



HUAWEI MU609 HSPA LGA Module

AT Command Interface Specification

Issue 02

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2013-04-10		Creation
02	2016-12-27	1.6	Deleted the commands: <ATD>, <ATA>, <AT+CLIP> and <AT+CLCC>
		2.2	Deleted section 2.2 in issue 01: ATS0–Ring Before Automatic Answer
		2.12.2	Updated the description of Interface Description
		2.20	Deleted section 2.20 in issue 01: AT+CRC–Cellular Result Codes
		2.19	Added section 2.19 : +++–Switch Data Mode to Command Mode
		3	Deleted chapter 3 in issue 01: Call Control Commands and Methods
		3.3.3	Updated the parameter description of <fac> and <classx>
		3.3.5	Updated the example of AT+CLK
		3.4.3	Updated the parameter description of <fac>
		3.4.5	Updated the example of AT+CPWD
		3.8.3	Updated the parameter description of <service>
		4.5	Deleted section 4.5 in issue 01: AT+CLIR–Calling Line Identification Restriction



Document Version	Date	Chapter	Descriptions
		4.6	Deleted section 4.6 in issue 01: AT+CLIP–Calling Line Identification Presentation
		4.7	Deleted section 4.7 in issue 01: +CLIP–CLIP Notifications
		4.8	Deleted section 4.8 in issue 01: AT+CLCC–List Current Calls
		4.9	Deleted section 4.9 in issue 01: AT+CCFC–Call Forwarding
		4.10	Deleted section 4.10 in issue 01: AT+CCWA–Call Waiting
		4.11	Deleted section 4.11 in issue 01: +CCWA–Call Waiting Notifications
		4.12	Deleted section 4.12 in issue 01: +CRING–Indicate Incoming Call
		4.13	Deleted section 4.13 in issue 01: AT+CHLD–Call Hold
		4.15	Deleted section 4.15 in issue 01: +CSSI–Supplementary Service Notifications
		4.16	Deleted section 4.16 in issue 01: +CSSU–Supplementary Service Notifications
		6.8	Deleted section 6.8 in issue 01: AT+CMUT–Switch Mute Status
		8.4	Deleted section 8.4 in issue 01: ATH–Hang Up Call
		8.15.3	Updated the parameter description of <TP–DCS>
		11.2.3	Updated Table 11-3 Definitions of Page 0 Bit [60–0] for the presentation of unsolicited results
		11.6.3	Updated the parameter description of <source>



Document Version	Date	Chapter	Descriptions
		13	Deleted chapter 13 in issue 01: Huawei Proprietary Interface: Voice Call Interface
		16.11	Deleted section 16.11 in issue 01: AT^DVCFG–Set Priority of Voice Call and Data Service
		18	Deleted chapter 18 in issue 01: Huawei Proprietary Interface: PCM Audio
		18.1	Updated List of URC Commands
		18.2	Updated Table 18-1 General "CME ERROR" Codes and Table 18-2 General "CME ERROR" Codes (Huawei proprietary)
		18.4	Updated Final Result Code
		18.5	Updated Initial Values of Command Parameters After MT Startup
		18.7	Updated Acronyms and Abbreviations



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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 based on this AT specification, the MT must comply with the specification. For example, to interconnect with the unified background of an existing personal computer (PC), a new module must comply with this specification. A PC application or tool must comply with this specification to interconnect with existing terminal devices. If a TE or MT does not communicate by using AT commands, this specification does not apply.

1.3 Organization

Chapter 2 "General Commands" to chapter 10 "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 11 "Huawei Proprietary Interface: Mobile Termination Control and Status Interface" to chapter 17 "Huawei Proprietary Interface: Temperature Protection" describe Huawei proprietary interfaces.

1.4 Document Conventions

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

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

For example:

Saving upon Power-off	PIN
N	Y

The settings are described as follows:

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

1.5 AT Command Syntax

1.5.1 AT Command Types

Table 1-1 Types of AT commands

AT command type	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

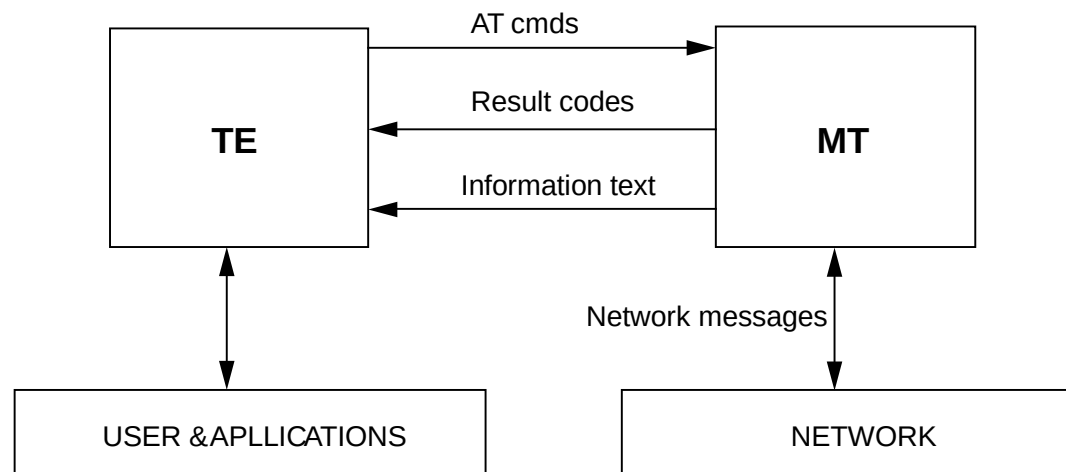
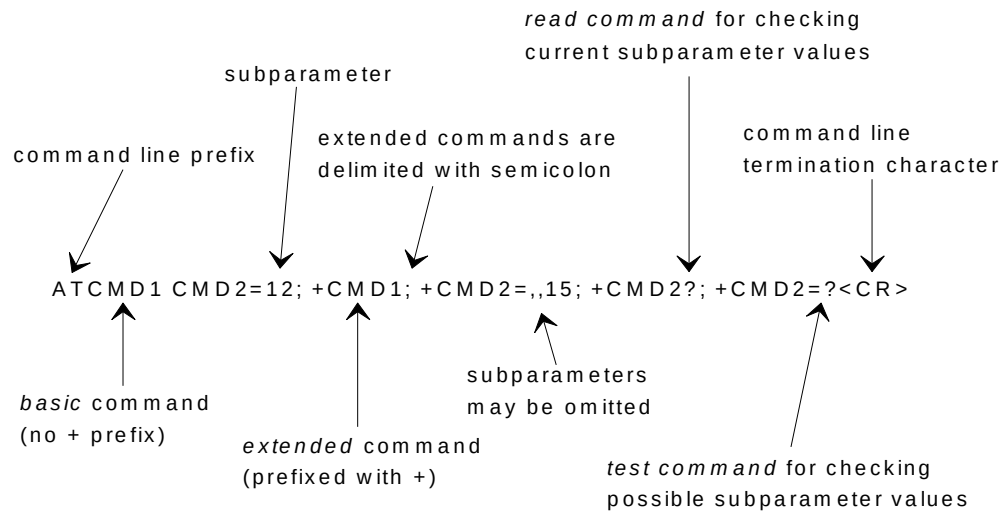


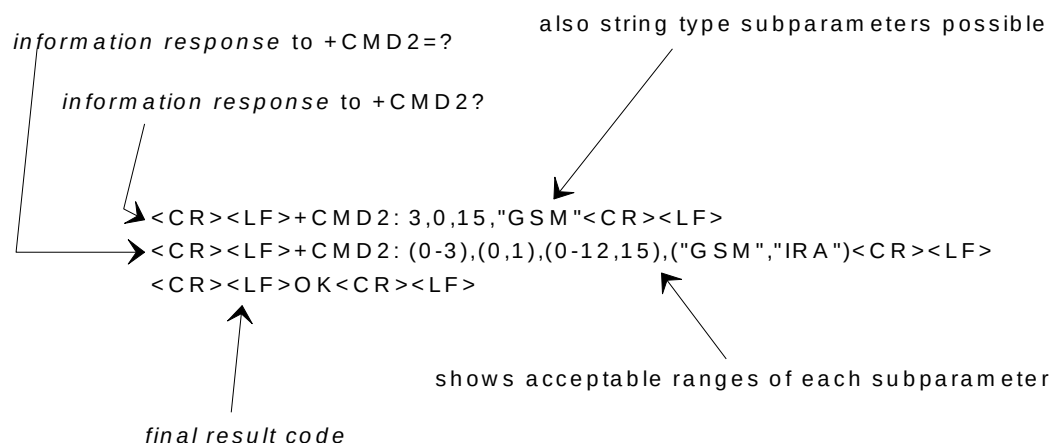
Figure 1-2 shows the basic organization format of the AT command line.

Figure 1-2 Basic organization format the AT command line



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



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.

AT+CLK	Can be aborted
AT+COPS	Can be aborted except "AT+COPS=?"
AT^IPINIT	Can be aborted
AT^IPOPEN	Can be aborted
AT^IPSEN	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.

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 ATS3–Command Line Termination Character

2.2.1 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>

2.2.2 Interface Description

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

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

2.2.3 Parameter Description

<value>: the default value is 13.

0–127 Set *S3* in ASCII code

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

2.2.5 Example

Run: ATS3=13

Response: OK

2.3 ATS4-Response Format Character

2.3.1 Command Syntax

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>

2.3.2 Interface Description

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

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

2.3.3 Parameter Description

<value>: the default value is 10.

0–127 Set *S4* in ASCII code.

2.3.4 Property Description

Saving upon Power-off	PIN
N	N

2.3.5 Example

Run: ATS4=10

Response: OK

2.4 ATV-Set the Response Format

2.4.1 Command Syntax

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

2.4.2 Interface Description

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

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

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

2.4.3 Parameter Description

<value>:

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

Note:

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

2.4.4 Property Description

Saving upon Power-off	PIN
N	N

2.4.5 Example

Run: ATV1

Response: OK

2.5 ATI-Request Identification

2.5.1 Command Syntax

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

2.5.2 Interface Description

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

Manufacturer (AT+GMI)

Product model (AT+GMM)

Software version (AT+GMR)

ESN/IMEI (AT+GSN)

Capability list (AT+GCAP)

About the details, please see 2.5.5 Example.

2.5.3 Parameter Description

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

<value>=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.

2.5.4 Property Description

Saving upon Power-off	PIN
NA	N

2.5.5 Example

Run: ATI

Response: Manufacturer: Huawei Technologies Co., Ltd.
 Model: MU609
 Revision: 11.110.07.04.00
 IMEI: 356112010004540
 +GCAP: +CGSM,+DS,+ES

 OK

2.6 AT+CGMI/AT+GMI-Request Manufacturer Identification

2.6.1 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>

2.6.2 Interface Description

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

2.6.3 Parameter Description

<manufacturer>: a string indicating the manufacturer information.

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

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

Run: AT+CGMI
Response: Huawei Technologies Co., Ltd.

OK

2.7 AT+CGMM/+GMM-Request Model Identification

2.7.1 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>

2.7.2 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.

2.7.3 Parameter Description

<production_name>: product name.

2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

Product name: MU609

Run: AT+CGMM

Response: MU609

OK

2.8 AT+CGMR/AT+GMR-Request Software Version

2.8.1 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>

2.8.2 Interface Description

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

2.8.3 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.

2.8.4 Property Description

Saving upon Power-off	PIN
NA	N

2.8.5 Example

Run: AT+CGMR
Response: 11.103.35.00.00

OK

2.9 AT+CGSN/AT+GSN-Request Product IMEI

2.9.1 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>

2.9.2 Interface Description

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

2.9.3 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

2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

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

Run: AT+CGSN

Response: 351548000225444

OK

2.10 AT+CSCS-Select TE Character Set

2.10.1 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>

2.10.2 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.

2.10.3 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).

