HUAWEI MU609 HSPA LGA Module

AT Command Interface Specification

Issue 04

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2013-07-19		Creation
02	2013-09-18	12.8	Updated interface description of AT^IOCTRL–Control the GPIO
		16.9	Added section 16.9 AT^IPFLOWQ–Request and Clear TCP/UDP Link Data Packet Statistics
		17.1.2	Updated the parameter value description of <mode>
		21.1	Updated command syntax of AT^NDISDUP–NDIS-Based Dialing
		21.2.2	Updated the parameter value description of <PDP_type>
		21.3.2	Updated the parameter value description of <PDP_type>
03	2014-02-13	4.3	Updated <fac>'s parameter value of AT+CLCK–Facility Lock
		4.13	Updated the parameter value description of <n> and deleted example description when AT+CHLD=3
		4.14	Deleted section 4.14 in issue 02: AT+CSSN–Set Supplementary Service Notification Presentation
		4.15	Deleted section 4.15 in issue 02: +CSSI–Supplementary Service Notifications

Document Version	Date	Chapter	Descriptions
		4.16	Deleted section 4.16 in issue 02: +CSSU–Supplementary Service Notifications
		6.2	Added `<fac>`'s parameter value "PH-NET PIN" of AT+CPIN–Enter PIN
		15.2	Updated `<roam>`'s description of AT^SYSCFG–System Configuration
		17.5.3	Updated the parameter value description of `<option>`
		17.7.2	Added description of NMEA sentences
		23	Added chapter 23: AT&T Extended Commands
		24.1	Updated section 24.1: List of URC Commands
		24.7	Updated section 24.7: Acronyms and Abbreviations
04	2014-03-12	9.6	Updated the parameter value description of `<mt>` and `<ds>`, and example of `AT+CNMI`
		9.17	Updated example of `AT+CNMA`

Contents

1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by Huawei terminal product MU609 module.

Please read the Release Notes released with the firmware before using MU609 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 b ased 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 11 "Standard STK Interface" describe AT interfaces defined in international standards such as 3GPP and ITU-T. The content is based on the structure of 3GPP TS 27.007.

Chapter 12 "Huawei Proprietary Interface: Mobile Termination Control and Status Interface" to chapter 22 "Huawei Proprietary Interface: FOTA Interfaces" describe Huawei proprietary interfaces.

Chapter 23 "AT&T Extended Commands" describes AT interfaces of AT&T Version.

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

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

For example:

Saving upon Power-off	PIN
N	Y

The settings are described as follows:

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

1.5 AT Command Syntax

1.5.1 AT Command Types

Table 1-1 Types of AT commands

AT command type	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	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. For details, see the description in S3.

<LF>:   Line feed character. For details, see the description in 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
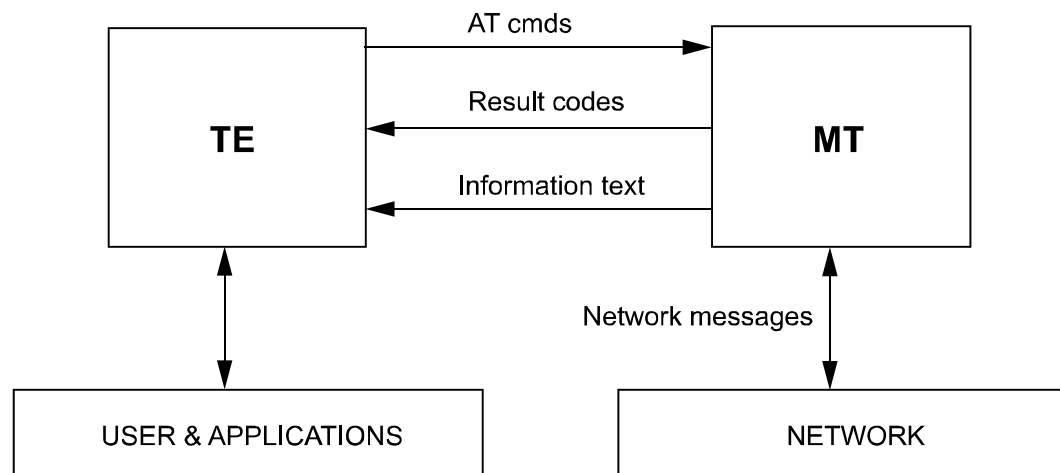
Figure 1-2 shows the basic organization format of the AT command line.

Figure 1-2 Basic organization format 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
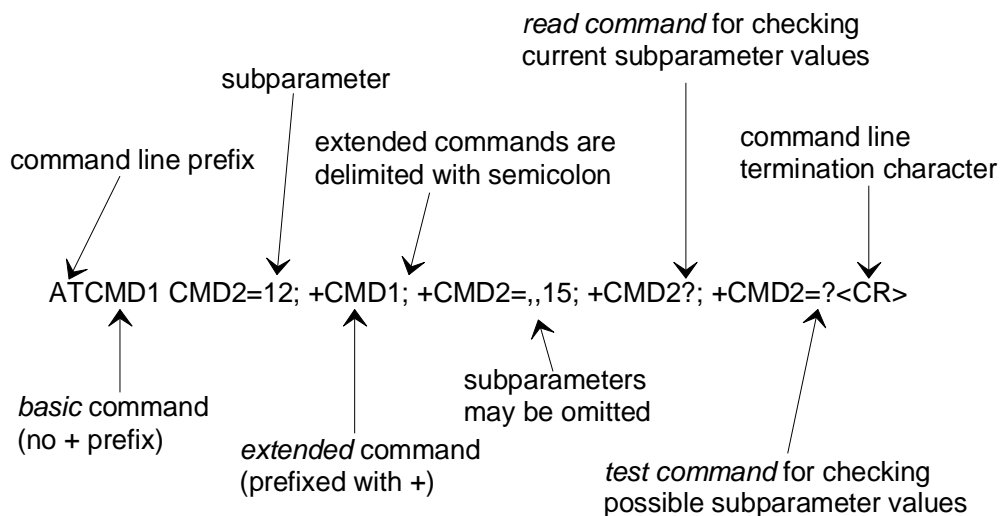
The returned value of the AT command consists of two parts: response message and result codes. Figure 1-3 shows an example of returned value of the AT command.

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
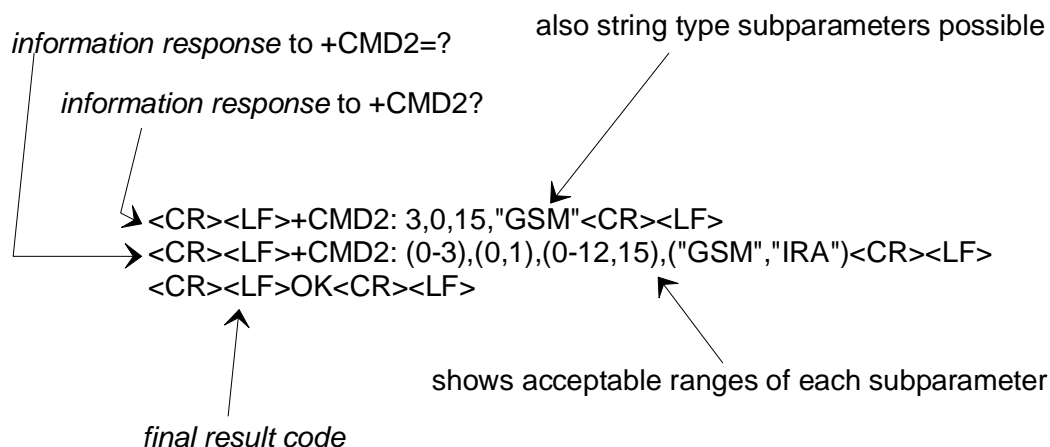
1.6 Abort Attributes of AT Commands

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
ATA	Can be aborted
AT+CLCK	Can be aborted
AT+COPS	Can be aborted except "AT+COPS=?"
AT+CLCC	Can be aborted
AT+CLIP	Can be aborted
AT^IPINIT	Can be aborted
AT^IPOPEN	Can be aborted
AT^IPSEND	Can be aborted
AT^IPSENDEX	Can be aborted
AT^IPCLOSE	Can be aborted

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 ATE–Echo Command

2.1.1 Command Syntax

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

2.1.2 Interface Description

The ATE command sets whether the MT echoes the characters received from the TE.

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

2.1.3 Parameter Description

<value>:

0   The MT does not echo the characters received from the TE.

1   The MT echoes the characters received from the TE (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: ATE0

Response: OK

2.2 ATS0–Ring Before Automatic Answer

2.2.1 Command Syntax

Set command
ATS0=<value>
Possible Response(s)
<CR><LF>OK<CR><LF>
Read command
ATS0?
Possible Response(s)
<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

2.2.2 Interface Description

The set command is used to disable or enable the DCE automatic to answer the incoming call. If <value> was set to non-zero value, DCE will answer the incoming call after <value> rings.

The read command is used to return the current value.

The return value comprises three octets, for example:

0–000

1–001

For PS and CS incoming call:

When ATS0=0, call will not be auto-answered. Otherwise, call will be auto-answered after S0 rings. The maximum number of rings is 13. When PS call is incoming and S0 is set to more than 13, the current PS call will not be auto-answered.

2.2.3 Parameter Description

<value>:

0	Disable automatic answering (default value).
1–255	Enable automatic answering after the specified number of rings.

Note:

Value of S0 will restore to default when module was reset.

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

2.2.5 Example

Run: ATS0=3

Response: OK

2.3 ATS3–Command Line Termination Character

2.3.1 Command Syntax

Set command
ATS3=<value>
Possible Response(s)
<CR><LF>OK<CR><LF>
Read command
ATS3?
Possible Response(s)
<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

2.3.2 Interface Description

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

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

2.3.3 Parameter Description

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

0–127   Set `S3` in ASCII code

2.3.4 Property Description

Saving upon Power-off	PIN
N	N

2.3.5 Example

Run: ATS3=13

Response: OK

2.4 ATS4–Response Format Character

2.4.1 Command Syntax

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

2.4.2 Interface Description

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

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

2.4.3 Parameter Description

<value>: the default value is 10.

0–127   Set S4 in ASCII code.

2.4.4 Property Description

Saving upon Power-off	PIN
N	N

2.4.5 Example

Run: ATS4=10

Response: OK

2.5 ATV–Set the Response Format

2.5.1 Command Syntax

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

2.5.2 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>

2.5.3 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.

2.5.4 Property Description

Saving upon Power-off	PIN
N	N

2.5.5 Example

Run: `ATV1`

Response: `OK`

2.6 ATI–Request Identification

2.6.1 Command Syntax

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

2.6.2 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 2.6.5 Example.

2.6.3 Parameter Description

<value>: an integer type value and the valid value set is 0–255.

 0　　　　　Queries the previously described MS ID information.

If <value> is not specified or other value instead of 0, it is equivalent to <value>=0.

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

Run:　　　　ATI

Response: Manufacturer: Huawei Technologies Co., Ltd.
             Model: MU609
             Revision: 12.105.17.00.00
             IMEI: 356112010004540
             +GCAP: +CGSM,+DS,+ES

             OK

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

2.7.1 Command Syntax

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

2.7.2 Interface Description

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

2.7.3 Parameter Description

<manufacturer>: a string indicating the manufacturer information.

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

2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

Run: AT+CGMI

Response: Huawei Technologies Co., Ltd.

              OK

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

2.8.1 Command Syntax

Execution command
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>
Test command AT+CGMM=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.8.2 Interface Description

This command queries the MT's model identification. Both AT+CGMM and AT+GMM 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.

2.8.3 Parameter Description

<production_name>: product name.

2.8.4 Property Description

Saving upon Power-off	PIN
NA	N

2.8.5 Example

Product name: MU609

Run: AT+CGMM

Response: MU609

           OK

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

2.9.1 Command Syntax

Execution command
AT+CGMR
Possible Response(s)
<CR><LF><softversion><CR><LF><CR><LF>OK<CR><LF>
Test command
AT+CGMR=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.9.2 Interface Description

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

2.9.3 Parameter Description

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

2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

Run: AT+CGMR

Response: 11.103.35.00.00

OK

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

2.10.1 Command Syntax

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

2.10.2 Interface Description

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

2.10.3 Parameter Description

<IMEI>: 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

2.10.4 Property Description

Saving upon Power-off	PIN
NA	N

2.10.5 Example

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

Run: `AT+CGSN`

Response: `351548000225444`

`OK`

2.11 AT+CSCS–Select TE Character Set

2.11.1 Command Syntax

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

2.11.2 Interface Description

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

2.11.3 Parameter Description

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

2.11.4 Property Description

Saving upon Power-off	PIN
N	N

2.11.5 Example

- Set command:

  Run: AT+CSCS="IRA"

  Response: OK

- Read command:

  Run: AT+CSCS?

  Response: +CSCS: "IRA"

             OK

- Test command:

  Run: AT+CSCS=?

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

             OK

2.12 AT+CIMI–Request IMSI

2.12.1 Command Syntax

Execution command
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>
Test command
AT+CIMI=?
Possible Response(s)
<CR><LF>OK<CR><LF>

2.12.2 Interface Description

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

2.12.3 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

2.12.4 Property Description

Saving upon Power-off	PIN
NA	N

2.12.5 Example

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

Run: AT+CIMI

Response: 1234512345678

            OK

2.13 ATZ–Restore Factory Settings

2.13.1 Command Syntax

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

2.13.2 Interface Description

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

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

For the restored parameters of the AT command, see Table 2-1 . In addition to restoring the parameters of the AT command to their default values, the `&W` command can set the user value. If the user value is not set, the parameters are restored to the factory default values.

Table 2-1 The commands that can be restored to the default value

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

2.13.3 Parameter Description

<value>

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

Note:

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

2.13.4 Property Description

Saving upon Power-off	PIN
N	N

2.13.5 Example

Run: ATZ0

Response: OK

2.14 AT&F–Restore Default AT Command Settings

2.14.1 Command Syntax

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

2.14.2 Interface Description

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

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

Command
E
V
Q
X
&C
&D
&S
S0

Command
S3
S4
S5
S7
S10
+IFC
+ICF
+IPR

Note:

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

2.14.3 Parameter Description

<value>:

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

Note:

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

2.14.4 Property Description

Saving upon Power-off	PIN
N	N

2.14.5 Example

Run: AT&F0

Response: OK

2.15 A/–Repeat Previous Command Line

2.15.1 Command Syntax

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

2.15.2 Interface Description

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

2.15.3 Parameter Description

NA

2.15.4 Property Description

Saving upon Power-off	PIN
NA	N

2.15.5 Example

If the last command is:

Run: AT+CGSN

Response: 351782030028946

           OK

Run: A/

Response: 351782030028946

           OK

2.16 ATQ–Set Result Code Presentation Mode

2.16.1 Command Syntax

Execution command
ATQ[value]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

2.16.2 Interface Description

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

2.16.3 Parameter Description

<value>:

0   DCE transmits result code (default value).

1   Result codes are suppressed and not transmitted.

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

2.16.4 Property Description

Saving upon Power-off	PIN
N	N

2.16.5 Example

Run: ATQ0

Response: OK

2.17 AT&W–Store User Settings

2.17.1 Command Syntax

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

2.17.2 Interface Description

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

The commands and parameters that can be stored are followed:

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

2.17.3 Property Description

Saving upon Power-off	PIN
NA	N

2.17.4 Example

Run: AT&W

Response: OK

2.18 AT&V–Query Current Configuration

2.18.1 Command Syntax

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

2.18.2 Interface Description

This command queries the current configuration.

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

2.18.3 Property Description

Saving upon Power-off	PIN
NA	N

2.18.4 Example

Run: AT&V

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

            OK

2.19 AT+CCLK–Return Current Time of the Module

2.19.1 Command Syntax

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

2.19.2 Interface Description

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

The read command returns the current setting of the clock.

2.19.3 Parameter Description

`<time>`: string type value; format is "yyyy/MM/dd,hh:mm:ss±zz", where characters indicate year, month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -96...+96). E.g. 6th of May 2001, 22:10:00 GMT+2 hours equals to "2001/05/06,22:10:00+08"

Note:

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

2.19.4 Property Description

Saving upon Power-off	PIN
NA	N

2.19.5 Example

Run:	AT+CCLK="2013/01/06,01:14:09"
Response:	OK
Run:	AT+CCLK?
Response:	+CCLK: "2013/01/06,01:14:34"
	OK
Run:	AT+CCLK=?
Response:	OK

2.20 AT+CRC–Cellular Result Codes

2.20.1 Command Syntax

Set command
AT+CRC[=<mode>]

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

Read command
AT+CRC?

Possible Response(s)
<CR><LF>+CRC: <mode><CR><LF><CR><LF>OK<CR><LF>

Test command
AT+CRC=?

Possible Response(s)

```
<CR><LF>+CRC:  (list of supported
<mode>s) <CR><LF><CR><LF>OK<CR><LF>
```

2.20.2 Interface Description

The set command controls whether or not the extended format of incoming call indication or GPRS network request for PDP context activation or notification for VBS/VGCS calls is used. When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

The test command returns values supported as a compound value.

Note:

Similar command may be found in TIA IS–99 and TIA IS–135.

2.20.3 Parameter Description

<mode>: integer type

0	Disables extended format (default value)
1	Enables extended format

<type>:

ASYNC [,<priority>[,<subaddr>,<satype>]]
Asynchronous transparent
SYNC [,<priority>[,<subaddr>,<satype>]]
Synchronous transparent
REL ASYNC [,<priority>[,<subaddr>,<satype>]]
Asynchronous non-transparent
REL SYNC [,<priority>[,<subaddr>,<satype>]]
Synchronous non-transparent
FAX [,<priority>[,<subaddr>,<satype>]]
Facsimile (TS 62)
VOICE [,<priority>[,<subaddr>,<satype>]]
Normal voice (TS 11)
VOICE/XXX [,<priority>[,<subaddr>,<satype>]]
Voice followed by data (BS 81) (XXX is ASYNC, SYNC, REL ASYNC or REL SYNC)

ALT VOICE/XXX [,<priority>[,<subaddr>,<satype>]]
Alternating voice/data, voice first (BS 61)
ALT XXX/VOICE [,<priority>[,<subaddr>,<satype>]]
Alternating voice/data, data first (BS 61)
ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]
Alternating voice/fax, voice first (TS 61)
ALT FAX/VOICE [,<priority>[,<subaddr>,<satype>]]
Alternating voice/fax, fax first (TS 61)
GPRS <PDP_type>, <PDP_addr>[, [<L2P>][,<APN>]]
GPRS network request for PDP context activation
VGC <GCA>, <GId>, <ackflag> [,<priority>]
Voice group call (TS 91)
VBC <GCA>, <GId>, <ackflag> [,<priority>]
voice broadcast call (TS 92)

<priority>: indicates the eMLPP priority level of the incoming call by paging, notification or setup message. The priority level values are as defined in eMLPP specification 3GPP TS 22.067.

<subaddr>: string type subaddress of format specified by <satype>.

<satype>: type of subaddress octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.8).

<PDP_type>, <PDP_addr> and <APN> are as defined in 8.1 the Define PDP Context (AT+CGDCONT) command. If the MT is unable to announce to the TE the network's request (for example it is in V.250 online data state), the MT shall reject the request. No corresponding unsolicited result code shall be issued when the MT returns to a command state.

<GCA> is a part of the group call reference as specified in 3GPP TS 23.003 and indicates group call area.

<GId> is a part of the group call reference as specified in 3GPP TS 23.003 and indicates group call identification. The <ackflag>=1 proposes that a predefined confirmation procedure is to be used after the call is ended. For <ackflag>=0, no confirmation procedure is required.

2.20.4 Property Description

Saving upon Power-off	PIN
N	N

2.20.5 Example

Run:	AT+CRC=0
Response:	OK
Run:	AT+CRC?
Response:	+CRC: 0
	OK
Run:	AT+CRC=?
Response:	+CRC: (0,1)
	OK

If a voice call incoming when AT+CRC=1, an unsolicited report is presented automatically as follows:

Run:	ATD13903711850;	Send this command on other MT
Response:	+CRING: VOICE	If the CRC is enabled, the ring will be reported.

3 Call Control Commands and Methods

3.1 ATD–Dial Command

3.1.1 Command Syntax

Execution command
ATD[<digits>][I/i][;]
Possible Response(s)
<CR><LF>OK<CR><LF>
About the responses, see "Final Result Code" in the 24.4 .

3.1.2 Interface Description

This command is used to initiate a voice or data service call.

For the illustrations of message interaction between the TE and MT when the MT makes a voice call.

3.1.3 Parameter Description

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

[I/i]: flag of CLIR services (if this flag is not specified, the network's default value is used, or the value of this flag is dependent on whether the network has assigned permanent CLIR services). This flag only support voice service.

| I | Enable CLIR |
| i | Disable CLIR |

Exceptions:

- If the network has not assigned CLIR services and the user enables the CLIR service, the network side determines whether the call initiated by the user can continue. If the call is rejected, the reason for rejecting the call is presented in the call ending indication AT^CEND.

- If the network assigns permanent CLIR services, the call initiated by the user can continue after the user disables the CLIR service.

[;]: call type indication. When ';' is contained in this command, a voice call is initiated. When ';' is not contained in this command, a data service call is initiated.

Note:

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

3.1.4 Property Description

Saving upon Power-off	PIN
NA	N

3.1.5 Example

- Dial a valid number at normal case

Run:	ATD13903711825;	Initiate a voice call.
Response:	OK	

- Dial a number that when the sim pin is required

Run:	ATD13903711825;	Initiate a voice call.
Response:	ERROR	

3.2 ATA–Answer Command

3.2.1 Command Syntax

Execution command
ATA
Possible Response(s)
<CR><LF>OK<CR><LF>

About the responses, see "Final Result Code" in the 24.4 .

3.2.2 Interface Description

When MT has an incoming call, TE uses this command to notify MT of the incoming call.

Note:
This command cannot be sent to receive CS data service call at the PCUI port.

3.2.3 Property Description

Saving upon Power-off	PIN
NA	Y

3.2.4 Example

Answer a normal voice call:

Run: ATA

Response: OK   When MT has an incoming call

3.3 RING–Call Indication

3.3.1 Command Syntax

URC
RING

3.3.2 Interface Description

When a call is originated to the MT, the MT periodically (T=5s) reports this indication to the TE.

3.3.3 Property Description

Saving upon Power-off	PIN
NA	NA

3.3.4 Example

If a voice call incoming when `AT+CRC=0`, an unsolicited report is presented automatically as follows.

Run:	`ATD13903711850;`	Send this command on other MT
Response:	`RING`	If the CRC is disabled, the ring will be reported several times.
	`RING`	
	`RING`	
	`RING`	

3.4 AT+VTS–Send DTMF Tone

3.4.1 Command Syntax

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

3.4.2 Interface Description

The set command uses DTMF tone to send each ASCII character to the peer. This command can be used only in the activated speech call.

3.4.3 Parameter Description

<DTMF_CHAR>: an ASCII character falling within the range of the set (0–9, #, *, A, B, C, D). The characters must be upper-case letters in protocols; however, they can be either upper-case letters or lower-case letters in Huawei products.

3.4.4 Property Description

Saving upon Power-off	PIN
NA	N

3.4.5 Example

Send the dtmf:

Run: AT+VTS=A

Response: OK

3.5 ATO–Return to Data State

3.5.1 Command Syntax

Execution command
ATO[<value>]
Possible Response(s)
<CR><LF>CONNECT [<text>]<CR><LF> <CR><LF>NO CARRIER<CR><LF> <CR><LF>ERROR<CR><LF> <CR><LF>+CME ERROR: <err><CR><LF>

3.5.2 Interface Description

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

3.5.3 Parameter Description

`<value>`:

0   Switch command mode to data state.

`<text>`: indicator of interface speed.

Note:

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

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

3.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.5.5 Example

Run: ATO

Response: CONNECT 9600

3.6 +++–Switch Data Mode to Command Mode

While the DCE is in data mode, this command enables DCE switch to command mode.

Or while the DCE is in transparent mode of Embedded TCP/IP function, +++ will make the DCE return to command mode. For Embedded TCP/IP function, +++ can be used in serial and USB ports, for the other case, +++ can only be used in serial port.

When executing this command, any character is forbidden in 900 ms before and after inputting "+++", and it must be less than 900 ms between two '+' input.

3.6.1 Example

Run: +++

Response: OK   Currently DCE is command mode.

3.7 AT+CHUP–Call Hangup

3.7.1 Command Syntax

Execution command
AT+CHUP
Possible Response(s)
<CR><LF>OK<CR><LF>
Test command
AT+CHUP=?
Possible Response(s)
<CR><LF>OK<CR><LF>

3.7.2 Interface Description

This command is used to end a call when the conversation is over and to reject an incoming call. When multiple calls are connected, this command hangs up all hold, active, and waiting calls, whereas other new incoming calls are not affected by the hangup.

3.7.3 Property Description

Saving upon Power-off	PIN
NA	N

3.7.4 Example

Disconnect a voice call use chup:

Run: AT+CHUP

Response: OK

4 Network Service Related Commands

4.1 AT+COPS–Operator Selection

4.1.1 Command Syntax

Set command
`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>`

Read command
`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>`

Test command
`AT+COPS=?`
Possible Response(s)

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

4.1.2 **Interface Description**

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

The set command enables to select the GSM/UMTS network automatically or manually.

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

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

Note:

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

4.1.3 **Parameter Description**

`<mode>`:

0	Automatic (`<oper>` field is ignored)
1	Manual (`<oper>` field shall be present, and `<AcT>` optionally)
2	Deregister from network
3	Set only `<format>` (for read command `AT+COPS?`), do not attempt registration/deregistration (`<oper>` and `<AcT>` fields are ignored); this value is not applicable in read command response
4	Manual/automatic (`<oper>` field shall be present); if manual selection fails, automatic mode (`<mode>`=0) is entered

`<format>`:

0	Long format alphanumeric `<oper>`
1	Short format alphanumeric `<oper>`
2	Numeric `<oper>`

`<oper>`: string type.

`<format>`: indicates if the format is alphanumeric or numeric, long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13). Numeric format is the GSM Location Area Identification number (refer 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

2   UTRAN

4.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.1.5 Example

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

Run: AT+COPS=?

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

              OK

- Automatic search of network:

Run: AT+COPS=0

Response: OK

Note:

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

- Manual search of network:

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

Response: OK

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

Run: AT+COPS?

Response: +COPS: 1

            OK

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

Notes:
- We cannot manually search the UTRAN network when current setting is GSM ONLY (mode=13) mode which set by AT^SYSCFG.
- We cannot manually search the GSM network when current setting is WCDMA ONLY (mode=14) mode which set by AT^SYSCFG.
- 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"	Command returns mode, format and registered operator.
	OK	

4.2 AT+CREG–Network Registration

4.2.1 Command Syntax

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

Test command
`AT+CREG=?`
Possible Response(s)
`<CR><LF>+CREG:` (list of supported `<n>`s) `<CR><LF><CR><LF>OK<CR><LF>`

4.2.2 Interface Description

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

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

4.2.3 Parameter Description

`<n>`:

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

`<stat>`:

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

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

`<ci>`: string type; eight-character cell ID.

