



HUAWEI MU709 Series HSPA+ Module
V100R002

AT Command Interface Specification

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2015-02-13		Creation
02	2015-03-09	4.3	Updated AT+CLCK–Facility Lock
		4.8	Updated AT+CCFC–Call Forwarding
		4.9	Updated AT+CCWA–Call Waiting
		10.10	Updated AT^LEDCTRL–Control LED GPIO PIN
		16.19	Updated AT^SLEN–Initialize Secure Service
		16.26	Updated ^SSLRX–Notify SSL Arrival Data
03	2015-05-13	3.1.3	Updated ATD–Dial Command
04	2016-01-05	2.12	Updated AT+CSCS–Select TE Character Set
		4.3	Updated AT+CLCK–Facility Lock
		4.11	Updated AT+CHLD–Call Hold
		6.12	Added AT^AUDIOCFG–Set Tone Volume Level
		14.2.3	Updated AT^SYSINFOEX–Query Extended System Information
		15.1.2	Updated AT^AUDREC–Record Audio
		15.2.2	Updated ^AUDEND–Unsolicitedly Report the End of Audio Playback
		15.3.2	Updated AT^RECCFG–Change the Recording Settings
15.4.2	Updated AT^FILEIO–Operate File		



Document Version	Date	Chapter	Descriptions
		16.11	Updated AT^IPCFL–Configure TCP/UDP Static Parameters
		16.12	Added AT^HBECONT–Set Heartbeat Parameters
		16.13	Added AT^HBEACT–Set Heartbeat Function
		16.22	Updated AT^SSLCFG–Configure SSL
		19.10	Updated AT^FOTASMSCFG–Set FOTA SMS Auto-Upgrade
		19.11	Updated AT^FOTASMS–Notify User to Decide on FOTA Upgrade
		19.12	Updated AT^FOTAP–Confirm FOTA Upgrade
		23.1	Added AT^CODECPOW–Initialize Codec Settings After Power-on
		23.2	Added AT^SETCODECREG–Configure the Codec Register
		23.3	Added AT^GETCODECREG–Query the Codec Register
		23.4	Added AT^PCMCODECCFG–Set the Codec
05	2016-10-27	2.21	Added AT^CUSTFEATURE–Control M2M Customized Feature
		6.11	Updated AT+CCLK–Return Current Time of the Module
		11.5	Added AT^CALLSRV–Set the CS Voice Function
		12.12	Added AT^MEDAEC–Set AEC DTD Parameters
		12.13	Added AT^MEDAIG–Set AIG Parameters
		12.14	Added AT^MEDANR1MIC–Set the ANR1 Maximum Noise Suppression
		12.15	Added AT^MEDANR2MIC–Set the ANR2 Suppression Gain Lower Limit
		12.16	Added AT^MEDCOMPAIN–Set the Left Offset for Gain



Document Version	Date	Chapter	Descriptions
		12.17	Added AT^MEDDEVGAIN—Set the Gain for Uplink or Downlink Device in Single-Talk Mode
		12.18	Added AT^MEDHPF—Enable or Disable HPF

Scope

MU709s-2 (11.652.65.00.00 version or later)

MU709s-6



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1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by HUAWEI Mobile Broadband product MU709 series module.

Table 1-1 MU709 series module

Product	Bands
MU709s-2	UMTS: WCDMA 900 MHz/2100 MHz GSM: 850 MHz/900 MHz, DCS 1800 MHz, and PCS 1900 MHz
MU709s-6	UMTS: WCDMA 850 MHz/1900 MHz/2100 MHz GSM: 850 MHz/900 MHz, DCS 1800 MHz, and PCS 1900 MHz

Please read the Release Notes released with the firmware before using MU709 series 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 Document Conventions

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

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

For example:

Saving upon Power-off	PIN
N	Y

The settings are described as follows:

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

1.4 AT Command Syntax

1.4.1 AT Command Description

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

Figure 1-1 Interaction between the TE and MT

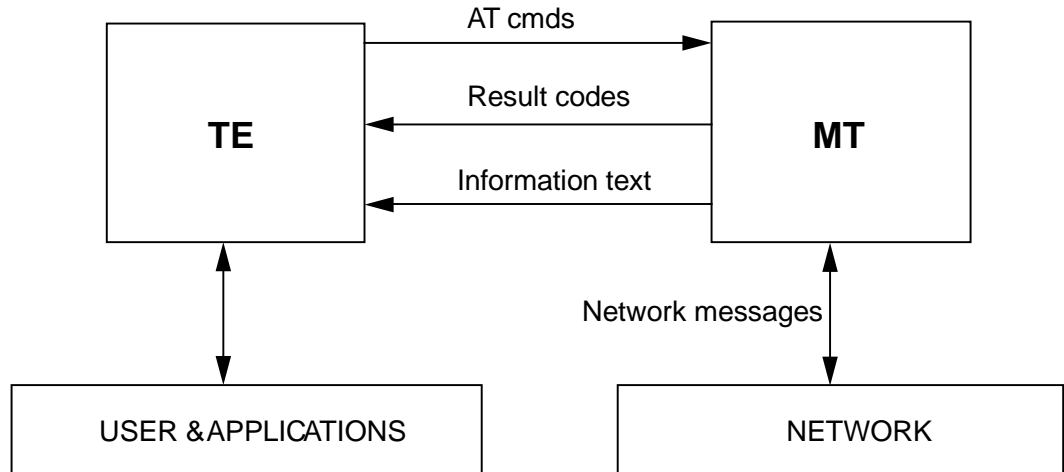
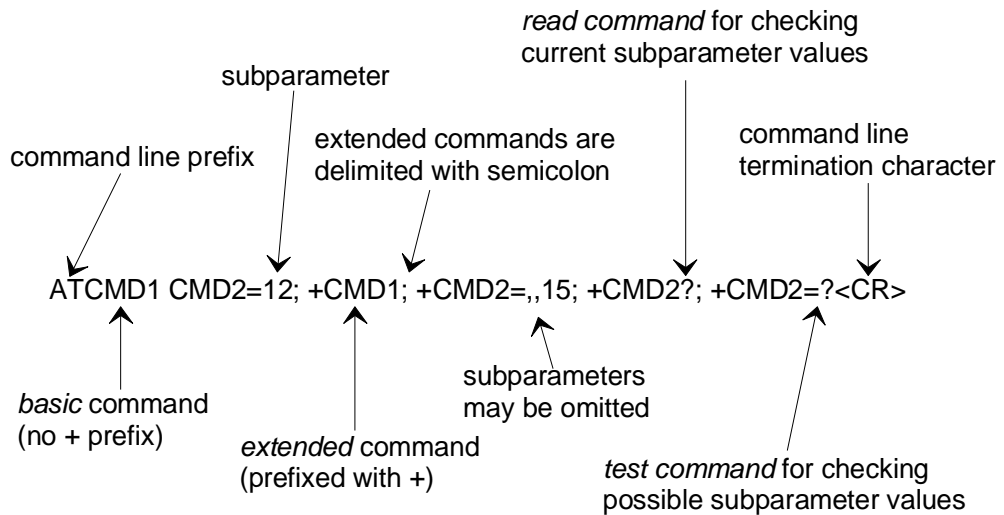