2.10.4 Property Description

Saving upon Power-off	PIN
N	N

2.10.5 Example

1. Set command:

Run: AT+CSCS="IRA"

Response: OK

2. Read command:

Run: AT+CSCS?

Response: +CSCS: "IRA"

OK

3. Test command:

Run: AT+CSCS=?

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

OK

2.11 AT+CIMI-Request IMSI

2.11.1 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>

2.11.2 Interface Description

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

2.11.3 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

2.11.4 Property Description

Saving upon Power-off	PIN
NA	N

2.11.5 Example

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

Run: AT+CIMI

Response: 1234512345678

OK

2.12 ATZ-Restore Default AT Command Settings

2.12.1 Command Syntax

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

2.12.2 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 will be disconnected, which is different from the &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 and parameters that can be restored

Command
E
V
Q
X
&C
&D
&S

Command
S0
S3
S4
S5
S7
S10
+IFC
+ICF

2.12.3 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.

2.12.4 Property Description

Saving upon Power-off	PIN
N	N

2.12.5 Example

Run: ATZ0

Response: OK

2.13 AT&F-Restore Default AT Command Settings

2.13.1 Command Syntax

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

2.13.2 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
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.

2.13.3 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.

2.13.4 Property Description

Saving upon Power-off	PIN
N	N

2.13.5 Example

Run: AT&F0
Response: OK

2.14 A/-Repeat Previous Command Line

2.14.1 Command Syntax

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

2.14.2 Interface Description

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

2.14.3 Parameter Description

NA

2.14.4 Property Description

Saving upon Power-off	PIN
NA	N

2.14.5 Example

If the last command is:

```
Run:          AT+CGSN
Response:     351782030028946

              OK

Run:          A/
Response:     351782030028946

              OK
```

2.15 ATQ-Set Result Code Presentation Mode

2.15.1 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>

2.15.2 Interface Description

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

2.15.3 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.

2.15.4 Property Description

Saving upon Power-off	PIN
N	N

2.15.5 Example

Run: ATQ0

Response: OK

2.16 AT&W-Store User Settings

2.16.1 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>

2.16.2 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

2.16.3 Property Description

Saving upon Power-off	PIN
NA	N

2.16.4 Example

Run: AT&W

Response: OK

2.17 AT&V-Query Current Configuration

2.17.1 Command Syntax

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

2.17.2 Interface Description

This command queries the current configuration.

The commands and parameters which can be queried followed &F

2.17.3 Property Description

Saving upon Power-off	PIN
NA	N

2.17.4 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

2.18 AT+CCLK-Return Current Time of the Module

2.18.1 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>

2.18.2 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 27007 for <err> values.

The read command returns the current setting of the clock.

2.18.3 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 1994, 22:10:00 GMT+2 hours equals to "1994/05/06,22:10:00+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.

2.18.4 Property Description

Saving upon Power-off	PIN
NA	N

2.18.5 Example

1. Set command:

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

Response: OK

2. Read command:

Run: AT+CCLK?

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

OK

3. Test command:

Run: AT+CCLK=?

Response: OK

2.19 +++-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.

2.19.1 Example

Run: +++

Response: OK

Currently DCE is command mode.

3 Network Service Related Commands

3.1 AT+COPS-Operator Selection

3.1.1 Command Syntax

Set command

AT+COPS=[<mode>[, <format>[, <oper>[, <AcT>]]]]

Possible Response(s)

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

In case of an MS-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 MS-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>OK<CR><LF>

In case of an CME-related error:

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

3.1.2 Interface Description

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

The 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.

3.1.3 Parameter Description

`<mode>`:

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

`<format>`:

- | | |
|---|---|
| 0 | Long format alphanumeric <code><oper></code> |
| 1 | Short format alphanumeric <code><oper></code> |
| 2 | Numeric <code><oper></code> |

`<oper>`: string type.

`<format>`: indicates if the format is alphanumeric or numeric, long alphanumeric format can be upto 16 characters long and short format up to 8 characters (refer GSM MoU SE.13). Numeric format is the GSM Location Area Identification number (refer TS 24.008 subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A, plus a two BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD. Hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1).

<stat>:

0	Unknown
1	Available
2	Current
3	Forbidden

<AcT>: access technology selected

0	GSM
2	UTRAN

3.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.1.5 Example

1. 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

2. Automatic search of network:

Run: AT+COPS=0

Response: OK

Note:

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

3. Manual search of network:

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

Response: OK

4. 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.

5. 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

3.2 AT+CREG–Network Registration

3.2.1 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>

3.2.2 Interface Description

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

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

3.2.3 Parameter Description

<n>:

- | | |
|---|--|
| 0 | Disable network registration unsolicited result code +CREG |
| 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.

3.2.4 Property Description

Saving upon Power-off	PIN
N	Y

3.2.5 Example

1. Enable the initiative report when network registration status change:

Run: AT+CREG=1

Response: OK

2. Query the current network registration status:

Run: AT+CREG?

Response: +CREG: 1,1

OK

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

Run: AT+CREG=?

Response: +CREG: (0-2)

OK

3.3 AT+CLCK-Facility Lock

3.3.1 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>

3.3.2 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.

3.3.3 Parameter Description

<fac>: specifies the target of this command.

"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All Barring services (applicable only for <mode>=0)
"AC"	All incoming barring services (applicable only for <mode>=0)
"AG"	All outgoing barring services (applicable only for <mode>=0)
"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
"PP"	Service Provider Personalization

- "PC" Corporate Personalization
- "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)

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>:

- 1 Data
- 4 Fax
- 8 Short message service

3.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

Note :

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

3.3.5 Example

1. Query the lock status of SIM:

Run: AT+CLCK="sc", 2

Response: +CLCK: 0

OK

2. Set the lock status of SIM:

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

Response: OK

3. Query the list of supported <fac>s:

Run: AT+CLCK=?

Response: +CLCK: ("AB", "AC", "AG", "PN", "PU", "PP", "PC", "PF")

OK

3.4 AT+CPWD-Change Password

3.4.1 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>
```

3.4.2 Interface Description

The execution 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.

3.4.3 Parameter Description

<fac>: specifies the target of this command.

"P2"	SIM PIN2
"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All Barring services (applicable only for <mode>=0)
"AC"	Ahort message service
"AG"	All inComing barring services

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

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

3.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

Note :

When 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.

3.4.5 Example

1. Modify PIN2 of SIM:

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

Response: OK

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

Run: AT+CPWD=?

Response: +CPWD:
("AB", 4) , ("AC", 4) , ("AG", 4) , ("SC", 8) , ("P2", 8)

OK

3.5 AT+CSSN–Set Supplementary Service Notification Presentation

3.5.1 Command Syntax

Set command
AT+CSSN=[<n>[, <m>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
Read command
AT+CSSN?
Possible Response(s)
<CR><LF>+CSSN: <n>, <m><CR><LF><CR><LF>OK<CR><LF>
Test command
AT+CSSN=?
Possible Response(s)
<CR><LF>+CSSN: (list of supported <n>s) , (list of supported <m>s) <CR><LF><CR><LF>OK<CR><LF>

3.5.2 Interface Description

The set command enables or disables the presentation of supplementary services.

Note:

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

3.5.3 Parameter Description

<n>: sets the presentation of +CSSI.

0 Disable
1 Enable

<m>: sets the presentation of +CSSU.

0 Disable
1 Enable

3.5.4 Property Description

Saving upon Power-off	PIN
N	N

3.5.5 Example

1. Query the status of supplementary service notification presentation:

Run: AT+CSSN?
Response: +CSSN: 0,0

 OK

2. Enable CSSI and CSSU report:

Run: AT+CSSN=1,1
Response: OK

3. Query the list of supported <n>s and <m>s:

Run: AT+CSSN=?
Response: +CSSN: (0-1),(0-1)

 OK

3.6 AT+CUSS-USSD Command

Users can run Unstructured Supplementary Service Data (USSD) commands using mobile devices to request specific services from the network, and the network also can send USSD commands to devices to implement specific services. Unlike SMS, USSD allows real-time bidirectional data exchange so that it can be used in services,

such as stock information query. Currently, many value-added services, such as stock, lottery, weather forecast, and flight information query, are provided using USSD.

3.6.1 Command Syntax

Set command
AT+CUSD=[<n>[, <str>[, <dc>]]]
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>

3.6.2 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>[, <dc>]]

The definition of its parameters and the use of this command, see section 3.7 +CUSD—Unsolicitedly Report USSD of Network.

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

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

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

The test command returns all the supported n values.

3.6.3 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 |

3.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.6.5 Actions Performed by the Client

See the following example.

3.6.6 Example

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

1. Use USSD to query the phone number (given that the query code is 99):

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

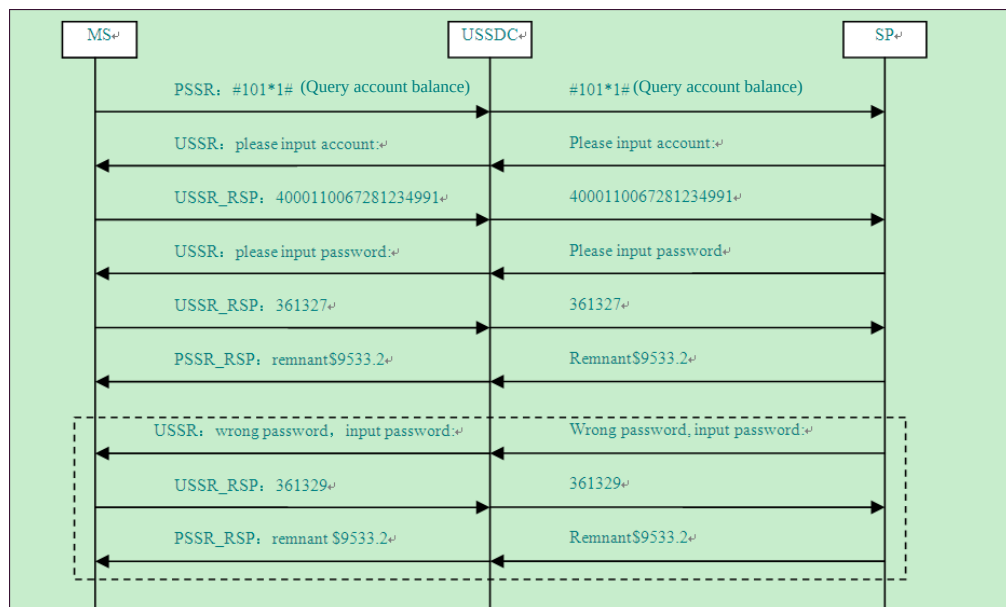
Response: OK

Network response (if the phone number is 86139037601):

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

Response: OK

2. 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

3.7 +CUSD–Unsolicitedly Report USSD of Network

3.7.1 Command Syntax

URC

```
<CR><LF>+CUSD: <m>[, <str>, <dc>]<CR><LF>
```

3.7.2 Interface Description

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

The definition of its parameters and the use of this command, see section 3.7 +CUSD–Unsolicitedly Report USSD of Network.

3.7.3 Property Description

Saving upon Power-off	PIN
NA	Y

3.7.4 Example

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

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

3.8 AT+CNUM–Subscriber Number

3.8.1 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>
```

3.8.2 Interface Description

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

3.8.3 Parameter Description

<alpha>: optional alphanumeric string associated with <number>; used character set should be the one selected with command 2.10 AT+CSCS–Select TE Character Set.