`<AcT>`: integer type; 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.

4.2.4 Property Description

Saving upon Power-off	PIN
N	Y

4.2.5 Example

- Enable the initiative report when network registration status change:

Run: AT+CREG=1

Response: OK

- Query the current network registration status:

Run: AT+CREG?

Response: +CREG: 1,1

OK

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

Run: AT+CREG=?

Response: +CREG: (0-2)

OK

4.3 AT+CLCK–Facility Lock

4.3.1 Command Syntax

Set command
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>
Test command AT+CLCK=?
Possible Response(s)
<CR><LF>+CLCK: (list of supported <fac>s)<CR><LF><CR><LF>OK<CR><LF>

4.3.2 Interface Description

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

The test command returns the facilities supported.

4.3.3 Parameter Description

<fac>: specifies the target of this command.

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

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

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

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

"AI"   Bar All Incoming calls

"AO"   Bar All Outgoing calls

"IR"   BIC-Roam (Bar Incoming Calls when Roaming outside the home country)

"OI"   Bar Outgoing International calls

"OX"	Bar Outgoing international calls except to home country
"FD"	SIM card or active application in the UICC (GSM or USIM) fixed dialing memory feature (reserved, not supported currently)
"PN"	Network Personalization
"PU"	Network subset Personalization (reserved, not supported currently)
"PP"	Service Provider Personalization (reserved, not supported currently)
"PC"	Corporate Personalization (reserved, not supported currently)
"PF"	Lock Phone to the very First inserted SIM/UICC card (PH-FSIM) (if this parameter is set, you need to enter the password when changing an SIM/UICC card) (reserved, not supported currently)

Note:

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

<mode>: integer type; operating mode.

0	Unlock
1	Lock
2	Queries status

<status>: integer type; 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>:

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

4.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

Note：

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

4.3.5 Example

- Query the lock status of SIM:

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

    Response: `+CLCK: 0`

    `OK`

- Set the lock status of SIM:

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

    Response: `OK`

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

    Run: `AT+CLCK=?`

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

    `OK`

4.4 AT+CPWD–Change Password

4.4.1 Command Syntax

Set command
`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>

Test command

AT+CPWD=?

Possible Response(s)

<CR><LF>+CPWD: list of supported
(<fac>,<pwdlength>)s<CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

4.4.2 Interface Description

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

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

4.4.3 Parameter Description

<fac>: specifies the target of this command.

"P2"	SIM PIN2
"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All Barring services (applicable only for <mode>=0)
"AC"	Ahort message service
"AG"	All inComing barring services
"AI"	Bar All Incoming calls
"AO"	Bar All Outgoing calls
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"OI"	Bar Outgoing International calls
"OX"	Bar Outgoing international calls except to home country

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

<pwdlength>: integer type maximum length of the password for the facility.

4.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

Note：

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

4.4.5 Example

- Modify PIN2 of SIM:

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

Response: `OK`

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

Run: `AT+CPWD=?`

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

`OK`

4.5 AT+CLIR–Calling Line Identification Restriction

4.5.1 Command Syntax

Set command
`AT+CLIR=[<n>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
Read command
`AT+CLIR?`
Possible Response(s)
<CR><LF>`+CLIR: <n>,<m>`<CR><LF><CR><LF>`OK`<CR><LF>

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

4.5.2 Interface Description

This command allows a caller to enable or disable the presentation of the calling line identification (CLI). If the calling line identification restriction (CLIR) is enabled, the CLI is not displayed to the called party.

When <n> is not specified, the execution command is equivalent to the set command: AT+CLIR=0.

The read command returns actual subscription.

4.5.3 Parameter Description

<n>: disables or enables the presentation of the unsolicited result code (URC).

0   Used according to the subscription of the CLIR service (default value).

1   Enable.

2   Disable.

<m>: specifies CLIR service status.

0   CLIR not provided.

1   CLIR provided in permanent mode.

2   Unknown (network problems).

3   CLIR temporary mode presentation restricted.

4   CLIR temporary mode presentation allowed.

4.5.4 Property Description

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

4.5.5 Example

- Query the status of calling line identification restriction:

Run: AT+CLIR?

Response: +CLIR: 0,0

            OK

- Enable calling line identification restriction:

Run: AT+CLIR=1

Response: OK

- Query the list of supported <n>s.

Run: AT+CLIR=?

Response: +CLIR: (0-2)

            OK

4.6 AT+CLIP–Calling Line Identification Presentation

4.6.1 Command Syntax

Set command
AT+CLIP=[<n>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
AT+CLIP?
Possible Response(s)
<CR><LF>+CLIP: <n>[,<m>]<CR><LF><CR><LF>OK<CR><LF>
Test command
AT+CLIP=?
Possible Response(s)
<CR><LF>+CLIP: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

4.6.2 Interface Description

This command allows a called party to get the CLI of the caller. If the calling line identification presentation (CLIP) is enabled, +CLIP is presented following the ring indication. (For the definition of the interface, see section 4.7 +CLIP–CLIP Notifications.)

Note:

When <n> is not specified, the execution command is equivalent to set command: AT+CLIP=0.

4.6.3 Parameter Description

<n>: integer type; disables or enables the presentation of URC +CLIP.

0   Disable (default value)

1   Enable

<m>: integer type; specifies the subscription status of CLIP services.

0   CLIP not provided

1   CLIP provided

2   Unknown (network problems)

4.6.4 Property Description

Saving upon Power-off	PIN
N	Y

4.6.5 Example

- Query the status of calling line identification presentation:

Run: AT+CLIP?

Response: +CLIP: 0,1

            OK

- Enable calling line identification presentation:

Run: AT+CLIP=1

Response: OK

Then if the CLI is presented(the calling line identification "CLIR" is not enabled), a message similar to the following is displayed:

Response: +CLIP: "82882690",129,,,,0

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

Run: AT+CLIP=?

Response: +CLIP: (0-1)

             OK

4.7 +CLIP–CLIP Notifications

4.7.1 Command Syntax

URC
<CR><LF>+CLIP: <number>,<type>,,,,<CLI validity><CR><LF>

4.7.2 Interface Description

The "AT+CLIP" set command sets whether reporting of the caller ID unsolicited result code (URC) is allowed. If the caller ID URC is allowed to be reported, when there is an incoming call, the caller ID indication is provided following the RING indication and periodically (every five seconds) reported to the TE.

4.7.3 Parameter Description

`<number>`: specifies a calling number with ASCII character. Allowed characters are '0'–'9', '*',' #', and '+'.

`<type>`: specifies the number type. "145" indicates an international number. For details about the values of `<type>`, see the value definitions of `<type_addr>` in section 10.3 AT+CMGS–Send Message.

`<CLI validity>`:

0   The call line identity (CLI) is valid.

1   The CLI is rejected by the call originator.

2   The CLI is unavailable because of the limitation of the originating network or a network problem.

Three fields are reserved between `<type>` and `<CLI validity>`.

4.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.7.5 Example

Firstly, enable calling line identification presentation:

Run: AT+CLIP=1

Response: OK

If the CLI is presented, a message similar to the following is displayed:

Response: +CLIP: "82882690",129,,,,0

If the counter party enables the CLIR, the CLI cannot be presented and a message similar to the following is displayed:

Response: +CLIP: ,129,,,,1

If the CLI cannot be presented due to network problems, a message similar to the following is displayed:

Response: +CLIP: ,129,,,,2

4.8 AT+CLCC–List Current Calls

4.8.1 Command Syntax

Execution command
AT+CLCC
Possible Response(s)
[<CR><LF>+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<priority>]]][<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<priority>]]][...]]<CR><LF>]<CR><LF>OK<CR><LF>
Test command
AT+CLCC=?
Possible Response(s)
<CR><LF>OK<CR><LF>

4.8.2 Interface Description

This command queries the number of current calls and call state.

4.8.3 Parameter Description

`<idx>`: specifies the call ID.

`<dir>`: specifies the call direction.

0	Mobile originated (MO) call
1	Mobile terminated (MT) call

`<state>`: specifies the call state.

0	Active
1	Hold
2	Dialing
3	Alerting
4	Incoming
5	Waiting

`<mode>`: specifies the call mode.

0	Voice
1	Data
2	Fax

`<mpty>`: specifies whether the call involves multiple parties or not.

0	Non-multiparty call
1	Multiparty call

`<number>`: specifies a calling number with ASCII character. Valid characters are '0'–'9', '*', '#', and '+'. '+' is only allowed before a phone number.

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

`<alpha>`: specifies text information corresponding to the entry in the phonebook. Used character set is the one selected with command 2.11 AT+CSCS–Select TE Character Set. (reserved, not supported currently)

`<priority>`: not supported currently.

4.8.4 Property Description

Saving upon Power-off	PIN
NA	N

4.8.5 Example

An MT has set up an active call and enabled call waiting, and a call is waiting. Run the AT+CLCC command. The following information is displayed:

Run: AT+CLCC

Response: +CLCC: 1,0,0,0,0,"13987654321",129

            +CLCC: 2,1,5,0,0,"13987654321",129

            OK

4.9 AT+CCFC–Call Forwarding

4.9.1 Command Syntax

Set command
AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<reserved1>[,<reserved2>[,<time>]]]]]]
Possible Response(s)
When <mode>=2 and the command is executed successfully: <CR><LF>+CCFC: <status>,<class1>[,<number>,<type>[,<reserved1>,<reserved2>[,<time>]]][<CR><LF>+CCFC: <status>,<class2>[,<number>,<type>[,<reserved1>,<reserved2>[,<time>]]][...]]<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>
Test command AT+CCFC=?
Possible Response(s)

```
<CR><LF>+CCFC: (list of supported
<reason>s)<CR><LF><CR><LF>OK<CR><LF>
```

4.9.2 Interface Description

This command allows control of the call forwarding supplementary service, including registration, erasure, activation, deactivation, and status query.

Responses are returned one by one. See section 4.9.1 "Command Syntax." This command is set according to the sum of bits.

The test command returns supported reason values.

4.9.3 Parameter Description

<reason>: specifies the call forwarding type.

0	Unconditional
1	Mobile busy
2	No reply
3	Unreachable (no network or phone power-off)
4	All call forwarding
5	All conditional call forwarding

<mode>: specifies the operation mode of call forwarding.

0	Deactivated
1	Activated
2	Query status
3	Registration
4	Erasure

<number>: string type phone number of forwarding address in format specified by <type>.

<type>: specifies the number type. "145" indicates an international number. For details about the values of <type>, see the value definitions of <type_addr> in section 10.3 AT+CMGS–Send Message.

<reserved1>: reserved.

<reserved2>: reserved.

<classx>: specifies service type. The default value is 7, indicating the combination of voice, data, and fax services. Currently, only voice services are supported. Therefore, the value is 1.

1	Voice
2	Data
4	Fax
8	Short message
16	Synchronous CS data
32	Asynchronous CS data
64	Dedicated packet access
128	Dedicated PAD access

<time>: when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded. The value ranges from 1 to 30 seconds and the default value is 20.

<status>:

| 0 | Not active |
| 1 | Active |

4.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.9.5 Example

| Run: | AT+CCFC=0,3,"13987654321",,1 | Register the current number with unconditional call transfer to 13987654321. |
| Response: | OK | |

4.10 AT+CCWA–Call Waiting

4.10.1 Command Syntax

Set command
AT+CCWA=[<n>[,<mode>[,<class>]]]
Possible Response(s)

When `<mode>`=2 and the command is executed successfully:

<CR><LF>+CCWA: <status>,<class1>[<CR><LF>+CCWA: <status>,<class2>[...]]<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>

Read command
AT+CCWA?

Possible Response(s)

<CR><LF>+CCWA: <n><CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

Test command
AT+CCWA=?

Possible Response(s)

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

4.10.2 Interface Description

This command allows control of the Call Waiting supplementary service, including activation, deactivation, and status query.

`<n>` is used to disable/enable the presentation of a URC.

The test command returns supported values.

Note:

The value of <n> is unchanged when the number of parameters is greater than 1 and <n> is default.

4.10.3 Parameter Description

`<n>`: disables or enables the presentation of a URC.

0   Disable (default value)

1   Enable

Note:

the value of `<n>` is unchanged when the number of parameters is greater than 1 and `<n>` is default.

`<mode>`:

0	Deactivated
1	Activated (default value)
2	Query status

Note:

When the number of parameters is greater than 1, mode is set to 1 by default.

`<classx>`: specifies service type. The default value is 7, indicating the combination of voice, data, and fax services. Currently, only voice services are supported. Therefore, the value is 1.

1	Voice
2	Data
4	Fax
8	Short message
16	Synchronous CS data
32	Asynchronous CS data
64	Dedicated packet access
128	Dedicated PAD access

`<status>`: integer type

0	not active
1	active

Note:

When the number of parameters is greater than 1, class is set to 7 by default.

4.10.4 Property Description

Saving upon Power-off	PIN
N	Y

4.10.5 Example

Run:	AT+CCWA=1,1,1	Enable the voice call waiting function and enable the presentation of call waiting information.
Response:	OK	
Run:	AT+CCWA=1	Enable the presentation of call waiting information.
Response:	OK	
Run:	AT+CCWA=,1	Enable the call waiting function (with `<class>` set to the default value 7 and the value of `<n>` unchanged).
Response:	+CME ERROR: retry operation	Currently, only voice services are supported. Therefore, the default value 7 for `<class>` is not supported by the network.
Run:	AT+CCWA=1,,	Enable the call waiting function (with `<mode>` and `<class>` set to the default values) and enable the presentation of call waiting information.
Response:	+CME ERROR: retry operation	Currently, only voice services are supported. Therefore, the default value 7 for `<class>` is not supported by the network.

4.11 +CCWA–Call Waiting Notifications

4.11.1 Command Syntax

URC
<CR><LF>+CCWA: `<number>`,`<type>`,`<class>`,[`<alpha>`][,`<CLI validity>`[,`<subaddr>`,`<satype>`[,`<priority>`]]]**<CR><LF>**

4.11.2 Interface Description

When call waiting is enabled, call waiting information is presented automatically in a period consistent with that of ring presentation.

Note:

The incoming call may be reported even during the processing of AT commands.

4.11.3 Parameter Description

<number>: specifies the waiting number.

<type>: specifies the number type. For detailed value, see the definition of the <type_addr>: parameter in an SC number in section 10.3 AT+CMGS–Send Message. If CLIP is not enabled, the value of <type> is set to 128 by default.

<class>: same as <class> in the CCWA setting command.

<alpha>: specifies the name corresponding to the calling number in the phonebook. Used character set is the one selected with command 2.11 AT+CSCS–Select TE Character Set. (not supported currently).

<CLI validity>:

0	The CLI is valid.
1	The CLI is reserved by the call originator.
2	The CLI is unavailable because of the limitation of the originating network.

When the CLI is invalid (<CLI validity>=2), the value of <number> is null and the value of <type> is also invalid.

<subaddr>: not supported currently.

<satype>: not supported currently.

<priority>: not supported currently.

4.11.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.11.5 Example

If the call waiting function is enabled, call waiting information is presented automatically as follows:

Response: +CCWA: "13901000460",129,1

4.12 +CRING–Indicate Incoming Call

4.12.1 Command Syntax

URC
`<CR><LF>`+CRING: `<type><CR><LF>`

4.12.2 Interface Description

An unsolicited report will be sent to TE periodically (voice incoming call: cycle=5s). It will be reported when `AT+CRC=1`.

When there is a PS incoming call, the maximum number of rings is 13.

4.12.3 Parameter Description

`<type>`: the details refer to 2.20 AT+CRC–Cellular Result Codes.

4.12.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.12.5 Example

If a voice call incoming when `AT+CRC=1`, an unsolicited report is presented automatically as follows:

Response: +CRING: VOICE

4.13 AT+CHLD–Call Hold

4.13.1 Command Syntax

Set command
`AT+CHLD=[<n>]`
Possible Response(s)

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

4.13.2 Interface Description

This command allows operations related to call hold.

Note:

When \<n\> is not specified, the execution command is equivalent to set command: AT+CHLD=2.

The test command returns the list of supported commands. The calling number required by some operations is indicated by x, which ranges from 1 to 9.

4.13.3 Parameter Description

\<n\>:

0	Releases all calls on hold or sets User Determined User Busy (UDUB) for waiting calls.
1	Releases all activated calls and activates other calls (in held or waiting status).
1x	Releases a specified call (in originate connecting status, held or active status).
2	Holds all activated calls and accepts another call (in held or waiting status).
2x	Holds all activated calls except the specified call.
3	Puts through a held call (current not supported).

4.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.13.5 Example

In standby mode, perform the following operations to initiate a three-party conference call:

- Run the following command to set up a call (by initiating a call actively or connecting a called party):

Run: `ATD13987654321;`

            `or ATA`

Response: `OK`

- Run the following command to hold the call:

Run: `AT+CHLD=2`

Response: `OK`

- Run the following command to initiate and set up the second call:

Run: `ATD13987654320;`

Response: `OK`

- Run the following the test commands:

Run: `AT+CHLD=?`

Response: `+CHLD: (0,1,1x,2,2x,3)`

            `OK`

4.14 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.

4.14.1 Command Syntax

Set command
`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>`
Read command `AT+CUSD?`
Possible Response(s)
`<CR><LF>+CUSD: <n><CR><LF>`
Test command `AT+CUSD=?`
Possible Response(s)
`<CR><LF>+CUSD:` (list of supported `<n>`s) `<CR><LF><CR><LF>OK<CR><LF>`

4.14.2 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 4.15 +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 n values.

4.14.3 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 ^USSDMODE.

<dcs>: integer type, USSD coding. The default value is 0 (see 3GPP TS 23.038 Cell Broadcast Data Coding Scheme in integer format).

When USSD is transmitted in coding mode, the MT supports GSM 7-bit and GSM 8-bit, but not UCS2.

<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

4.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.14.5 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):

  Run: `AT+CUSD=0,"139037601",15`

  Response: `OK`

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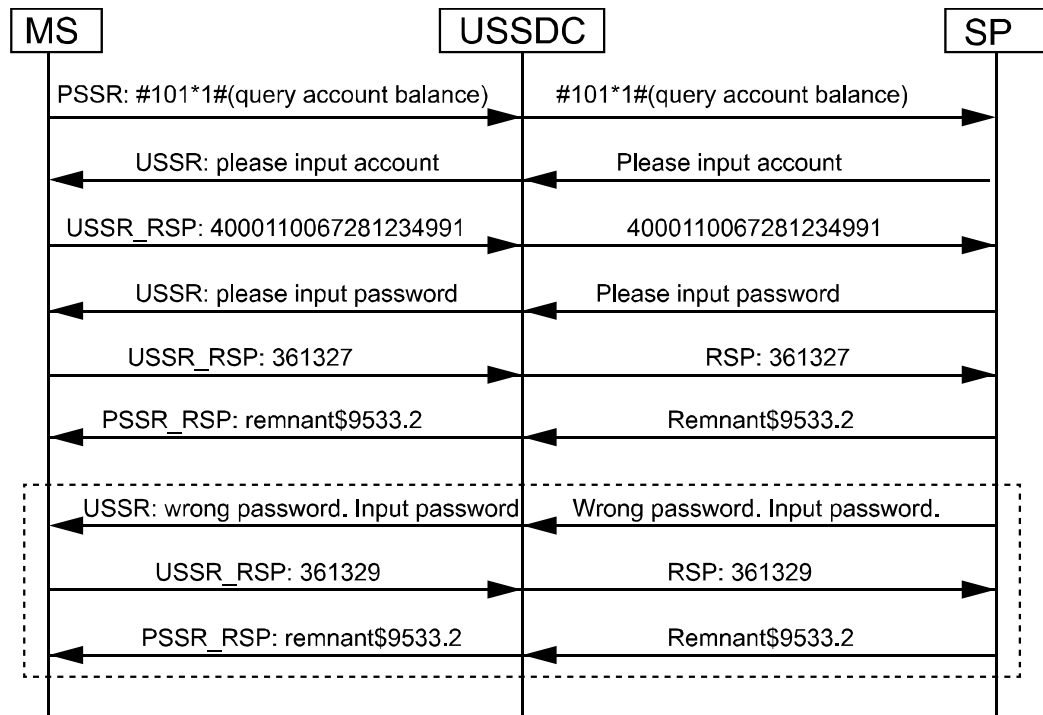
Notes:

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

4.15 +CUSD–Unsolicitedly Report USSD of Network

4.15.1 Command Syntax

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

4.15.2 Interface Description

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

The definition of its parameters and the use of this command, see section 4.15 +CUSD–Unsolicitedly Report USSD of Network.

4.15.3 Property Description

Saving upon Power-off	PIN
NA	Y

4.15.4 Example

If send `AT+CUSD=1,"3133",15` to MT, an unsolicited report is presented automatically as follows:

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

4.16 AT+CNUM–Subscriber Number

4.16.1 Command Syntax

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

Test command
AT+CNUM=?
Possible Response(s)
<CR><LF>OK<CR><LF>

4.16.2 Interface Description

The execution command returns the MSISDNs related to the subscriber (this information can be stored in the EF$_{MSISDN}$ folder on the SIM/USIM). For a SIM card, the information is stored in the EF$_{MSISDN}$ under DF$_{Telecom}$. For a USIM card, the information is stored in the EF$_{MSISDN}$ under ADF$_{USIM}$. If the subscriber has different MSISDNs for different services, each MSISDN is returned in a separate line.

4.16.3 Parameter Description

<alpha*x*>: optional alphanumeric string associated with <number*x*>; used character set should be the one selected with command 2.11 AT+CSCS–Select TE Character Set.

<number*x*>: string type phone number of format specified by <type*x*>

<type*x*>: type of the phone number; address octet in integer format. When <number*x*> contains the plus sign (+), the value of <type*x*> is 145, indicating that the phone number is an international number. When <number*x*> does not contain the plus sign (+), the value of <type*x*> is 129, indicating that the phone number is a national number.

<speed>: reference 27007-b10 subclause6.7 (not supported currently)

<service>: integer type (service related to the phone number) (not supported currently)

0   Asynchronous modem

1   Synchronous modem

2   PAD Access (asynchronous)

3   Packet Access (synchronous)

4   Voice

5   Fax

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

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

0   3.1 kHz

1   UDI

4.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.16.5 Example

- Run the following four commands to write two numbers of the MT to the USIM card:

Run: `AT+CPBS="ON"`

Response: `OK`

Run: `AT+CPBW=1,"+8613987654321",145,"CC"`

Response: `OK`

Run: `AT+CPBW=2,"123",129,"USER"`

Response: `OK`

Run: `AT+CNUM`

Response: `+CNUM: "CC","+8613987654321",145`

`+CNUM: "USER","123",129`

`OK`

- Run the following commands to clear the numbers:

Run: `AT+CPBS="ON"`

Response: `OK`

Run: `AT+CPBW=1`

Response: `OK`

Run: `AT+CPBW=2`

Response: `OK`

Run: `AT+CNUM`

Response: `OK`

5 Serial Interface Control Commands

5.1 AT&C–Set Carrier Detection (DCD) Line Mode

5.1.1 Command Syntax

Execution command
AT&C[value]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

5.1.2 Interface Description

This parameter determines how the state of circuit 109 relates to the detection of received line signal from the distant end. Changing the parameter will take effect immediately in both the command and online command states.

In &C1 mode of operation, circuit 109 is not turned off until all data previously received from the remote DCE is delivered to the local DTE. However, such buffered data shall be discarded and circuit 109 turned off if the DTE turns off circuit 108 (if &D1 or &D2 is set).

5.1.3 Parameter Description

<value>:

0   The DCE always presents the ON condition on circuit 109.

1   Circuit 109 changes in accordance with the underlying DCE, which may include functions other than the physical layer functions (e.g. Recommendations V.42, V.110, V.120 and V.13).(default value)

Note:

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

5.1.4 Property Description

Saving upon Power-off	PIN
N	N

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

If the command is sent from the UART port, the command is validated.

5.1.5 Example

- The DCE always presents the ON condition on circuit 109.

Run: AT&C0

Response: OK

- Circuit 109 changes in accordance with the underlying DCE, which may include functions other than the physical layer functions.

Run: AT&C1

Response: OK

5.2 AT&D–Set DTE Ready (DTR) Line Mode

5.2.1 Command Syntax

Execution command
AT&D[value]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>ERROR<CR><LF>

5.2.2 Interface Description

This parameter determines how the DCE responds when circuit 108/2 is changed from the ON to the OFF condition during online data state.

5.2.3 Parameter Description

`<value>`:

0	DCE ignores circuit 108/2.
1	Upon an on-to-off transition of circuit 108/2, the DCE enters online command state and issues an `OK` result code; the call remains connected. (not supported currently).
2	Upon an on-to-off transition of circuit 108/2, the DCE instructs the underlying DCE to perform an orderly cleardown of the call. The disposition of any data in the DCE pending transmission to the remote DCE is controlled by the +ETBM parameter (see 6.5.6 in ITU V.250) if implemented; otherwise, this data is sent before the call is cleared, unless the remote DCE clears the call first (in which case pending data is discarded). The DCE disconnects from the line. Automatic answer is disabled while circuit 108/2 remains off.

Note:

If `<value>` is not specified, it is equivalent to set `<value>` to default value which can be queried by `AT&V`.

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

If the command is sent from the UART port, the command is validated.

5.2.4 Property Description

Saving upon Power-off	PIN
N	N

5.2.5 Example

- DCE ignores circuit 108/2.

Run:　　　`AT&D0`

Response:　`OK`

- Upon an on-to-off transition of circuit 108/2, the DCE enters online command state and issues an `OK` result code; the call remains connected. (not supported currently).

  Run: `AT&D1`

  Response: `ERROR`

- Upon an on-to-off transition of circuit 108/2, the DCE instructs the underlying DCE to perform an orderly cleardown of the call.

  Run: `AT&D2`

  Response: `OK`

5.3 AT&S–Set Data Set Ready (DSR) Line Mode

5.3.1 Command Syntax

Execution command
`AT&S[value]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

5.3.2 Interface Description

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

5.3.3 Parameter Description

`<value>`:

0   DSR line always is ON.

1   DSR line is ON when connected.

5.3.4 Property Description

Saving upon Power-off	PIN
N	N

5.3.5 **Example**

- DSR line always is ON.

  Run: AT&S0

  Response: OK

- DSR line is ON when connected.