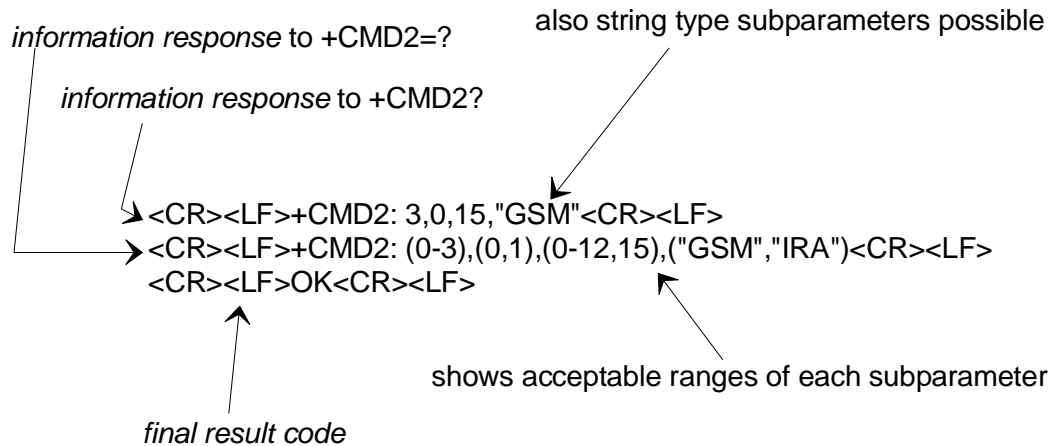
Figure 1-2 shows the basic organization format of the AT command line.

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



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

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



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

1.4.2 AT Command Types

Table 1-2 Types of AT commands

AT command type	Sub-type	Syntax	Function
General command	Set command	<ul style="list-style-type: none"> Contains one parameter: AT<name>[=<value>] Contains multiple parameters: AT<name>=[<compound_value>] 	A set command is executed to set parameters.
	Execution command	<ul style="list-style-type: none"> 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.

AT command type	Sub-type	Syntax	Function
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>.

1.4.3 AT Command Parameter

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

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

- <...>: The parameter inside these angle brackets is mandatory. The <> does not exist in a command.
- [...]: The parameter inside these square brackets is optional. The [] does not exist in a command or a response.
- <CR>: Carriage return character, which value is specified with command S3.
- <LF>: Line feed character, which value is specified with command S4.

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

**NOTE**

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

1.5 Abort Attributes of AT Commands

Some action commands that require time to execute may be aborted while in progress. Aborting of commands is accomplished by the transmission from the DTE to the DCE of any character. A single character shall be sufficient to abort the command in progress; however, characters transmitted during the first 400 milliseconds after transmission of the termination character shall be ignored (to allow for the DTE to append additional control characters such as line feed after the command line termination character). To insure that the aborting character is recognized by the DCE, it should be sent at the same rate as the preceding command line; the DCE may ignore characters sent at other rates. When such an aborting event is recognized by the DCE, it shall terminate the command in progress and return an appropriate result code to the DTE, as specified for the particular command.

The following commands can be aborted.

ATD

ATA

AT+CLCK

AT+COPS=?

AT+CLCC

AT+CLIP

AT^IPINIT

AT^IPOPEN

AT^IPSEND

AT^IPSENDEX

AT^IPCLOSE

AT^EMSEND

AT^HTTPCMD

AT^FTPCMD

AT^SSLO

AT^SSLTX

AT^SSLRX

AT+CMSS

1.6 Rules for Running AT Commands

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

2 General Commands

2.1 ATE-Echo Command

2.1.1 Command Syntax

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

2.1.2 Interface Description

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

**NOTE**

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

2.1.3 Parameter Description

<value>:

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

**NOTE**

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

2.1.4 Property Description

Saving upon Power-off	PIN
N	N

2.1.5 Example

Run: ATE0
Response: OK

2.2 ATS0-Ring Before Automatic Answer

2.2.1 Command Syntax

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

2.2.2 Interface Description

The set command is used to disable or enable the DCE automatic to answer the incoming call. If set to a non-zero value, the DCE shall cause the DCE to answer when the incoming call indication (ring) has occurred the number of times indicated by the value.

The read command is used to return the current value.

For PS and CS incoming call:

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

2.2.3 Parameter Description

<value>: the default value is 0.

0-255 Enable automatic answering after the specified number of rings.

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

2.2.5 Example

Run: ATS0=3
Response: OK

2.3 ATS3-Command Line Termination Character

2.3.1 Command Syntax

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

2.3.2 Interface Description

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

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

2.3.3 Parameter Description

<value>: the default value is 13.

0-127 Set S3 in ASCII code

2.3.4 Property Description

Saving upon Power-off	PIN
N	N

2.3.5 Example

Run: ATS3=13
Response: OK

2.4 ATS4-Response Format Character

2.4.1 Command Syntax

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

2.4.2 Interface Description

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

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

2.4.3 Parameter Description

<value>: the default value is 10.