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

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

3.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.8.5 Example

1. 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
```

2. 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

4 Serial Interface Control Commands

4.1 AT&C-Set Carrier Detection (DCD) Line Mode

4.1.1 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>`

4.1.2 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).

4.1.3 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 which can be queried by AT+V.

4.1.4 Property Description

Saving upon Power-off	PIN
N	N

Note:

AT+C will set value to 0.

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

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

4.1.5 Example

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

Run: AT+C0

Response: OK

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

Run: AT+C1

Response: OK

3. 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

4. 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

4.2 AT&D-Set DTE Ready (DTR) Line Mode

4.2.1 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>

4.2.2 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.

4.2.3 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.

4.2.4 Property Description

Saving upon Power-off	PIN
N	N

4.2.5 Example

1. DCE ignores circuit 108/2.

Run: AT&D0

Response: OK

2. 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

3. 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

4.3 AT&S-Set Data Set Ready (DSR) Line Mode

4.3.1 Command Syntax

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

4.3.2 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).

4.3.3 Parameter Description

<value>:

- | | |
|---|--------------------------------|
| 0 | DSR line always is ON. |
| 1 | DSR line is ON when connected. |

4.3.4 Property Description

Saving upon Power-off	PIN
N	N

4.3.5 Example

1. DSR line always is ON.

Run: AT&S0

Response: OK

2. DSR line is ON when connected.

Run: AT&S1

Response: OK

4.4 AT+IPR–Set Fixed Data Rate

4.4.1 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>
```

4.4.2 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.

4.4.3 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.

4.4.4 Property Description

Saving upon Power-off	PIN
Y	N

4.4.5 Example

1. Set the baudrate as 115200:

Run: AT+IPR=115200
Response: OK

2. Query current baudrate:

Run: AT+IPR?
Response: +IPR: 115200

OK

3. List of supported fixed-only rates:

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

OK

4.5 AT+IFC-Control Local Flow

4.5.1 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>

Test command

AT+IFC=?

Possible Response(s)

<CR><LF>+IFC:

<DCE_by_DTE>,<DTE_by_DCE><CR><LF><CR><LF>OK<CR><LF>

4.5.2 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.

4.5.3 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.

4.5.4 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.

4.5.5 Example

1. None flow control:

Run: AT+IFC=0, 0

Response: OK

2. Query current control state:

Run: AT+IFC?

Response: +IFC: 0, 0

OK

3. List of supported parameters:

Run: AT+IFC=?

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

OK

4. Enable flow control:

Run: AT+IFC=2, 2

Response: OK

5 Mobile Termination Control and Status Commands

5.1 AT+CFUN-Set Operation Mode

5.1.1 Command Syntax

Set command
AT+CFUN=[<fun>[, <rst>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MS-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 MS-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>

5.1.2 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.

5.1.3 Parameter Description

<fun>:

- | | |
|---|---|
| 0 | Minimum functionality (disable RF but reserve SIM card power supply, previous mode must not be offline) |
| 1 | Set as online mode (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>: MT 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) |

5.1.4 Property Description

Saving upon Power-off	PIN
NA	N

5.1.5 Example

1. Query the MT's current mode use the read command:

Run: AT+CFUN?

Response: +CFUN: 1

OK

2. 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

3. Which mode does MT support, use the read command:

Run: AT+CFUN=?

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

OK

5.2 AT+CPIN-Enter PIN

5.2.1 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>

5.2.2 Interface Description

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

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

If the current password required is PIN or PIN2, run +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.

5.2.3 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
SIM PIN2	MT is waiting for SIM PIN2 to be given
SIM PUK2	MT is waiting for UICC/SIM PUK2 to be given to unblock the blocked SIM PIN2

5.2.4 Property Description

Saving upon Power-off	PIN
N	N

5.2.5 Example

1. Read command:

Run: AT+CPIN?
Response: +CPIN: SIM PUK2

OK

Note:

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

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

Run: AT+CPIN="87654321", "5678"
Response: OK

3. Try Read command again:

Run: AT+CPIN?

Response: +CPIN: READY

OK

4. Test command:

Run: AT+CPIN=?

Response: OK

5.3 AT+CSQ-Signal Quality

5.3.1 Command Syntax

Execution command
AT+CSQ
Possible Response(s)
<CR><LF>+CSQ: <rss>, <ber><CR><LF><CR><LF>OK<CR><LF>
Test command
AT+CSQ=?
Possible Response(s)
<CR><LF>+CSQ: (list of supported <rss>s) , (list of supported <ber>s) <CR><LF><CR><LF>OK<CR><LF>

5.3.2 Interface Description

The execution command returns received signal strength indication <rss> 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.

5.3.3 Parameter Description

<rsi>: received signal strength indication.

Network	<rsi>	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
TD-SCDMA	100	≤ -116 dBm
	101	-115 dBm
	102–191	-114 dBm to -26 dBm
	191	≥ -25 dBm
	199	Unknown or undetectable

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

5.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.3.5 Example

1. Query the MT's signal strength use the execution command:

Run: AT+CSQ

Response: +CSQ: 19,99

OK

2. Test command:

Run: AT+CSQ=?

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

OK

5.4 AT+CPBS-Select Phonebook Memory Storage

5.4.1 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>

5.4.2 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.

5.4.3 Parameter Description

<storage>: phonebook storage type.

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

<reserved>: reserved.

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

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

5.4.4 Property Description

Saving upon Power-off	PIN
N	Y

5.4.5 Example

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

Run: AT+CPBS=?

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

OK

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

Run: AT+CPBS?

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

OK

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

Run: AT+CPBS="ME"

Response: OK

5.5 AT+CPBR-Read Phonebook Entries

5.5.1 Command Syntax

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

5.5.2 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.

5.5.3 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 2.10 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>.

5.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.5.5 Example

1. Test command:

Run: AT+CPBR=?

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

OK

2. 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.

5.6 AT+CPBW-Write Phonebook Entry

5.6.1 Command Syntax

Set command
AT+CPBW=[<index>][,<number>[<type>[<text>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MS-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>
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>

5.6.2 Interface Description

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

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

If 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.

5.6.3 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 2.10 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>`.

5.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.6.5 Example

1. 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

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

Run: AT+CPBW?

Response: +CPBW: 1

OK

3. Test command:

Run: AT+CPBW=?

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

OK

5.7 AT+CRSM-Restricted SIM Access

5.7.1 Command Syntax

Set command

AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]

Possible Response(s)

<CR><LF>+CRSM:<sw1>,<sw2>[,<response>]<CR><LF>

In case of an MS-related error:

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

Test command

AT+CRSM=?

Possible Response(s)

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

5.7.2 Interface Description

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

5.7.3 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 11.11.

<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.

5.7.4 Property Description

Saving upon Power-off	PIN
NA	N

5.7.5 Example

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

Run: AT+CRSM=242

Response: +CRSM:108,41,"62278202782183023F00A50D8001718302E573C104800F55FF8A01058B032F0601C606900100830101"

OK

Notes:

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



2. Test command:

Run: AT+CRSM=?

Response: OK

6 Mobile Termination Errors

6.1 AT+CMEE-Report Mobile Termination Error

6.1.1 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>

6.1.2 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.

6.1.3 Parameter Description

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

- | | |
|---|---|
| 0 | Disable the +CME ERROR: <err> result code and use ERROR instead |
| 1 | Enable the +CME ERROR: <err> result code and use numeric <err> values |
| 2 | Enable the +CME ERROR: <err> result code and use verbose <err> values |

<err>: see section 18.1 List of URC Commands.

6.1.4 Property Description

Saving upon Power-off	PIN
N	N

6.1.5 Example

1. Set command:

Run: AT+CMEE=2

Response: OK

2. Read command:

Run: AT+CMEE?

Response: +CMEE: 2

OK

3. Test command:

Run: AT+CMEE=?

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

OK

7 UMTS Packet Domain Commands

7.1 AT+CGDCONT-Define PDP Context

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

7.1.1 Command Syntax

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>

7.1.2 Interface Description

The MT locally saves a group of PDP contexts with `<cid>` as the index. Each record of the saved setting environment contains a group of PDP-related parameters. The set command saves the group of PDP-related parameters in the PDP contexts that use `<cid>` as the index. Each PDP context is initially undefined. After the set command saves a group of parameters in a PDP context, the PDP context is defined. The number of defined PDP contexts that can be saved at the same time is determined by the value range of `<cid>`.

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

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.

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

7.1.3 Parameter Description

`<cid>`:

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

`<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.

7.1.4 Property Description

Saving upon Power-off	PIN
Y	N

7.1.5 Example

- Step 1

Run: AT+CGDCONT=?

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

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.

7.2 AT+CGACT-Activate or Deactivate PDP Context

7.2.1 Command Syntax

Set command

AT+CGACT=[<state>[, <cid>[, <cid>[, ...]]]]

Possible Response(s)

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

<CR><LF>ERROR<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>

Test command

AT+CGACT=?

Possible Response(s)

<CR><LF>+CGACT: (list of supported
<state>s) <CR><LF><CR><LF>OK<CR><LF>

7.2.2 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.

7.2.3 Parameter Description

<state>: integer type, indicates the state of PDP context activation.

- | | |
|---|-------------|
| 0 | Deactivated |
| 1 | Activated |

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

7.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2.5 Example

1. Query the value range of PDP Activation state:

Run: AT+CGACT=?

Response: +CGACT: (0,1)

OK

2. Query the current PDP Activation state:

Run: AT+CGACT?

Response: +CGACT: 1,0

OK

3. Activate or deactivate PDP contexts:

Run: AT+CGACT=1,1

Response: OK

Run: AT+CGACT=0,1

Response: OK

7.3 AT+CGATT-Attach or Detach PS Domain

7.3.1 Command Syntax

Set command
AT+CGATT=[<state>]
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+CGATT?
Possible Response(s)
<CR><LF>+CGATT: <state><CR><LF><CR><LF>OK<CR><LF>
Test command
AT+CGATT=?
Possible Response(s)
<CR><LF>+CGATT: <state><CR><LF><CR><LF>OK<CR><LF>

7.3.2 Interface Description

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

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

The read command returns the current GPRS service state.

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

7.3.3 Parameter Description

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

0	Detached
1	Attached

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

7.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.3.5 Example

1. Query the value range of PS domain service states:

Run: `AT+CGATT=?`

Response: `+CGATT: (0,1)`

OK

2. Query the current GPRS service state:

Run: `AT+CGATT?`

Response: `+CGATT: 0`

OK

3. Attach or Detach PS Domain:

Run: `AT+CGATT=1`

Response: OK

Run: `AT+CGATT=0`

Response: OK

7.4 AT+CGREG-PS Domain Registration Status

7.4.1 Command Syntax

Set command

`AT+CGREG[=<n>]`

Possible Response(s)

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

7.4.2 Interface Description

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

when $\langle n \rangle = 1$ and there is a change in the MT's network registration status, +CGREG: $\langle stat \rangle$ is presented.

When $\langle n \rangle = 2$ and there is a change in the network cell, +CGREG: $\langle stat \rangle$ [, $\langle lac \rangle$, $\langle ci \rangle$ [, $\langle AcT \rangle$, $\langle rac \rangle$]] is presented. In this case $\langle AcT \rangle$, $\langle lac \rangle$, $\langle rac \rangle$ and $\langle ci \rangle$ are sent only if available.

The read command returns the current registration state $\langle stat \rangle$. Location information elements $\langle lac \rangle$ and $\langle ci \rangle$ are returned only when $\langle n \rangle = 2$.

The test command returns the $\langle n \rangle$'s values supported by the UE.

7.4.3 Parameter Description

$\langle n \rangle$:

- | | |
|---|---|
| 0 | Disable unsolicited result code +CGREG (default value) |
| 1 | Enable unsolicited result code +CGREG: $\langle stat \rangle$ |
| 2 | Enable network registration and location information unsolicited result code +CGREG: $\langle stat \rangle$ [, $\langle lac \rangle$, $\langle ci \rangle$ [, $\langle AcT \rangle$, $\langle rac \rangle$]] |

$\langle stat \rangle$:

- | | |
|---|---|
| 0 | Not registered, MT is not currently searching for a new operator to register with |
| 1 | Registered, home network |

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

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

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

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

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

Notes:

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

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

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

7.4.4 Property Description

Saving upon Power-off	PIN
N	Y

Note:

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

7.4.5 Example

1. Query the value range of PS domain registration status:

```
Run:      AT+CREG?
Response: +CREG: 0,1

          OK
```

2. Query the state of the currently registered network:

```
Run:      AT+CREG?
Response: +CREG: 0,1

          OK
```

3. Set unsolicited indication:

```
Run:      AT+CREG=1
Response:  OK

Run:      AT+CREG=2
Response:  OK
```

7.5 AT+CGSMS–SMS Bearer Domain

7.5.1 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>

Test command

AT+CGSMS=?