  Run: AT&S1

  Response: OK

5.4 AT+IPR–Set Fixed Data Rate

5.4.1 **Command Syntax**

Set command
AT+IPR[=<rate>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
Read command
AT+IPR?
Possible Response(s)
<CR><LF>+IPR: <rate><CR><LF><CR><LF>OK<CR><LF>
Test command
AT+IPR=?
Possible Response(s)
<CR><LF>+IPR: (supported auto detectable rates),(list of supported fixed-only rates)<CR><LF><CR><LF>OK<CR><LF>

5.4.2 **Interface Description**

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

The <rate> specified does not apply in OnLine Data State if Direct mode of operation is selected.

5.4.3 Parameter Description

The <rate> value specified shall be the rate in bits per second at which the DTE-DCE interface should operate, e.g. "19 200" or "115 200". The rates supported by a particular DCE are manufacturer-specific; however, the +IPR parameter should permit the setting of any rate supported by the DCE during online operation.

Recommended default setting:

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

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

If the command is sent from the USB interface, OK is returned. However, the command is invalidated.

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

5.4.4 Property Description

Saving upon Power-off	PIN
Y	N

5.4.5 Example

- Set the baudrate as 115200:

Run: AT+IPR=115200

Response: OK

- Query current baudrate:

Run: AT+IPR?

Response: +IPR: 115200

            OK

- List of supported fixed-only rates:

Run: AT+IPR=?

Response: +IPR:
             (),(300,600,1200,2400,4800,9600,19200,38400,57600,
             115200,230400)

             OK

5.5 AT+IFC–Control Local Flow

5.5.1 Command Syntax

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

5.5.2 Interface Description

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

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

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

5.5.3 Parameter Description

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

0	None
1	DC1/DC3 on circuit 103; do not pass DC1/DC3 characters to the remote DCE.
2	Circuit 133 (Ready for Receiving)
3	DC1/DC3 on circuit 103 with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control
4–127	Reserved for future standardization

Other reserved for manufacturer-specific use.

<DTE_by_DCE>: specifies the method to be used by the DCE to control the flow of

transmitted data from the DTE.

0	None
1	DC1/DC3 on circuit 104
2	Circuit 106 (Clear to Send/Ready for Sending)
3–127	Reserved for future standardization

Other reserved for manufacturer-specific use.

Note:
DC1 is IA5 1/1; DC3 is IA5 1/3.

Recommended default settings:

For <DCE_by_DTE>: 0

For <DTE_by_DCE>: 0

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

5.5.4 Property Description

Saving upon Power-off	PIN
N	N

Note:

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

If the command is sent from the UART port, the command is validated.

5.5.5 Example

- None flow control:

  Run: AT+IFC=0,0

  Response: OK

- Query current control state:

  Run: AT+IFC?

  Response: +IFC: 0,0

              OK

- List of supported parameters:

  Run: AT+IFC=?

  Response: +IFC: (0-3),(0-2)

              OK

- Enable flow control:

  Run: AT+IFC=2,2

  Response: OK

6 Mobile Termination Control and Status Commands

6.1 AT+CFUN–Set Operation Mode

6.1.1 Command Syntax

Set command
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>

Read command
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>

Test command
AT+CFUN=?

Possible Response(s)
<CR><LF>+CFUN: (list of supported <fun>s),(list of supported <rst>s)<CR><LF><CR><LF>OK<CR><LF>

6.1.2 Interface Description

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

The read command is used to return the current mode.

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

6.1.3 Parameter Description

`<fun>`:

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

`<rst>`: whether to restart MT before setting

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

6.1.4 Property Description

Saving upon Power-off	PIN
NA	N

6.1.5 Example

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

Run: `AT+CFUN?`

Response: `+CFUN: 1`

           `OK`

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

Run: `AT+CFUN=5,0`

Response: `OK`

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

Run: `AT+CFUN=?`

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

            `OK`

6.2 AT+CPIN–Enter PIN

6.2.1 Command Syntax

Set command
`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>
Read command
`AT+CPIN?`
Possible Response(s)
<CR><LF>`+CPIN: <code>`<CR><LF><CR><LF>`OK`<CR><LF>
Test command
`AT+CPIN=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

6.2.2 Interface Description

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

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

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

If the current password required is PUK or PUK2, run `AT+CPIN=<pin>[,<newpin>]` to unblock the PIN. In "`AT+CPIN=<pin>[,<newpin>]`", `<pin>` is the SIM PUK or SIM PUK2, and `<newpin>` is the new PIN or PIN2.

If the set command is executed when PIN is not requested, `+CME ERROR: <err>` is returned.

Note:

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

6.2.3 Parameter Description

`<pin>`, `<newpin>`: string type values of the 4–8 digits ; must be enclosed in quotation. 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.
SIM PIN2	MT is waiting for SIM PIN2 to be given(not supported currently)
SIM PUK2	MT is waiting for UICC/SIM PUK2 to be given to unblock the blocked SIM PIN2 (not supported currently)

6.2.4 Property Description

Saving upon Power-off	PIN
N	N

6.2.5 Example

- Try Read command again:

Run: AT+CPIN?

Response: +CPIN: READY

             OK

- Test command:

Run: AT+CPIN=?

Response: OK

6.3 AT+CSQ–Signal Quality

6.3.1 Command Syntax

Execution command
`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>`

Test command
`AT+CSQ=?`
Possible Response(s)

`<CR><LF>+CSQ: (list of supported <rssi>s),(list of supported <ber>s)<CR><LF><CR><LF>OK<CR><LF>`
 	
In case of an MT-related error:
`<CR><LF>+CME ERROR: <err><CR><LF>`

6.3.2 Interface Description

The execution command returns received signal strength indication `<rssi>` and channel bit error rate `<ber>` from the MT. Refer to subclause 9.2 for possible `<err>` values in 3GPP TS 27.007.

The test command returns supported RSSI and BER values.

6.3.3 Parameter Description

`<rssi>`: received signal strength indication.

Network	<rssi>	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).

6.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.3.5 Example

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

Run:　　　AT+CSQ

Response:　+CSQ: 19,99

　　　　　OK

- Test command:

Run:　　　AT+CSQ=?

Response:　+CSQ: (0-31,99),(0-7,99)

　　　　　OK

6.4 AT+CPBS–Select Phonebook Memory Storage

6.4.1 Command Syntax

Set command
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>
Read command 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>
Test command AT+CPBS=?
Possible Response(s)
<CR><LF>+CPBS: (list of supported <storage>s)<CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

6.4.2 Interface Description

The set command selects phonebook memory storage <storage>, which is used by other phonebook commands. After the MT is restarted, the value of <storage> is restored to its default value "SM".

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

The test command returns supported phonebook storages.

6.4.3 Parameter Description

<storage>: phonebook storage type.

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

<reserved>: reserved.

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

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

6.4.4 Property Description

Saving upon Power-off	PIN
N	Y

6.4.5 Example

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

Run: `AT+CPBS=?`

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

`OK`

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

Run: `AT+CPBS?`

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

`OK`

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

Run: `AT+CPBS="EN"`

Response: `OK`

6.5 AT+CPBR–Read Phonebook Entries

6.5.1 Command Syntax

Execution command
`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>`

Test command
AT+CPBR=?

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

6.5.2 Interface Description

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

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

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

6.5.3 Parameter Description

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

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

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

<text>: string type field of maximum length <tlength>; character set as specified by command 2.11 AT+CSCS–Select TE Character Set.

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

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

6.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.5.5 Example

- Test command:

Run: AT+CPBR=?

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

            OK

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

Run: AT+CPBR=1

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

            OK

Note:

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

6.6 AT+CPBW–Write Phonebook Entry

6.6.1 Command Syntax

Set command
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>
Read command
AT+CPBW?
Possible Response(s)
<CR><LF>+CPBW: <written_index><CR><LF><CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Test command
AT+CPBW=?
Possible Response(s)

<CR><LF>+CPBW: (list of supported <index>s),[<nlength>], (list of supported <type>s),[<tlength>]<CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

6.6.2 Interface Description

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

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

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

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

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

Note:

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

The test command returns:

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

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

6.6.3 Parameter Description

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

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

<type>: type of address octet in integer format (refer 3GPP TS 24.008 subclause 10.5.4.7) ; default 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 2.11 AT+CSCS–Select TE Character Set.

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

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

6.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.6.5 Example

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

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

Response: OK

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

Run: AT+CPBW?

Response: +CPBW: 1

           OK

- Test command:

Run: AT+CPBW=?

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

           OK

6.7 AT+CRSM–Restricted SIM Access

6.7.1 Command Syntax

Set command
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>
Test command AT+CRSM=?
Possible Response(s)
<CR><LF>OK<CR><LF>

6.7.2 Interface Description

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

6.7.3 Parameter Description

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

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

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

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

<data>: information in hexadecimal format

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

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

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

6.7.4 Property Description

Saving upon Power-off	PIN
NA	N

6.7.5 Example

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

Run: AT+CRSM=242

Response: +CRSM:108,41,"62278202782183023F00A50D8001718302E5
73C104800F55FF8A01058B032F0601C606900100830101"

OK

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

- Test command:

Run: AT+CRSM=?

Response: OK

6.8 AT+CMUT–Switch Mute Status

6.8.1 Command Syntax

Set command
AT+CMUT=<n>
Possible Response(s)

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

In case of an MT-related error:

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

Read command

AT+CMUT?

Possible Response(s)

<CR><LF>+CMUT: <n><CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

Test command

AT+CMUT=?

Possible Response(s)

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

In case of an MT-related error:

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

6.8.2 Interface Description

This command is used to enable and disable the uplink voice muting during a voice call.

The read command returns the current value of the uplink voice mute status.

The test command returns the supported value of the uplink voice mute setting.

6.8.3 Parameter Description

<n>: mute switch

0   Mute off (default value)

1   Mute on

6.8.4 Property Description

Saving upon Power-off	PIN
N	Y

6.8.5 Implementation

This command can be used only when a voice call is established. The mute state is switched off when the call is over. This command cannot be used in the following conditions: The caller dials up, but the called party does not answer the call; The called party is answering a call while another incoming call is originated.

6.8.6 Example

Run:	AT+CMUT=1	This command can be used only when a voice call is established otherwise it will return ERROR.
Response:	ERROR	
Run:	AT+CMUT?	
Response:	+CMUT: 0	
	OK	
Run:	AT+CMUT=?	
Response:	+CMUT: (0-1)	
	OK	

7 Mobile Termination Errors

7.1 AT+CMEE–Report Mobile Termination Error

7.1.1 Command Syntax

Set command
`AT+CMEE=<n>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`ERROR`<CR><LF>
Read command
`AT+CMEE?`
Possible Response(s)
<CR><LF>`+CMEE: <n>`<CR><LF><CR><LF>`OK`<CR><LF>
Test command
`AT+CMEE=?`
Possible Response(s)
<CR><LF>`+CMEE:` (list of supported `<n>`s)<CR><LF><CR><LF>`OK`<CR><LF>

7.1.2 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.

7.1.3 Parameter Description

<n>: an integer type value indicating the format of the error result code. The default value is 2. 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 24.2 General CME Error List.

7.1.4 Property Description

Saving upon Power-off	PIN
N	N

7.1.5 Example

Run:	AT+CMEE=2
Response:	OK
Run:	AT+CMEE?
Response:	+CMEE: 2
	OK
Run:	AT+CMEE=?
Response:	+CMEE: (0,1,2)
	OK

8 UMTS Packet Domain Commands

8.1 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.

8.1.1 Command Syntax

Set command
`AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]`
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>ERROR<CR><LF>
Read command
`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>
Test command
`AT+CGDCONT=?`
Possible Response(s)

<CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,, (list of supported <d_comp>s), (list of supported <h_comp>s)[<CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,, (list of supported <d_comp>s), (list of supported <h_comp>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

8.1.2 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 1, and it will be saved when MT is powered off.
- If <cid>=15, command is not allowed to execute when the PD session is ongoing. If this command is sent to module, error will returned.

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.

8.1.3 Parameter Description

<cid>:

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

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

"IP"   Internet Protocol

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

"IPV6"   IPV6 Protocol (not supported currently)

"IPV4V6"   IPV4V6 Dual Stack (not supported currently)

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

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

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

0   Off

1   On

2   V.42bis

3   V.44 (not supported currently)

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

0   Off

1   On

2   RFC1144 (applicable for SNDCP only)

3   RFC2507

4   RFC3095 (applicable for PDCP only)

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

8.1.4 Property Description

Saving upon Power-off	PIN
Y	N

8.1.5 Example

- Step 1

Run: AT+CGDCONT=?

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

OK

- Step 2

Run: AT+CGDCONT?

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

OK

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

- Step 3

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

Response: OK

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

- Step 4

Run: AT+CGDCONT?

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

OK

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

- Step 5

Run: AT+CGDCONT=16

Response: OK

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

- Step 6

Run: AT+CGDCONT?

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

            OK

Note:

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

8.2 AT+CGACT–Activate or Deactivate PDP Context

8.2.1 Command Syntax

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

8.2.2 Interface Description

The set 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.

8.2.3 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.

8.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.2.5 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

8.3 AT+CGATT–Attach or Detach PS Domain

8.3.1 Command Syntax

Set command
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>
Read command
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>
Test command
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>

8.3.2 Interface Description

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

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

The read command returns the current GPRS service state.

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

8.3.3 Parameter Description

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

0   Detached

1   Attached

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

8.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.3.5 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`

8.4 ATH–Hang Up Call

8.4.1 Command Syntax

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

8.4.2 Interface Description

This command is used to disconnect the MT from remote users under the single mode. When a multiparty call is hung up, each connected user is disconnected. The difference between the ATH command and the AT+CHUP command is that the AT+CHUP command is used for calls of multiple modes. The AT+CHUP command is not a replacement of the ATH command.

8.4.3 Parameter Description

<value>: an integer type value.

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

8.4.4 Property Description

Saving upon Power-off	PIN
NA	N

8.4.5 Example

- Disconnect the current connection:

Run: ATH

Response: OK

Run: ATH0

Response: OK

- Use the incorrect parameter:

Run: ATH1

Response: ERROR

8.5 AT+CGREG–PS Domain Registration Status

8.5.1 Command Syntax

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

8.5.2 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.

8.5.3 Parameter Description

`<n>`:

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

`<stat>`:

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

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

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

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

0	GSM
1	GSM Compact
2	UTRAN
3	GSM w/EGPRS[1]
4	UTRAN w/HSDPA[2]
5	UTRAN w/HSUPA[2]
6	UTRAN w/HSDPA and HSUPA[2]
7	E-UTRAN

Notes:

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

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

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

8.5.4 Property Description

Saving upon Power-off	PIN
N	Y

Note:

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

8.5.5 Example

- Query the value range of PS domain registration status:

Run: AT+CGREG=?

Response: +CGREG: (0-2)

             OK

- Query the state of the currently registered network:

Run: AT+CGREG?

Response: +CGREG: 0,1

             OK

- Set unsolicited indication:

Run: AT+CGREG=1

Response: OK

Run: AT+CGREG=2

Response: OK

8.6 AT+CGSMS–SMS Bearer Domain

8.6.1 Command Syntax

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

8.6.2 Interface Description

The set command sets the SMS bear 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.

8.6.3 Parameter Description

`<service>`:

0   PS domain

1   CS domain

2   PS domain preferred

3 CS domain preferred (default value)

8.6.4 Property Description

Saving upon Power-off	PIN
Y	Y

8.6.5 Example

- Query the value range of SMS Bearer Domain:

Run: `AT+CGSMS=?`

Response: `+CGSMS: (0-3)`

`OK`

- Query the current domain type which SMS used:

Run: `AT+CGSMS?`

Response: `+CGSMS: 3`

`OK`

- Set the SMS Bearer Domain type:

Run: `AT+CGSMS=0`

Response: `OK`

Run: `AT+CGSMS=1`

Response: `OK`

Run: `AT+CGSMS=2`

Response: `OK`

8.7 AT+CGDATA–Enter Data State

8.7.1 Command Syntax

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

8.7.2 Interface Description

The set command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types. This may include performing a PS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.25ter online data state.

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

The detailed behavior after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060 and in more detail in 3GPP TS 29.061 and the specifications for the relevant PDPs. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

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

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

- The MT may have a priori knowledge, for example, it may implement only one PDP type.
- The command may have provided an <L2P> parameter value.

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

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

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

- The PDP type must match exactly.

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

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

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

If the activation is successful, data transfer may proceed.

After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the V.25ter command state is re-entered and the MT returns the final result code OK.

In the event of an erroneous termination or a failure to start up, the V.25ter command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported.

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

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

8.7.3 Parameter Description

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

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

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

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

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

8.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.7.5 Example

- Set command to establish the communication:

Run: `AT+CGDATA="PPP",1`

Response: `CONNECT 236800`

- Test command:

Run: `AT+CGDATA=?`

Response: `+CGDATA: ("PPP")`

            `OK`

9 Text Mode Commands for SMS

9.1 AT+CSMS–Select Messaging Service

9.1.1 Command Syntax

Set command
AT+CSMS=<service>
Possible Response(s)
<CR><LF>+CSMS: <mt>,<mo>,<bm><CR><LF><CR><LF>OK<CR><LF>

Read command
AT+CSMS?
Possible Response(s)
<CR><LF>+CSMS: <service>,<mt>,<mo>,<bm><CR><LF><CR><LF>OK<CR><LF>

Test command
AT+CSMS=?
Possible Response(s)
<CR><LF>+CSMS: (list of supported <service>s)<CR><LF><CR><LF>OK<CR><LF>

9.1.2 Interface Description

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

9.1.3 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) |

9.1.4 Property Description

Saving upon Power-off	PIN
N	N

9.1.5 Example

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

Run: `AT+CSMS=1`

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

            `OK`

Note:

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

9.2 AT+CPMS–Preferred Message Storage

9.2.1 Command Syntax

Set command
`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 MT-related error:
`<CR><LF>+CME ERROR: <err><CR><LF>`
Read command `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 MT-related error:
`<CR><LF>+CME ERROR: <err><CR><LF>`
Test command `AT+CPMS=?`
Possible Response(s)
`<CR><LF>+CPMS:` (list of supported `<mem1>`s), (list of supported `<mem2>`s), (list of supported `<mem3>`s)`<CR><LF><CR><LF>OK<CR><LF>`
In case of an MT-related error:
`<CR><LF>+CME ERROR: <err><CR><LF>`

9.2.2 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.

9.2.3 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
"BM"	Broadcast message storage (not supported currently)
"MT"	Any of the storages associated with ME (not supported currently)

"TA" TA message storage (not supported currently)

"SR" Status report storage (not supported currently)

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

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

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

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

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

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

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

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

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

Note:
The settings of <mem3> are 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.

9.2.4 Property Description

Saving upon Power-off	PIN
N	Y

9.2.5 Example

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

Run: AT+CPMS=?

Response: `+CPMS: ("ME","SM"),("ME","SM"),("ME","SM")`

`OK`

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

Run: `AT+CPMS?`

Response: `+CPMS: "ME",0,23,"ME",0,23,"ME",0,23`

`OK`

- Set the storage type using the test command:

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

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

`OK`

Note:

> For details about the parameters, refer to the 9.2.3 . It is recommended that you keep the three types of storage consistent

9.3 AT+CMGF–Message Format

9.3.1 Command Syntax

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

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

9.3.2 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, only the PDU mode is used in GSM, WCDMA. For details about the message format in PDU mode, see section 10.3 AT+CMGS–Send Message.

The read command returns the currently selected mode.

The test command returns available values of `<mode>`.

9.3.3 Parameter Description

`<mode>`:

0   PDU mode (default value)

1   Text mode

Note:
If `<mode>` is not specified, it is equivalent to `<mode>`=0.

9.3.4 Property Description

Saving upon Power-off	PIN
N	N

9.3.5 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.

9.4 AT+CSCA–Service Center Address

9.4.1 Command Syntax

Set command
`AT+CSCA=<sca>[,<tosca>]`
Possible Response(s)
<CR><LF>`OK`**<CR><LF>**
In case of an MT-related error: **<CR><LF>**`+CME ERROR: <err>`**<CR><LF>**

Read command
`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>**

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

9.4.2 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 10.3 AT+CMGS–Send Message.

9.4.3 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 10.3 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.

9.4.4 Property Description

Saving upon Power-off	PIN
Y	Y

9.4.5 Example

Sets the service center number using the test command:

Run: AT+CSCA="8613800688509",145

Response: OK

9.5 AT+CSMP–Set Text Mode Parameters

9.5.1 Command Syntax

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

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

9.5.2 Interface Description

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

The read command returns the supported parameters.

The test command returns OK.

9.5.3 Parameter Description

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

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

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

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

9.5.4 Property Description

Saving upon Power-off	PIN
N	Y

9.5.5 Example

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

  Run: AT+CSMP=,,0,8

  Response: OK

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

Run:　　　　`AT+CSMP=,,,0`

Response:　`OK`

9.6 AT+CNMI–New Message Indications to TE

9.6.1 Command Syntax

Set command
`AT+CNMI[=<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT+CNMI?`
Possible Response(s)
<CR><LF>`+CNMI:` `<mode>,<mt>,<bm>,<ds>,<bfr>`<CR><LF><CR><LF>`OK`<CR><LF>
Test command
`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>

9.6.2 Interface Description

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

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

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

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

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

The test command returns the supported parameter values.

Notes:
- 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.
- AT+CNMI is equivalent to AT+CNMI=0,0,0,0,0.

9.6.3 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 0r 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	Do not store SMS-DELIVER indications on the MT but directly sends them to the TE (not supported currently). • If PDU mode enabled: +CMT: [<reserved>],<length><CR><LF><pdu> • If TEXT mode enabled: +CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>

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

The following figure illustrates the interaction between the TE and the MT for the previous three modes.
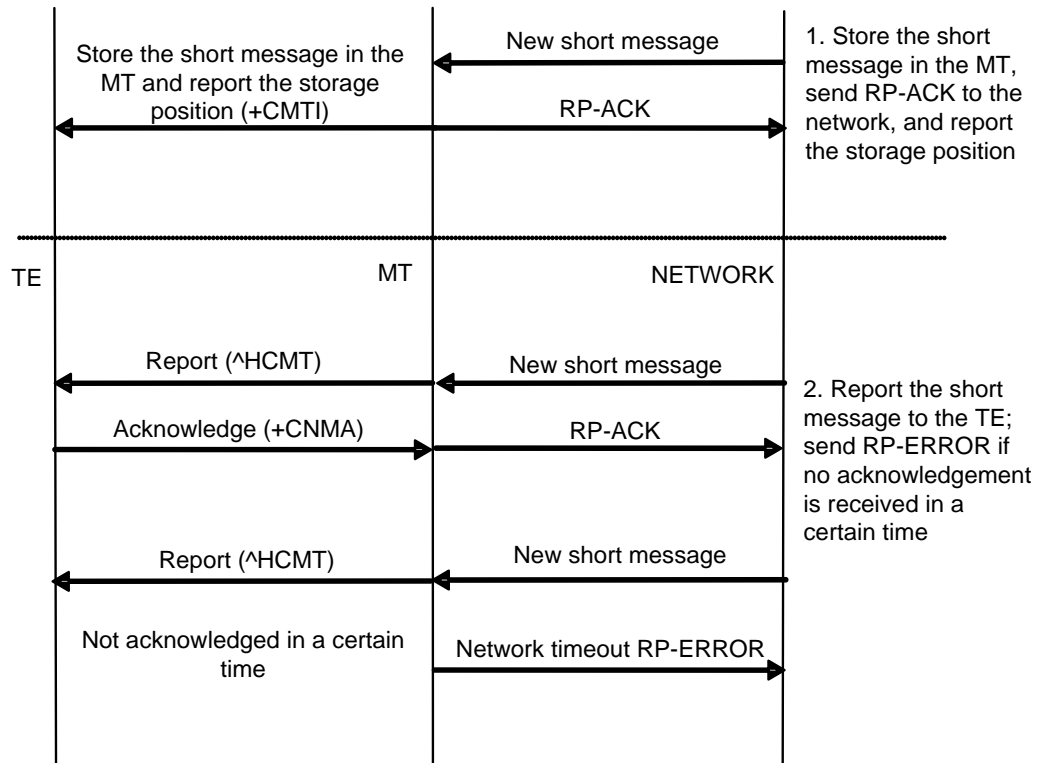
The following table describes the <mt> values and the corresponding indications.

<mt>	no class or class 1	class 0 or message waiting indication group (discard)	class 2 or message waiting indication group (store)	class 3
0				
1	AT+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 10.3.3 .
- "+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 TEXT mode enabled:

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

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

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

Table 9-1 <bm> parameter

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

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

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

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

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

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

2	Store message status reports to the MT and send the storage location to the TE using `AT+CDSI` (not supported currently).

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

`<bfr>:` specifies how the buffer is handled after the MT switches from `<mode>=0` to `<mode>=1` or `<mode>=2`.

0	After switching from `<mode>=0` to `<mode>=1` or `<mode>=2`, the MT sends all the unsolicited result code in its buffer to the TE. (default value)
1	After switching from `<mode>=0` to `<mode>=1` or `<mode>=2`, the MT clears the buffer and all unsolicited result codes in the buffer are discarded.

9.6.4 Property Description

Saving upon Power-off	PIN
N	N

9.6.5 Example

1. `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.

2. 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.

9.7 +CMTI–New SMS-DELIVER Indication

9.7.1 Command Syntax

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

9.7.2 Interface Description

This command indicates that a new message is received.

9.7.3 Parameter Description

`<mem>`:

"BM"	Broadcast message storage (not supported currently)
"ME"	ME message storage
"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

9.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.7.5 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.

9.8 +CMT–New Message Directly Deliver Indication

9.8.1 Command Syntax

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

9.8.2 Interface Description

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

9.8.3 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 10.1.3 .

For other parameters, see section 10.3 AT+CMGS–Send Message.

9.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.8.5 Example

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

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

Note:

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

9.9 +CDSI–New SMS Status Report Indication

9.9.1 Command Syntax

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

9.9.2 Interface Description

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

9.9.3 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

9.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.9.5 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

9.10 +CDS–SMS Status Report Indication Directly Displayed

9.10.1 Command Syntax

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

9.10.2 Interface Description

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

9.10.3 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 10.3 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
TP-DCS	TP-Data-Coding-Scheme	O	o
TP-UDL	TP-User-Data-Length	O	o
TP-UD	TP-User-Data	O	

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

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

For other parameters, see section 10.3 AT+CMGS–Send Message.

9.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.10.5 Example

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

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

Note:

In this example, the message is in Text mode.

9.11 AT+CMGD–Delete Message

9.11.1 Command Syntax

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

9.11.2 Interface Description

The execution command deletes the message at location `<index>` in the storage `<mem1>`. For details about `<mem1>`, see section 9.2 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 9.11.3 . If the deletion fails, `+CMS ERROR:` `<err>` is returned.

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

9.11.3 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.