0–127 Set *S4* in ASCII code.

2.4.4 Property Description

Saving upon Power-off	PIN
N	N

2.4.5 Example

Run: ATS4=10

Response: OK

2.5 ATV-Set the Response Format

2.5.1 Command Syntax

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

2.5.2 Interface Description

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

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

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

2.5.3 Parameter Description

<value>:

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



NOTE

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

2.5.4 Property Description

Saving upon Power-off	PIN
N	N

2.5.5 Example

Run: ATV1

Response: OK

2.6 ATI-Request Identification

2.6.1 Command Syntax

```
ATI[<value>]
```

Possible Response(s)

```
<CR><LF><list of MS ID info><CR><LF><CR><LF>OK<CR><LF>
```

2.6.2 Interface Description

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

Manufacturer (`AT+GMI`)

Product model (`AT+GMM`)

Software version (`AT+GMR`)

ESN/IMEI (`AT+GSN`)

Capability list (`AT+GCAP`)

About the details, please see 2.6.5 Example.

2.6.3 Parameter Description

`<value>`: queries the previously described MS ID information. The value ranges from 0 to 255 (these values are meaningless). If `<value>` is not specified, it is equivalent to set `<value>` to 0.

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

```
Run:          ATI
Response:    Manufacturer: Huawei Technologies Co., Ltd.
              Model: MU709s-2
              Revision: 11.652.60.00.00
              IMEI: 356112010004540
              +GCAP: +CGSM,+DS,+ES

              OK
```

2.7 AT+GCAP-Request Transmission Capacity Domain Identification

2.7.1 Command Syntax

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

2.7.2 Interface Description

This command lists transmission capacity domains currently supported by an MS.
Only the execution command is supported at present. The test command returns OK.

2.7.3 Parameter Description

None.

2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

```
Run:          AT+GCAP
Response:    +GCAP: +CGSM,+DS,+ES

              OK
```

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

2.8.1 Command Syntax

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

2.8.2 Interface Description

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

2.8.3 Parameter Description

<manufacturer>: a string indicating the manufacturer information.

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

2.8.4 Property Description

Saving upon Power-off	PIN
NA	N

2.8.5 Example

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

              OK
```

2.9 AT+CGMM/AT+GMM-Request Model Identification

2.9.1 Command Syntax

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

2.9.2 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.

2.9.3 Parameter Description

<production_name>: indicates the product name.

2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

Product name: MU709s-2

Run: AT+CGMM

Response: MU709s-2

OK

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

2.10.1 Command Syntax

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

2.10.2 Interface Description

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

2.10.3 Parameter Description

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

2.10.4 Property Description

Saving upon Power-off	PIN
NA	N

2.10.5 Example

```
Run:          AT+CGMR
Response:    11.103.35.00.00

                OK
```

2.11 AT+CGSN/AT+GSN-Request Product Serial Number Identification

2.11.1 Command Syntax

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

2.11.2 Interface Description

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

2.11.3 Parameter Description

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

8 char	6 char	1 char
TAC	SNR	Spare

TAC : the type approval code assigned to the MT

SNR : the MT's serial number

Spare: spare digit

2.11.4 Property Description

Saving upon Power-off	PIN
NA	N

2.11.5 Example

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

Run: AT+CGSN

Response: 351548000225444

OK

2.12 AT+CSCS-Select TE Character Set

2.12.1 Command Syntax

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

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

2.12.2 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.

2.12.3 Parameter Description

<chset>:

"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. (not supported currently)
"IRA"	International reference alphabet (ITU-T T.50) (default value)
"PCCPxxx"	PC character set Code Page xxx (not supported currently)
"PCDN"	PC Danish/Norwegian character set (not supported currently)
"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.
"8859-1"	ISO 8859 Latin 1 character set
"8859-n"	ISO 8859 Latin n (2–6) character set (not supported currently)
"8859-C"	ISO 8859 Latin/Cyrillic character set (not supported currently)
"8859-A"	ISO 8859 Latin/Arabic character set (not supported currently)
"8859-G"	ISO 8859 Latin/Greek character set (not supported currently)
"8859-H"	ISO 8859 Latin/Hebrew character set (not supported currently)



NOTE

- If <chset> is not specified, it is equivalent to set <chset> to "IRA".
- 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).

2.12.4 Property Description

Saving upon Power-off	PIN
N	N

2.12.5 Example

```
Run:          AT+CSCS="IRA"  
Response:    OK  
Run:          AT+CSCS?  
Response:    +CSCS: "IRA"  
  
              OK  
Run:          AT+CSCS=?  
Response:    +CSCS: ("IRA", "UCS2", "GSM", "8859-1")  
  
              OK
```

2.13 AT+CIMI-Request IMSI

2.13.1 Command Syntax

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

2.13.2 Interface Description

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

2.13.3 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

2.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

2.13.5 Example

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

```
Run:          AT+CIMI
Response:    123451234567890

              OK
```

2.14 ATZ–Restore Factory Settings

2.14.1 Command Syntax

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

2.14.2 Interface Description

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

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

For the restored parameters of the AT command, see Table 2-1 . In addition to restoring the parameters of the AT command to their default values, the `AT&W`

command can set the user value. If the user value is not set, the parameters are restored to the factory default values.

2.14.3 Parameter Description

<value>

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



NOTE

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

2.14.4 Property Description

Saving upon Power-off	PIN
NA	N

2.14.5 Example

Run: ATZ0

Response: OK

2.15 AT&F-Restore Default AT Command Settings

2.15.1 Command Syntax

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

2.15.2 Interface Description

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

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

Command
E
V

Command
Q
X
&C
&D
&S
S0
S3
S4
S5
S7



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.

2.15.3 Parameter Description

<value>:

0 Restore the parameters of all the AT commands described in Table 2-1 to their default settings.

Other values Used by the manufacturer for function expansion. (not supported currently)



NOTE

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

2.15.4 Property Description

Saving upon Power-off	PIN
NA	N

2.15.5 Example

Run: AT&F0

Response: OK

2.16 A/-Repeat Previous Command Line

2.16.1 Command Syntax

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

2.16.2 Interface Description

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

2.16.3 Parameter Description

None

2.16.4 Property Description

Saving upon Power-off	PIN
NA	N

2.16.5 Example

If the last command is:

```
Run:      AT+CGSN
Response: 351782030028946

OK

Run:      A/
Response: 351782030028946

OK
```


2.17 ATQ-Set Result Code Presentation Mode

2.17.1 Command Syntax

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

2.17.2 Interface Description

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

2.17.3 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.

2.17.4 Property Description

Saving upon Power-off	PIN
N	N

2.17.5 Example

Run: ATQ0

Response: OK

2.18 AT&W-Store User Settings

2.18.1 Command Syntax

AT&W
Possible Response(s)
<CR><LF>OK<CR><LF>

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

2.18.2 Interface Description

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

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

2.18.3 Parameter Description

None

2.18.4 Property Description

Saving upon Power-off	PIN
NA	N

2.18.5 Example

Run: AT&W
Response: OK

2.19 AT&V-Query Current Configuration

2.19.1 Command Syntax

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

2.19.2 Interface Description

This command queries the current configuration.

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

2.19.3 Parameter Description

None

2.19.4 Property Description

Saving upon Power-off	PIN
NA	N

2.19.5 Example

Run: AT&V

Response: E: 1; V: 1; Q: 0; X: 1; &C: 1; &D: 2; &S: 0;S0: 000;
S3: 013; S4: 010; S5: 008; S7: 050; +IFC: 0,0; +ICF:
3,3; +IPR: 115200;

OK

2.20 AT+CMEE-Report Mobile Termination Error

2.20.1 Command Syntax

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

2.20.2 Interface Description

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

2.20.3 Parameter Description

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

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

<err>: see section 25.2

General CME Error List.

2.20.4 Property Description

Saving upon Power-off	PIN
N	N

2.20.5 Example

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

Run:          AT+CMEE?
Response:     +CMEE: 2

                OK

Run:          AT+CMEE=?
Response:     +CMEE: (0-2)

                OK
```

2.21 AT^CUSTFEATURE-Control M2M Customized Feature

2.21.1 Command Syntax

```
AT^CUSTFEATURE=<ID>,<Val>
```

```
Possible Response(s)
```

<pre><CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>
<pre>AT^CUSTFEATURE?</pre>
<p>Possible Response(s)</p>
<pre><CR><LF>^CUSTFEATURE: <CR><LF>[<ID>, <Val><CR><LF>[...]]<CR><LF>OK<CR><LF></pre>
<pre>AT^CUSTFEATURE=?</pre>
<p>Possible Response(s)</p>
<pre><CR><LF>^CUSTFEATURE: (0-127), (0-1)<CR><LF><CR><LF>OK<CR><LF></pre>

2.21.2 Interface Description

The set command disables or enables the customized M2M feature.

The read command returns the current enabled customized M2M feature.

The test command returns the supported parameter value

2.21.3 Parameter Description

<ID>: an integer type value that indicates the customized M2M feature index.

- | | |
|---|---|
| 0 | Disconnect the network when no service in connect mode of Haikang (not supported currently) |
| 1 | Fall back to NULL APN when LTE attach rejects with cause #33 of Haikang (not supported currently) |
| 2 | Try 4G network when camped on 2G/3G feature of Haikang (not supported currently) |
| 3 | Netmask feature customized of BaiFu (not supported currently) |
| 4 | PPP connect default authentication to none of BaiFu (not supported currently) |
| 5 | Avoid BaiFu machine dump issues |
| 6 | BaiFu delay report feature |

<Val>: an integer type value that indicates the feature switch is on or off.

- | | |
|---|----------------------------|
| 0 | The feature switch is off. |
| 1 | The feature switch is on. |

2.21.4 Property Description

Saving upon Power-off	PIN
Y	N

2.21.5 Example

- Set the customized M2M feature.

Run: AT^CUSTFEATURE=1,1

Response: OK

- Query the current enabled customized M2M feature.

Run: AT^CUSTFEATURE?

Response: ^CUSTFEATURE:

0,1

1,1

OK

- Query the supported parameter values.

Run: AT^CUSTFEATURE?

Response: ^CUSTFEATURE: (0-127), (0-1)

OK

3 Call Control Commands and Methods

3.1 ATD-Dial Command

3.1.1 Command Syntax

```
ATD[<digits>][I/i];
```

Possible Response(s)

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

About the responses, see "Final Result Code" in the 25.4 .

3.1.2 Interface Description

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

3.1.3 Parameter Description

<digits>: the called phone number, ASCII characters. Valid characters are '0'-'9', '*', '#', and '+'. '+' is only allowed before a phone number, otherwise it will be ignored. The maximum length of the number for a 3GPP product cannot exceed 80 characters (excluding '+'). Invalid characters of the number are dealt allowing for platform differences.

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

I	Enable CLIR
i	Disable CLIR

Exceptions:

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

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

[;]: call type indication. When ';' is contained in this command, a voice call is initiated. When ';' is not contained in this command, a CS data service call is initiated (the CS data service call is not supported currently).



NOTE

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

3.1.4 Property Description

Saving upon Power-off	PIN
NA	N

3.1.5 Example

- Dial a valid number at normal case:

Run: ATD13903711825;

Initiate a voice call.

Response: OK

- Dial a number when the SIM pin is required:

Run: ATD13903711825;

Initiate a voice call.

Response: NO CARRIER

3.2 ATA-Answering Command

3.2.1 Command Syntax

ATA
Possible Response(s)
<CR><LF>OK<CR><LF>
About the responses, see "Final Result Code" in the 25.4 .

3.2.2 Interface Description

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



NOTE

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

3.2.3 Parameter Description

None

3.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.2.5 Example

Answer a normal voice call:

Run: ATA

Response: OK

3.3 ATH-Hang Up Call

3.3.1 Command Syntax

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

3.3.2 Interface Description

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

3.3.3 Parameter Description

<value>: an integer type value.