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

7.5.2 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.

7.5.3 Parameter Description

<service>:

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

7.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

7.5.5 Example

1. Query the value range of SMS Bearer Domain:

Run: AT+CGSMS=?

Response: +CGSMS: (0-3)

OK

2. Query the current domain type which SMS used:

Run: AT+CGSMS?

Response: +CGSMS: 3

OK

3. Set the SMS Bearer Domain type:

Run: AT+CGSMS=0

Response: OK

Run: AT+CGSMS=1

Response: OK

Run: AT+CGSMS=2

Response: OK

7.6 AT+CGDATA-Enter Data State

7.6.1 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>

7.6.2 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.

7.6.3 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).

7.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.6.5 Example

1. Set command to establish the communication:

Run: AT+CGDATA="PPP",1

Response: CONNECT 236800

2. Test command:

Run: AT+CGDATA=?

Response: +CGDATA: ("PPP")

OK

8 Text Mode Commands for SMS

8.1 AT+CSMS-Select Messaging Service

8.1.1 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>

8.1.2 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.

8.1.3 Parameter Description

<service>: messaging service type.

- 0 3G TS 23.040, 3G TS 23.041 (messaging AT command syntax is compatible with GSM07.05 Phase 2.) (default value)
- 1 3G TS 23.040, 3G TS 23.041 (messaging AT command syntax is compatible with GSM07.05 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)

8.1.4 Property Description

Saving upon Power-off	PIN
N	N

8.1.5 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.

8.2 AT+CPMS–Preferred Message Storage

8.2.1 Command Syntax

Set command

AT+CPMS=<mem1>[, <mem2>[, <mem3>]]

Possible Response(s)

```
<CR><LF>+CPMS :
<used1>,<total1>,<used2>,<total2>,<used3>,<total3><CR><LF><C
R><LF>OK<CR><LF>
```

In case of an MS-related error:

```
<CR><LF>+CMS 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 messaging-related error:

```
<CR><LF>+CMS 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>
```

8.2.2 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.

8.2.3 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.

8.2.4 Property Description

Saving upon Power-off	PIN
N	Y

8.2.5 Example

1. Query the types of supported storage using the test command:

Run: AT+CPMS=?

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

OK

2. 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

3. 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 8.2.3. It is recommended that you keep the three types of storage consistent

8.3 AT+CMGF-Message Format

8.3.1 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>

8.3.2 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, and TD-SCDMA. For details about the message format in PDU mode, see section 9.3 AT+CMGS—Send Message.

The read command returns the currently selected mode.

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

8.3.3 Parameter Description

`<mode>`:

- | | |
|---|--------------------------|
| 0 | PDU mode (default value) |
| 1 | Text mode |

Note:

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

8.3.4 Property Description

Saving upon Power-off	PIN
N	N

8.3.5 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 23040.

8.4 AT+CSCA–Service Center Address

8.4.1 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>+CMS 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>

8.4.2 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 9.3 AT+CMGS–Send Message).

8.4.3 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 9.3 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.

8.4.4 Property Description

Saving upon Power-off	PIN
Y	Y

8.4.5 Example

Sets the service center number using the test command:

Run: AT+CSCA="8613800688509",145

Response: OK

8.5 AT+CSMP-Set Text Mode Parameters

8.5.1 Command Syntax

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

8.5.2 Interface Description

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

The read command returns the supported parameters.

The test command returns OK.

8.5.3 Parameter Description

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

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

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

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

8.5.4 Property Description

Saving upon Power-off	PIN
N	Y

8.5.5 Example

1. Set the data coding scheme to UCS2 using the test command:

Run: AT+CSMP=, , 0, 8

Response: OK

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

Run: AT+CSMP=, , , 0

Response: OK

8.6 AT+CNMI-New Message Indications to TE

8.6.1 Command Syntax

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

8.6.2 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`.

8.6.3 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. |

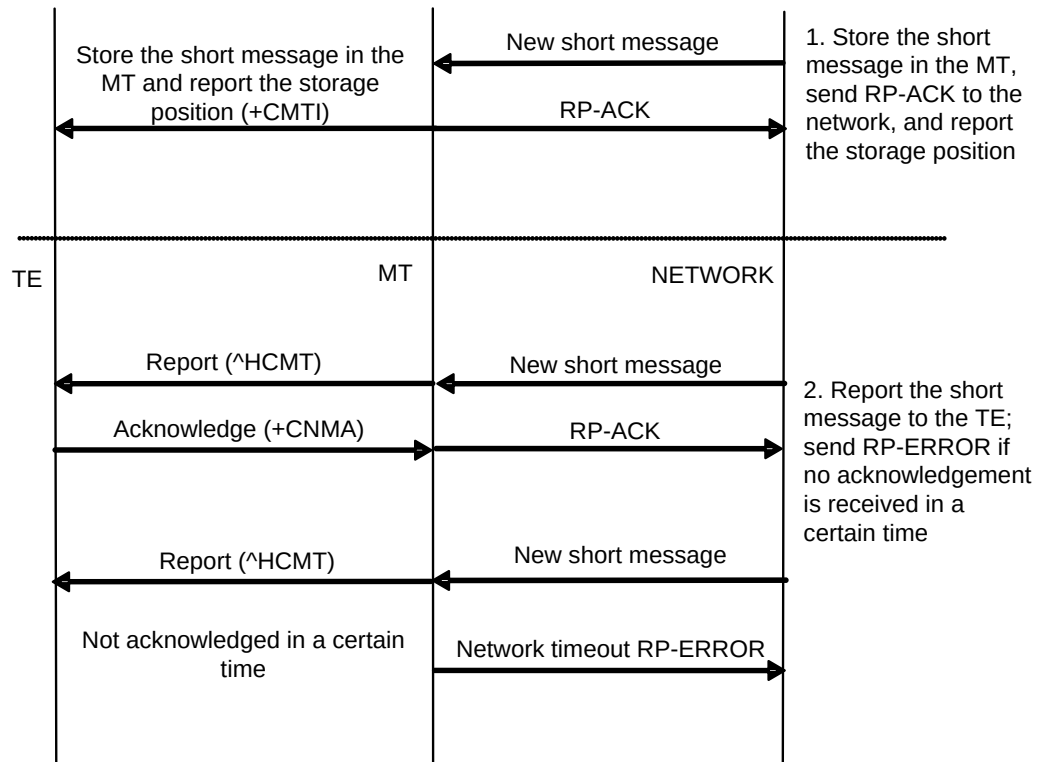
Note:

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 or 3.).

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

- | | |
|---|--|
| 0 | No SMS-DELIVER indications are routed to the TE. |
| 1 | Stores SMS-DELIVER indications on the MT and sends storage location indication to the TE.
<code>+CMTI: <mem>,<index></code> |
| 2 | Does not store SMS-DELIVER indications on the MT but directly sends them to the TE. <ul style="list-style-type: none">• If PDU mode enabled:
<code>+CMT: [<reserved>],<length><CR><LF><pdu></code>• If TEXT mode enabled:
<code>+CMT: <oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data></code> |
| 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.

<code><mt></code>	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 9.3.3.
- "+CMT & +CNMA" indicates that the TE is required to send the confirmation (+CNMA).

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

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

- 1 If CBM is stored into ME/TA, indication that the memory location is routed to the TE using unsolicited result code:
+CBMI: <mem>,<index> (not supported currently)
- 2 New CBMs are routed directly to the TE using unsolicited result code:
 - If PDU mode enabled:
+CBM: <length><CR><LF><pdu> (PDU mode enabled)
 - If TEXT mode enabled:
+CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data>
(text mode enabled)
 - If ME supports data coding groups which define special routing also for messages other than class 3 (e.g. (U)SIM specific messages), ME may choose not to route messages of such data coding schemes into TE (indication of a stored CBM may be given as defined in <bm>=1).
- 3 Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1 (not supported currently).

Table 8-1 <bm> parameter

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

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

- 0 Do not send message status reports (default value)
- 1 Do not store message status reports to the MT and directly send the reports to the TE
+CDS: <length><CR><LF><pdu> (PDU mode enabled); or
+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (text mode enabled)

- 2 Store message status reports to the MT and send the storage location to the TE using AT+CDSI
+CDSI: <mem>,<index>

<bfr>: 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.

8.6.4 Property Description

Saving upon Power-off	PIN
N	N

8.6.5 Example

- AT+CNMI=1,1,0,1,0
Class 1 messages are stored to the MT, and then storage locations are reported (+CMTI: ME,1). Message status reports are directly sent (+CDS:).
If SMS-DELIVER indications cannot be sent (for example, when in online data state), they will be discarded.
- AT+CNMI=1,1,0,2,0
Class 1 messages are stored to the MS, and then storage locations are reported (+CMTI: ME,1). Message status reports are stored to the MS, and then storage locations are reported (+CDSI: ME,2).
If SMS-DELIVER indications cannot be sent (for example, when in online data state), they will be discarded.(The SMS messages and SMS-DELIVER indications are stored in the MS and can be read using the +CMGL command; however, the TE cannot receive the indications.)
- Other commonly-used settings include:
AT+CNMI=1,1,0,0,0: store the messages, and then send the storage locations to the TE; do not send the message status reports.
AT+CNMI=1,2,0,0,0: do not store the messages but directly send them to the TE; do not send the message status reports.

8.7 +CMTI-New SMS-DELIVER Indication

8.7.1 Command Syntax

URC

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

8.7.2 Interface Description

This command indicates that a new message is received.

8.7.3 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

8.7.4 Property Description

Saving upon Power-off	PIN
NA	N

8.7.5 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.

8.8 +CMT–New Message Directly Deliver Indication

8.8.1 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>
```

8.8.2 Interface Description

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

8.8.3 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 9.1.3 .

8.8.4 Property Description

Saving upon Power-off	PIN
NA	N

8.8.5 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 ^SMEMFULL: "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.

8.9 +CDSI-New SMS Status Report Indication

8.9.1 Command Syntax

URC

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

8.9.2 Interface Description

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

8.9.3 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

8.9.4 Property Description

Saving upon Power-off	PIN
NA	N

8.9.5 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

8.10 +CDS–SMS Status Report Indication Directly Displayed

8.10.1 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)
```

8.10.2 Interface Description

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

8.10.3 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 9.3 "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 ³⁾	M	l
TP-RA	TP-Recipient-Address	M	2-12o
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o
TP-DT	TP-Discharge-Time	M	7o

Abbr.	Reference	P1)	R2)
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).

8.10.4 Property Description

Saving upon Power-off	PIN
NA	N

8.10.5 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.

8.11 AT+CMGD-Delete Message

8.11.1 Command Syntax

Set command
AT+CMGD=<index>[,<delflag>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an messaging-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>

8.11.2 Interface Description

The execution command deletes the message at location <index> in the storage <mem1>. For details about <mem1>, see section 8.2 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 8.11.3 . If the deletion fails, +CMS ERROR: <err> is returned.

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

8.11.3 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.

8.11.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.11.5 Example

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

Run: AT+CMGD=1

Response: OK

2. Delete all the message in the current storage using the test command:

Run: AT+CMGD=1, 4

Response: OK

8.12 AT+CMGL-List Messages

8.12.1 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>
```

```
<CR><LF>+CMGL:
<index>, <stat>, <da/oa>, [<alpha>], [<scts>][, <tooa/toda>,
<length>]<CR><LF><data>[...]<CR><LF><CR><LF>OK<CR><LF>
```

If text mode (AT+CMGF=1), command successful and SMS-COMMANDS:

```
<CR><LF>+CMGL:
<index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
[<CR><LF>
<CR><LF>+CMGL:
<index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>
[...]]<CR><LF><CR><LF>OK<CR><LF>
```

If text mode (AT+CMGF=1), command successful and SMS-COMMANDS:

```
<CR><LF>+CMGL: <index>, <stat>, <fo>, <ct>[<CR><LF>
<CR><LF>+CMGL:
<index>, <stat>, <fo>, <ct>[...]]<CR><LF><CR><LF>OK<CR><LF>
```

If text mode (AT+CMGF=1), command successful and CBM storage:

```
<CR><LF>+CMGL: <index>, <stat>, <sn>, <mid>, <page>, <pages>
<CR><LF><data>[<CR><LF>
<CR><LF>+CMGL: <index>, <stat>, <sn>, <mid>, <page>, <pages>
<CR><LF><data>[...]]<CR><LF><CR><LF>OK<CR><LF>
```

Otherwise:

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

Test command

AT+CMGL=?