9.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.11.5 Example

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

Run: AT+CMGD=1

Response: OK

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

Run: AT+CMGD=1,4

Response: OK

9.12 AT+CMGL–List Messages

9.12.1 Command Syntax

Set command
AT+CMGL[=<stat>]
Possible Response(s)
If text mode (AT+CMGF=1), command successful and SMS-SUBMITs and/or SMS-DELIVERs: <CR><LF>+CMGL: <index>,<stat>,<oa/da>,[<reserved>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF>+CMGL: <index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]]<CR><LF><CR><LF>OK<CR><LF>
If text mode (AT+CMGF=1), command successful and SMS-STATUS-REPORTs: <CR><LF>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF>+CMGL: <index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]<CR><LF><CR><LF>OK<CR><LF>   If text mode (AT+CMGF=1), command successful and SMS-COMMANDs: <CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[...]]<CR><LF><CR><LF>OK<CR><LF>   If text mode (AT+CMGF=1), command successful and CBM storage: <CR><LF>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[<CR><LF>+CMGL: <index>,<stat>,<sn>,<mid>,<page>,<pages><CR><LF><data>[...]]<CR><LF><CR><LF>OK<CR><LF>   Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>
Test command
AT+CMGL=?
Possible Response(s)
<CR><LF>+CMGL: (list of supported <stat>s)<CR><LF><CR><LF>OK<CR><LF>   In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

9.12.2 Interface Description

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

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

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

9.12.3 Parameter Description

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

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

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

`<reserved>`: reserved.

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

For details about other parameters, refer to GSM 07.05.

Note:

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

9.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.12.5 Example

Lists all the messages in the current storage using the test command:

Run: `AT+CMGL="ALL"`

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

test1

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

test2

OK

Note:
> In this example, the message is in Text mode.

9.13 AT+CMGR–Read an SMS Message

9.13.1 Command Syntax

Execution command
`AT+CMGR=<index>`
Possible Response(s)
If text mode (`AT+CMGF=1`), command successful and SMS-DELIVER: **<CR><LF>**`+CMGR:` `<stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]`**<CR><LF>**`<data>`**<CR><LF><CR><LF>**`OK`**<CR><LF>**
If text mode (`AT+CMGF=1`), command successful and SMS-SUBMIT: **<CR><LF>**`+CMGR:` `<stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]`**<CR><LF>**`<data>`**<CR><LF><CR><LF>**`OK`**<CR><LF>**
If text mode (`AT+CMGF=1`), command successful and SMS-STATUS-REPORT: **<CR><LF>**`+CMGR:` `<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>`**<CR><LF><CR><LF>**`OK`**<CR><LF>**
If text mode (`AT+CMGF=1`), command successful and SMS-COMMAND: **<CR><LF>**`+CMGR:` `<stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>`**<CR><LF>**`<cdata>]`**<CR><LF><CR><LF>**`OK`**<CR><LF>**
If text mode (`AT+CMGF=1`), command successful and CBM storage: **<CR><LF>**`+CMGR:` `<stat>,<sn>,<mid>,<dcs>,<page>,<pages>`**<CR><LF>**`<data>`**<CR><LF>** **<CR><LF>**`OK`**<CR><LF>**

Otherwise:

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

Test command

AT+CMGR=?

Possible Response(s)

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

In case of an MT-related error:

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

9.13.2 Interface Description

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

The test command returns OK.

9.13.3 Parameter Description

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

<stat>: SMS type.

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

<length>: integer type; length of PDU data

For other parameters, refer to GSM 07.05.

Note:

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

9.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.13.5 Example

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

Run: AT+CMGR=4

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

              OK

9.14 AT+CMGW–Write Message to Memory

9.14.1 Command Syntax

If TEXT mode (AT+CMGF=1**):**

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

9.14.2 Interface Description

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

9.14.3 Parameter Description

Text mode:

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

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

The four high-order bits indicate the number type:

0   Unknown

1   International

The four low-order bits indicate the number plan:

0   Unknown

1   Telephony

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

"REC UNREAD"   Received unread message

"REC READ"   Received read message

"STO UNSENT"   Stored unsent message

"STO SENT"   Stored sent message

The default value is "STO UNSENT".

9.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.14.5 Example

For examples of this command, see section 9.15 AT+CMGS–Send Message.

9.15 AT+CMGS–Send Message

9.15.1 Command Syntax

If text mode (AT+CMGF=1):

Set command
`AT+CMGS=<da>[,<toda>]`**<CR>** text is entered`<ctrl-Z/ESC>`
Possible Response(s)
<CR><LF>`+CMGS: <mr>`**<CR><LF><CR><LF>**`OK`**<CR><LF>** In case of an MS-related error: **<CR><LF>**`+CMS ERROR: <err>`**<CR><LF>**
Test command `AT+CMGS=?`
Possible Response(s)
<CR><LF>`OK`**<CR><LF>**

9.15.2 Interface Description

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

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

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

9.15.3 Parameter Description

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

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

The four high-order bits indicate the number type:

0   Unknown

1   International

The four low-order bits indicate the number plan:

0   Unknown

1   Telephony

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

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

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

9.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.15.5 Example

Run:	AT+CMGF=1	Sets the message format to Text format.
Response:	OK	
Run:	AT+CSMP=,,0,8	Sets the data coding scheme to UCS2.
Response:	OK	
Run:	AT+CSCA="8613800688509", 145	Sets the service center number.
Response:	OK	
Run:	AT+CSCS="UCS2"	Sets the TE's character set to UCS2 encoding.
Response:	OK	
Run:	AT+CMGS="003100330033003 1003200330034003500360037 0038" > 534E4E3A \0x1A	Ends the message to the destination address "13312345678" that must be enclosed in double quotation marks. The message content is the UCS2 codes for the Chinese characters "华为". Press ctrl+z (0x1A) to stop entering message content and send the message.
Response:	+CMGS: 6 OK	The message is successfully sent.

9.16 AT+CMSS–Send Message from Storage

9.16.1 Command Syntax

Execution command
`AT+CMSS=<index>[,<da>[,<toda>]]`
Possible Response(s)
If text mode (`AT+CMGF=1`) and sending successful: <CR><LF>+CMSS: `<mr>`[,`<scts>`]<CR><LF><CR><LF>OK<CR><LF>
If sending fails: <CR><LF>+CMS ERROR: `<err>`<CR><LF>
Test command
`AT+CMSS=?`
Possible Response(s)
<CR><LF>OK<CR><LF>

9.16.2 Interface Description

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

`<da>` is controlled by `AT+CSCS`.

9.16.3 Parameter Description

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

For other parameters description of this command, see section 9.15 AT+CMGS–Send Message.

9.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.16.5 Example

Send a stored short message in TEXT mode.

Run:	AT+CMGF=1	
Response:	OK	
Run:	AT+CMSS=8	A short message at the location whose index is 8.
Response:	+CMSS: 21	
	OK	

9.17 AT+CNMA–New Message Acknowledgement

9.17.1 Command Syntax

Set command
If PDU mode (AT+CMGF=0):
AT+CNMA[=<n>[,<length>[<CR>PDU is given <ctrl-Z/ESC>]]]
If text mode (AT+CMGF=1):
AT+CNMA

Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>

Test command
AT+CNMA=?

Possible Response(s)
If PDU mode (AT+CMGF=0):
<CR><LF>+CNMA: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>
If text mode (AT+CMGF=1):
<CR><LF>OK<CR><LF>

In case of an MT-related error:

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

9.17.2 Interface Description

The set command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when +CSMS parameter <service> equals 1. For the use of this command, see section 9.6 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 command Send Message +CMGS, 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 +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.

9.17.3 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 by TE according to users'	00	Class 0. Messages are displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message.
			01	Class 1. Messages are stored to the MT, or to the SIM card when the message storage on the MT is used up.

		selection	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 9-1 and Figure 9-2 illustrate the formats of the user data encoded using different schemes.

Figure 9-1 User data encoded using the default 7-bit encoding scheme
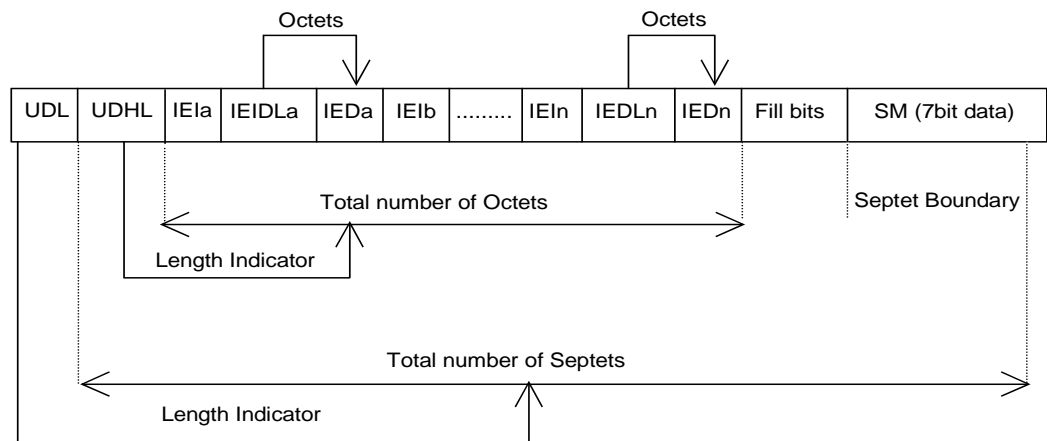
Figure 9-2 User data encoded using the 8-bit or UCS2 encoding scheme
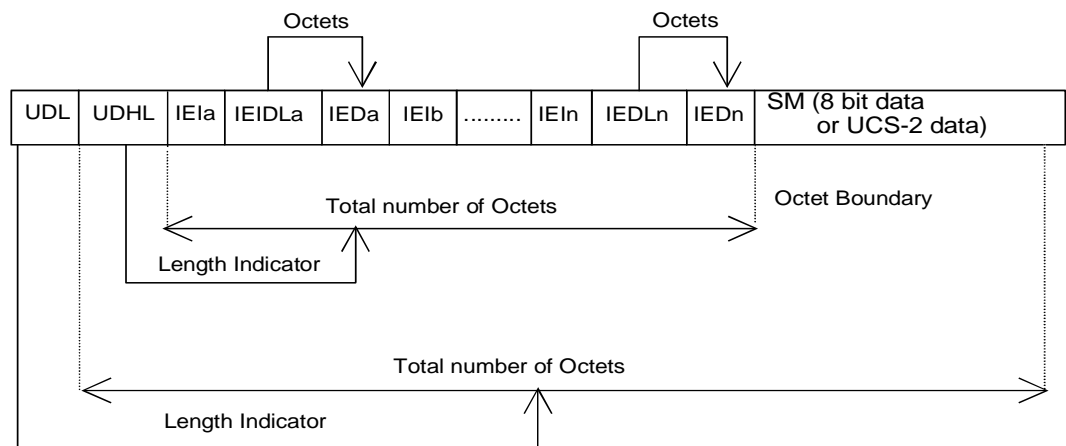
In Figure 9-1 and Figure 9-2 , IEI is short for Information Element Identifier.

9.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.17.5 Example

Firstly, set AT commands orderly as follows:

Run: `AT+CSMS=1`

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

    `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`

10 PDU Mode Commands for SMS

The PDU mode uses the same commands and responses as the text mode. However, the following commands and responses have a different format.

10.1 AT+CMGL–List Messages

10.1.1 Command Syntax

Execution command
AT+CMGL[=<stat>]
Possible Response(s)
If in PDU mode and the command is executed successfully: [<CR><LF>+CMGL: <index>,<stat>,[<reserved>],<length><CR><LF><pdu>[<CR><LF>+CMGL: <index>,<stat>,[<reserved>],<length><CR><LF><pdu>[...]]<CR><LF>]<CR><LF>OK<CR><LF> Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>
Test command
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>

10.1.2 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.

10.1.3 Parameter Description

<stat>: message status; default value is 0.

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 10.3 AT+CMGS–Send Message.

For the TPDU format of messages to be sent, see section 10.3 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 10.3 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 10.3 AT+CMGS–Send Message.

<RP>: see the definition in section 10.3 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 10.3 AT+CMGS–Send Message.

<DCS>: use data coding scheme. See the definition in section 10.3 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 10.3 AT+CMGS–Send Message.

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

10.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.1.5 Example

Lists all the received unread messages using the test command:

Run: AT+CMGL=0

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

OK

Note:

In this example, the message is in PDU mode.

10.2 AT+CMGR–Read Message

10.2.1 Command Syntax

Set command
`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>**
Otherwise: **<CR><LF>**`+CMS ERROR: <err>`**<CR><LF>**
Test command
`AT+CMGR=?`
Possible Response(s)
<CR><LF>`OK`**<CR><LF>**
In case of an MT-related error: **<CR><LF>**`+CME ERROR: <err>`**<CR><LF>**

10.2.2 Interface Description

The set 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`.

10.2.3 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 10.1.3 .

10.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.2.5 Example

List all the received unread messages using the test command:

Run: AT+CMGL=0

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

            OK

Note:
In this example, the message is in PDU mode.

10.3 AT+CMGS–Send Message

10.3.1 Command Syntax

If PDU mode (AT+CMGF=0):

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

10.3.2 Interface Description

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

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

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

10.3.3 Parameter Description

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

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

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

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

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

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

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

<SCA>: service center address (SCA). Its structure is illustrated in the following figure.
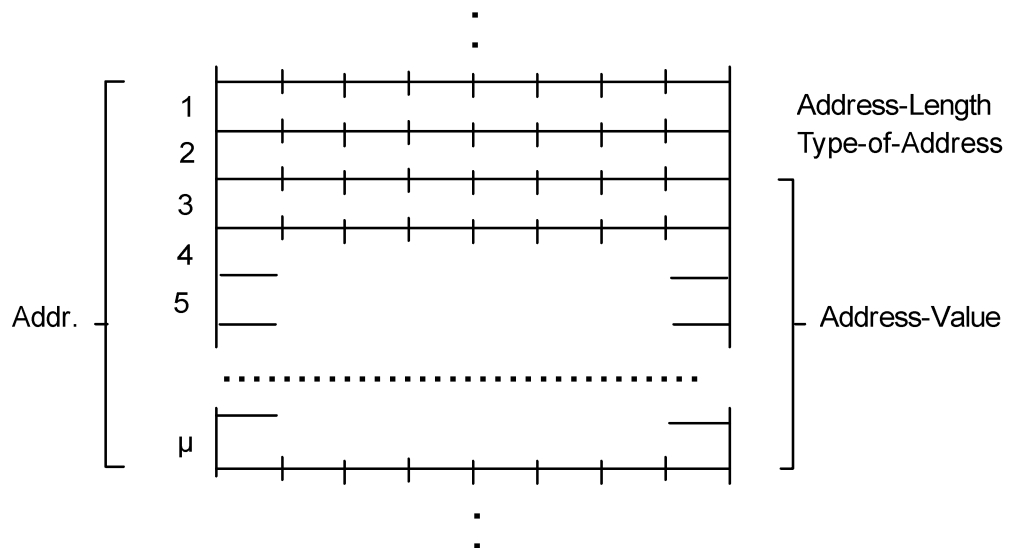
<sc_len>: length of <SCA>. It is composed of two characters. It indicates the number of characters occupied by <type_addr> and (<numbers>/2).

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

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.
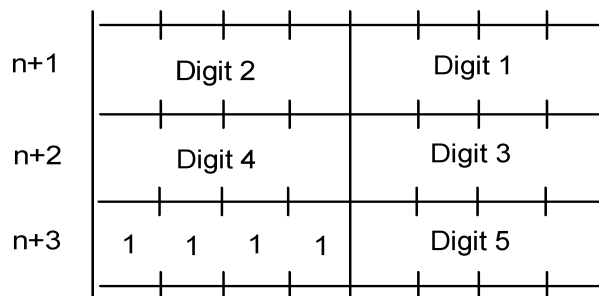
Note:

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

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

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

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

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

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

The TPDU format is described in the following table.

1Octet								1Oct	2Oct~12Oct	1Oct	1Oct	1Oct	1Oct	
RP	UDHI	SRR	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit7	Bit6	Bit5	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>.

<oa>: 3GPP TS 23.040 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 07.07); type of address given by <tooa>.

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

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

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

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in 10.3 AT+CMGS–Send Message.

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

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

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

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

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

10.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.3.5 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)

  >81000B8131090100054F3001804534E4E3A \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`

10.4 AT+CMGW–Write Message to Memory

10.4.1 Command Syntax

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

Execution command
`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>**
Test command `AT+CMGS=?`
Possible Response(s)
<CR><LF>OK**<CR><LF>**

10.4.2 Interface Description

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

10.4.3 Parameter Description

PDU mode:

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

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

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

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

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

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

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

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

For details about the PDU format, see section 10.3 AT+CMGS–Send Message.

10.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.4.5 Example

Run:	`AT+CMGF=0`
Response:	`OK`
Run:	`AT+CMGW=56`
Response:	`>`

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

Response: +CMGW: 10

OK

10.5 AT+CMSS–Send Message from Storage

10.5.1 Command Syntax

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

10.5.2 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 abortable.

`<da>` is limited by `AT+CSCS`.

10.5.3 Parameter Description

For the parameter description of this command, see section 10.3 AT+CMGS–Send Message.

10.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.5.5 Example

Send a stored short message in PDU mode.

Run:	AT+CMGF=0	
Response:	OK	
Run:	AT+CMSS=8	A short message at the location whose index is 8.
Response:	+CMSS: 21	
	OK	

11 Standard STK Interface Commands

11.1 +CUSATP–Unsolicitedly Report a UICC Proactive Command

11.1.1 Command Syntax

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

11.1.2 Interface Description

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

11.1.3 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.

11.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.1.5 Example

Response:	+CUSATP: "D01A8103012300820281828 D0B043C54494D452D4F55543 E9102000A"	Unsolicitedly report a proactive command "GET INPUT".

11.2 AT+CUSATE–Send USAT Envelope

11.2.1 Command Syntax

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

11.2.2 Interface Description

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

11.2.3 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.

11.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.2.5 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

11.3 AT+CUSATT–Send USAT Terminal Response

11.3.1 Command Syntax

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

11.3.2 Interface Description

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

11.3.3 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.

11.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.3.5 Example

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

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

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

11.4.1 Command Syntax

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

11.4.2 Interface Description

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

11.4.3 Property Description

Saving upon Power-off	PIN
NA	NA

11.4.4 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="81030125808202 8281830100"

Response: OK

Then the CUSATEND will be reported as following:

Response: +CUSATEND

12 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

12.1 AT^CPIN–Manage PIN

12.1.1 Command Syntax

Set command
`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>
Read command
`AT^CPIN?`
Possible Response(s)
<CR><LF>`^CPIN:` `<code>,[<times>],<puk_times>,<pin_times>,<puk2_times>,<pin2_ti` `mes>`<CR><LF><CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Test command
`AT^CPIN=?`
Possible Response(s)
<CR><LF>`OK`<CR><LF>

12.1.2 Interface Description

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

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

If the current password required is PIN or PIN2, run AT^CPIN=<pin> to verify PIN or PIN2.

If the current password required is PUK or PUK2, run AT^CPIN=<pin>,<newpin> to unblock the PIN. In "AT^CPIN=<pin>[,<newpin>]", <pin> is the SIM PUK or SIM PUK2, and <newpin> is the new PIN or PIN2.

If the set command is executed when PIN is not requested, +CME ERROR: <err> is returned.

Note:

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

12.1.3 Parameter Description

<pin>,<newpin>: string type values with length 4–8 that must be enclosed in double quotation marks. Characters allowed in these fields are 0–9, otherwise ERROR is returned.

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

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

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

Note:

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

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

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

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

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

12.1.4 Property Description

Saving upon Power-off	PIN
N	N

12.1.5 Example

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

Run: AT^CPIN?

Response: ^CPIN: SIM PIN ,3,10,3,10,0

            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 ,,10,3,10,0

            OK

Run: AT^CPIN=?

Response: OK

12.2 AT^CURC–Set Presentation of Unsolicited Results

12.2.1 Command Syntax

Set command
AT^CURC=<mode>[,<Sleeping_UR_cfg>,<working_UR_cfg>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of command or parameter-related error: <CR><LF>ERROR<CR><LF>
Read command
AT^CURC?
Possible Response(s)
<CR><LF>^CURC: <mode>[,<Sleeping_UR_cfg>,<working_UR_cfg>[,<Sleeping_UR_cfg>,<working_UR_cfg>[,<Sleeping_UR_cfg>,<working_UR_cfg>]]]<CR><LF> <CR><LF>OK<CR><LF>
Test command
AT^CURC=?
Possible Response(s)
<CR><LF>^CURC: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

12.2.2 Interface Description

The set command selects the control mode for the presentation of unsolicited results. When <mode>=2, the specific types of unsolicited results can be specified.

The read command queries the current control mode for the presentation of unsolicited results. When <mode>=2, the specific types of unsolicited results can be queried.

The test command lists the supported control mode for the presentation of unsolicited results.

12.2.3 Parameter Description

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

0	The presentation of the unsolicited indications in Table 12-1 is disabled:
1	Enables the presentation of the unsolicited indications(default value).

2   According to `<Sleeping_UR_cfg>` and `<working_UR_cfg>`, customer can configure the parameter mode for the presentation of unsolicited results and decide whether report for all UR in Table 12-2 .

Table 12-1 List for the presentation of unsolicited results when `AT^CURC=0`

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

Table 12-2 The control mode when `<mode>=2`.

Control Parameters in Sleeping Status	Control Parameters in Working Status	Suspend Status	Normal Status
1	1	Directly report	Directly report
1	0	Directly report	Discard
0	1	Cache	Directly report
0	0	Discard	Discard

Cache: the unsolicited AT will be store when the host is in the suspend status. The unsolicited AT result will be reported to the host when the host exit suspend status to reduce the wakeup times.

`<Sleeping_UR_cfg>`: specifies the types of unsolicited results to be presented when in sleep mode. The length is 64-bits and the value must be entered in hexadecimal format.

- Bit [63-61] is reserved for page, it defines the page number of unsolicited results to be presented (which is used to expansion for the presentation of unsolicited results); Up to eight pages can be specified.

- Bit [60-0] is Sleep_ur_mask that defines the types of unsolicited results to be presented; each bit specifies whether the presentation of the corresponding type of unsolicited results is enabled or disabled. If the value of a bit is 1, the presentation is enabled. If the value of a bit is 0, the presentation is disabled. The detailed information for each bit can be seen in Table 12-3 .

The following table describes the definitions of bit [63-61] and bit [60-0] for `<Sleeping_UR_cfg>`.

Bit[63-61]	Bit[60-0]
Page	Sleep_ur_mask

`<working_UR_cfg>`: specifies the types of unsolicited results to be presented when in operating mode. The length is 64-bits and the value must be entered in hexadecimal format.

Bit [63-61] is reserved for page, it defines the page types of unsolicited results to be presented (which is used to expansion for the presentation of unsolicited results); Up to eight pages can be specified.

Bit [60-0] is Work_ur_mask that defines the types of unsolicited results to be presented; each bit specifies whether the presentation of the corresponding type of unsolicited results is enabled or disabled. If the value of a bit is 1, the presentation is enabled. If the value of a bit is 0, the presentation is disabled. The detailed information for each bit can be seen in Table 12-3 .

The following table describes the definitions of bit [63-61] and bit [60-0] for `<work_UR_cfg>`.

Bit[63-61]	Bit[60-0]
Page	work_ur_mask

Table 12-3 Definitions of Page 0　Bit [60–0] for the presentation of unsolicited results

Bit 0	Bit 1	Bit 2	Bit 3
AT^MODE	AT^RSSI	AT^CSNR	AT^SRVST
Bit 4	Bit 5	Bit 6	Bit 7
AT+CREG/AT+CGREG	AT^SIMST	AT^NWTIME	AT^ACTIVEBAND
Bit 8	Bit 9	Bit 10	Bit 11
AT^ANLEVEL	AT^LOCCHD	AT^SIMFILEREFRESH	AT^SMMEMFULL
Bit 12	Bit 13	Bit 14	Bit 15

AT^POSITION	AT^TIMESETRULT /AT^DATASETRULT /AT^DATAVALIDIT Y	AT^WNINV	AT^POSEND
Bit 16	Bit 17	Bit 18	Bit 19
AT^WPDCP	AT^WPDDL	AT^WPDOP	AT+CTZV
Bit 20	Bit 21	Bit 22	Bit 23
AT^NDISEND	AT^BOOT	AT^DSFLOWRPT	AT^EARST
Bit 24	Bit 25	Bit 26	Bit 27
AT^ORIG	AT^CONF	AT^CONN	AT^CEND
Bit 28	Bit 29	Bit 30	Bit 31
AT^RFSWITCH	AT^STIN	AT+CUSD	AT+CDS/AT+CMT/ AT+CDSI/AT+CMT I/AT+CBM
Bit 32	Bit 33	Bit 34	Bit 35
AT^RSSILVL	AT^HRSSILVL	AT^HDRRSSI	AT^CRSSI
Bit 36	Bit 37	Bit 38	Bit 39
AT^OTACMSG	AT^DSDORMANT	AT^IPDATA	AT^THERM
Bit 40	Bit 41	Bit 42	Bit 43
AT^XDSTATUS	AT+CLIP	AT+CCWA	
Bit 44	Bit 45	Bit 46	Bit 47
	AT^IPSTATE	AT+CUSATP	AT+CUSATEND
Bit 48	Bit 49	Bit 50	Bit 51
Reserved	AT^ECLSTAT	Reserved	Reserved
Bit 52	Bit 53	Bit 54	Bit 55
Reserved	Reserved	Reserved	Reserved
Bit 56	Bit 57	Bit 58	Bit 59
Reserved	Reserved	Reserved	Reserved
Bit 60			
Reserved			

Notes:

- When $<mode>$=0 or 1, $<Sleeping\_UR\_cfg>$ and $<working\_UR\_cfg>$ must not be contained in the command. When $<mode>$=2, both of $<Sleeping\_UR\_cfg>$ and $<working\_UR\_cfg>$ are contained in the command or both are not contained in the

command, otherwise, ERROE will be returned. The initial default value of
<Sleeping_UR_cfg> is 0x870; and the initial default value of <working_UR_cfg> is
0x872. The <Sleeping_UR_cfg> and <working_UR_cfg> configured when <mode>=2
are not saved when the product is powered off. Up to 8*61=488 of the presentation of
unsolicited results supported (including ones added by Huawei and standard) can be
configured by customer. The strong related presentation of unsolicited results are controlled
by the same bit, such as ^TIMESETRULT and ^DATASETRULT. For the presentation of
unsolicited results added later, you must add the illustration for the bit.

