[13] ITU-T Recommendation V.25 ter

[14] ITU-T T.50: International Reference Alphabet (IRA)

[15] HUAWEI Terminal AT Command Interface Specifications

16.7 Acronyms and Abbreviations

Acronym or Abbreviation	Full spelling
3GPP	Third Generation Partnership Project
AT	ATtention
APN	Access Point Name
BER	Bit Error Rate
CS	Circuit Switched (CS) domain
DCE	Data Circuit Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
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
MT	Mobile Terminal
NMEA	National Marine Electronics Association

Acronym or Abbreviation	Full spelling
PD	Position Determination
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PUK	PIN Unblocking Key
PS	Packet Switched (PS) domain
QoS	Quality of Service
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address
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
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