Possible Response(s)

```
<CR><LF>+CMGL: (list of supported
<stat>s)<CR><LF><CR><LF>OK<CR><LF>
```

8.12.2 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.

8.12.3 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.

8.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.12.5 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.

8.13 AT+CMGR–Read an SMS Message

8.13.1 Command Syntax

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

8.13.2 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.

8.13.3 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.

8.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.13.5 Example

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

Run: AT+CMGR=4

Response: +CMGR: "REC
 UNREAD", "+8613312345678", , "12/05/1
 7,16:13:08+00"
 huawei

 OK

8.14 AT+CMGW-Write Message to Memory

8.14.1 Command Syntax

If TEXT mode (AT+CMGF=1):

Set 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 messaging-related error:

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

Test command

AT+CMGW=?

Possible Response(s)

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

8.14.2 Interface Description

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

8.14.3 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 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".

8.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.14.5 Example

Test command:

Run: AT+CMGW=?

Response: OK

8.15 AT+CNMA–New Message Acknowledgement

8.15.1 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 messaging-related error:

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

Test command

AT+CNMA=?

Possible Response(s)

```
If PDU mode (AT+CMGF=1):  
<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>
```

8.15.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when +CSMS parameter <service> equals 1. For the use of this command, see section 8.6 .

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.

8.15.3 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 (l), 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 exists.

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Extension bit	Reserved	Reserved	Reserved	Reserved	TP-UDL	TP-DCS	TP-PID

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

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

Bit 7–bit 6 (TE uses this TP-DCS mode)	00: used by TE when sending a message.	Bit 5	0	TE sets bit 5 to zero, indicating the message is not compressed.
			1	If bit 5 is set to 1, the message is compressed. TE does not use this value.
		Bit 4	0	When TE sets bit 4 to 0, bit 1 and bit 0 are reserved and set to 00.
			1	When bit 4 is set to 1, bit 1 and bit 0 indicate the message type. A message's type is dependent on user settings. If the user specifies a message type (for example, class 1 or class 2), TE sets bit 4 to 1.
		Bit 3–2: message encoding scheme	00	GSM 7-bit encoding scheme; default.
			01	8-bit encoding scheme
			10	UCS2 encoding scheme. TE uses this value when the user inputs Chinese characters.
		Bit 1–0: message type; set	00	Class 0. Messages are displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message.

Bit 7–bit 4 (TE does not use this TP-DCS mode)		by TE according to users' selection	01	Class 1. Messages are stored to the MT, or to the SIM card when the message storage on the MT is used up.
			10	Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure.
			11	Class 3. Messages are stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE.
	1100 and 1101: GSM 7 bit encoding 1110: uncompressed UCS2 encoding scheme)	Bit 3	1	Enable the message waiting indication feature.
		Bit 2	0	Reserved
		Bit 1–0: message waiting type	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 8-1 and Figure 8-2 illustrate the formats of the user data encoded using different schemes.

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

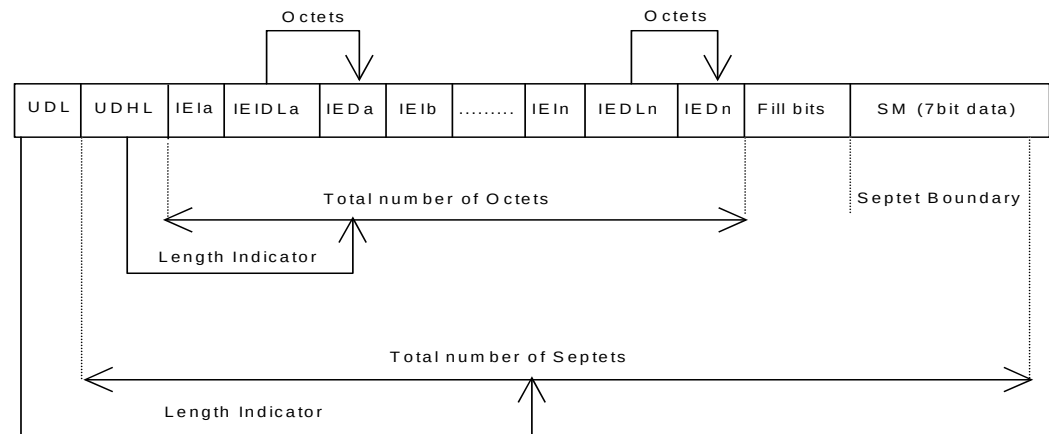
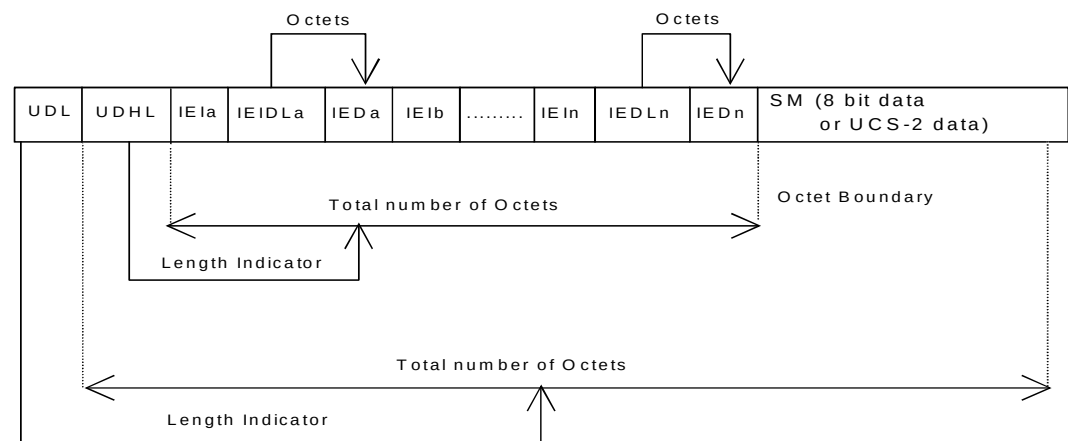


Figure 8-2 User data encoded using the 8-bit or UCS2 encoding scheme



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

8.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.15.5 Example

Firstly, set AT commands orderly as follows:

Run: AT+CSMS=1

Response: +CSMS: 1,1,1

OK

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

Response: OK

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

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

Run: AT+CNMA

Response: OK

9 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.

9.1 AT+CMGL-List Messages

9.1.1 Command Syntax

Set command
AT+CMGL[=<stat>]
Possible Response(s)
If in PDU mode and the command is executed successfully: <pre>[<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></pre>
Test command
AT+CMGL=?
Possible Response(s)
<pre><CR><LF>+CMGL: (list of supported <stat>s) <CR><LF><CR><LF>OK<CR><LF></pre>

9.1.2 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 `+CMGL=0`.

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

9.1.3 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 9.3 AT+CMGS–Send Message.

For the TPDU format of messages to be sent, see section 9.3 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	1 Oct	
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 9.3 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 9.3 AT+CMGS–Send Message.

<RP>: see the definition in section 9.3 AT+CMGS–Send Message.

<OA>: originating address. Its definition is the same as <sc>. 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 9.3 AT+CMGS–Send Message.

<DCS>: use data coding scheme. See the definition in section 9.3 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 9.3 AT+CMGS–Send Message.

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

9.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.1.5 Example

Lists all the received unread messages using the test command:

```
Run: AT+CMGL=0
Response: +CMGL: 1,0,,25
0891683108608805F9040D91683109
730147F200002150716172350005F4
F29C4E03

OK
```

Note:

In this example, the message is in PDU mode.

9.2 AT+CMGR–Read Message

9.2.1 Command Syntax

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

9.2.2 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.

9.2.3 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 9.1.3 9.1.3 .

9.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.2.5 Example

List all the received unread messages using the test command:

```
Run:          AT+CMGL=0
Response:     +CMGL: 1,0,,25
              0891683108608805F9040D91683109
              730147F200002150716172350005F4
              F29C4E03

              OK
```

Note:

In this example, the message is in PDU mode.

9.3 AT+CMGS-Send Message

9.3.1 Command Syntax

If PDU mode (+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 messaging-related error:

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

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

9.3.2 Interface Description

The execution 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).

9.3.3 Parameter Description

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

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

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

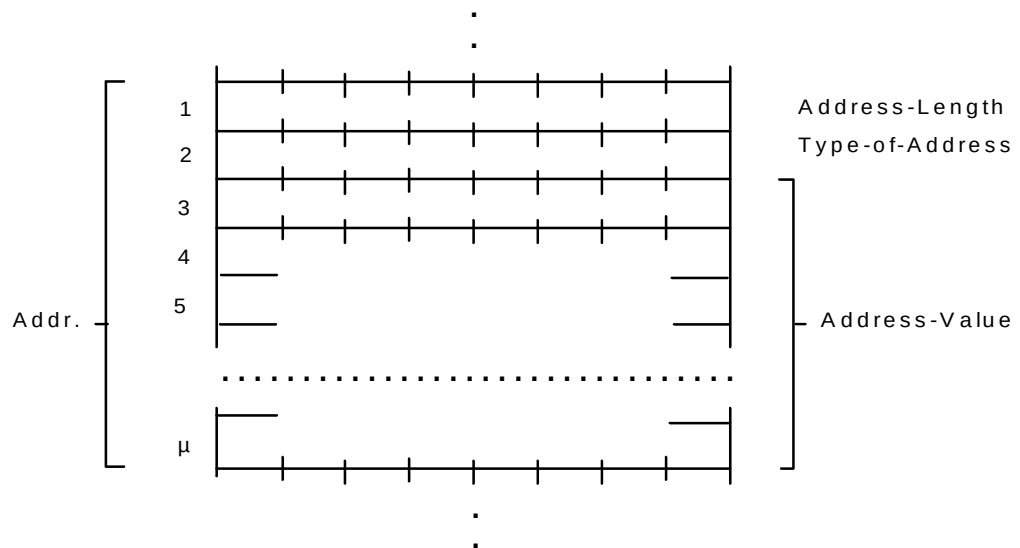
<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

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

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

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

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



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

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

1	Type-of-number	Numbering-plan-identification
---	----------------	-------------------------------

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

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

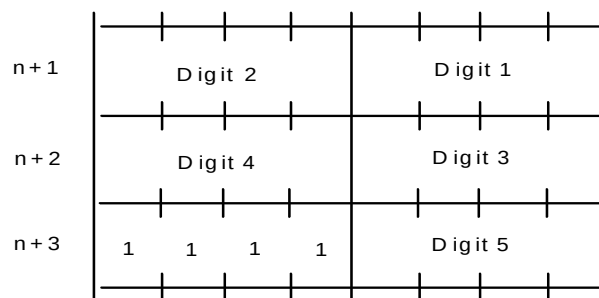
Values of Numbering-plan-identification (bits 3–0) are defined as follows:

Note:

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

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

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


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. 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.	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
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 1 fax message waiting 1 0 email message waiting 1 1 message of unknown type waiting
1110	The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.	The settings of bits 3...0 are the same as those when bits 7...4=1101.
1111	Data coding/message class	Bit 3 reserved. The value is 0. Bit 2 message encoding scheme. Its values are defined as follows: 0 GSM 7-bit encoding scheme; default. 1 8-bit encoding scheme

Bits 7...4	Bits 3...0
	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	$(VP + 1) \times 5$ minutes
144 to 167	12 hours + $((VP - 143) \times 30)$ minutes
168 to 196	$(VP - 166) \times 1$ day
197 to 255	$(VP - 192) \times 1$ 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>.