- Undefined bits and currently-not-supported unsolicited results cannot be configured using
  the ^CURC command. The AT commands of each unsolicited results may vary with the
  specific products

12.2.4 Property Description

Saving upon Power-off	PIN
N	N

Note:

Since the SMS can be controlled by AT^WAKEUPCFG, therefore, if need disable SMS wakeup
function you need to disable AT^WAKEUPCFG and AT^CURC .

12.2.5 Example

- To set <mode> to 0:

  Run: AT^CURC=0

  Response: OK

- To set <mode> to 1:

  Run: AT^CURC=1

  Response: OK

- To set <mode> to 2:

  Run: AT^CURC=2,FF,F

  Response: OK

- Query the current mode:

  Run: AT^CURC?

Response: `^CURC: 2,0xff,0xf`

`OK`

12.3 AT^NWTIME–Query Presentation of Network System Time

12.3.1 Command Syntax

Read command

`AT^NWTIME?`

Possible Response(s)

If the command is successfully executed:

`<CR><LF>^NWTIME: <time><tz>,<dt><CR><LF><CR><LF>OK<CR><LF>`

In case of an MT-related error:

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

12.3.2 Interface Description

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

12.3.3 Parameter Description

`<time>`: specifies date and time in the format of yy/MM/dd,hh:mm:ss. The value of `<time>` consists of date and time, for example, 10/09/07,05:56:13.

`<tz>`: specifies the time zone. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, + 8 hours.

`<dt>`: specifies daylight saving time. When the parameter is not specified, the board presents 0. Otherwise, corresponding daylight saving time is presented. Detailed values and descriptions are as follows (refer to table 10.5.97a/3GPP TS 24.008):

0	No adjustment for Daylight Saving Time
1	+1 hours adjustment for Daylight Saving Time
2	+2 hours adjustment for Daylight Saving Time
3	Reserved

12.3.4 Property Description

Saving upon Power-off	PIN
N	Y

12.3.5 Example

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

Run: AT^NWTIME?

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

            OK

12.4 ^NWTIME–Unsolicitedly Report Network System Time

12.4.1 Command Syntax

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

12.4.2 Interface Description

This command is used to unsolicitedly report network system time, time zone, and daylight saving time.

12.4.3 Parameter Description

<time>: specifies date and time in the format of yy/MM/dd,hh:mm:ss. The value of <time> consists of date and time, for example, 10/09/07,05:56:13.

<tz>: specifies the time zone. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, + 8 hours.

<dt>: specifies daylight saving time. When the parameter is not specified, the board presents 0. Otherwise, corresponding daylight saving time is presented. Detailed values and descriptions are as follows (refer to table 10.5.97a/3GPP TS 24.008):

0   No adjustment for Daylight Saving Time

1   +1 hours adjustment for Daylight Saving Time

2	+2 hours adjustment for Daylight Saving Time
3	Reserved

12.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.4.5 Example

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

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

12.5 ^SYSSTART–Unsolicitedly Report Module Startup

12.5.1 Command Syntax

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

12.5.2 Interface Description

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

12.5.3 Example

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

Response: `^SYSSTART`

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

12.6.1 Command Syntax

Set command
AT^WAKEUPCFG=<n>[,<channel>[,<source>]]
Possible Response(s)
If the command is successfully executed: <CR><LF>OK<CR><LF> If the command is unsuccessfully executed: <CR><LF>ERROR<CR><LF>
Read command
AT^WAKEUPCFG?
Possible Response(s)
<CR><LF>^WAKEUPCFG: <n>,<channel>,<source><CR><LF><CR><LF>OK<CR><LF>
Test command
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>

12.6.2 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.

12.6.3 Parameter Description

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

0   Disables the module's Remote Wake-up feature.

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

<channel>: sets Remote Wake-up channels.

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

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

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

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

The default value of this parameter is0x03.

<source>: sets Remote Wake-up sources.

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

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

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

0x0001	Voice
0x0002	SMS
0x0004	Data
0x0008	UR (unsolicited report)
0x0010–0x8000	reserved

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

12.6.4 Property Description

Saving upon Power-off	PIN
Y	N

Note：

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

12.6.5 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

12.7 AT^IMEISV–Query the IMEISV

12.7.1 Command Syntax

Read command
AT^IMEISV?
Possible Response(s)
<CR><LF>^IMEISV: <imeisv><CR><LF><CR><LF>OK<CR><LF>

12.7.2 Interface Description

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

12.7.3 Parameter Description

<imeisv>: IMEI and software version of a board. The returned value is a 16-character decimal value. The following table lists the value structure (for details, see the 3GPP TS 23.003 protocol).

16 digits IMEISV		
8 characters	6 characters	2 characters
TAC	SNR	SVN

TAC: type approval code

SNR: serial number

SVN: software version number

12.7.4 Property Description

Saving upon Power-off	PIN
NA	N

12.7.5 Implementation

Huawei proprietary interface

Optional

12.7.6 Example

Query the IMEISV:

Run: AT^IMEISV?

Response: ^IMEISV: 3545240400110917

             OK

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

12.8 AT^IOCTRL–Control the GPIO

12.8.1 Command Syntax

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

12.8.2 Interface Description

This command is used to control the GPIO's actions.

The test command returns supported values as compound value.

This command controls 5 GPIO pins, set the command for each parameter (from left to right) corresponding to the LGA pins are as follows:

GPIO PIN: 5   4   3   2   1

LGA PIN: 55   109   113   51   105

12.8.3 Parameter Description

`<sel>`: enable GPIOs.

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

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

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

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

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

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

12.8.4 Property Description

Saving upon Power-off	PIN
N	N

12.8.5 Implementation

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

12.8.6 Example

- Run the following command to get the GPIO state:

Run: AT^IOCTRL?

Response: ^IOCTRL: 00000,00000

            OK

- Run the following command to set the GPIO state:

Run: AT^IOCTRL=11111,11110,00110

Response: OK

12.9 ^THERM–Thermal Protection Activated Unsolicited Report

12.9.1 Command Syntax

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

12.9.2 Interface Description

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

12.9.3 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.

12.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.9.5 Example

- Indicates that the thermal protection is inactive:

  Response: ^THERM: 0

- Indicates that the thermal protection is active:

  Response: ^THERM: 1

12.10 AT^ICCID–Query the ICCID

12.10.1 Command Syntax

Set command
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>
Test command AT^ICCID=?
Possible Response(s)
<CR><LF>OK<CR><LF>

12.10.2 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.

12.10.3 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 GSM 51.011 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.
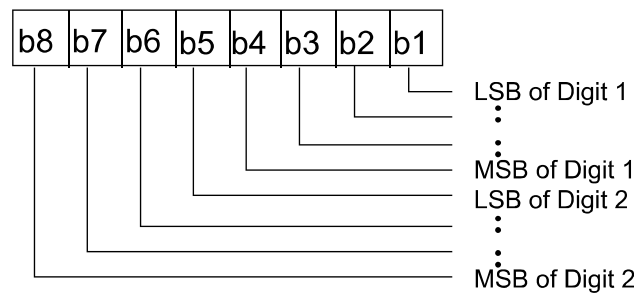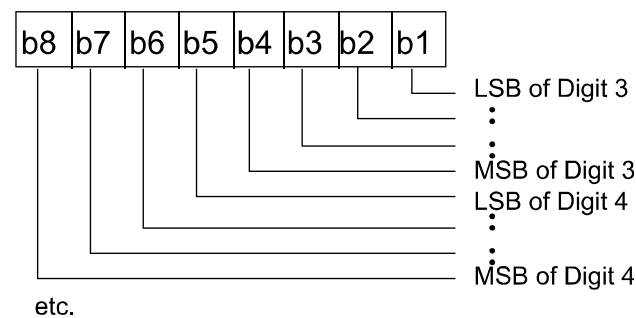
The bit sequence of the information obtained from the EF_{ICCID} file must be converted.

12.10.4 Property Description

Saving upon Power-off	PIN
NA	N

12.10.5 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	

13 Huawei Proprietary Interface: Voice Call Interface

13.1 ^ORIG–Indicate the Origination of a Call

13.1.1 Command Syntax

URC
`<CR><LF>^ORIG: <call_x>,<call_type><CR><LF>`

13.1.2 Interface Description

This command indicates that the MT is originating a call.

13.1.3 Parameter Description

`<call_x>`: specifies the call ID, uniquely identifying the call. Integer, with a product-specific value.

`<call_type>`: specifies the call type.

0	Voice call
1	CS domain data call (GW)
2	PS domain data call (GW)
3	CDMA SMS call
7	OTA call (standard OTASP numbers)
8	OTA call (non-standard OTASP numbers)
9	Emergency call

13.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.1.5 Example

Dial a normal number

Response: ^ORIG: 1,0

13.2 ^CONF–Ringback Tone Indication

13.2.1 Command Syntax

URC
<CR><LF>^CONF: <call_x><CR><LF>

13.2.2 Interface Description

If a MT receives a ringback tone after initiating a call, the MT presents this indication to the TE.

13.2.3 Parameter Description

<call_x>: call ID; integer type with a product-specific value range.

13.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.2.5 Example

Dial a normal number:

Response: ^CONF: 1

13.3 ^CONN–Call Connection Indication

13.3.1 Command Syntax

URC
`<CR><LF>^CONN: <call_x>,<call_type><CR><LF>`

13.3.2 Interface Description

When a call is connected, the MT presents this indication to the TE, indicating that a call starts.

13.3.3 Parameter Description

`<call_x>`: specifies the call ID, uniquely identifying the call. Integer, with a product-specific value..

`<call_type>`: specifies the call type.

0	Voice call
1	CS domain data call (GW)
2	PS domain data call (GW)
3	CDMA SMS call
7	OTA call (standard OTASP numbers)
8	OTA call (non-standard OTASP numbers)
9	Emergency call

13.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.3.5 Example

Answer a normal number:

Response: `^CONN: 1,0`

13.4 ^CEND–Call End Indication

13.4.1 Command Syntax

URC
`<CR><LF>^CEND:` `<call_x>,<duration>,<end_status>[,<cc_cause>]<CR><LF>`

13.4.2 Interface Description

After a call is terminated, the MT reports this indication to the TE to notify the TE of the call end cause and the call duration.

13.4.3 Parameter Description

`<call_x>`: call ID; integer type with a product-specific value range.

`<duration>`: call duration in the unit of second.

`<end_status>`: call end cause.

CM_CALL_END_OFFLINE=0	The board is in offline mode.
CM_CALL_END_NO_SRV=21	The board is out of service.
CM_CALL_END_FADE=22	The call is ended normally.
CM_CALL_END_INTERCEPT=23	The call is interrupted by the BS.
CM_CALL_END_REORDER=24	A BS record is received during the call.
CM_CALL_END_REL_NORMAL=25	The BS releases the call.
CM_CALL_END_REL_SO_REJ=26	The BS rejects the current SO service.
CM_CALL_END_INCOM_CALL=27	A call from the BS is received.
CM_CALL_END_ALERT_STOP=28	A ringing stop signaling is received during the call.
CM_CALL_END_CLIENT_END=29	The call is ended normally at the client.
CM_CALL_END_ACTIVATION=30	The activation is ended during the OTASP call.
CM_CALL_END_MC_ABORT=31	The MC stops initiating the call or stops the call.
CM_CALL_END_RUIM_NOT_PRESENT=34	The RUIM does not exist.
CM_CALL_END_NDSS_FAIL=99	The network directed system selection (NDSS) fails.
CM_CALL_END_LL_CAUSE=100	The call is released from the bottom

layer, and cc_cause must be queried.

CM_CALL_END_CONF_FAILED=101	The network fails to respond.
CM_CALL_END_INCOM_REJ=102	The MT rejects an incoming call.
CM_CALL_END_SETUP_REJ=103	The call is rejected during setup.
CM_CALL_END_NETWORK_END=104	The call is released from the network, and cc_cause must be queried.
CM_CALL_END_NO_FUNDS=105	The fund runs out.
CM_CALL_END_NO_GW_SRV=106	The MT is out of service.

<cc_cause>: call control information

1	UNASSIGNED_CAUSE
3	NO_ROUTE_TO_DEST
6	CHANNEL_UNACCEPTABLE
8	OPERATOR_DETERMINED_BARRING
16	NORMAL_CALL_CLEARING
17	USER_BUSY
18	NO_USER_RESPONDING
19	USER_ALERTING_NO_ANSWER
21	CALL_REJECTED
22	NUMBER_CHANGED
26	NON_SELECTED_USER_CLEARING
27	DESTINATION_OUT_OF_ORDER
28	INVALID_NUMBER_FORMAT
29	FACILITY_REJECTED
30	RESPONSE_TO_STATUS_ENQUIRY
31	NORMAL_UNSPECIFIED
34	NO_CIRCUIT_CHANNEL_AVAILABLE
38	NETWORK_OUT_OF_ORDER
41	TEMPORARY_FAILURE
42	SWITCHING_EQUIPMENT_CONGESTION
43	ACCESS_INFORMATION_DISCARDED
44	REQUESTED_CIRCUIT_CHANNEL_NOT_AVAILABLE
47	RESOURCES_UNAVAILABLE_UNSPECIFIED
49	QUALITY_OF_SERVICE_UNAVAILABLE

50	REQUESTED_FACILITY_NOT_SUBSCRIBED
55	INCOMING_CALL_BARRED_WITHIN_CUG
57	BEARER_CAPABILITY_NOT_AUTHORISED
58	BEARER_CAPABILITY_NOT_PRESENTLY_AVAILABLE
63	SERVICE_OR_OPTION_NOT_AVAILABLE
65	BEARER_SERVICE_NOT_IMPLEMENTED
68	ACM_GEQ_ACMMAX
69	REQUESTED_FACILITY_NOT_IMPLEMENTED
70	ONLY_RESTRICTED_DIGITAL_INFO_BC_AVAILABLE
79	SERVICE_OR_OPTION_NOT_IMPLEMENTED
81	INVALID_TRANSACTION_ID_VALUE
87	USER_NOT_MEMBER_OF_CUG
88	INCOMPATIBLE_DESTINATION
91	INVALID_TRANSIT_NETWORK_SELECTION
95	SEMANTICALLY_INCORRECT_MESSAGE
96	INVALID_MANDATORY_INFORMATION
97	MESSAGE_TYPE_NON_EXISTENT
98	MESSAGE_TYPE_NOT_COMPATIBLE_WITH_PROT_STATE
99	IE_NON_EXISTENT_OR_NOT_IMPLEMENTED
100	CONDITIONAL_IE_ERROR
101	MESSAGE_NOT_COMPATIBLE_WITH_PROTOCOL_STATE
102	RECOVERY_ON_TIMER_EXPIRY
111	PROTOCOL_ERROR_UNSPECIFIED
127	INTERWORKING_UNSPECIFIED
160	REJ_UNSPECIFIED
161	AS_REJ_RR_REL_IND
162	AS_REJ_RR_RANDOM_ACCESS_FAILURE
163	AS_REJ_RRC_REL_IND
164	AS_REJ_RRC_CLOSE_SESSION_IND
165	AS_REJ_RRC_OPEN_SESSION_FAILURE
166	AS_REJ_LOW_LEVEL_FAIL
167	AS_REJ_LOW_LEVEL_FAIL_REDIAL_NOT_ALLOWED
168	MM_REJ_INVALID_SIM

169	MM_REJ_NO_SERVICE
170	MM_REJ_TIMER_T3230_EXP
171	MM_REJ_NO_CELL_AVAILABLE
172	MM_REJ_WRONG_STATE
173	MM_REJ_ACCESS_CLASS_BLOCKED
174	ABORT_MSG_RECEIVED
175	OTHER_CAUSE
176	CNM_REJ_TIMER_T303_EXP
177	CNM_REJ_NO_RESOURCES
178	CNM_MM_REL_PENDING
179	CNM_INVALID_USER_DATA

Note：

If a call is terminated due to network problems, `<cc_cause>` is presented. If a call is terminated before response from the network side is received, `<cc_cause>` is not presented.

13.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.4.5 Example

The users disconnect the voice call normally:

Response: `^CEND: 1,2,29,16`   Normal clearing the voice call

14 Huawei Proprietary Interface: SMS Service Interface

14.1 ^SMMEMFULL–Message Memory Full

14.1.1 Command Syntax

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

14.1.2 Interface Description

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

14.1.3 Parameter Description

<mem_type>: a string type value that indicates the type of the storage that is full.

"SM" (U)SIM card

"ME" NV memory

14.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.1.5 Example

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

Response:　　`^SMMEMFULL: "SM"`

15 Huawei Proprietary Interface: Network Service Interfaces

15.1 AT^SYSINFO–Query System Information

15.1.1 Command Syntax

Execution command
`AT^SYSINFO`
Possible Response(s)

`<CR><LF>^SYSINFO:`
`<srv_status>,<srv_domain>,<roam_status>,<sys_mode>,<sim_state`
`>[,<lock_state>,<sys_submode>]<CR><LF><CR><LF>OK<CR><LF>`

15.1.2 Interface Description

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

15.1.3 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

<sys_mode>: indicates the system mode.

0	No services
1	AMPS mode
2	CDMA mode
3	GSM/GPRS mode
4	HDR mode
5	WCDMA mode
6	GPS mode
7	GSM/WCDMA
8	CDMA/HDR HYBRID
15	TD_SCDMA mode

<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 CS and PS
240	ROMSIM version
250	No SIM card is found

<lock_state>: indicates whether the SIM card is locked by the CardLock feature (not supported currently.

0	SIM card is not locked by the CardLock feature.
1	SIM card is locked by the CardLock feature.

<sys_submode>: indicates the system sub-mode.

0	No services
1	GSM mode
2	GPRS mode
3	EDGE mode
4	WCDMA mode
5	HSDPA mode
6	HSUPA mode
7	HSUPA and HSDPA mode
8	TD_SCDMA mode
9	HSPA+ mode
10	EVDO Rev.0
11	EVDO Rev.A
12	EVDO Rev.B
13	1xRTT
14	UMB
15	1xEVDV
16	3xRTT
17	HSPA+(64QAM) mode
18	HSPA+(MIMO) mode

15.1.4 Property Description

Saving upon Power-off	PIN
NA	N

Note：

For HSPA+ mode, common boards report <sys_submode> to be 9. If 17 or 18 must be reported, you must use a customized board.

15.1.5 Example

Query the current system information:

Run:　　　　AT^SYSINFO

Response: `^SYSINFO: 2,3,0,3,1,,3`

`OK`

15.2 AT^SYSCFG–System Configuration

15.2.1 Command Syntax

Set command
`AT^SYSCFG=<mode>,<acqorder>,<band>,<roam>,<srvdomain>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT^SYSCFG?`
Possible Response(s)
<CR><LF>`^SYSCFG:` `<mode>,<acqorder>,<band>,<roam>,<srvdomain>`<CR><LF><CR><LF>`O` `K`<CR><LF>
Test command
`AT^SYSCFG=?`
Possible Response(s)
<CR><LF>`^SYSCFG:` (list of supported `<mode>`s), (list of supported `<acqorder>`s), (list of supported(`<band>,<band_name>`)s), (list of supported `<roam>`s), (list of supported `<srvdomain>`s)<CR><LF><CR><LF>`OK`<CR><LF>

15.2.2 Interface Description

The set command is used to set the system mode, GW access order, frequency band, roaming support, domain, and other features.

The test command returns values supported as a compound value.

15.2.3 Parameter Description

`<mode>`: specifies the system mode.

2   Automatic

3	CDMA mode (not supported)
4	HDR mode (not supported)
8	CDMA/HDR HYBRID mode (not supported)
13	GSM ONLY
14	WCDMA ONLY
15	TD_SCDMA ONLY (not supported)
16	No change

<acqorder>: specifies the network access order.

0	Automatic
1	GSM > WCDMA
2	WCDMA > GSM
3	No change
255	Not supported

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

The value of <band> can be one of the following values and their combinations (excluding 0x3FFFFFFF and 0x40000000):

00080000 (CM_BAND_PREF_GSM_850)	GSM 850
00000080 (CM_BAND_PREF_GSM_DCS_1800)	GSM DCS systems
00000100 (CM_BAND_PREF_GSM_EGSM_900)	Extended GSM 900
00000200 (CM_BAND_PREF_GSM_PGSM_900)	Primary GSM 900
00100000 (CM_BAND_PREF_GSM_RGSM_900)	Railway GSM 900
00200000 (CM_BAND_PREF_GSM_PCS_1900)	GSM PCS
00400000 (CM_BAND_PREF_WCDMA_I_IMT_2000)	WCDMA IMT 2000
00800000 (CM_BAND_PREF_WCDMA_II_PCS_1900)	WCDMA_II_PCS_1900
04000000 (CM_BAND_PREF_WCDMA_V_850)	WCDMA_V_850
08000000(CM_BAND_PREF_WCDMA_VI_800)	WCDMA_VI_800
3FFFFFFF (CM_BAND_PREF_ANY)	Any band
40000000 (CM_BAND_PREF_NO_CHANGE)	No band change
0004000000000000 (CM_BAND_PREF_WCDMA_IX_1700)	WCDMA_IX_1700
0000000000400000	WCDMA_IMT(2100)

(CM_BAND_PREF_WCDMA_IMT)

0002000000000000	WCDMA 900
00680380	Automatic

The following are definition of the CDMA band.

00000001(CM_BAND_PREF_BC0_A)	Band 0 A System
00000002(CM_BAND_PREF_BC0_B)	Band 0 B System
00000004(CM_BAND_PREF_BC1)	Band 1 1900
00000008(CM_BAND_PREF_BC2)	Band 2
00000010(CM_BAND_PREF_BC3)	Band 3
00000020(CM_BAND_PREF_BC4)	Band 4
00000040 (CM_BAND_PREF_BC5)	Band 5
00000400(CM_BAND_PREF_BC6)	BAND 6
00000800(CM_BAND_PREF_BC7)	BAND 7
00001000(CM_BAND_PREF_BC8)	BAND 8
00002000(CM_BAND_PREF_BC9)	BAND 9
00004000(CM_BAND_PREF_BC10)	BAND 10
00008000(CM_BAND_PREF_BC11)	BAND 11
10000000(CM_BAND_PREF_BC12)	Band 12
20000000(CM_BAND_PREF_BC14)	Band 14
80000000(CM_BAND_PREF_BC15)	Band 15

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

<roam>: indicates whether roaming is supported (this parameter is not supported. Any value entered will be ignored, and roaming is supported by default).

0	Not supported
1	Supported (default value)
2	No change

<srvdomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY
2	CS_PS
3	ANY
4	No change

255   Not supported

15.2.4 Property Description

Saving upon Power-off	PIN
NA	N

Note：

Frequency bands are configurable. If multiple bands are combined, set the band value to the result obtained by calculating all these band values using the "OR" operation.

15.2.5 Example

- Query the current system configuration:

Run: AT^SYSCFG?

Response: ^SYSCFG: 2,1,3FFFFFFF,1,2

            OK

- Set system configuration:

Run: AT^SYSCFG=2,0,3FFFFFFF,1,2

Response: OK

- Query the list of supported system configuration parameters:

Run: AT^SYSCFG=?

Response: ^SYSCFG:
            (2,13,14,16),(0-3),((2000000400380,"GSM900/GSM1800
            /WCDMA900/WCDMA2100"),(4a80000,"GSM850/GSM1900/WCD
            MA850/WCDMA1900"),(3fffffff,"All
            Bands")),(0-2),(0-4)

            OK

15.3 AT^USSDMODE–Select USSD Mode

15.3.1 Command Syntax

Set command
`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>
Read command
`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>
Test command
`AT^USSDMODE=?`
Possible Response(s)
<CR><LF>^USSDMODE: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

15.3.2 Interface Description

The set 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.

15.3.3 Parameter Description

`<mode>`:

0   Select USSD non-transparent mode.

1   Select USSD transparent mode (default value).

15.3.4 Property Description

Saving upon Power-off	PIN
N	N

15.3.5 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

15.4 ^SRVST–Service State Change Indication

15.4.1 Command Syntax

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

15.4.2 Interface Description

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

15.4.3 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

15.4.4 Property Description

Saving upon Power-off	PIN
N	N

15.4.5 Example

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

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

Response: ^SRVST: 0

              ^MODE: 0,0

              ^RSSI: 99

              ^MODE: 3,3

              ^RSSI: 8

              ^SRVST: 1

              ^RSSI: 25

              ^SRVST: 2

              OK

15.5 ^SIMST–SIM Card State Change Indication

15.5.1 Command Syntax

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

15.5.2 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.

15.5.3 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.
3	Invalid SIM card in PS domain.
4	Invalid SIM card in PS domain and CS domain.
240	ROMSIM version.
255	No SIM card is found. This value may be returned if the SIM card is not inserted or it is locked by the CardLock feature. In this case, the actual state of the SIM card is determined by <lock_state>.

<lock_state>: indicates whether the SIM card is locked by the CardLock feature (not supported currently).

0	SIM card is not locked by the CardLock feature.
1	SIM card is locked by the CardLock feature.

15.5.4 Property Description

Saving upon Power-off	PIN
NA	N

15.5.5 Example

Run: AT+CPIN=1234

Response: OK

            ^SIMST: 1

15.6 ^MODE–System Mode Change Indication

15.6.1 Command Syntax

URC
<CR><LF>^MODE: <sys_mode>,<sys_submode><CR><LF>

15.6.2 Interface Description

When the system mode is changed, the MT unsolicited sends this indication to the TE.

15.6.3 Parameter Description

<sys_mode>: indicates the system mode.

0	No services
1	AMPS mode (not available currently)
2	CDMA mode (not supported)
3	GSM/GPRS mode
4	HDR mode (not supported)
5	WCDMA mode
6	GPS mode
7	GSM/WCDMA
8	CDMA/HDR HYBRID (not supported)
15	TD_SCDMA mode(not supported)

<sys_submode>: indicates the system sub-mode.

0	No services
1	GSM mode
2	GPRS mode
3	EDGE mode
4	WCDMA mode
5	HSDPA mode

6	HSUPA mode	
7	HSDPA mode and HSUPA mode	
8	TD_SCDMA mode(not supported)	
9	HSPA+ mode(not supported)	
10	EVDO Rev.0(not supported)	
11	EVDO Rev.A(not supported)	
12	EVDO Rev.B(not supported)	

15.6.4 Property Description

Saving upon Power-off	PIN
NA	N

15.6.5 Example

When sends `AT+COPS` set command to MT, the system mode is changed, the MT unsolicited 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

16 Huawei Proprietary Interface: Built-in TCP/IP Protocol Stacks and AT Interfaces

Internet services refer to data services based on built-in TCP/IP protocol stacks of terminals. A user can deliver AT commands to terminals to establish an IP/PPP link for user data transmission. This chapter describes the AT commands related to the Internet services. Services related to built-in protocol stacks are limited to physical ports.