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

3.3.4 Property Description

Saving upon Power-off	PIN
NA	N

3.3.5 Example

- Disconnect the current connection:

Run: ATH

Response: OK

Run: ATH0

Response: OK

- Use the incorrect parameter:

Run: ATH1

Response: ERROR

3.4 RING-Call Indication

3.4.1 Command Syntax

URC
Possible Response(s)
RING

3.4.2 Interface Description

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

3.4.3 Parameter Description

None

3.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

3.4.5 Example

Ring notification:

Response: RING If the CRC is disabled, the ring will be reported.

RING

RING

RING

3.5 +CRING-Indicate Incoming Call

3.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CRING: <type><CR><LF>

3.5.2 Interface Description

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

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

3.5.3 Parameter Description

<type>: the details refer to 3.10 AT+CRC-Cellular Result Codes.

3.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

3.5.5 Example

When a new call comes, the following unsolicited report will be returned:

Response: +CRING: VOICE

3.6 AT+VTS-Send DTMF Tone

3.6.1 Command Syntax

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

3.6.2 Interface Description

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

3.6.3 Parameter Description

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

<duration>: tone duration in 1/10 seconds with tolerance. The minimum duration of DTMF signals is 100 ms (default value). The range of the valid value is from 1 to 255.



NOTE

The tone is generated by MSC (Mobile Switching Center), <duration> may influent but could not determine the length of the tone. It all depends on the pre-determined parameters set by Network operator.

3.6.4 Property Description

Saving upon Power-off	PIN
NA	N

3.6.5 Example

Send the DTMF character 'A' during an active voice call:

Run: AT+VTS=A

Response: OK

3.7 ATO-Return to Data State

3.7.1 Command Syntax

```
ATO[<value>]
```

Possible Response(s)

```
<CR><LF>CONNECT [<text>]<CR><LF>
```

or

```
<CR><LF>NO CARRIER<CR><LF>
```

or

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

3.7.2 Interface Description

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

3.7.3 Parameter Description

<value>:

0 Switch command mode to data state.

<text>: indicator of interface speed.



NOTE

"ATO" is the same as "AT00" and not support PCUI port.

When one port is in data/PPP state, other port is forbidden to send "ATO" or "AT00".

3.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.7.5 Example

Run: ATO

Response: CONNECT 9600

3.8 +++-Switch Data Mode to Command Mode

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

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

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

3.8.1 Example

```
Run:          +++
Response:    OK                Currently DCE is command mode.
```

3.9 AT+CHUP-Hangup a Call

3.9.1 Command Syntax

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

3.9.2 Interface Description

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

3.9.3 Parameter Description

None

3.9.4 Property Description

Saving upon Power-off	PIN
NA	N

3.9.5 Example

Disconnect a voice call:

Run: AT+CHUP

Response: OK

3.10 AT+CRC-Cellular Result Codes

3.10.1 Command Syntax

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

3.10.2 Interface Description

The set command controls whether the extended format of incoming call indication is reported or not. When enabled, an incoming call is indicated to the TE with unsolicited result code +CRING: <type> instead of the normal RING.

The test command returns values supported as a compound value.



NOTE

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

3.10.3 Parameter Description

<mode>: an integer type.

- 0 Disable extended format (default value)
- 1 Enable extended format



<type>:

VOICE Normal voice (TS 11)

3.10.4 Property Description

Saving upon Power-off	PIN
N	N

3.10.5 Example

Run: AT+CRC=0

Response: OK

Run: AT+CRC?

Response: +CRC: 0

OK

Run: AT+CRC=?

Response: +CRC: (0,1)

OK

4 Network Service Related Commands

4.1 AT+COPS-Select Operator

4.1.1 Command Syntax

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

4.1.2 Interface Description

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

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

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

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

**NOTE**

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

4.1.3 Parameter Description

`<mode>`:

- | | |
|---|---|
| 0 | Automatic (<code><oper></code> field is ignored) |
| 1 | Manual (<code><oper></code> field shall be present, and <code><AcT></code> optionally) |
| 2 | Deregister from network (not supported currently) |
| 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. (not supported currently) |

`<oper>`: string type.

`<format>`: indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters (refer GSM MoU SE.13). Numeric format is the GSM Location Area Identification number (refer TS 24.008 subclause 10.5.1.3) which consists of a three BCD(Binary Coded Decimal) 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).

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

`<stat>`:

- | | |
|---|-----------|
| 0 | Unknown |
| 1 | Available |
| 2 | Current |
| 3 | Forbidden |

`<AcT>`: access technology selected.

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

4.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.1.5 Example

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

Run: AT+COPS=?

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

OK

- Automatic search of network:

Run: AT+COPS=0

Response: OK

NOTE

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

- Manual search of network:

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

Response: OK

NOTE

- CME ERROR will be returned when logging in to a nonexistent network or a network that cannot be logged in to (unless in the situation that services are restricted or services are restricted for the current zone).
- The current network state can be queried using the AT+CREG? or AT+CGREG? command.
- If the selected operator was not allowed, the ME is now deregistered. The read command will return only the mode, but no operator:

Run: AT+COPS?

Response: +COPS: 1

OK

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



NOTE

- We cannot manually search the UTRAN network when current setting is GSM ONLY (<mode>=13) mode which set by AT^SYSCFG.
- We cannot manually search the GSM network when current setting is WCDMA ONLY (<mode>=14) mode which set by AT^SYSCFG.
- ERROR will be returned in this situation.
- Query the status of the ME's network registration using the read command:

Run: AT+COPS?

Queries the information of the network currently logged in.

Response: +COPS: 1,2,"46000",0

Command returns mode, format and registered operator.

OK

4.2 AT+CREG-Register Network

4.2.1 Command Syntax

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

4.2.2 Interface Description

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

- When <n>=1 and there is a change in the MT's network registration status, +CREG: <stat> is presented.