9.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.3.5 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)
>81000B813109010054F3001804534E4E3A \x1A
Where, 81 is the value of <RP~MTI>, 00 is the value of <MR>, 0B is the value of <DA-len>, 81 is the value of <DA-type>, 3109010054F3 is the value of <DA-numbers>, 00 is the value of <PID>, 18 is the value of <DCS>, 04 is the value of <UDL>, 534E4E3A is the value of <UD>, and \x1A is the value of <ctrl-Z>.
- Fill in <SCA> when you send the SMS. (The value of <SCA> is obtained from the PDU packet.)
AT+CMGS=17
>05a13109920081000B813109010054F3001804534E4E3A \x1A
Or
AT+CMGS=17
>0081000B813109010054F3001804534E4E3A \x1A (In this case, the value of <sc_len> is 0. The value of <SCA> was set with the +CSCA command.)

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

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

```
AT+CMGS=17
>05a13109920081000B813109010054F3001804534E4E3A \x1A
```

9.4 AT+CMSS–Send Message from Storage

9.4.1 Command Syntax

Set command
AT+CMSS=<index>[, <da>[, <tda>]]
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>

9.4.2 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.

9.4.3 Property Description

Saving upon Power-off	PIN
NA	Y



9.4.4 Example

Test command:

Run: AT+CMSS=?

Response: OK

10

Standard STK Interface Commands

10.1 +CUSATP-Unsolicitedly Report a UICC Proactive Command

10.1.1 Command Syntax

URC

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

10.1.2 Interface Description

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

10.1.3 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.

10.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.1.5 Example

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

10.2 AT+CUSATE-Send USAT Envelope

10.2.1 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>

10.2.2 Interface Description

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

10.2.3 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 TS102.221 and ETSI TS102.223 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. |

10.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.2.5 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

10.3 AT+CUSATT-Send USAT Terminal Response

10.3.1 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>

10.3.2 Interface Description

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

10.3.3 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 TS102.221 and ETSI TS102.223 protocols.

10.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.3.5 Example

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

Response: +CUSATP: "D0158103012100820281028D0404434154"

Run: AT+CUSATT="810301218082028281830100"

Response: OK

10.4 +CUSATEND-Unsolicitedly Report of Terminating a UICC Proactive Command Session

10.4.1 Command Syntax

URC

<CR><LF>+CUSATEND<CR><LF>

10.4.2 Interface Description

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

10.4.3 Property Description

Saving upon Power-off	PIN
NA	NA

10.4.4 Example

As the following, the proactive command is reported:

Response: +CUSATP:
"D04B810301250082028182050D53494
D205365727669636573FF8F0D8750686
F6E65206E756D6265728F0B8553656C6
62053657276658F10805370656369616
C204E756D626572731803212421"

Then user send the terminal response:



Run: AT+CUSATT="810301258082028281830100"

Response: OK

Then the CUSATEND will be reported as following:

Response: +CUSATEND

11 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

11.1 AT^CPIN-Manage PIN

11.1.1 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_times><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>

11.1.2 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.

11.1.3 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.

11.1.4 Property Description

Saving upon Power-off	PIN
N	N

11.1.5 Example

1. The read command returns a string indicating a password is required:

Run: AT^CPIN?

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

OK

2. The set command is used for verifying and unblocking PIN:

Run: AT^CPIN=1234

Response: OK

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

Run: AT^CPIN?

Response: ^CPIN: READY , ,10,3,10,0

OK

- 4.

Run: AT^CPIN=?

Response: OK

11.2 AT^CURC-Set Presentation of Unsolicited Results

11.2.1 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>

11.2.2 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.

11.2.3 Parameter Description

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

0 The presentation of the unsolicited indications in Table 11-1 is disabled:

- 1 Enables the presentation of the unsolicited indications

Table 11-1 List for the presentation of unsolicited results when AT^CURC=0

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

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 11-2 .

Table 11-2 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 detail information for each bit can be seen in Table 11-3 .

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 detail information for each bit can be seen in Table 11-3 .

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 11-3 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^SIMFILEREFRSH	AT^SMMEMFULL
Bit 12	Bit 13	Bit 14	Bit 15

AT^POSITION	AT^TIMESETRULT /AT^DATASETRULT /AT^DATAVALIDITY	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 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^HRRSSI	AT^CRSSI
Bit 36	Bit 37	Bit 38	Bit 39
AT^OTACMSG	AT^DSDORMANT	AT^IPDATA	AT^THERM
Bit 40			Bit 43
AT^XDSTATUS			AT+CSSI
Bit 44	Bit 45	Bit 46	Bit 47
AT+CSSU	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

11.2.4 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`.

11.2.5 Example

1. To set `<mode>` to 0:

Run: `AT^CURC=0`

Response: `OK`

2. To set `<mode>` to 1:

Run: `AT^CURC=1`

Response: `OK`

3. To set `<mode>` to 2:

Run: `AT^CURC=2,FF,F`

Response: `OK`

4. Query the current mode:

Run: `AT^CURC?`

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

`OK`

11.3 AT^NWTIME-Query Presentation of Network System Time

11.3.1 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>

11.3.2 Interface Description

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

11.3.3 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

11.3.4 Property Description

Saving upon Power-off	PIN
N	Y

11.3.5 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

11.4 ^NWTIME-Unsolicitedly Report Network System Time

11.4.1 Command Syntax

URC

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

11.4.2 Interface Description

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

11.4.3 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

11.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.4.5 Example

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

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

11.5 ^SYSSTART-Unsolicitedly Report Module Startup

11.5.1 Command Syntax

URC

<CR><LF>SYSSTART<CR><LF>

11.5.2 Interface Description

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

11.5.3 Example

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

Response: ^SYSSTART

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

11.6.1 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><LR>
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><LR>

11.6.2 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.

11.6.3 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 Enables the channel controlled by the bit.
- 1 Disables the channel controlled by the bit.

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

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

The default value of this parameter is 0x02.

<source>: sets Remote Wake-up sources.

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

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

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

- 0x0002 SMS
- 0x0004 Data
- 0x0008 UR (unsolicited report)
- 0x0010–0x8000 reserved

The default value of this parameter is 0x000F

11.6.4 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.

11.6.5 Example

1. The set command if only support USB Remote Wakeup:

Run: AT^WAKEUPCFG=1,2,7

Response: OK

2. Read command:

Run: AT^WAKEUPCFG?

Response: ^WAKEUPCFG: 1,2,7

OK

3. The test command:

Run: AT^WAKEUPCFG=?

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

OK

11.7 AT^IMEISV-Query the IMEISV

11.7.1 Command Syntax

Read command

AT^IMEISV?

Possible Response(s)

<CR><LF>^IMEISV: <imeisv><CR><LF><CR><LF>OK<CR><LF>

11.7.2 Interface Description

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

11.7.3 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 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

11.7.4 Property Description

Saving upon Power-off	PIN
NA	N

11.7.5 Implementation

Huawei proprietary interface

Optional

11.7.6 Example

Query the IMEISV:

Run: AT^IMEISV?

Response: ^IMEISV: 3545240400110917

OK

Notes:

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

11.8 AT^IOCTRL-Control the GPIO

11.8.1 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>
```

11.8.2 Interface Description

This command is used to control the GPIO's actions.

The test command returns supported values as compound value.

11.8.3 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
```

Resetting the module will not affect the value. Module updating will reset the value to default value. All GPIOs are input mode, and the value is 0 by default.

11.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

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

11.8.6 Example

1. Run the following command to get the GPIO state:

Run: AT^IOCTRL?
Response: ^IOCTRL: 00000,00000

 OK

2. Run the following command to set the GPIO state:

Run: AT^IOCTRL=11111,11110,00110
Response: OK

11.9 ^THERM–Thermal Protection Activated Unsolicited Report

11.9.1 Command Syntax

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

11.9.2 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).

11.9.3 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. |

11.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.9.5 Example

1. Indicates that the thermal protection is inactive:

Response: ^THERM: 0

2. Indicates that the thermal protection is active:

Response: ^THERM: 1

12 Huawei Proprietary Interface: SMS Service Interface

12.1 ^SMMEMFULL-Message Memory Full

12.1.1 Command Syntax

URC

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

12.1.2 Interface Description

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

12.1.3 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

12.1.4 Property Description

Saving upon Power-off	PIN
NA	N

12.1.5 Example

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

Response: ^SMMEMFULL: "SM"

13

Huawei Proprietary Interface: Network Service Interfaces

13.1 AT^SYSINFO-Query System Information

13.1.1 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>
```

13.1.2 Interface Description

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

13.1.3 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.

- | | |
|---|---|
| 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

13.1.4 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.

13.1.5 Example

Query the current system information:

Run: AT^SYSINFO

Response: ^SYSINFO: 2,3,0,3,1,,3

OK

13.2 AT^SYSCFG–System Configuration

13.2.1 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>OK<CR><LF>

Test command

AT^SYSCFG=?

Possible Response(s)

^SYSCFG: (list of supported <mode>s) ,
(list of supported <acqorder>s) ,
(list of supported (<band>,<band_name>)s) ,
(list of supported <roam>s) ,
(list of supported <srvdomain>s)
<CR><LF><CR><LF>OK<CR><LF>

13.2.2 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.

13.2.3 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 (CM_BAND_PREF_WCDMA_IMT)	WCDMA_IMT(2100)
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.

0	Not supported
1	Supported
2	No change

<srvdomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY

2	CS_PS
3	ANY
4	No change
255	Not supported

13.2.4 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.

13.2.5 Example

1. Query the current system configuration:

Run: AT^SYSCFG?

Response: ^SYSCFG: 2,1,3FFFFFFF,1,2

OK

2. Set system configuration:

Run: AT^SYSCFG=2,0,3FFFFFFF,1,2

Response: OK

3. 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/WCDMA850/WCDMA1900"),(3fffffff,"All Bands")), (0-2),(0-4)

OK

13.3 AT^USSDMODE-Select USSD Mode

13.3.1 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>

13.3.2 Interface Description

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

The read command returns the current USSD mode.

The test command returns the list of supported USSD modes.

13.3.3 Parameter Description

<mode>:

- | | |
|---|---|
| 0 | Select USSD non-transparent mode. |
| 1 | Select USSD transparent mode (default value). |

13.3.4 Property Description

Saving upon Power-off	PIN
N	N

13.3.5 Example

1. Query the current USSD mode:

Run: AT^USSDMODE?

Response: ^USSDMODE: 1

OK

2. Set USSD mode:

Run: AT^USSDMODE=0

Non-transparent mode

Response: OK

3. Query the list of supported <mode>s:

Run: AT^USSDMODE=?

Response: ^USSDMODE: (0-1)

OK

13.4 ^SRVST-Service State Change Indication

13.4.1 Command Syntax

URC

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

13.4.2 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.

13.4.3 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

13.4.4 Property Description

Saving upon Power-off	PIN
N	N

13.4.5 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

13.5 ^SIMST-SIM Card State Change Indication

13.5.1 Command Syntax

URC

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

13.5.2 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.

13.5.3 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.

0	SIM card is not locked by the CardLock feature.
1	SIM card is locked by the CardLock feature.

13.5.4 Property Description

Saving upon Power-off	PIN
NA	N

13.5.5 Example

Run: AT+CPIN=1234

Response: OK

^SIMST: 1

13.6 ^MODE-System Mode Change Indication

13.6.1 Command Syntax

URC