16.1 AT^IPINIT–Initialize Embedded TCP/IP Service

16.1.1 Command Syntax

Set command
`AT^IPINIT=<APN>[,<user_name>[,<password>[,<ip_addr>[,<auth_type>]]]]`
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
`AT^IPINIT?`
Possible Response(s)
If initialized: <CR><LF>^IPINIT: <state>,<ip_address>,<APN>,<pri_dns_address>,<sec_dns_address><CR><LF><CR><LF>OK<CR><LF>
If not initialized: <CR><LF>^IPINIT: 0<CR><LF><CR><LF>OK<CR><LF>

Test command

`AT^IPINIT=?`

Possible Response(s)

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

16.1.2 Interface Description

This command has the same dialing function as a modem.

This command is used to configure basic parameters for dialing and establish connections with networks. A local IP is obtained after the command is run. Only after network connections are established by running the `AT^IPINIT` command, you can perform further operations such as opening the TCP links and transmitting UDP data.

16.1.3 Parameter Description

`<APN>`: string type with quotation marks indicating the access point name (APN), with a maximum of 100 characters, as shown in the example. (If only comma is specified or no character is specified , which indicates that APN is null)

`<user_name>`: string type with quotation marks, with a maximum of 31 characters, which can be left out.

`<password>`: string type with quotation marks, with a maximum of 31 characters, which can be left out.

`<ip_addr>`: string type with quotation marks, with a maximum of 40 characters. This parameter can be set to a static IPv4 address by a request, and 3GPP2 does not support and set this parameter. However, an actual IPv4 address may be obtained for this parameter.

`<auth_type>`: indicates the authentication mode. CHAP authentication is defaulted. This parameter is not supported by 3GPP2 and is determined by negotiation between a module and the network.

0	No authentication
1	PAP authentication
2	CHAP authentication

`<state>`: initialization completion identifier

0	The network is not initialized, or network connection fails to be established.
1	Network connection is successfully established.

`<pri_dns_address>`: string type with quotation marks, indicating the IP address of the preferred DNS server

`<sec_dns_address>`: string type with quotation marks, indicating the IP address of the alternate DNS server

16.1.4 Property Description

Saving upon Power-off	PIN
N	Y

16.1.5 Example

Take the WCDMA module as an example:

Run:	`AT^IPINIT="1234"`
Response:	`OK`
Run:	`AT^IPINIT?`

Response:	`^IPINIT:`
	`1,"192.168.70.59","1234","172.22.44.200","172.22.4`
	`4.201"`
	
	`OK`

Run:	`AT^IPINIT=?`

Response:	`^IPINIT: (0-1)`
	
	`OK`

16.2 AT^IPOPEN–Open TCP/UDP Link

16.2.1 Command Syntax

Set command
`AT^IPOPEN=<link_id>,<type>,<remote_addr>,<remote_port>[,<local_port>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>

Read command

`AT^IPOPEN?`

Possible Response(s)

If link has been open:

<CR><LF>`^IPOPEN:`
`<link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_`
`port>,<MSS>`[<CR><LF>`^IPOPEN:`
`<link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_`
`port>,<remote_MSS>`][...]]<CR><LF><CR><LF>`OK`<CR><LF>

If link hasn't been open:

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

Test command

`AT^IPOPEN=?`

Possible Response(s)

<CR><LF>`^IPOPEN:` (list of supported `<link_id>`s), (list of supported
`<local_port>`s), (list of supported
`<remote_port>`s)<CR><LF><CR><LF>`OK`<CR><LF>

16.2.2 Interface Description

This command is used to establish links with single or multiple remote servers using wireless modes. TCP and UDP are supported.

16.2.3 Parameter Description

`<link_id>`: link ID

  1–5   The range of link ID

`<type>`: string type with quotation marks, indicating the type of the link.

  "TCP"   Establishing a TCP link

  "UDP"   Establishing a UDP link

`<remote_addr>`: a remote object address, indicating either an IP string or a domain name string, with the maximum length of 255 characters, as shown in the example.

`<remote_ip>`: string type, indicating a remote IP address as shown in the example

`<remote_port>`: an integer ranging from 1 to 65535, indicating a remote port.

`<local_port>`: an integer ranging from 1 to 65535, indicating a local transceiver port. This parameter is optional when the execution command is run. If users do not input this parameter, a terminal designates the local port number at random.

`<SIO_port>`: the physical port number bound with this link (the port for communication between a host-computer and the terminal) ranging from 0 to 10.

0	Reserved
1	UART
3	PCUI
4 –10	Reserved

<MSS>: a TCP-type link indicating the maximum length of the TCP packet segment negotiated with the peer end.

16.2.4 Property Description

Saving upon Power-off	PIN
N	Y

16.2.5 Example

- Three links are consecutively established, as shown below:

Run: AT^IPOPEN=1,"TCP","129.11.18.8",10000,9000

Response: OK

Run: AT^IPOPEN=2,"TCP","129.11.18.8",10000,8000

Response: OK

Run: AT^IPOPEN=3,"UDP","129.11.18.8",7000,6000

Response: OK

Run: AT^IPOPEN?

Response: ^IPOPEN:
1,"TCP",9000,"129.11.18.8",10000,1,1460

^IPOPEN:
2,"TCP",8000,"129.11.18.8",10000,1,1460

^IPOPEN:
3,"UDP",6000,"129.11.18.8",7000,1,0

OK

- One link is established using the URL mode, as shown below:

Run: AT^IPOPEN=1,"TCP","www.baidu.com",80,3081

Response: OK

Run: AT^IPOPEN?

Response:　　^IPOPEN:
1,"TCP",3081,"220.181.111.147",80,1,1440

OK

16.3 AT^IPLISTEN–Configure TCP/UDP as a Server

16.3.1 Command Syntax

Set command
AT^IPLISTEN=<type>,<listen_port>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
AT^IPLISTEN?
Possible Response(s)
<CR><LF>^IPLISTEN: <type>,<listen_port>,<idle_num><CR><LF><CR><LF>OK<CR><LF>
Test command
AT^IPLISTEN=?
Possible Response(s)
<CR><LF>^IPLISTEN: (list of supported <type>s),(list of supported <listen_port>s),(list of supported <idle_num>s)<CR><LF><CR><LF>OK<CR><LF>

16.3.2 Interface Description

This command is used to enable listening function. At most 5 clients are supported

16.3.3 Parameter Description

<type>: string type with quotation marks, indicating the type of the link.

Note:

If the listening function is not enabled, the query command returns a null string.

    "TCP"   Establishing a TCP link

    "UDP"   Establishing a UDP link

<listen_port>: an integer ranging from 1 to 65535, indicating the local listening port.

Note:

    If the listening function is not enabled, the query command returns 0.

<idle_num>: an integer ranging from 0 to 5, indicating the number of current idle links

16.3.4 Property Description

Saving upon Power-off	PIN
N	Y

16.3.5 Example

Run:	AT^IPLISTEN?
Response:	^IPLISTEN: "",0,2
	OK
Run:	AT^IPLISTEN=?
Response:	^IPLISTEN: ("TCP","UDP"),(1-65535),(0-5)
	OK
Run:	AT^IPLISTEN="TCP",12000
Response:	OK
Run:	AT^IPLISTEN?
Response:	^IPLISTEN: "TCP",12000,2
	OK

16.4 AT^IPSEND–Send TCP/UDP Data

16.4.1 Command Syntax

Set command
`AT^IPSEND=<link_id>,<data>`
Possible Response(s)
`<CR><LF>^IPSEND: <link_id><CR><LF><CR><LF>OK<CR><LF>`
In case of an MT-related error: `<CR><LF>+CME ERROR: <err><CR><LF>`
Test command
`AT^IPSEND=?`
Possible Response(s)
`<CR><LF>OK<CR><LF>`

16.4.2 Interface Description

This command is used to send user data based on established links. If the user data is sent to socket, `OK` is returned. Otherwise, an error message is returned.

16.4.3 Parameter Description

`<link_id >`: the ID of established links ranging from 1 to 5.

`<data>`: indicates user data. The maximum length of the user data that can be sent is 1500 bytes. The user data must be put in quotation marks.

Note:
The user data only supports visible characters and quotation marks are not required. Users can use `AT^IPSENDEX` to obtain more functions.

16.4.4 Property Description

Saving upon Power-off	PIN
N	Y

16.4.5 Example

Run: `AT^IPSEND=3,"ASDF"`

Response: ^IPSEND: 3

OK

16.5 ^IPDATA–Notificate Arrival Data

16.5.1 Command Syntax

URC
<CR><LF>^IPDATA: <link_id>,<data_len>,<data>**<CR><LF>**

16.5.2 Interface Description

This command is used to automatically report data when the data arrives.

16.5.3 Parameter Description

<link_id >: the number of established links, ranging from 1 to 5.

<data_len>: an integer indicating the length of data, ranging from 1 to 1500.

<data>: a character string that contains any characters without quotation marks, indicating newly received data information.

16.5.4 Property Description

Saving upon Power-off	PIN
N	Y

16.5.5 Example

Response: ^IPDATA:
1,71,123456781234561234567234567234567234678234782
34782345678234678903489034

16.6 AT^IPCLOSE–Close TCP/UDP Link

16.6.1 Command Syntax

Set command
`AT^IPCLOSE=<link_id>`

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

Read command
`AT^IPCLOSE?`

Possible Response(s)
<CR><LF>`^IPCLOSE:` `<link1_state>,<link2_state>,<link3_state>,<link4_state>,<link5_state>`<CR><LF><CR><LF>`OK`<CR><LF>

Test command
`AT^IPCLOSE=?`

Possible Response(s)
<CR><LF>`^IPCLOSE:` (list of supported `<link_id>`s)<CR><LF><CR><LF>`OK`<CR><LF>

16.6.2 Interface Description

This command is used to close links, disable the server's listening function, or close radio network connections.

- When `<link_id>` is any of 1 to 5, the link corresponding to the link ID is closed.
- When `<link_id>` is 6, the server's listening function is disabled and connections with the server are closed.
- When `<link_id>` is 7, the radio network connections are closed. If a link's or the server's listening function is available, the function is also disabled.

16.6.3 Parameter Description

`<link_id>`: link ID ranging from 1 to 7

1–5	The number of established links
6	A local server and established links with the server
7	Closed radio network connections

<linkx_state>: the state of link x

0   Indicates that the link is closed and can be used.

1   Indicates that the link is open and in use.

16.6.4 Property Description

Saving upon Power-off	PIN
N	Y

16.6.5 Example

Run: AT^IPCLOSE?

Response: ^IPCLOSE: 1,1,0,0,0

           OK

Run: AT^IPCLOSE=1

Response: OK

Run: AT^IPCLOSE?

Response: ^IPCLOSE: 0,1,0,0,0

           OK

16.7 AT^IPENTRANS–Enable Transparent Transfer Mode

16.7.1 Command Syntax

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

<CR><LF>^IPENTRANS: <link_id><CR><LF><CR><LF>OK<CR><LF>
When no transparent transmission link exists: <CR><LF>OK<CR><LF>

16.7.2 Interface Description

This command is used to transfer the command mode of a physical port where a link locates to data mode. In data mode, all the data input except the +++ command for exiting the data mode is transmitted as user data. This command returns OK if it runs successfully, and then the user can receive and send data in data mode.

If a user enters three consecutive signs (+++), the physical port exists the transparent transmission mode.

Requirements of the three consecutive plus signs are detected as follows: No data is input 900 ms before the three consecutive plus signs are entered. The time interval between two '+' input must be less than 900 ms. No other data is required 900 ms after the third plus sign is entered.

The twelfth parameter of the AT^IPCFL command sets the transparent transmission mode of a UDP link to mode 0 or mode 1 .

In mode 0, the module sends any data from the host computer to socket as user data, and determines delay and timing of the assembled data packets and data packet sending length based on parameters 5 and 11 of IPCFL.

In mode 0, data is sent as follows:

* 1. If the length of the data received from the host computer reaches the data packet sending length, the module sends the data to socket and continues to process the data.

* 2. If the length of the rest data received from the host computer does not reach the data packet sending length, the module starts or resets the packet delay timer.

* 3. If the timer expires, the module sends the rest data to socket.

* 4. If the module receives new data from the host computer when the packet delay timer is running, repeat steps 1 to 3.

In mode 1, the host computer needs to add the 0x7E end character for each data packet of the user data. If the module detects 0x7E, the module considers that a data packet ends and then sends it to socket. Therefore, end characters of the user data need to be escaped. That is, the host computer needs to check all the user data and convert their end characters. The module then escapes the converted end characters to the original characters and sends the original characters to socket.

The escape rule of the user data to be sent is as follows: The 0x7E end characters contained in the user data are escaped as the 0x7D 0x5E end characters. The 0x7D end characters contained in the user data are escaped as the 0x7D 0x5D end characters.

At the same time, the host computer needs to process the data received from the module. The host computer escapes the 0x7D 0x5E end characters to the 0x7E end characters, and escapes the 0x7D 0x5D end characters to the 0x7D end characters.

The 0x7E end characters indicate the end of a UDP packet and are not the actual user data. Mode 0 is applicable to sending and receiving data packets with an invariable length over a UDP link. Mode 1 is applicable to sending and receiving data packets with a variable length.

16.7.3 Parameter Description

`<link_id>`: link number for entering the transparent transmission mode.

16.7.4 Property Description

Saving upon Power-off	PIN
N	Y

16.7.5 Example

Run: AT^IPENTRANS=1

Response: OK

Now the remote end receives any characters entered by the user.

16.8 AT^IPSENDEX–Send and Expand TCP/UDP Data

16.8.1 Command Syntax

Set command

`<mode>`=0 or `<mode>`=1:
 `AT^IPSENDEX=<link_id>,<mode>,<data>`
 `<mode>`=2:
 `AT^IPSENDEX=<link_id>,<mode>,<len>`**<CR>**`entered data`

Possible Response(s)
`<CR><LF>^IPSENDEX: <link_id><CR><LF><CR><LF>`OK`<CR><LF>`   In case of an MT-related error: `<CR><LF>`+CME ERROR: `<err>`**<CR><LF>**
Test command   `AT^IPSENDEX=?`
Possible Response(s)
`<CR><LF>^IPSENDEX:` (list of supported `<link_id>`s), (list of supported `<mode>`s) `<CR><LF><CR><LF>`OK`<CR><LF>`

16.8.2 Interface Description

This command is used to send the user data based on established links. Among three data sending modes available, mode 2 is recommended.

- Mode 0 is compatible with the ^IPSEND functions backwards.

- Mode 1 is a mandatory data conversion mode. In this mode, the original data requested by a user to be sent must be converted from hexadecimal digits to character strings. After the character strings are converted to the original data, the module sends the original data to the peer. For example, the user can enter the `^IPSENDEX=1,1,"01081B2C"` command to send the quartet data: 0x01, 0x08, 0x1B, and 0x2C. The receiving end will receive the quartet data.

- Mode 2 is a length-limited full-character mode. In this mode, the user sends a command to notify the module of the length of the data to be sent first. After the module returns `OK`, the user enters data until the data length reaches the requested length.

Note:

If the length of the input data is less than the expected length, the module waits for the user to enter the rest data. If the length of the input data is greater than the requested length, an error is returned.

16.8.3 Parameter Description

`<link_id>`: the ID of established links ranging from 1 to 5

`<mode>`:

0	Compatible with ^IPSEND
1	Mandatory data conversion mode
2	Length-limited full-character mode

`<data>`: user data with quotation marks. The maximum length of the user data is 1500 characters in both mode 0 and mode 1.

`<len>`: the maximum length of the data requested by a user to be sent, which cannot exceed 1500 characters.

Note:

It is suggested that the user data be sent over a TCP link with the MSS value being the maximum length. Otherwise extra packets are generated, affecting the transmission rate. For example, if the MSS value is 1460, 1460 characters are recommended for the maximum length of <len>.

16.8.4 Property Description

Saving upon Power-off	PIN
N	Y

16.8.5 Example

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

Response: `^IPSENDEX: 1`

`OK`

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

Response: `OK`

Input user data:

Response: `^IPSENDEX: 1`

`OK`

16.9 AT^IPFLOWQ–Request and Clear TCP/UDP Link Data Packet Statistics

16.9.1 Command Syntax

Set command
`AT^IPFLOWQ[=<link_id>]`
Possible Response(s)
<CR><LF>`OK`<CR><LF>
In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT^IPFLOWQ?`
Possible Response(s)

<CR><LF>^IPFLOWQ: <link1>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_S OCKET>,<RX_TO_USER><CR><LF>^IPFLOWQ: <link2>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_S OCKET>,<RX_TO_USER>…<CR><LF><CR><LF>OK<CR><LF>
Test command AT^IPFLOWQ?
<CR><LF>^IPFLOWQ: (list of supported <link_num>s)<CR><LF><CR><LF>OK<CR><LF>

16.9.2 Interface Description

When data is sent over a TCP link, the peer end, if it receives the data, sends ACK to the sending end. After the ME receives the ACK from the peer end, the ME confirms that the data is successfully sent.

No ACK is required when data is received or sent over a UDP link. Only the sums of the data packets are sent to and received from the peer end are recorded.

The set command is used to clear the data packet statistics of the designated TCP/UDP link, including:

- Uplink: the sum of the data packets received from the host computer, the sum of the data packets sent to socket, and the sum of the confirmed data packets.
- Downlink: the sum of data packets received from socket and the sum of data packets sent to the host computer.

The read command is used to query the data packet statistics of all current TCP/UDP links.

The test command is used to query the sequence number of the supported TCP/UDP link.

16.9.3 Parameter Description

<link_id>: an integer indicating the TCP/UDP sequence number.

0	Indicates clearing the statistics of all TCP links and used for setting commands.
1–5	Indicates the link number of the statistics to be cleared.

<TX_FROM_USER>: indicates the sum of the statistics received from the host computer. The maximum value is 2^{32}-1 bytes.

<TX_TO_SOCKET>: indicates the sum of the statistics sent to socket. The maximum value is 2^{32}-1 bytes.

<TX_ACK_SUM>: indicates the sum of statistics that is acknowledged to be received over a TCP link. This value should not exceed the current <send_sum>. This parameter does not supported in the UDP protocol, and an invariable value 0 is reported. The maximum value is 2^{32}-1 bytes.

`<RX_FROM_SOCKET>`: indicates the sum of the statistics received from socket. The maximum value is 2^{32}-1 bytes.

`<RX_TO_USER>`: indicates the sum of the statistics sent to the host computer. The maximum value is 2^{32}-1 bytes.

16.9.4 Property Description

Saving upon Power-off	PIN
N	Y

16.9.5 Example

Run:	`AT^IPFLOWQ?`
Response:	`^IPFLOWQ: 1,3,3,3,3,3`
	`^IPFLOWQ: 2,0,0,0,0,0`
	`^IPFLOWQ: 3,0,0,0,0,0`
	`^IPFLOWQ: 4,0,0,0,0,0`
	`^IPFLOWQ: 5,0,0,0,0,0`
	`OK`

16.10 ^IPSTATE–Indicate TCP/UDP Data Link State

16.10.1 Command Syntax

URC
<CR><LF>`^IPSTATE: <link_id>,<state>,<errcode>`**<CR><LF>**

16.10.2 Interface Description

This command is used by the module to notify the host computer of the current link information and state when the TCP/UDP link state changes.

16.10.3 Parameter Description

`<link_id>`: TCP/UDP link ID

0	An illegal ID
1–5	ID of established links

6   Local server

7   Network connection

`<state>`: link state

0   Indicates that the link is closed

1   Indicates that the link is established

2–255   Reserved

`<errcode>`: error message

0   Indicates that the peer end closes the link

1   Indicates that the server receives a new link

2:           Indicates that a network error occurs

3   Indicates that the supported link reaches the threshold

4   Indicates that the server rejects new connections in the transparent transmission mode

5–254   Reserved

255   No error

16.10.4 Property Description

Saving upon Power-off	PIN
N	Y

16.10.5 Example

After the ME establishes the 1 TCP link, the server delivers a normal command to disconnect the link, and the module notifies the host computer of the disconnection.

Response: `^IPSTATE: 1,0,0`

16.11 AT^IPCFL–Configure TCP/UDP Static Parameters

16.11.1 Command Syntax

Set command
`AT^IPCFL=<parameter_id>,<value>`
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
`AT^IPCFL?`
Possible Response(s)
<CR><LF>^IPCFL: <parameter_id>,<value>[<CR><LF>^IPCFL: <parameter_id>,<value>[…]]<CR><LF><CR><LF>OK<CR><LF>
Test command
`AT^IPCFL=?`
Possible Response(s)
<CR><LF>^IPCFL: <parameter_id>,(list of supported <value>s)[<CR><LF>^IPCFL: <parameter_id>,(list of supported <value>s)[…]]<CR><LF><CR><LF>OK<CR><LF>

16.11.2 Interface Description

This command is used to configure static parameters related to IPSTACK, including the sending delay timer, the maximum packet length during transparent transmission, and the selection of the transparent transmission mode.

The set command is used to set one parameter at a time. The user needs to enter parameter ID and the corresponding value.

The read command returns the supported parameters and their corresponding values. Parameters that are not supported by the terminal are not returned.

The test command returns the value range corresponding to the supported parameters.

16.11.3 Parameter Description

Parameter_id	Value Range(Unit)	Description
5	1–100 (0.1s) (10 by default)	Specifies the value of the timer for the transparent transmission.

Parameter_id	Value Range(Unit)	Description
10	1–1472 (byte) (1024 by default)	Specifies the length of the TCP/UDP data packet for packet sending.
12	0–1 (0 by default)	For selecting the transparent transmission mode, see the description of AT^IPENTRANS.

16.11.4 Property Description

Saving upon Power-off	PIN
N	Y

16.11.5 Example

Run: `AT^IPCFL=5,2`   Set the time of the assembled data packet timer to 0.2s during transparent transmission.

Response: `OK`

16.12 AT^DVCFG–Set Priority of Voice Call and Data Service

16.12.1 Command Syntax

Set command
`AT^DVCFG=<mode>`
Possible Response(s)
<CR><LF>`OK`<CR><LF>   In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT^DVCFG?`
Possible Response(s)
<CR><LF>`^DVCFG: <mode>`<CR><LF><CR><LF>`OK`<CR><LF>

Test command
AT^DVCFG=?

Possible Response(s)
<CR><LF>^DVCFG:　(list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

16.12.2 Interface Description

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

16.12.3 Parameter Description

<mode>:

0: voice call prefer (default value)

In this state, an incoming voice call will suspend the data transmission. If data service is not in transparent transmission mode, all ports (PCUI port, MODEM port, and UART port) will report RING message. If data service is in transparent transmission mode, all ports will report RING message except the port which is processing data service, and the RING pin is dredged. The data transmission will keep on going after stopping the voice call. But there is one risk that the transmitted data maybe loss during the process of voice call, only the last packet(less than 1600 byte) can be sent successfully

1: data service prefer

In this state, When the TE performing IP Stack asynchronous command or in the transparent transmission mode, an incoming voice call will be hung up by the module automatically.

In this state, the TE can originate a voice call. And a new incoming voice call during the call will not be hung up automatically.

To change the priority of voice call and data service by using AT^DVCFG=0 command, or using command AT^IPCLOSE=7 to close IPSTACK, which can return back to answer the voice call when it coming.

16.12.4 Property Description

Saving upon Power-off	PIN
N	Y

16.12.5 Example

Run:　　　　AT^DVCFG=0

Response:　　OK

17 Huawei Proprietary Interface: GPS Service Interfaces

17.1 AT^WPDOM–Set Operation Mode

17.1.1 Command Syntax

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

17.1.2 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 in the positioning process. Otherwise, an error message is returned.

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

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

17.1.3 Parameter Description

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

0	Standalone only. In this mode, no network assistance is required, and an MS can be in or not in the network coverage area. This mode can be used to position the session without SIM cards.
1	Network only. The MS-assisted positioning mode, which is one of Assisted Global Positioning Systems (A-GPSs), is used here. The MS needs to communicate with PDE or PDM upon each positioning, and the PDE or PDM calculates position information. In this operation mode, the PDE or PDM needs to be accessed, and network coverage is required. (not supported currently)
2	Speed optimal. The positioning data with the optimal speed is obtained, that is, the minimum TTF mode is used. The speed optimal mode is only MS-based in UMTS.
3	Accuracy optimal. The positioning data with the optimal accuracy is obtained. The accuracy optimal mode is only MS-assisted in UMTS. (not supported currently)
4	Data optimal. The MS uses the minimum PDE data interaction mode with the network side. The data optimal mode is only standalone in UMTS.
5	MS-bases only. The network needs to provide positioning assistance information, and the MS calculates the position information. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning.
6	gpsOneXTRA, which is the enhanced mode of standalone. Before the GPS searches the satellite, the GPS downloads the ephemeris data from the Internet. The orbit equation contained in the ephemeris data can save the time during data demodulation.
7	Low Accuracy MSA. The terminal originates an MSA positioning session with extremely low positioning accuracy in bad weather. The server side determines the positioning mode. (In this operation mode, a specified QoS positioning session is originated, and the user does not need to set the QoS parameters). (not supported currently)

<err>: error type prompts

Error code	Description
4	Operation not supported
276	GPS function disabled

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

17.1.4 Property Description

Saving upon Power-off	PIN
N	N

17.1.5 Example

- Query the value range of operation mode:

Run: AT^WPDOM=?

Response: ^WPDOM: (0-7)

            OK

- Query the current operation mode:

Run: AT^WPDOM?

Response: ^WPDOM: 0

            OK

- Set the operation mode:

Run: AT^WPDOM=0

Response: OK

Run: AT^WPDOM=1

Response: OK

Run: AT^WPDOM=2

Response: OK

17.2 AT^WPDST–Set Session Type

17.2.1 Command Syntax

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

17.2.2 Interface Description

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

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

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

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

17.2.3 Parameter Description

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

0   Provides a single positioning operation.

1   Provides tracing positioning. The positioning value is obtained using the designated frequency. The positioning frequency is set by running `AT^WPDFR`.

2   Provides the last positioning information, but does not execute the satellite searching operation.

3   Downloads data. Allows the MS to download the ephemeris/almanac data and the coarse position a-priori data. This setting makes the MS ready for obtaining future positioning information, and is applicable only to the CDMA network. (not supported currently)

`<err>`: error type prompts

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

17.2.4 Property Description

Saving upon Power-off	PIN
N	N

17.2.5 Example

- Query the value range of session type:

Run: `AT^WPDST=?`

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

      `OK`

- Query the current session type:

Run: `AT^WPDST?`

Response: `^WPDST: 0`

      `OK`

- Set the session type:

Run:	AT^WPDST=0
Response:	OK
Run:	AT^WPDST=1
Response:	OK
Run:	AT^WPDST=2
Response:	OK
Run:	AT^WPDST=3
Response:	+CME ERROR: Invalid parameter

17.3 AT^WPDFR–Set Positioning Frequency

17.3.1 Command Syntax

Set command
AT^WPDFR=<num>,<time>
Possible Response(s)
<CR><LF>OK<CR><LF>   In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
AT^WPDFR?
Possible Response(s)
<CR><LF>^WPDFR: <num>,<time><CR><LF><CR><LF>OK<CR><LF>
Test command
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>

17.3.2 Interface Description

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

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

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

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

Note:

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

17.3.3 Parameter Description

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

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

<err>: error type prompts.