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

The read command returns the current registration status $\langle \text{stat} \rangle$. Location information elements $\langle \text{lac} \rangle$, $\langle \text{ci} \rangle$ and $\langle \text{AcT} \rangle$ are returned only when $\langle n \rangle = 2$.

4.2.3 Parameter Description

$\langle n \rangle$:

- | | |
|---|--|
| 0 | Disable network registration unsolicited result code +CREG |
| 1 | Enable network registration unsolicited result code +CREG: $\langle \text{stat} \rangle$ |
| 2 | Enable network registration and location information unsolicited result code +CREG: $\langle \text{stat} \rangle$ [, $\langle \text{lac} \rangle$, $\langle \text{ci} \rangle$ [, $\langle \text{AcT} \rangle$]] |

$\langle \text{stat} \rangle$:

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

$\langle \text{lac} \rangle$: a string type value indicates two byte location area code or tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

$\langle \text{ci} \rangle$: a string type value indicates four byte GERAN/UTRAN cell ID in hexadecimal format.

$\langle \text{AcT} \rangle$: an integer type value indicates the access technology of the serving cell.

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

 **NOTE**

- [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.
- When the module is used for voice or data services on a WCDMA network, AT+CREG? cannot return the LAC or CI information of the new serving cell after the serving cell is switched. Instead, AT+CREG? will return the LAC or CI information of the original serving cell. To obtain the correct information, run AT+CREG? when the module is in idle state.

4.2.4 Property Description

Saving upon Power-off	PIN
N	Y

4.2.5 Example

- Enable the initiative report when network registration status change:

Run: AT+CREG=1

Response: OK

- Query the current network registration status:

Run: AT+CREG?

Response: +CREG: 1,1

OK

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

Run: AT+CREG=?

Response: +CREG: (0-2)

OK

- If the location area code is 0x2513, the cell ID is 0x E01F4, and the network mode is WCDMA, the terminal will receive the unsolicited reports:

Run: AT+CREG?

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

OK

4.3 AT+CLCK–Facility Lock

4.3.1 Command Syntax

```
AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]
```

Possible Response(s)

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

```
<CR><LF>+CLCK: <status><CR><LF><CR><LF>OK<CR><LF>
```

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

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

In case of an MT-related error:

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

```
AT+CLCK=?
```

Possible Response(s)

```
<CR><LF>+CLCK: (list of supported <fac>s) <CR><LF><CR><LF>OK<CR><LF>
```

4.3.2 Interface Description

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

The test command returns the facilities supported.

4.3.3 Parameter Description

<fac>: a string type value indicates the target of this command.

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

"FD"	SIM card or active application in the UICC (GSM or USIM) fixed dialing memory feature (not supported currently)
"PN"	Network Personalization (not supported currently)
"PU"	Network subset Personalization (not supported currently)
"PP"	Service Provider Personalization (not supported currently)
"PC"	Corporate Personalization (not supported currently)
"PF"	Lock Phone to the very First inserted SIM/UICC card (PH-FSIM) (if this parameter is set, you need to enter the password when changing an SIM/UICC card) (not supported currently)
"PS"	PH-SIM (lock PHone to SIM/UICC card installed in the currently selected card slot) (MT asks password when other than current SIM/UICC card inserted; MT may remember certain amount of previously used cards thus not requiring password when they are inserted) (not supported currently)



NOTE

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

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

0	Unlock
1	Lock
2	Queries status

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

0	Not active
1	Active

<passwd>: a string type value that shall be enclosed in quotation marks when specified in the command and be the same as the password specified using the AT+CPWD command. When <mode>=0 or 1, <passwd> is mandatory. When <mode>=2, <passwd> is not required. The characters in <passwd> must range from '0' to '9'.

<class>:

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

4.3.4 Property Description

Saving upon Power-off	PIN
Y	Y



NOTE

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

4.3.5 Example

- Query the lock status of SIM:

Run: AT+CLCK="SC",2

Response: +CLCK: 0

OK

- Set the lock status of SIM:

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

Response: OK

- Query the list of supported <fac>s:

Run: AT+CLCK=?

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

OK

4.4 AT+CPWD-Change Password

4.4.1 Command Syntax

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

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

4.4.2 Interface Description

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

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

4.4.3 Parameter Description

<fac>: specifies the target of this command.

"P2"	SIM PIN2
"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All Barring services (applicable only for <mode>=0)
"AC"	All incoming barring services
"AG"	All incoming barring services
"AI"	Bar All Incoming calls
"AO"	Bar All Outgoing calls
"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
"OI"	Bar Outgoing International calls
"OX"	Bar Outgoing international calls except to home country
"PN"	Network Personalization (not supported currently)
"PU"	Network subset Personalization (not supported currently)
"PP"	Service Provider Personalization (not supported currently)
"PC"	Corporate Personalization (not supported currently)
"PS"	PH-SIM (lock PHone to SIM/UICC card installed in the currently selected card slot) (MT asks password when other than current SIM/UICC card inserted; MT may remember certain amount of previously used cards thus not requiring password when they are inserted) (not supported currently)

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

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

4.4.4 Property Description

Saving upon Power-off	PIN
NA	Y



NOTE

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

4.4.5 Example

- Modify PIN2 of SIM:

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

Response: OK

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

Run: AT+CPWD=?

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

OK

4.5 AT+CLIP—Calling Line Identification Presentation

4.5.1 Command Syntax

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

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

4.5.2 Interface Description

This command allows a called party to get the CLI of the caller. If the calling line identification presentation (CLIP) is enabled, +CLIP is presented following the ring indication. (For the definition of the interface, see section 4.6 +CLIP-CLIP Notifications.)



NOTE

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

4.5.3 Parameter Description

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

0	Disable (default value)
1	Enable

<m>: an integer type value indicates the subscription status of CLIP services.