```
<CR><LF>^MODE: <sys_mode>, <sys_submode><CR><LF>
```

13.6.2 Interface Description

When the system mode is changed, the MT unsolicited sends this indication to the TE.

13.6.3 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

<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
9	HSPA+ mode
10	EVDO Rev.0
11	EVDO Rev.A
12	EVDO Rev.B

13.6.4 Property Description

Saving upon Power-off	PIN
NA	N

13.6.5 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

14

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.

14.1 AT^IPINIT-Initialize Embedded TCP/IP Service

14.1.1 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>

14.1.2 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.

14.1.3 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

14.1.4 Property Description

Saving upon Power-off	PIN
N	Y

14.1.5 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", "172.22.44.
201"

OK

Run: AT^IPINIT=?

Response: ^IPINIT: (0-1)

OK

14.2 AT^IPOPEN-Open TCP/UDP Link

14.2.1 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: <pre><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></pre> If link hasn't been open: <pre><CR><LF>OK<CR><LF></pre>
Test command
AT^IPOPEN=?
Possible Response(s)
<pre><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></pre>

14.2.2 Interface Description

This command is used to establish links with single or multiple remote servers using wireless modes. TCP and UDP are supported.

14.2.3 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

14.2.4 Property Description

Saving upon Power-off	PIN
N	Y

14.2.5 Example

- Three links are consecutively established, as shown below:

```
Run:          AT^IOPEN=1,"TCP","129.11.18.8",10000,9000
Response:     OK

Run:          AT^IOPEN=2,"TCP","129.11.18.8",10000,8000
Response:     OK

Run:          AT^IOPEN=3,"UDP","129.11.18.8",7000,6000
Response:     OK

Run:          AT^IOPEN?
Response:     ^IOPEN:
              1,"TCP",9000,"129.11.18.8",10000,1,1460
              ^IOPEN:
              2,"TCP",8000,"129.11.18.8",10000,1,1460
              ^IOPEN:
              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
```

14.3 AT^IPLISTEN-Configure TCP/UDP as a Server

14.3.1 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>

14.3.2 Interface Description

This command is used to enable listening function. At most 5 clients are supported

14.3.3 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

14.3.4 Property Description

Saving upon Power-off	PIN
N	Y

14.3.5 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

14.4 AT^IPSEND-Send TCP/UDP Data

14.4.1 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>

14.4.2 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.

14.4.3 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.

14.4.4 Property Description

Saving upon Power-off	PIN
N	Y

14.4.5 Example

Run: AT^IPSEND=3, "ASDF"

Response: ^IPSEND: 3

OK

14.5 ^IPDATA-Notificate Arrival Data

14.5.1 Command Syntax

URC

```
<CR><LF>^IPDATA: <link_id>,<data_len>,<data><CR><LF>
```

14.5.2 Interface Description

This command is used to automatically report data when the data arrives.

14.5.3 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.

14.5.4 Property Description

Saving upon Power-off	PIN
N	Y

14.5.5 Example

Response: ^IPDATA:
1,71,123456781234561234567234567234567234678234782
34782345678234678903489034

14.6 AT^IPCLOSE-Close TCP/UDP Link

14.6.1 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>

14.6.2 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.

14.6.3 Parameter Description

<link_id>: link ID ranging from 1 to 7

1-5	The number of established links
6	Alocal 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.

14.6.4 Property Description

Saving upon Power-off	PIN
N	Y

14.6.5 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

14.7 AT^IPENTRANS-Enable Transparent Transfer Mode

14.7.1 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>
```

14.7.2 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.

14.7.3 Parameter Description

<link_id>: link number for entering the transparent transmission mode.

14.7.4 Property Description

Saving upon Power-off	PIN
N	Y

14.7.5 Example

Run: AT^IPENTRANS=1

Response: OK

Now the remote end receives any characters entered by the user.

14.8 AT^IPSENDEX-Send and Expand TCP/UDP Data

14.8.1 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^IPENTRANS=?

Possible Response(s)

<CR><LF>^IPSENDEX: (list of supported <link_id>s) , (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

14.8.2 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.

14.8.3 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>.

14.8.4 Property Description

Saving upon Power-off	PIN
N	Y

14.8.5 Example

Run: AT^IPSENDEX=1,1,"393830"

Response: ^IPSENDEX: 1

OK

Input user data:

Run: AT^IPSENDEX=1,2,3

Response: ^IPSENDEX: 1

OK

14.9 ^IPSTATE-Indicate TCP/UDP Data Link State

14.9.1 Command Syntax

URC
<CR><LF>^IPSTATE: <link_id>,<state>,<errcode><CR><LF>

14.9.2 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.

14.9.3 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

14.9.4 Property Description

Saving upon Power-off	PIN
N	Y

14.9.5 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

14.10 AT^IPCFL-Configure TCP/UDP Static Parameters

14.10.1 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>

14.10.2 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.

14.10.3 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.

14.10.4 Property Description

Saving upon Power-off	PIN
N	Y

14.10.5 Example

Run: AT^IPCFL=5,2 Set the time of the assembled data packet timer to 0.2s during transparent transmission.

Response: OK

15 Huawei Proprietary Interface: GPS Service Interfaces

15.1 AT^WPDOM-Set Operation Mode

15.1.1 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>

15.1.2 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.

15.1.3 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. |
| 2 | Speed optimal. The positioning data with the optimal speed is obtained, that is, the minimum TTF mode is used. The speed optimal mode is only MS-based in UMTS. |
| 3 | Accuracy optimal. The positioning data with the optimal accuracy is obtained. The accuracy optimal mode is only MS-assisted in UMTS. |
| 4 | Data optimal. The MS uses the minimum PDE data interaction mode with the network side. The data optimal mode is only standalone in UMTS. |
| 5 | MS-bases only. The network needs to provide positioning assistance information, and the MS calculates the position information. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning. |
| 6 | gpsOneXTRA which is the enhanced mode of standalone. Before the GPS searches the satellite, the GPS downloads the ephemeris data from the Internet. The orbit equation contained in the ephemeris data can save the time during data demodulation. |
| 7 | Low Accuracy MSA. The terminal originates an MSA positioning session with extremely low positioning accuracy in bad weather. The server side determines the positioning mode. Some positioning modes are directly converted into cell ID for positioning. Some positioning modes are converted to cell id after the MSA positioning session fails. The other positioning modes are never converted into cell ID. (In this operation mode, a specified QoS positioning session is originated, and the user does not need to set the QoS parameters.) |

<err>: error type prompts

Error code	Description
4	Operation not supported

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

15.1.4 Property Description

Saving upon Power-off	PIN
N	N

15.1.5 Example

1. Query the value range of operation mode:

Run: AT^WPDOM=?

Response: ^WPDOM: (0-7)

OK

2. Query the current operation mode:

Run: AT^WPDOM?

Response: ^WPDOM: 0

OK

3. Set the operation mode:

Run: AT^WPDOM=0

Response: OK

Run: AT^WPDOM=1

Response: OK

Run: AT^WPDOM=2
Response: OK

15.2 AT^WPDST-Set Session Type

15.2.1 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>

15.2.2 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.

15.2.3 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

15.2.4 Property Description

Saving upon Power-off	PIN
N	N

15.2.5 Example

1. Query the value range of session type:

Run: AT^WPDST=?

Response: ^WPDST: (0-2)

OK

2. Query the current session type:

Run: AT^WPDST?

Response: ^WPDST: 0

OK

3. 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
```

15.3 AT^WPDFR-Set Positioning Frequency

15.3.1 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,<time>s) <CR><LF><CR><LF>OK<CR><LF>

15.3.2 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`.

15.3.3 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

15.3.4 Property Description

Saving upon Power-off	PIN
N	N

15.3.5 Example

1. Query the value range of positioning frequency:

Run: `AT^WPDFR=?`

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

OK

2. Query the current positioning frequency

Run: AT^WPDFR?

Response: ^WPDFR: 65535,1

OK

3. 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

15.4 AT^WPQOS-Set QoS

15.4.1 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,<accuracy>s)<CR><LF><CR><LF>OK<CR><LF>

15.4.2 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.

15.4.3 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

15.4.4 Property Description

Saving upon Power-off	PIN
N	N

15.4.5 Example

1. Query the value range of QoS parameter:

Run: AT^WPQOS=?

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

OK

2. Query the current settings:

Run: AT^WPQOS?

Response: ^WPQOS: 255,50

OK

3. 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

15.5 AT^WPDGL-Set GPS Session Lock

15.5.1 Command Syntax

Set command

AT^WPDGL=<option>

Possible Response(s)

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

15.5.2 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.

15.5.3 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

<err>: error type prompts.

Error code	Description
4	Operation not supported
100	Unknown
281	Invalid parameter
283	PD session is ongoing

Error code	Description
285	Too many parameters

15.5.4 Property Description

Saving upon Power-off	PIN
Y	N

15.5.5 Example

1. Query the value range of the session lock's type:

Run: AT^WPDGL=?

Response: ^WPDGL: (0-3)

OK

2. Query the current GPS session lock type:

Run: AT^WPDGL?

Response: ^WPDGL: 0

OK

3. Set the GPS session lock type:

Run: AT^WPDGL=1

Response: OK

15.6 AT^GPSTYPE-Query GPS Type

15.6.1 Command Syntax

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

15.6.2 Interface Description

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

15.6.3 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

15.6.4 Property Description

Saving upon Power-off	PIN
Y	N

15.6.5 Example

If the module supports all GPS types:

Run: AT^GPSTYPE?

Response: ^GPSTYPE: 15

OK

The binary digit of 15 is 1111.

15.7 AT^WGNSS-Set Positioning System

15.7.1 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>

15.7.2 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.

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.

15.7.3 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

15.7.4 Property Description

Saving upon Power-off	PIN
Y	N

15.7.5 Example

1. Query the value range of positioning system's type:

Run: AT^WGNSS=?

Response: ^WGNSS: (0-1)

OK

2. Query the current positioning system type:

Run: AT^WGNSS?

Response: ^WGNSS: 0

OK

3. Set the positioning system type:

Run: AT^WGNSS=1

Response: OK

15.8 AT^WPURL-Set AGPS Server Address and Port on the WCDMA Network

15.8.1 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>

15.8.2 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.

15.8.3 Parameter Description

<url>: address of the AGPS server in the WCDMA server. It is a URL 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

15.8.4 Property Description

Saving upon Power-off	PIN
Y	N

15.8.5 Example

Set the address of the AGPS server:

Run: AT^WPURL=SUPL.GOOGLE.COM:7276

Set the address of the AGPS server.

Response: OK

15.9 AT^WPDGP-Start Positioning Session

15.9.1 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>

15.9.2 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.

15.9.3 Parameter Description

<err>: error type prompts

Error code	Description
4	Operation not supported
276	GPS function disabled
277	Standalone disabled
278	AGPS disabled

Error code	Description
279	gpsOneXTRA disabled
283	PD session is ongoing
287	GPS locked

15.9.4 Property Description

Saving upon Power-off	PIN
NA	N

15.9.5 Example

1. Set PD session failed:

Run: AT^WPDGL=1

Response: OK

Run: AT^WPDGP

Response: +CME ERROR: GPS locked

2. Set PD session success:

Run: AT^WPDGL=0

Response: OK

Run: AT^WPDGP

Response: OK

15.10 AT^SOCKETCONT-Set the AGPS Socket Profile

15.10.1 Command Syntax

Set command

AT^SOCKETCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_c
omp>]]]]]

Possible Response(s)

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

In case of an error:
<code><CR><LF>+CME ERROR: <err><CR><LF></code>
Read command
<code>AT^SOCKETCONT?</code>
Possible Response(s)
<code><CR><LF>^SOCKETCONT:</code> <code><cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[<CR><LF>^SOCKETCONT:</code> <code><cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[...]]<CR><LF></code> <code><CR><LF>OK<CR><LF></code>
Test command
<code>AT^SOCKETCONT=?</code>
Possible Response(s)
<code><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:</code> <code>(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></code>

15.10.2 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.

15.10.3 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 forcibly 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 SMDCP only)

3 RFC2507

4 RFC3095 (applicable for PDCP only)

15.10.4 Property Description

Saving upon Power-off	PIN
Y	N

15.10.5 Example

Run:	<code>AT^SOCKETCONT=1,"IP","abc.com","10.111.145.233",1,1</code>	Modify the PDP context of index 15 on the MT (regardless of the value of the <cid> parameter).
Response:	OK	
Run:	<code>AT^SOCKETCONT=1</code>	Delete the PDP context of index 15 (regardless of the value of the <cid> parameter).
Response:	OK	

15.11 AT^WPEND-Terminate Positioning Process

15.11.1 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>

15.11.2 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.

15.11.3 Parameter Description

<err>: error type prompts

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

15.11.4 Property Description

Saving upon Power-off	PIN
NA	N

15.11.5 Example

1. Terminate the PD session successfully:

Run: AT^WPEND

Response: OK

2. PD Session is not on going, Terminate Failure:

Run: AT^WPEND

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

15.12 AT^WPDIM-Delete Auxiliary Data

15.12.1 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>

15.12.2 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.

15.12.3 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

15.12.4 Property Description

Saving upon Power-off	PIN
NA	N

15.12.5 Example

1. Query the value range of delete auxiliary data mode:

Run: AT^WPDIM=?

Response: ^WPDIM: (0-3)

OK

2. Set the deletion mode:

Run: AT^WPDIM=1

Response: OK

15.13 AT^XTRATIME-Inject XTRA Time

15.13.1 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>
```

15.13.2 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.