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

17.3.4 Property Description

Saving upon Power-off	PIN
N	N

17.3.5 Example

- Query the value range of positioning frequency:

Run: AT^WPDFR=?

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

            OK

- Query the current positioning frequency

Run: AT^WPDFR?

Response: ^WPDFR: 65535,1

            OK

- Set the positioning frequency
  - Failure

Run: AT^WPDST=0

Response: OK

Run: AT^WPDFR=20,2

Response: +CME ERROR: operation not supported

  - Success

Run: AT^WPDST=1

Response: OK

Run: AT^WPDFR=20,2

Response: OK

17.4 AT^WPQOS–Set QoS

17.4.1 Command Syntax

Set command
AT^WPQOS=<performance>,<accuracy>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
AT^WPQOS?
Possible Response(s)
<CR><LF>^WPQOS: <performance>,<accuracy><CR><LF><CR><LF>OK<CR><LF>

Test command
AT^WPQOS=?

Possible Response(s)
<CR><LF>^WPQOS: (list of supported <performance>s),(list of supported <accuracy>s)<CR><LF><CR><LF>OK<CR><LF>

17.4.2 Interface Description

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

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

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

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

17.4.3 Parameter Description

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

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

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

<err>: error type prompts.

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

17.4.4 Property Description

Saving upon Power-off	PIN
N	N

17.4.5 Example

- Query the value range of QoS parameter:

Run: `AT^WPQOS=?`

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

`OK`

- Query the current settings:

Run: `AT^WPQOS?`

Response: `^WPQOS: 255,50`

`OK`

- Set the QoS parameter:

Run: `AT^WPQOS=255,50`

Response: `OK`

Run: `AT^WPQOS=0,50`

Response: `+CME ERROR: Invalid parameter`

Run: `AT^WPQOS=255,20`

Response: `+CME ERROR: Invalid parameter`

17.5 AT^WPDGL–Set GPS Session Lock

17.5.1 Command Syntax

Set command
`AT^WPDGL=<option>`
Possible Response(s)

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

In case of an error:

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

Read command
AT^WPDGL?
Possible Response(s)
<CR><LF>^WPDGL: <option><CR><LF><CR><LF>OK<CR><LF>
Test command
AT^WPDGL=?
Possible Response(s)
<CR><LF>^WPDGL: (list of supported <option>s)<CR><LF><CR><LF>OK<CR><LF>

17.5.2 Interface Description

This command is used to set a GPS session lock.

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

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

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

17.5.3 Parameter Description

<option>: GPS session lock type. The default value is 0. The values are as follows:

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

Note:

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

<err>: error type prompts.

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

17.5.4 Property Description

Saving upon Power-off	PIN
Y	N

17.5.5 Example

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

Run: AT^WPDGL=?

Response: ^WPDGL: (0-3)

            OK

- Query the current GPS session lock type:

Run: AT^WPDGL?

Response: ^WPDGL: 0

            OK

- Set the GPS session lock type:

Run: AT^WPDGL=1

Response: OK

17.6 AT^GPSTYPE–Query GPS Type

17.6.1 Command Syntax

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

17.6.2 Interface Description

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

17.6.3 Parameter Description

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

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

bit0: whether to support standalone

bit1: whether to support control plane

bit2: whether to support user plane

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

<err>: error type prompts.

Error code	Description
4	Operation not supported
100	unknown

17.6.4 Property Description

Saving upon Power-off	PIN
Y	N

17.6.5 Example

If the module supports all GPS types:

Run:	`AT^GPSTYPE?`	
Response:	`^GPSTYPE: 15`	The binary digit of 15 is 1111.
	`OK`	

17.7 AT^WGNSS–Set Positioning System

17.7.1 Command Syntax

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

17.7.2 Interface Description

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

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

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

$GPVTG.

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

The format of these NMEA sentences comply with NMEA0183 protocol.

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

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

17.7.3 Parameter Description

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

0   GPS

1   GNSS

`<err>`: error type prompts

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

17.7.4 Property Description

Saving upon Power-off	PIN
Y	N

17.7.5 Example

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

Run: `AT^WGNSS=?`

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

            `OK`

- Query the current positioning system type:

Run:　　　 AT^WGNSS?

Response:　 ^WGNSS: 0

　　　　　　 OK

- Set the positioning system type:

Run:　　　 AT^WGNSS=1

Response:　 OK

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

17.8.1 Command Syntax

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

17.8.2 Interface Description

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

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

17.8.3 Parameter Description

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

`<err>`: error type prompts

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

17.8.4 Property Description

Saving upon Power-off	PIN
Y	N

17.8.5 Example

Set the address and port number of the AGPS server:

Run:	`AT^WPURL=XXXXXX:XXXX`	Set the address and port number of the AGPS server.
Response:	`OK`	

17.9 AT^WPDGP–Start Positioning Session

17.9.1 Command Syntax

Execution command
`AT^WPDGP`
Possible Response(s)
`<CR><LF>OK<CR><LF>`

In case of an error:

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

17.9.2 Interface Description

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

17.9.3 Parameter Description

<err>: error type prompts

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

17.9.4 Property Description

Saving upon Power-off	PIN
NA	N

17.9.5 Example

- Set PD session failed:

Run: AT^WPDGL=1

Response: OK

Run: AT^WPDGP

Response: +CME ERROR: GPS locked

- Set PD session success:

Run: `AT^WPDGL=0`

Response: `OK`

Run: `AT^WPDGP`

Response: `OK`

17.10 AT^SOCKETCONT–Set the AGPS Socket Profile

17.10.1 Command Syntax

Set command
`AT^SOCKETCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT^SOCKETCONT?`
Possible Response(s)

<CR><LF>`^SOCKETCONT:`
`<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>`[<CR><LF>`^`
`SOCKETCONT:`
`<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>`[...]]<CR><LF>
><CR><LF>`OK`<CR><LF>

Test command
`AT^SOCKETCONT=?`
Possible Response(s)
<CR><LF>`^SOCKETCONT:` (list of supported `<cid>`s),`<PDP_type>`,,, (list of supported `<d_comp>`s), (list of supported `<h_comp>`s)[<CR><LF>`^SOCKETCONT:` (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>

17.10.2 Interface Description

This command is used to set the AGPS PDP context on the GSM and WCDMA.

The set command is used to save PDP context parameters into the profile of index 15. The set command is available only before or after a positioning session. Do not modify parameters during the positioning process. Otherwise, an error is returned.

The `AT^SOCKETCONT=<cid>` command is used to delete the PDP context of index 15 regardless of the value of the `<cid>` parameter.

The read command is used to obtain values of parameters that are defined in the PDP context.

The test command is used to return all supported values.

17.10.3 Parameter Description

`<cid>`: index of the PDP context, ranging from 1 to 16.

This command is a compatible AT command on the MU609. When the `AT^SOCKETCONT` command is executed, delivered PDP profile parameters are forcedly written into the PDP profile of index 15 regardless of the value of the `<cid>` parameter.

`<PDP_type>`: a character string indicating the type of the packet data protocol. Available values as follows:

IP   IP protocol

PPP   Point to point protocol(not support currently)

`<apn>`: a character string indicating the domain name of the access point.

`<PDP_addr>`: a character string indicating the MT address.

`<d_comp>`: integer, indicating the PDP data compression mode. (not supported currently)

Available values as follows:

0   Not compress (default value)

1   Compress

2   V.42bis

`<h_comp>`: integer, indicating the PDP header compression mode. (not supported currently)

0   Not compress (default value)

1   Compress

2   RFC1144 (applicable for SNDCP only)

3   RFC2507

4   RFC3095 (applicable for PDCP only)

Note:

If `<cid>`=15, command is not allowed to execute when the PD session is ongoing. If this command is sent to module, error will returned.

17.10.4 Property Description

Saving upon Power-off	PIN
Y	N

17.10.5 Example

Run:	`AT^SOCKETCONT=1,"IP","abc.com","10.111.145.233",1,1`	Modify the PDP context of index 15 on the MT (regardless of the value of the `<cid>` parameter).
Response:	`OK`	
Run:	`AT^SOCKETCONT=1`	Delete the PDP context of index 15 (regardless of the value of the `<cid>` parameter).
Response:	`OK`	

17.11 AT^WPEND–Terminate Positioning Process

17.11.1 Command Syntax

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

17.11.2 Interface Description

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

Note:

The GPS session triggered by network cannot be terminated by this command.

17.11.3 Parameter Description

`<err>`: error type prompts

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

17.11.4 Property Description

Saving upon Power-off	PIN
NA	N

17.11.5 Example

- Terminate the PD session successfully:

Run: `AT^WPEND`

Response: `OK`

- PD Session is not on going, Terminate Failture:

Run: `AT^WPEND`

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

17.12 AT^WPDIM–Delete Auxiliary Data

17.12.1 Command Syntax

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

Test command
`AT^WPDIM=?`

Possible Response(s)
`<CR><LF>^WPDIM: (list of supported` `<mode>s)<CR><LF><CR><LF>OK<CR><LF>`

17.12.2 Interface Description

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

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

17.12.3 Parameter Description

`<mode>`: deletion type.

0	Cold start
1	Warm start
2	Hot start (default value)
3	gpsOneXTRA. If the module does not support the XTRA mode, this parameter is not supported.

`<err>`: error type prompts

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

17.12.4 Property Description

Saving upon Power-off	PIN
NA	N

17.12.5 Example

- Query the value range of delete auxiliary data mode:

  Run: AT^WPDIM=?

  Response: ^WPDIM: (0-3)

                OK

- Set the deletion mode:

  Run: AT^WPDIM=1

  Response: OK

17.13 AT^XTRATIME–Inject XTRA Time

17.13.1 Command Syntax

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

17.13.2 Interface Description

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

Note:

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

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

17.13.3 Parameter Description

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

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

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

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

0   GPS time

1   UTC time

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

0   No

1   Yes

`<err>`: error type prompts

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

17.13.4 Property Description

Saving upon Power-off	PIN
N	N

17.13.5 Example

Inject XTRA time:

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

Response: OK

17.14 ^TIMESETRULT–Notify XTRA Time Injection

17.14.1 Command Syntax

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

17.14.2 Interface Description

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

17.14.3 Parameter Description

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

0   Injection succeeds

1   Injection fails

17.14.4 Property Description

Saving upon Power-off	PIN
NA	N

17.14.5 Example

If XTRA time have been injected successfully:

Response: ^TIMESETRULT: 0

17.15 AT^XTRADATA–Inject Auxiliary XTRA Data

17.15.1 Command Syntax

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

17.15.2 Interface Description

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

Note:

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

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

Note:

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

17.15.3 Parameter Description

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

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

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

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

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

0   Fails

1   Succeeds

`<err>`: error type prompts

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

17.15.4 Property Description

Saving upon Power-off	PIN
Y	N

17.15.5 Example

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

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

Response: OK

17.16 ^DATASETRULT–Notify XTRA Data Injection

17.16.1 Command Syntax

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

17.16.2 Interface Description

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

17.16.3 Parameter Description

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

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

17.16.4 Property Description

Saving upon Power-off	PIN
NA	N

17.16.5 Example

If auxiliary XTRA data have been injected successfully:

Response: `^DATASETRULT: 0`

17.17 AT^XTRASTA–Query XTRA Data Status

17.17.1 Command Syntax

Set command

`AT^XTRASTA`

Possible Response(s)

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

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

17.17.2 Interface Description

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

Note:

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

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

17.17.3 Parameter Description

<err>: error type prompts

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

17.17.4 Property Description

Saving upon Power-off	PIN
NA	N

17.17.5 Example

Query the XTRA data status:

Run: `AT^XTRASTA`

Response: `OK`

17.18 ^XDSTATUS–Notify XTRA Data Status

17.18.1 Command Syntax

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

17.18.2 Interface Description

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

17.18.3 Parameter Description

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

17.18.4 Property Description

Saving upon Power-off	PIN
NA	N

17.18.5 Example

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

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

17.19 ^POSITION–Notify Positioning Result

17.19.1 Command Syntax

URC
`<CR><LF>^POSITION:<long>,<lat>,<alt><CR><LF>`

17.19.2 Interface Description

This command is used by the module to notify the host computer of the positioning information and to display the positioning result. The report times of this command are related to the designated positioning frequency. If the positioning time interval is set to be greater than or equal to 3s, the report times are not limited.

If the positioning time interval is less than 3s, the first positioning result is reported. Subsequent positioning results are reported every three times, and the last positioning result is also reported.

17.19.3 Parameter Description

The default values of the following parameters are 0. Measurements vary depending on parameters.

`<long>`: longitude value. Positive numbers indicate east longitude, and negative numbers indicate west longitude. Numbers followed by the character d indicate degrees. For example, –117.22362d indicates longitude 117.22362 degrees west. The values range from –180 to +180.

`<lat>`: latitude value. Positive numbers indicate north latitude, and negative numbers indicate south latitude. Numbers followed by the character d indicate degrees. For example, 23.89089d indicates latitude 23.89089 degrees north. The values range from –90 to +90.

`<alt>`: altitude value. Positive numbers indicate that objects are above sea level, and negative numbers indicate that objects are below sea level. Numbers followed by the character m indicate altitude. The current altitude is not precise because of the GPS system design and therefore is for reference only.

17.19.4 Property Description

Saving upon Power-off	PIN
NA	N

17.19.5 Example

When positioning data is available, report the following:

Response: `^POSITION:113.94026d,22.53206d,270m`

17.20 ^POSEND–Report Positioning End Information

17.20.1 Command Syntax

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

17.20.2 Interface Description

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

17.20.3 Parameter Description

`<reason>`: positioning end reason

–1	Normal end
0	Session ended due to phone going offline
1	Session ended due to no service
2	Session ended due to no connection with PDE
7	Session ended due to connection failure with PDE
9	User ended the session
12	Session ended due to timeout (i.e., for GPS search)
15	Session ended due to an error in fix
16	Session rejected from PDE
18	Ending session due to E911 call
20	Ending because BS information is stale
21	Session ended due to VX LCS agent authorization failure
22	Session ended due to unknown system error
23	Session ended due to unsupported service
24	Subscription violation
25	The desired fix method failed
28	Network indicated a normal ending of the session
29	No error specified by the network
31	Session ended due to position server not available
32	Network reported an unsupported version of protocol
33	Mapped to corresponding SS-MOLR-error error code

34	MO-LR unexpected error
35	MO-LR Data missing
36	MO-LR facility not supported
37	MO-LR subscription violation
38	MO-LR position method failure
39	MO-LR undefined error
43	Position response Nongood (NG) reception (LIS side system anomaly)
44	Position response NG reception (beyond the LSU maximum session count)
45	Position response NG reception (MS side setting information failure)
46	Session interruption NG reception (LIS side system anomaly)
47	Session interruption NG reception (MS side setting information failure)
48	Abnormal response reception
49	T04 timer timed out
50	T03 timer timed out
51	T02 timer timed out
52	IS-801 timer timed out
53	LR reject reception
54	AA reject reception
55	EPH reject reception
56	ALM reject reception
57	Seed reject reception
58	IS-801 sequence error
59	PPP establish trial failure
60	Network link disconnection after PPP established (MS-initiated)
61	Network link disconnection after PPP established (server-initiated)
62	GPS data request response NG reception (LIS side system anomaly)
63	GPS data request response NG reception (beyond LSU maximum session count)
64	GPS data request response NG reception (MS side setting information)
65	GPS data request interruption NG reception (LIS side system)
66	GPS data request interruption NG reception (MS side setting information)
67	T20 timer timed out

68	T21 timer timed out
901	No fix with download the data
911	MSA (MSB auto) – No fix with download the data

`<leftfixnum>`: left positioning times

17.20.4 Property Description

Saving upon Power-off	PIN
NA	N

17.20.5 Example

If user ended the PD session:

Response: `^POSEND: 9,0`

17.21 ^WNINV–Notify NI Positioning

17.21.1 Command Syntax

URC
<CR><LF>`^WNINV: <req_type>`<CR><LF>

17.21.2 Interface Description

This command is used by the board to notify the user of the positioning request from the network side.

17.21.3 Parameter Description

`<req_type>`: NI request type. The values are as follows:

| 0 | Notify and Verify. In this type, the module notifies the user of the NI request and the user accepts or rejects the NI positioning. If the user does not respond within 20s, the system accepts or rejects the NI positioning based on the network policy. |
| 1 | Notify Only. In this type, the module notifies the user of the NI request, and the user accepts the NI positioning by default. |

| 2 | No Notify No Verify. In this type, the module does not notify the user of the NI request. The user does not accept or reject the NI positioning either. |

17.21.4 Property Description

Saving upon Power-off	PIN
NA	N

17.21.5 Example

- Notify and verify NI positioning:

Response: ^WNINV: 0

- Only notify NI positioning:

Response: ^WNINV: 1

- No notify No verify:

Response: ^WNINV: 2

17.22 AT^WNICT–Set NI Response

17.22.1 Command Syntax

Set command
AT^WNICT=<choice>
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>
Test command
AT^WNICT=?
<CR><LF>^WNICT: (list of supported <choice>s)<CR><LF><CR><LF>OK<CR><LF>

17.22.2 Interface Description

The set command is used by the user to notify the board of the response to the NI positioning request so that the board can perform relevant operations when the NI positioning type is Notify and Verify. This command supports the set command. The user can accept or reject the NI positioning only when the NI positioning type is Notify and Verify and when the user receives the NI positioning report or WNINV. Otherwise, an error message is returned.

The test command is used to return all supported values.

17.22.3 Parameter Description

<choice>: indicates whether the user accepts the NI request. The values are as follows:

0　　　　No

1　　　　Yes

<err>: error type prompts

Error code	Description
4	Operation not supported
281	Invalid parameter
285	Too many parameters

17.22.4 Property Description

Saving upon Power-off	PIN
NA	N

17.22.5 Example

- Query the range of supported values:

Run:　　　　AT^WNICT=?

Response:　^WNICT: (0-1)

　　　　　　OK

- Set NI response:

Run:　　　　AT^WNICT=0

Response: OK

Run: AT^WNICT=1

Response: OK

18 Huawei Proprietary Interface: PCM Audio

18.1 AT^ECHO–Switch Echo Canceller Mode

18.1.1 Command Syntax

Set command
`AT^ECHO=<n>`
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
`AT^ECHO?`
Possible Response(s)
<CR><LF>^ECHO: <n><CR><LF><CR><LF>OK<CR><LF>
Test command
`AT^ECHO=?`
Possible Response(s)
<CR><LF>^ECHO: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

18.1.2 Interface Description

This command is used to switch the echo canceller mode before a voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

The read command returns the current echo canceller mode.

The test command is used to query the supported echo canceller modes.

18.1.3 Parameter Description

<n>:

0	Close the echo canceller
1	Handset mode, mild echo, short delay (less than 16 ms dispersion)
2	Headset mode, moderate echo, short delay (less than 16 ms dispersion)
3	Carkit mode, loud echo, long delay (up to 64 ms dispersion)
4	Speakerphone mode, loud echo, long delay (default value)
5	Bluetooth headset mode, there is a lot of delay in the Bluetooth air interface, and definitely can't be used for non-Bluetooth modes.

18.1.4 Property Description

Saving upon Power-off	PIN
Y	N

18.1.5 Example

- Close the echo canceller:

Run: `AT^ECHO=0`

Response: `OK`

- Handset mode, mild echo,short delay (less than 16 ms dispersion):

Run: `AT^ECHO=1`

Response: `OK`

- Headset mode, moderat echo, short delay (less than 16 ms dispersion):

Run: `AT^ECHO=2`

Response: `OK`

- Carkit mode, loud echo, long delay (up to 64 ms dispersion):

Run: `AT^ECHO=3`

Response: `OK`

- Speakerphone mode, loud echo, long delay (default value):

Run: AT^ECHO=4

Response: OK

- Bluetooth headset mode, there is a lot of delay in the Bluetooth air interface, and definitely can't be used for non-Bluetooth modes:

Run: AT^ECHO=5

Response: OK

- Query current mode:

Run: AT^ECHO?

Response: ^ECHO: 5

            OK

- List of supported modes:

Run: AT^ECHO=?

Response: ^ECHO: (0-5)

            OK

18.2 AT^CPCM–Configure PCM Audio

18.2.1 Command Syntax

Set command
AT^CPCM=<mode>,<format>,<clock>,<frame>,<offset>
Possible Response(s)
<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
Read command
AT^CPCM?
Possible Response(s)

<CR><LF>^CPCM:
<mode>,<format>,<clock>,<frame>,<offset><CR><LF><CR><LF>OK<CR><LF>

Test command

AT^CPCM=?

Possible Response(s)

<CR><LF>^CPCM: (list of supported <mode>s),(list of supported
<format>s),(list of supported <clock>s),(list of supported <frame>s),(list
of supported <offset>s)<CR><LF><CR><LF>OK<CR><LF>

18.2.2 Interface Description

This command is used to configure the PCM audio before a voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

The read command returns the current value of <mode>,<format>,<clock>,<frame> and <offset>.

The test command returns the list of <mode>,<format>,<clock>,<frame> and <offset>(some values are not supported currently , reference to parameter description).

18.2.3 Parameter Description

<mode>: PCM working mode

0	MASTER_PRIM mode. In this mode, the CLK and SYN signal clocks are generated by the module. The CLK signal clock is 2.048 MHz, and the SYN signal clock is 8 kHz. The frame format is short frame (default value).
1	MASTER_AUX mode. In this mode, the CLK and SYN signal clocks are generated by the module. The CLK signal clock is 128 MHz, and the SYN signal clock is 8 kHz. The frame format is long frame (not supported currently).
2	SLAVE mode. In this mode, the CLK and SYN signal clocks are generated by the external CODEC chip (not supported currently).

<format>: data format

0	linear (default value)
1	u-law
2	A-law (not supported currently)

<clock>: clock signal

0	2.048 MHz (default value)

| 1 | 1.024 MHz (not supported currently) |

| 2 | 512 kHz (not supported currently) |

| 3 | 256 kHz (not supported currently) |

`<frame>`: the SYN frame format setting

| 0 | Short frame (default value) |

| 1 | Long frame (not supported currently) |

`<offset>`: offset setting

| 0 | Offset cleared (default value): the sync launched is aligned to the rising edge of the PCM CLK. |

| 1 | Short sync offset set: the short sync sent to the external world in Primary PCM master mode is launched 1/4 cycle after the rising edge of the PCM CLK (not supported currently). |

| 2 | Long sync offset set: the long sync sent to the external world in Aux PCM master mode is launched 1/4 cycle ahead of the rising edge of PCM CLK (not supported currently). |

18.2.4 Property Description

Saving upon Power-off	PIN
Y	N

18.2.5 Example

- Set the PCM configuration:

Run: `AT^CPCM=0,1,0,0,0`

Response: `OK`

- Query PCM configuration:

Run: `AT^CPCM?`

Response: `^CPCM: 0,1,0,0,0`

           `OK`

19 Huawei Proprietary Interface: STK Interface

19.1 AT^STSF–Configure the Mode of STK

19.1.1 Command Syntax

Set command
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>
Read command
AT^STSF?
Possible Response(s)
<CR><LF>^STSF: \<Mode\>[,\<RawMode\>]<CR><LF><CR><LF>OK<CR><LF>
Test command
AT^STSF=?
Possible Response(s)
<CR><LF>^STSF: (0-1)[,list of supported \<RawMode\>s]<CR><LF><CR><LF>OK<CR><LF>

19.1.2 Interface Description

The set command is used to configure STK, including:

- Active and de-active 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).

19.1.3 Parameter Description

`<Mode>`:

0   Disable STK

1   Active 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.

19.1.4 Property Description

Saving upon Power-off	PIN
Y	N

19.1.5 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

19.2 AT^CUSATM–Query the Main Menu

19.2.1 Command Syntax

Read command
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>

19.2.2 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".

19.2.3 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.

19.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

19.2.5 Example

Query the main menu:

Run: `AT^CUSATM?`

Response: `^CUSATM:`
`"D0818A81030125008202818285118051687403901A0055005`
`30049004D53618F0D01444953504C415920544558548F0A024`
`7455420494E4B45598F0A0347455420494E5055548F0A044D4`
`F52452054494D458F0A05504C415920544F4E458F0E06504F4`
`C4C20494E54455256414C8F080752454546524553488F130853`
`4
54E442053484F5254204D455353414745"`

`OK`

20 Huawei Proprietary Interface: Temperature Protection

20.1 AT^CHIPTEMP–Query the Temperature of the Devices

20.1.1 Command Syntax

Read command
`AT^CHIPTEMP?`
Possible Response(s)
<CR><LF>`^CHIPTEMP: <G PAtemp>,<W PAtemp>,<L PAtemp>,<SIMtemp>,<BATTERYtemp>,<CRYSTALtemp>`**<CR><LF><CR><LF>**`OK`**<CR><LF>** In case of an error: **<CR><LF>**`ERROR`**<CR><LF>**
Test command
`AT^CHIPTEMP=?`
Possible Response(s)
<CR><LF>`^CHIPTEMP: <G PAtemp Range>,<W PAtemp Range>,<L PAtemp Range>,<SIMtemp Range>,<BATTERYtemp Range>,<CRYSTALtemp Range>`**<CR><LF><CR><LF>**`OK`**<CR><LF>**

Notes:

- The command is a platform-based command. The MU609 does not support the LTE mode. Therefore, the invalid value 65535 is returned for the `<L PAtemp>` parameter.

- No battery is configured on the AP-Modem. Therefore, 65535 is returned for the `<BATTERYtemp>` parameter.

- The hardware of the AP-Modem does not support temperature monitoring. Therefore, 65535 is returned for the SIM card temperature.

- When environment temperature exceeds the temperature range returned by `AT^CHIPTEMP=?`, the temperature returned by the query command may not be the real environment temperature accurately. In this case, temperature protection function should be taken to avoid the device damage.

The GSM PA and WCDMA PA use the same thermistor to detect temperature and the same register to read the temperature value. Therefore, the temperatures of the GSM PA and WCDMA PA are the same when the temperatures are queried at the same time.

20.1.2 Interface Description

The read command is used to query the temperature of the PA, SIM card, battery, and crystal oscillator.

The test command is used to query the temperature range.