0	CLIP not provided
1	CLIP provided
2	Unknown (network problems)

4.5.4 Property Description

Saving upon Power-off	PIN
N	Y

4.5.5 Example

- Query the status of calling line identification presentation:

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

          OK
```

- Enable calling line identification presentation:

```
Run:      AT+CLIP=1
```

```
Response:      OK
• Query the list of supported <n>s:
Run:           AT+CLIP=?
Response:      +CLIP: (0,1)

                OK
```

4.6 +CLIP-CLIP Notifications

4.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CLIP: <number>,<type>,,,,<CLI validity><CR><LF>

4.6.2 Interface Description

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

4.6.3 Parameter Description

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

<type>: specifies the number type. "145" indicates an international number. For details about the values of <type>, see the value definitions of <type_addr> in section 8.22 AT+CMGS—Send Message (PDU Mode). When CLI is not available, the <number> will be an empty string ("") and <type> value will not be significant. In this case the value of <type> is set to 128 by default.

<CLI validity>:

- | | |
|---|---|
| 0 | The call line identity (CLI) is valid. |
| 1 | The CLI is rejected by the call originator. |
| 2 | The CLI is unavailable because of the limitation of the originating network or a network problem. |
| 3 | CLI is not available due to calling party being of type payphone. |
| 4 | CLI is not available due to other reasons. |

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

4.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.6.5 Example

- If the CLI is presented, a message similar to the following is displayed:
Response: +CLIP: "82882690",129,,,,0
- If the counter party enables the CLIR, the CLI cannot be presented and a message similar to the following is displayed:
Response: +CLIP: ,128,,,,1
- If the CLI cannot be presented due to network problems, a message similar to the following is displayed:
Response: +CLIP: ,128,,,,2

4.7 AT+CLCC-List Current Calls

4.7.1 Command Syntax

AT+CLCC
Possible Response(s)
<pre>[<CR><LF>+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<p riority>]]][<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<p riority>]]][...][<CR><LF>]<CR><LF>OK<CR><LF></pre>
AT+CLCC=?
Possible Response(s)
<CR><LF>OK<CR><LF>

4.7.2 Interface Description

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

4.7.3 Parameter Description

<idx>: specifies the call ID.

<dir>: specifies the call direction.

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

<stat>: specifies the call state.

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

<mode>: specifies the call mode.

- 0 Voice
- 1 Data
- 2 Fax

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

- 0 Non-multiparty call
- 1 Multiparty call

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

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

<alpha>: specifies text information corresponding to the entry in the phonebook. Used character set is the one selected with command 2.12 AT+CSCS=Select TE Character Set. (not supported currently)

<priority>: not supported currently.

4.7.4 Property Description

Saving upon Power-off	PIN
NA	N

4.7.5 Example

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

```
Run:          AT+CLCC
Response:    +CLCC: 1,0,0,0,0,"13987654321",129
              +CLCC: 2,1,5,0,0,"13987654321",129

              OK
```

4.8 AT+CCFC-Call Forwarding

4.8.1 Command Syntax

```
AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<reserved1>
[,<reserved2>[,<time>]]]]]]
```

Possible Response(s)

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

```
<CR><LF>+CCFC:
<status>,<class1>[,<number>,<type>[,<reserved1>,<reserved2>[,<
time>]]][<CR><LF>+CCFC:
<status>,<class2>[,<number>,<type>[,<reserved1>,<reserved2>[,<
time>]]][...]<CR><LF><CR><LF>OK<CR><LF>
```

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

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

In case of an MT-related error:

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

```
AT+CCFC=?
```

Possible Response(s)

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

4.8.2 Interface Description

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

Responses are returned one by one. This command is set according to the sum of bits.

The test command returns supported reason values.

4.8.3 Parameter Description

<reason>: specifies the call forwarding type.

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

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

- 0 Deactivated
- 1 Activated
- 2 Query status
- 3 Registration
- 4 Erasure

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

<type>: specifies the number type. "145" indicates an international number. For details about the values of <type>, see the value definitions of <type_addr> in section 8.22 AT+CMGS—Send Message (PDU Mode).

<reserved1>: reserved.

<reserved2>: reserved.

<classx>: specifies service type.

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

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

<status>:

- 0 Not active
- 1 Active

4.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.8.5 Example

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

Response: OK

4.9 AT+CCWA–Call Waiting

4.9.1 Command Syntax

AT+CCWA=[<n>[,<mode>[,<class>]]]
Possible Response(s)
When <mode>=2 and the command is executed successfully: <CR><LF>+CCWA: <status>,<class1>[<CR><LF>+CCWA: <status>,<class2>[...]]<CR><LF><CR><LF>OK<CR><LF>
When <mode>≠2 and the command is executed successfully: <CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CCWA?
Possible Response(s)
<CR><LF>+CCWA: <n><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT+CCWA=?
Possible Response(s)
<CR><LF>+CCWA: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

4.9.2 Interface Description

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

The test command returns supported values.

4.9.3 Parameter Description

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

0	Disable (default value)
1	Enable

**NOTE**

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

`<mode>`:

0	Disable
1	Enable (default value)
2	Query status

**NOTE**

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

`<classx>`: specifies service type.

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

`<status>`:

0	Not Activated
1	Activated

4.9.4 Property Description

Saving upon Power-off	PIN
N	Y

4.9.5 Example

Run: AT+CCWA=1, 1, 1 Enable the voice call waiting function and enable the presentation of call waiting information.

Response: OK

Run: AT+CCWA=1 Enable the presentation of call waiting information.

Response: OK

Run: AT+CCWA=1, 1 Enable the call waiting function (with <class> set to the default value 1) and enable the presentation of call waiting information.

Response: OK

4.10 +CCWA-Call Waiting Notifications

4.10.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CCWA: <number>, <type>, <class>, [<alpha>][, <CLI validity>[, <subaddr>, <satype>[, <priority>]]<CR><LF>

4.10.2 Interface Description

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



NOTE

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

4.10.3 Parameter Description

<number>: specifies the waiting number.

<type>: specifies the number type. For detailed value, see the definition of the <type_addr> parameter in an SC number in section 8.22 AT+CMGS–Send Message (PDU Mode). If CLIP is not enabled, the value of <type> is set to 128 by default.

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

<alpha>: specifies the name corresponding to the calling number in the phonebook. Used character set is the one selected with command 2.12 AT+CSCS–Select TE Character Set. (not supported currently)

<CLI validity>:

- 0 The CLI is valid.
- 1 The CLI is reserved by the call originator.
- 2 The CLI is unavailable because of the limitation of the originating network.
- 3 CLI is not available due to calling party being of type payphone.
- 4 CLI is not available due to other reasons.

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

<subaddr>: not supported currently.

<satype>: not supported currently.

<priority>: not supported currently.

4.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.10.5 Example

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

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

4.11 AT+CHLD–Call Hold

4.11.1 Command Syntax