15.13.3 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

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

15.13.4 Property Description

Saving upon Power-off	PIN
N	N

15.13.5 Example

Inject XTRA time:

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

Response: OK

15.14 ^TIMESETRULT-Notify XTRA Time Injection

15.14.1 Command Syntax

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

15.14.2 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.

15.14.3 Parameter Description

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

0 Injection succeeds

1 Injection fails

15.14.4 Property Description

Saving upon Power-off	PIN
NA	N

15.14.5 Example

If XTRA time have been injected successfully:

Response: `^TIMESETRULT: 0`

15.15 AT^XTRADATA-Inject Auxiliary XTRA Data

15.15.1 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>`

15.15.2 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 XTRA data is injected into the board. The successful XTRA 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 XTRA 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.

15.15.3 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

15.15.4 Property Description

Saving upon Power-off	PIN
Y	N

15.15.5 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
      0c370810100f0e0d0c0a090e5308110f0e0c0c09080d9602
      0b05020303c21f010004bb240ba2fd5600a10cda001a4cc400
      25576fffbef55ab00dc0003068b0200595724fdadfd4300a10c
      b50019d4d9ff8b41cb00021b9d018d0000068b03007b0b24f8
      55fd2700a10d1cffe7edd002fb1280007990d000a0001068b
      040051c824fd0efd4300a10de9001a86820021c5e2007fdb71
      00610003068b050016372405d7fd4500a10c6b004525c0000b
      dcc3004fd4a3fed8ffff068b0600396524fce3fd2e00a10d15
      ffed9544ffe727cc00564c87001f00,512,1
```

Response: OK

15.16 ^DATASETRULT-Notify XTRA Data Injection

15.16.1 Command Syntax

URC

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

15.16.2 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.

15.16.3 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 |

15.16.4 Property Description

Saving upon Power-off	PIN
NA	N

15.16.5 Example

If auxiliary XTRA data have been injected successfully:

Response: ^DATASETRULT: 0

15.17 AT^XTRASTA-Query XTRA Data Status

15.17.1 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>

15.17.2 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 XTRA 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.

15.17.3 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

15.17.4 Property Description

Saving upon Power-off	PIN
NA	N

15.17.5 Example

Query the XTRA data status:

Run: AT^XTRASTA

Response: OK

15.18 ^XDSTATUS-Notify XTRA Data Status

15.18.1 Command Syntax

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

15.18.2 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.

15.18.3 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.

15.18.4 Property Description

Saving upon Power-off	PIN
NA	N

15.18.5 Example

If AT^XTRASTA command have been executed successfully:

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

15.19 ^POSITION-Notify Positioning Result

15.19.1 Command Syntax

URC

<CR><LF>^POSITION:<long>,<lat>,<alt><CR><LF>

15.19.2 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.

15.19.3 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.

15.19.4 Property Description

Saving upon Power-off	PIN
NA	N

15.19.5 Example

When positioning data is available, report the following:

Response: ^POSITION:113.94026d,22.53206d,270m

15.20 ^POSEND-Report Positioning End Information

15.20.1 Command Syntax

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

15.20.2 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.

15.20.3 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

15.20.4 Property Description

Saving upon Power-off	PIN
NA	N

15.20.5 Example

If user ended the PD session:

Response: ^POSEND: 9,0

15.21 ^WNINV-Notify NI Positioning

15.21.1 Command Syntax

URC

<CR><LF>^WNINV: <req_type><CR><LF>

15.21.2 Interface Description

This command is used by the board to notify the user of the positioning request from the network side.

15.21.3 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. |

15.21.4 Property Description

Saving upon Power-off	PIN
NA	N

15.21.5 Example

1. Notify and verify NI positioning:

Response: ^WNINV: 0

2. Only notify NI positioning:

Response: ^WNINV: 1

3. No notify No verify:

Response: ^WNINV: 2

15.22 AT^WNICT-Set NI Response

15.22.1 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>

15.22.2 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.

15.22.3 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



15.22.4 Property Description

Saving upon Power-off	PIN
NA	N

15.22.5 Example

1. Query the range of supported values:

Run: AT^WNICT=?

Response: ^WNICT: (0-1)

OK

2. Set NI response:

Run: AT^WNICT=0

Response: OK

Run: AT^WNICT=1

Response: OK

16 Huawei Proprietary Interface: STK Interface

16.1 AT^STSF-Configure the Mode of STK

16.1.1 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>

16.1.2 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).

16.1.3 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 TS27.007 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.

16.1.4 Property Description

Saving upon Power-off	PIN
Y	N

16.1.5 Example

1. Disable STK:

Run: AT^STSF=0

Response: OK

2. Parameter setting error:

Run: AT^STSF=3,0
Response: ERROR

3. Active STK and set STK to standard raw data mode:

Run: AT^STSF=1,2
Response: OK

16.2 AT^CUSATM-Query the Main Menu

16.2.1 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>

16.2.2 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".

16.2.3 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 TS102.221 and ETSI TS102.223 protocols.

16.2.4 Property Description

Saving upon Power-off	PIN
NA	Y



16.2.5 Example

Query the main menu:

Run: AT^CUSATM?

Response: ^CUSATM:
"D0818A81030125008202818285118051687403901A0055005
30049004D53618F0D01444953504C415920544558548F0A024
7455420494E4B45598F0A0347455420494E5055548F0A044D4
F52452054494D458F0A05504C415920544F4E458F0E06504F4
C4C20494E54455256414C8F0807524546524553488F1308534
54E442053484F5254204D455353414745"

OK

17

Huawei Proprietary Interface: Temperature Protection

17.1 AT^CHIPTEMP-Query the Temperature of the PA/SIM/Battery/Crystal Oscillator

17.1.1 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.

17.1.2 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.

17.1.3 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.

17.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

17.1.5 Example

1. Query the temperature of the PA, SIM card, battery, and crystal oscillator:

Run: AT^CHIPTEMP?
Response: ^CHIPTEMP: 65535,65535,65535,65535,65535,300

OK

2. 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), (65535-65535), (65535-65535), (300-1100)

OK

17.2 AT^THERMFUN-Enable or Disable the Temperature Protection Function

17.2.1 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>

17.2.2 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.

17.2.3 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.

17.2.4 Property Description

Saving upon Power-off	PIN
N	N

17.2.5 Example

1. Check the parameter range supported by the command

Run: AT^THERMFUN=?
Response: ^THERMFUN: (0-1)

OK

2. Query whether the temperature protection function is enabled or disabled.

Run: AT^THERMFUN?
Response: ^THERMFUN: 1

OK



3. Enable the temperature protection function.

Run: AT^THERMFUN=1

Response: OK

A parameter value takes effect immediately after setting.

18 Appendix

18.1 List of URC Commands

URC	Function
+CSSI	Supplementary service notifications
+CSSU	Supplementary service notifications
+CUSD	Unsolicitedly report USSD of network
+CMTI	New SMS-DELIVER indication
+CMT	New message directly deliver indication
+CDSI	New SMS status report indication
+CDS	SMS status report indication directly displayed
+CUSATP	Unsolicitedly report a UICC proactive command
+CUSATEND	Unsolicitedly report of terminating a UICC proactive command session
^NWTIME	Unsolicitedly report network system time
^SYSSTART	Unsolicitedly report module startup
^THERM	Thermal protection activated unsolicited report
^NWTIME	Unsolicitedly report network system time
^SMEMFULL	Message memory full
^SRVST	Service state change indication
^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

URC	Function
^DATASETRULT	Notify XTRA data injection
^XDSTATUS	Notify XTRA data status
^POSITION	Notify positioning result
^POSEND	Report positioning end information
^WNINV	Notify NI positioning

18.2 General CME Error List

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

Table 18-1 General "CME ERROR" Codes

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

Numeric mode	Verbose mode
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed-emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
48	hidden key required
49	EAP method not supported
50	Incorrect parameters
51	Parameter length error for all Auth commands
52	Temporary error for all auth cmds
100	unknown
103	Illegal Mem_Store
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	service option not supported
133	requested service option not subscribed
134	service option temporarily out of order (#34)

Numeric mode	Verbose mode
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 18-2 General "CME ERROR" Codes (Huawei proprietary)

Numeric mode	Verbose mode
322	sys state error
323	parameters error
65284	spn file wrong
65285	Invalid parameter
65286	spn file accessed denied
65287	another SPN query operation still not finished
65289	input value is out of range

Table 18-3 GPS related "CME ERROR" Codes (Huawei proprietary)

Numeric mode	Verbose mode
276	GPS function disabled
277	Standalone disabled
278	AGPS disabled

Numeric mode	Verbose mode
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 18-4 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

Numeric mode	Verbose mode
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

18.3 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

Numeric mode	Verbose mode
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

18.4 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.
ERROR	4	There is a common error.
+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.

18.5 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
ATS3	<value>=013
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+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+CSSN	<n>=0, <m>=0

18.6 References

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

- [1] 3GPP TS 22.101
- [2] 3GPP TS 22.067
- [3] 3GPP TS 23.040
- [4] 3GPP TS 23.038
- [5] 3GPP TS 23.003
- [6] 3GPP TS 23.107
- [7] 3GPP TS 24.008
- [8] 3GPP TS 25.331
- [9] 3GPP TS 27.007 3d0
- [10] 3GPP TS 27.005 320
- [11] 3GPP TS 27.060
- [12] 3GPP TS 29.061
- [13] 3GPP TS 31.102
- [14] 3GPP TS 31.111
- [15] 3GPP TS 44.060
- [16] ETSI TS102.221
- [17] ETSI TS102.223
- [18] ITU-T Recommendation V.25 ter
- [19] HUAWEI Terminal AT Command Interface Specifications
- [20] E620 V100R001 Software Interface Specifications
- [21] AT Command Interface Specifications for Huawei UTPS Dashboard (GSM & WCDMA) V1.0.5
- [22] Guide for Modifying HUAWEI Terminal AT Command Interface Specifications V1.0. Huawei Internal Notes Specifications (for Huawei Device), Doc. code DKBA 2583-2010.3.

18.7 Acronyms and Abbreviations

Acronym or Abbreviation	Full spelling
3GPP	Third Generation Partnership Project
AT	ATtention
APN	Access Point Name

Acronym or Abbreviation	Full spelling
BER	Bit Error Rate
CDMA	Code Division Multiple Access
CS	Circuit Switched (CS) domain
CUG	Closed User Group
DCE	Data Circuit Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
IWF	Interworking Function
MCC	Mobile Country Code
ME	Mobile Equipment
MNC	Mobile Network Code
MS	Mobile Station
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
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

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