20.1.3 Parameter Description

The read command:

Parameter	Description
`<G PAtemp>`	An integer indicates the GSM PA chip's current temperature. If `<G PAtemp>` is not supported , 65535 is returned (not supported currently).
`<W PAtemp>`	An integer indicates the WCDMA PA chip's current temperature. If `<W PAtemp>` is not supported , 65535 is returned (not supported currently).
`<L PAtemp>`	An integer indicates the LTE PA chip's current temperature. If `<L PAtemp>` is not supported , 65535 is returned (not supported currently).
`<SIMtemp>`	An integer indicates the SIM card's current temperature. If `<SIMtemp>` is not supported , 65535 is returned (not supported currently).
`<BATTERYtemp>`	An integer indicates the battery's current temperature. If `<BATTERYtemp>` is not supported , 65535 is returned (not supported currently).
`<CRYSTALtemp>`	An integer indicates the crystal's current temperature.

Note:

If the query of a component's temperature fails, 65535 is returned.

The test command:

Parameter	Description
<G PAtemp Range>	Integer, indicating the temperature range of the GSM PA chip in the unit of 0.1°C. If this parameter is not supported, 65535 is returned (not supported currently).
<W PAtemp Range>	Integer, indicating the temperature range of the WCDMA PA chip in the unit of 0.1°C. If this parameter is not supported, 65535 is returned (not supported currently).
<L PAtemp Range>	Integer, indicating the temperature range of the LTE PA chip in the unit of 0.1°C. If this parameter is not supported, 65535 is returned (not supported currently).
<SIMtemp Range>	Integer, indicating the temperature range of the SIM card in the unit of 0.1°C. If this parameter is not supported, 65535 is returned (not supported currently).
<BATTERYtemp Range>	Integer, indicating the temperature range of the battery in the unit of 0.1°C. If this parameter is not supported, 65535 is returned (not supported currently).
<CRYSTALtemp Range>	Integer, indicating the temperature range of the crystal oscillator. The temperature ranges from 300 to 1110 in the unit of 0.1°C.

Note:

The temperature unit is 0.1°C. For example, if the returned value range is (–200,1000), the temperature ranges from –20°C to 100°C.

20.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

20.1.5 Example

- Query the temperature of the PA, SIM card, battery, and crystal oscillator:

Run: AT^CHIPTEMP?

Response: ^CHIPTEMP: 65535,65535,65535,65535,65535,300

             OK

- Query the work temperature range of the PA, SIM card, battery, and crystal oscillator:

Run: AT^CHIPTEMP=?

Response: ^CHIPTEMP:
             (65535-65535),(65535-65535),(65535-65535),(65535-6
             5535),(65535-65535),(300-1100)

             OK

20.2 AT^THERMFUN–Enable or Disable the Temperature Protection Function

20.2.1 Command Syntax

Set command
AT^THERMFUN=<switch>
Possible Response(s)
<CR><LF>OK<CR><LF>

In case of an MT-related error:
<CR><LF>ERROR<CR><LF> |
| **Read command**

AT^THERMFUN? |
| Possible Response(s) |
| <CR><LF>^THERMFUN: <switch><CR><LF><CR><LF>OK <CR><LF> |
| **Test command**

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

20.2.2 Interface Description

This command is used to enable or disable the temperature protection function. If the temperature protection function is enabled, the module performs corresponding protection operation, such as disable the PA or shut down the system when the temperature reaches the threshold. The protection operation and the temperature threshold vary with customer requirements. After protection operation is performed and the temperature protection function is disabled, the module recovers the normal state. All services are available. If the temperature protection function is disabled, the temperature does not affect the module functions.

20.2.3 Parameter Description

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

0   Disable the temperature protection function.

1   Enable the temperature protection function.

Note:
The default value is 1. The parameter value changes to 1 upon power-off.

20.2.4 Property Description

Saving upon Power-off	PIN
N	N

20.2.5 Example

- Check the parameter range supported by the command

Run: `AT^THERMFUN=?`

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

              `OK`

- Query whether the temperature protection function is enabled or disabled.

Run: `AT^THERMFUN?`

Response: `^THERMFUN: 1`

              `OK`

● Enable the temperature protection function.

Run: `AT^THERMFUN=1`

Response: `OK`   A parameter value takes effect
                                    immediately after setting.

21 Huawei Proprietary Interface: ECM Interfaces

21.1 AT^NDISDUP–NDIS-Based Dialing

21.1.1 Command Syntax

Set command
AT^NDISDUP=<cid>,<connect>[,<APN>[,<username>[,<passwd>[,<auth_type>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command AT^NDISDUP?
Possible Response(s)
<CR><LF>OK<CR><LF>
Test command AT^NDISDUP=?
Possible Response(s)
<CR><LF>^NDISDUP: (list of supported <cid>s),(list of supported <connect>s)<CR><LF><CR><LF>OK<CR><LF>

21.1.2 Interface Description

This command implements NDIS-based dialing. AT^NDISDUP=1,1 indicates that other parameters are not required. AT^NDISDUP=1,0 indicates that the network

connection must be disabled. This command can be used only when an NDIS port is available.

21.1.3 Parameter Description

The following IP address is in the hexadecimal format and is arranged in reverse order. For example, 192.168.50.32 is expressed as 0x2032A8C0, in which 0x20 represents 32, 0x32 represents 50, 0xA8 represents 168, and 0xC0 represents 192.

`<cid>`:

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

`<connect>`:

0	The connection is disabled
1	The connection is set up

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

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

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

`<authpref>`: authentication reference.

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

21.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

21.1.5 Example

Run:	AT^NDISDUP=1,1,"1234"
Response:	OK
Run:	AT^NDISDUP?
Response:	OK
Run:	AT^NDISDUP=?

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

    OK

21.2 ^NDISSTAT–Unsolicited Report of Connection Status

21.2.1 Command Syntax

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

21.2.2 Interface Description

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

21.2.3 Parameter Description

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

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

`<err_code>`:

0	Unknown error/unspecified error

The values of other error codes are defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions.

`<wx_state>`: sub-state of the WiMAX data card. It is applicable only to the WiMAX data card.

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition
4	Ranging

5	Handover ranging
6	Capabilities negotiation
7	Authorization
8	Registration

<PDP_type>: character string value.

"IPV4"

"IPV6"   (not supported currently)

21.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

21.2.5 Example

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

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

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

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

21.3 AT^NDISSTATQRY–Query the Connection Status

21.3.1 Command Syntax

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

21.3.2 Interface Description

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

21.3.3 Parameter Description

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

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>:

0	Unknown error/unspecified error
other error codes	Defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions

<wx_state>: sub-state of the WiMAX data card. It is applicable only to the WiMAX data card.

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition
4	Ranging
5	Handover ranging
6	Capabilities negotiation
7	Authorization
8	Registration

<PDP_type>: character string value.

"IPV4"

"IPV6"   (not supported currently)

21.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

21.3.5 Example

- MS is in the connected state:

Run: AT^NDISSTATQRY?

Response: ^NDISSTATQRY:1,,,"IPV4"

            OK

- MS is in the disconnected state:

Run: AT^NDISSTATQRY?

Response: ^NDISSTATQRY:0,0,,"IPV4"

            OK

22 Huawei Proprietary Interface: FOTA Interfaces

22.1 AT^FOTAMODE–Set Operation Mode

22.1.1 Command Syntax

Set command
AT^FOTAMODE=<dectect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
Read command
AT^FOTAMODE?
Possible Response(s)
<CR><LF>^FOTAMODE: <dectect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]<CR><LF><CR><LF>OK<CR><LF>
Test command
AT^ FOTAMODE=?
Possible Response(s)
<CR><LF>^FOTAMODE: (list of supported <dectect_mode>s), (list of supported <download_mode>s), (list of supported <update_mode>s), (list of supported <en_resume>s), (list of supported <period>s)<CR><LF><CR><LF>OK<CR><LF>

22.1.2 Interface Description

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

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

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

22.1.3 Parameter Description

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

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

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

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

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

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

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

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

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

Notes:

- When <dectect_mode> is set to 1, the module will check for a new version when the time specified by <period> times out, regardless of whether the module is awake.

- There are two timing methods for <period>: local timing and network timing. If the module is able to obtain the network time, network timing will be used; otherwise, the local timing will be used. Yet there may be time errors when local timing is used.

- The parameters will be restored to their default values after updates

22.1.4 Property Description

Saving upon Power-off	PIN
Y	N

22.1.5 Example

Run:	AT^FOTAMODE=1,0,1,1,22
Response:	OK
Run:	AT^FOTAMODE?
Response:	^FOTAMODE: 1,0,1,1,22
	OK
Run:	AT^FOTAMODE=?
Response:	^FOTAMODE: (0-1),(0-1),(0-1),(0-1),(1-65535)
	OK
Run:	AT^FOTAMODE=0,0,1,1
Response:	OK
Run:	AT^FOTAMODE?
Response:	^FOTAMODE: 0,0,1,1
	OK
Run:	AT^FOTAMODE=0,0,1,1,22
Response:	ERROR

22.2 AT^FOTACFG–Set FOTA Connection Parameters

22.2.1 Command Syntax

Set command
`AT^FOTACFG=<APN>,<username>,<password>,<auth_type>`
Possible Response(s)
<CR><LF>`OK`<CR><LF> In case of an MT-related error: <CR><LF>`+CME ERROR: <err>`<CR><LF>
Read command
`AT^FOTACFG?`
Possible Response(s)
<CR><LF>`^FOTACFG:` `<APN>,<username>,<password>,<auth_type>`<CR><LF><CR><LF>`OK`<CR><LF>

22.2.2 Interface Description

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

22.2.3 Parameter Description

`<APN>`: specifies the APN. Its value is a string with double quotation marks, consisting of a maximum of 100 bytes. It can be omitted.

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

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

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

0   No authentication

1   Password Authentication Protocol (PAP)

2   CHAP

22.2.4 Property Description

Saving upon Power-off	PIN
Y	N

22.2.5 Example

When the module is not detecting or downloading a new version or being updated, run `AT^FOTACFG` to set the APN, user name, password, and authentication mode for dial-up connections.

Set command:

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

Response: `OK`

Read command:

Run: `AT^FOTACFG?`

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

            `OK`

22.3 AT^FOTADET–Manually Detect a New Version

22.3.1 Command Syntax

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

22.3.2 Interface Description

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

22.3.3 Property Description

Saving upon Power-off	PIN
NA	Y

22.3.4 Example

When the module is not detecting or downloading a new version or being updated, run AT^FOTADET to initiate a new version detection.

Each detection attempt consumes 1 KB to 3 KB traffic.

1. If the command is executed successfully, the following is returned:

Run: AT^FOTADET

Response: OK

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

Response: ^FOTASTATE: 12,12.815.00.01.00,86763,"feature1: add fota future;feature2: repair some bugs of sms"

If the module detects no new version, the following is returned:

Response: ^FOTASTATE: 14

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

Run: AT^FOTADET

Response: +CME ERROR: <err>

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

Response: ^FOTASTATE: 13,18

22.4 AT^FOTADL–Manually Download a New Version

22.4.1 Command Syntax

Set command
AT^FOTADL=<n>
Possible Response(s)

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

22.4.2 Interface Description

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

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

22.4.3 Parameter Description

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

0	Cancels a download, deletes the downloaded file, and restores the FOTA status to idle state.
1	Starts a download or resumes data transfer.

22.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

22.4.5 Example

When the module is downloading a new version, run AT^FOTADL=0 to stop the download.

If no download or update is undergoing on the module, and the module has detected a new version available, run AT^FOTADL=1 to download the new version.

Run:	AT^FOTADL=?
Response:	^FOTADL: (0-1)
	OK

Run: `AT^FOTADL=1`

Response: `OK`

                      `^FOTASTATE: 30`

                      `^FOTASTATE: 40`

22.5 AT^FWUP–Start a FOTA Update

22.5.1 Command Syntax

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

22.5.2 Interface Description

This command is used to start a Firmware FOTA update.

22.5.3 Property Description

Saving upon Power-off	PIN
NA	N

22.5.4 Example

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

Run: `AT^FWUP`

Response: `OK`

                      `^FOTASTATE: 50`

If the update succeeds:

Response: `^FOTASTATE: 90`

If the update fails:

Response: `^FOTASTATE: 80,55`

22.6 AT^FOTASTATE–Report the FOTA Status

22.6.1 Command Syntax

Read command
`AT^FOTASTATE?`
Possible Response(s)
`<CR><LF>^FOTASTATE: <status><CR><LF><CR><LF>`OK`<CR><LF>`
URC
If `<status>` is 12: `<CR><LF>^FOTASTATE:` `<status>,<version>,<packet_size>,<description>`**<CR><LF>** In other cases: **<CR><LF>**`^FOTASTATE: <state>`**[**`,<error_code>`**]<CR><LF>**

22.6.2 Interface Description

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

22.6.3 Parameter Description

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

10	Idle.
11	Querying.
12	New version found.
13	New version query failed.
14	No version found.
20	Download failed.
30	Download progressing.

31	Download Pending. This value indicates that the module has a download task that is not yet complete after the module restarts. If resumable data transfer has been enabled, the module resumes the download.
40	Download Complete.
50	Ready to update.
60	Update Progressing.
80	Update failed.
90	Update successful.

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

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

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

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

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

22.6.4 Property Description

Saving upon Power-off	PIN
Y	N

22.6.5 Example

During an update, the module unsolicitedly reports the current update state whenever the status changes.

The module will not report <status> as 11 if the following conditions are met:

The module is forced to sleep.

The interval between version detections times out.

If the download succeeds:

Run: AT^FOTADL=1

Response: OK

             ^FOTASTATE: 30

             ^FOTASTATE: 40

If the download fails:

Run: AT^FOTADL=1

Response: OK

             ^FOTASTATE: 30

             ^FOTASTATE: 20,18

Run: AT^FOTASTATE?

Response: ^FOTASTATE: 10

             OK

22.7 AT^FOTADLQ–Query Download Status of Update Files

22.7.1 Command Syntax

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

22.7.2 Interface Description

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

22.7.3 Parameter Description

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

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

"IMAGE"   Firmware differential file.

"XNV"   NV configuration file.

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

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

22.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

22.7.5 Example

During an update (when <status> is 30 or 31), run AT^FOTADLQ to query the list of update files to download, the size of downloaded files, and the total size of update files to download.

Run:	AT^FOTADLQ
Response:	^FOTADLQ: 1,"IMAGE",9012,9012
	^FOTADLQ: 2,"XNV",0,77751
	OK

22.8 AT^FWLOAD–Perform a Local Upgrade

22.8.1 Command Syntax

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

22.8.2 Interface Description

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

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

You can run AT+IPR? to query the baud rates supported by the current module. To set the baud rates for a module, run the IPR SET command. When you do so, refer to the following baud rates supported by the full and differential upgrades.

1. Differential upgrades support baud rates of 9600, 19200, 38400, 57600, 115200, and 230400 bps.

2. Full upgrades support the baud rate of 115200 bps.

Note:

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

22.8.3 Parameter Description

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

0   Full upgrade

1   Differential upgrade

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

22.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

22.8.5 Example

- Local differential upgrade

Run: AT^FWLOAD=1

Response: >

               C

               OK

The board restarts, and the upgrade starts.

Response: ^FWLSTATE: 90

● Local full upgrade

Run: AT^FWLOAD=0

Response: >

               C

The board restarts, and the upgrade starts.

Response: ^FWLSTATE: 90

Note:

> After the data transmit is normally end in during full updates, OK will not be reported. During a local full update, module will restart and PCUI port number maybe change. the Host needs re-open the correct port.

22.9 ^FWLSTATE–Report the Upgrade Status

22.9.1 Command Syntax

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

22.9.2 Interface Description

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

22.9.3 Parameter Description

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

50   Ready to update

80	Update failed
90	Update succeeded

<error_code>: an integer, specifying the cause of the upgrade failure. See the error list in appendix 22.10 .

22.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

22.9.5 Example

Local differential upgrade

Run: `AT^FWLOAD=1`

Response: `>`

           `C`

           `OK`

The board restarts, and the upgrade starts.

Response: `^FWLSTATE: 90`

22.10 Appendix

22.10.1 CME ERROR Values and String Text for the FOTA Feature

<err> code	String Text
1502	Operation failed due to unknown error
1503	Previous command is not complete
1504	Error command parameters
1505	Operation not supported
1512	The network has not been opened yet
1513	The network has been opened already
1514	Fail to open network
1515	The link has not been established yet

<err> code	String Text
1517	Fail to establish link
1518	Fail to bind the specified port
1519	Fail to connect to the specified address
1520	Invalid domain name
1521	Fail to resolve DNS
1523	File type is not correct
1524	File source is not correct
1555	FOTA is in collision state
1602	Fail to send data because TE cancel
1603	Fail to send data because retry times are bigger than 10
1604	Fail to send data because file tag is error
1605	Fail to send data because packet number is error
1606	Fail to send data because the protocol is not 1K-Xmodem
1607	Invalid port for fwload mode
1608	Fail to send data because file crc or subfile crc is error
1609	Fail to send data because update type is error
1610	Fail to send data because model product is error
1611	Fail to send data because source version is error
1612	Fail to send data because some tag length is error
1613	Fail to send data because file num error
1614	Fail to send data because open subfile failed
1615	Fail to send data because write subfile to flash error

22.10.2 CME ERROR Values and Descriptions for the FOTA Feature

<err> code	Description
01	Operation failed due to unknown error
02	Previous command is not complete
03	Error command parameters
04	Operation not supported

<err> code	Description
05	Operation failed due to system error
11	The network has not been opened yet
12	The network has been opened already
13	Fail to open network
14	The link has not been established yet
15	The link has been established already
16	Fail to establish link
17	Fail to bind the specified port
18	Fail to connect to the specified address
19	Invalid domain name
20	Fail to resolve DNS
21	Http server error
22	File type is not correct
23	File source is not correct
51	Fail to get filelist file
52	MD5 check failed
54	FOTA is in collision state
101	Fail to send data because TE cancel
102	Fail to send data because retry times are bigger than 10
103	Fail to send data because input file size is error
104	Fail to send data because packet number is error
105	Fail to send data because the protocol is not 1K-Xmodem
106	Fail to send data because invalid port
107	Fail to send data because file CRC or subfile CRC is error
108	Fail to send data because update type is error
109	Fail to send data because model product is error
110	Fail to send data because source version is error
111	Fail to send data because some tag length is error
112	Fail to send data because file num error
113	Fail to send data because open subfile failed
114	Fail to send data because write subfile to flash error

<err> code	Description
151	Fail to write flag
152	Fail to read flag
153	Fail to erase region
154	Fail to copy osbl
155	Fail to replace image
156	Fail to copy xnv
157	Fail to write xnv
158	Fail to backup nv
159	Fail to restore nv

23 AT&T Extended Commands

Of all commands described in this document, AT&T Version does not support commands related to the voice call and the USSD features, which are listed in the following table:

AT&T not supported	Function
ATS0	Ring before Automatic Answer
ATD (voice call)	Dial Command (The data dial is support)
ATA	Answer Command
RING	Call indication
AT+VTS	Send DTMF Tone
AT+CHUP	Call Hangup
AT+CLIR	Calling Line Identification Restriction
AT+CLIP	Calling Line Identification Presentation
+CLIP	CLIP Notifications
AT+CLCC	List Current Calls
AT+CCFC	Call Forwarding
AT+CCWA	Call Waiting
+CCWA	Call Waiting Notifications
+CRING	Indicate Incoming Call
AT+CHLD	Call Hold
AT+CUSD	USSD Command
+CUSD	Unsolicitedly Report USSD of Network
^ORIG	Indicate the Origination of a Call
^CONF	Ringback Tone Indication

AT&T not supported	Function
`^CONN`	Call Connection Indication
`^CEND`	Call End Indication
`AT^USSDMODE`	Select USSD Mode

23.1 +PACSP–Indicate Network Selection Menu Control

23.1.1 Command Syntax

URC
<CR><LF>`+PACSP<Ind>`<CR><LF>

23.1.2 Interface Description

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

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

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

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

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

23.1.3 Parameter Description

`<Ind>`: network selection menu mode indicator.

    0   Menu is disabled; the report string is "`+PACSP0`".

    1   Menu is enabled; the report string is "`+PACSP1`".

23.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

23.1.5 Example

If PLMN mode bit is changed to 0:

Response:　　+PACSP0

24 Appendix

24.1 List of URC Commands

URC	Function
+CLIP	CLIP notifications
+CCWA	Call waiting notifications
+CRING	Indicate incoming call
+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
+PACSP	Network selection menu mode indication
^NWTIME	Unsolicitedly report network system time
^SYSSTART	Unsolicitedly report module startup
^ORIG	Indicate the origination of a call
^THERM	Thermal protection activated unsolicited report
^CONF	Ringback tone indication
^CONN	Call connection indication
^CEND	Call end indication
^SMMEMFULL	Message memory full
^SRVST	Service state change indication

URC	Function
^SIMST	SIM Card state change indication
^MODE	System mode change indication
^IPDATA	Notificate arrival data
^IPSTATE	Indicate TCP/UDP data link state
^TIMESETRULT	Notify XTRA time injection
^DATASETRULT	Notify XTRA data injection
^XDSTATUS	Notify XTRA data status
^POSITION	Notify positioning result
^POSEND	Report positioning end information
^WNINV	Notify NI positioning
^FOTASTATE	Report Fota Status
^FWLSTATE	Report Upgrade Status
^NDISEND	Report Disconnection Status (be replaced by the URC "^NDISSTAT")
^NDISSTAT	Report connection status

24.2 General CME Error List

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

Table 24-1 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

Numeric mode	Verbose mode
10	SIM not inserted (not supported currently. If no SIM is inserted, return SIM failure)
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed-emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
48	hidden key required
49	EAP method not supported

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

Table 24-2 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 24-3 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

Table 24-4 IPSTACK related "CME ERROR" Codes (Huawei proprietary)

Numeric mode	Verbose mode
1001	Normal error
1002	The link has not been established yet
1003	The link has been established already
1004	Fail to establish link
1005	Fail to bind the specified port
1006	Fail to connect to the specified address
1007	The server has not been established yet
1008	The server has been established already
1009	Fail to establish server
1010	Fail to bind the specified port with server
1011	Fail to establish listening
1012	The network has not been opened yet
1013	The network has been opened already
1014	Fail to open network
1015	Invalid domain name
1016	Fail to resolve DNS
1017	Port error
1018	Remain data is sending
1019	Previous command is not complete
1020	Too many data to be sent
1021	Forbidden operation in transparent mode
1022	Invalid port for transparent mode
1023	Fail to send data in transparent mode
1024	Fail to send data because it is too long
1025	Quit transparent mode because buffer is full
1026	More than one link in physical port
1027	The physical port is in listen state and has no client
1028	Quit transparent mode because link is down

24.3 General CMS Error List

The following lists the `<err>` value of CMS ERROR that may be returned by all AT commands of short messages.

`<err>` values used by common messaging commands:

Numeric mode	Verbose mode
0...127	3GPP TS 24.011 clause E.2 values
128...255	3GPP TS 23.040 clause 9.2.3.22 values.
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
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

24.4 Final Result Code

Final Result Code	No.	Description
OK	0	A command is executed, and there is no error.
CONNECT	1	A connection is established.
RING	2	An incoming call is originated.
NO CARRIER	3	A connection is terminated.
ERROR	4	There is a common error.
NO DIALTONE	6	There is no dialing tone.
BUSY	7	The peer is busy.
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	Numbering mode is not supported	The command is not supported.
TOO MANY PARAMETERS	Numbering mode is not supported	Too many parameters in the issued command

Note:

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

24.5 Initial Values of Command Parameters After MT Startup

The following table lists the initial values of the interface parameters mentioned in this document during MT startup.

Command	Initial Value
ATE	<value>=1
ATV	<value>=1
ATS0	<value>=000
ATS3	<value>=013

Command	Initial Value
ATS4	`<value>`=010
ATI	`<value>`=0
ATZ	`<value>`=0
AT&F	`<value>`=0
ATQ	`<value>`=0
AT+CSCS	"IRA"
AT+CGDCONT	Obtained from the NV memory after reboot.
AT+CCWA	`<n>`=0
AT+CSCA	`<sca>`=null, `<tosca>`=null. The AT+CSCA? command shall be used to obtain the SMSC number from the SIM.
AT+CSMS	`<service>`=0
AT+CMGF	`<mode>`=0
AT+CNMI	All of `<mode>`, `<mt>`, `<bm>`, `<ds>`, and `<bfr>` are zero.
AT+COPS	`<format>`=0
AT+CREG	`<n>`=0
AT+CGREG	`<n>`=0
AT+CLIP	`<n>`=0
AT+CMUT	`<n>`=0
AT+CUSD	`<n>`=0
AT+CMEE	`<n>`=2
AT+CFUN	`<fun>`=1, `<rest>`=0
AT+CPMS	`<mem1>`="SM", `<mem2>`="SM", `<mem3>`="SM"
AT+CGSMS	`<service>`=3

24.6 References

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

[1] 3GPP TS 22.067

[2] 3GPP TS 23.003

[3] 3GPP TS 23.038

[4] 3GPP TS 23.040

[5] 3GPP TS 23.041

[6] 3GPP TS 24.008

[7] 3GPP TS 25.331

[8] 3GPP TS 27.005

[9] 3GPP TS 27.007

[10] 3GPP TS 27.060

[11] 3GPP TS 29.061

[12] 3GPP TS 31.111

[13] 3GPP TS 44.060

[14] ETSI TS 102.221

[15] ETSI TS 102.223

[16] GSM 51.011

[17] GSM MoU SE.13

[18] ITU–T E.212 Annex A

[19] HUAWEI Terminal AT Command Interface Specifications

24.7 Acronyms and Abbreviations

Acronym or Abbreviation	Full spelling
3GPP	Third Generation Partnership Project
AT	ATtention
APN	Access Point Name
BER	Bit Error Rate
CDMA	Code Division Multiple Access
CHAP	Challenge Handshake Authentication Protocol
CLIP	Call Line Identifier Presentation
CS	Circuit Switched (CS) domain
CUG	Closed User Group
DCE	Data Circuit-terminating Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency

Acronym or Abbreviation	Full spelling
EGPRS	Enhanced General Packet Radio Service
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HSDPA	High Speed Downlink Packet Access
HSUPA	High Speed Uplink Packet Access
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
IWF	Interworking Function
MCC	Mobile Country Code
ME	Mobile Equipment
MNC	Mobile Network Code
MS	Mobile Station
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
NMEA	National Marine Electronics Association
PAP	Password Authentication Protocol
PD	Position Determination
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PUK	PIN Unblocking Key
PS	Packet Switched (PS) domain
QoS	Quality of Service
RSSI	Receive Signal Strength Indicator

Acronym or Abbreviation	Full spelling
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
UICC	Universal Integrated Circuit Card
UTRAN	Universal Terrestrial Radio Access Network
WCDMA	Wideband CDMA