```
AT+CHLD=[<n>]
```

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

4.11.2 Interface Description

This command allows operations related to call hold.



NOTE

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

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

4.11.3 Parameter Description

<n>:

- 0 Release all calls on hold or sets User Determined User Busy (UDUB) for waiting calls
- 1 Release all activated calls and activates other calls (in held or waiting status)
- 1x Release a specified call (in originate connecting status, held or active status)
- 2 Hold all activated calls and accepts another call (in held or waiting status)
- 2x Hold all activated calls except the specified call
- 3 Put through a held call
- 4 Connects the two calls and disconnects the subscriber from both calls

4.11.4 Property Description

Saving upon Power-off	PIN
NA	N

4.11.5 Example

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

- Set up a call (by initiating a call actively or connecting a called party):

Run: ATD13987654321;
 or ATA

Response: OK

- Hold the call :

Run: AT+CHLD=2

Response: OK

- Initiate and set up the second call:

Run: ATD13987654320;

Response: OK

- Query supported values of <n>:

Run: AT+CHLD=?

Response: +CHLD: (0,1,1x,2,2x,3,4)

OK

4.12 AT+CSSN-Set Supplementary Service Notification Presentation

4.12.1 Command Syntax

AT+CSSN=[<n>[, <m>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CSSN?
Possible Response(s)
<CR><LF>+CSSN: <n>, <m><CR><LF><CR><LF>OK<CR><LF>
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>

4.12.2 Interface Description

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



NOTE

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

4.12.3 Parameter Description

<n>: sets the presentation of +CSSI.

0	Disable
1	Enable

<m>: sets the presentation of +CSSU.

0	Disable
1	Enable

4.12.4 Property Description

Saving upon Power-off	PIN
NA	N

4.12.5 Example

- Query the status of supplementary service notification presentation:

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

OK

- Enable CSSI and CSSU report:

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

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

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

OK

4.13 +CSSI-Supplementary Service Notifications

4.13.1 Command Syntax

URC
Possible Response(s)
<code><CR><LF>+CSSI: <code1>[, <index>[, <number>, <type>[, <subaddr>, <satype>]]]<CR><LF></code>

4.13.2 Interface Description

If the +CSSN command is executed to enable +CSSI (<n>=1), +CSSI is presented to the TE when a supplementary service notification is received from a network during MO call setup.

4.13.3 Parameter Description

<code1>: the value ranges from 0 to 8. Values 2 and 3 are related to HOLD/RETRIEVE notifications.

0	Unconditional call forwarding is active
1	Some of the conditional call forwarding are active
2	Call has been forwarded
3	Call is waiting
4	This is a CUG call (not supported currently)
5	Outgoing calls are barred (not supported currently)
6	Incoming calls are barred (not supported currently)
7	CLIR suppression rejected (not supported currently)
8	Call has been deflected (not supported currently)

<index>: an integer type ranges from 0 to 9, and the default value is 0. The value 10 indicates no index.

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

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

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

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

4.13.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.13.5 Example

If A enables the supplementary service notification presentation +CSSI (<n>=1) and B has been set call forwarding to C, A automatically presents supplementary service presentations when A call B.

Response: +CSSI: 1

4.14 +CSSU–Supplementary Service Notifications

4.14.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CSSU: <code2>[, <index>[, <number>, <type>[, <subaddr>, <satype>]]]<CR><LF>

4.14.2 Interface Description

If the +CSSN command is executed to enable +CSSU (<m>=1), +CSSU is presented to the TE when a supplementary service notification is received from a network.

4.14.3 Parameter Description

<code2>: the value ranges from 0 to 10. Values 2 and 3 are related to HOLD/RETRIEVE notifications.

- | | |
|---|---|
| 0 | This is a forwarded call (MT call setup) |
| 1 | This is a CUG call (MT call setup) (not supported currently) |
| 2 | Call has been put on hold (during a voice call) |
| 3 | Call has been retrieved (during a voice call) |
| 4 | Multiparty call entered (during a voice call) (not supported currently) |
| 5 | Call on hold has been released (during a voice call) |
| 6 | Forward message received (not supported currently) |

- 7 Call is being connected with the remote party in alerting state (during a voice call) (not supported currently)
- 8 Call has been connected (during a voice call or MT call setup) (not supported currently)
- 9 This is a forwarded call (MT call setup) (not supported currently)
- 10 This is another forwarded call (not supported currently)

<index>: an integer type ranges from 0 to 9, and the default value is 0. The value 10 indicates no index.

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

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

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

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

4.14.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.14.5 Example

If A enables the supplementary service notification presentation +CSSU (<m>=1) and the call between A and B is activated, A automatically presents supplementary service presentations when A is held by B.

Response: +CSSU: 2

4.15 AT+CUSD–USSD Command

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

4.15.1 Command Syntax

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

4.15.2 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 or 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>]`

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.

4.15.3 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>: USSD-string. Characters allowed in this field are '0'-'9', '*', and '#'.

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

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

 **NOTE**

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

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

When USSD is transmitted in coding mode, the MT only supports GSM 7-bit.

<m>:

- | | |
|---|--|
| 0 | No further user action required (network-initiated USSD-Notify, or no further information needed after terminal initiated operation) |
| 1 | Further user action required (network initiated USSD-Request, or further information needed after terminal initiated operation) |
| 2 | USSD session released by the network side |
| 3 | Other local clients have responded |
| 4 | Operation not supported (message returned from network) |
| 5 | Network connection timeout |

4.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.15.5 Example

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

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

Run: AT+CUUSD=1, "*99#", 15

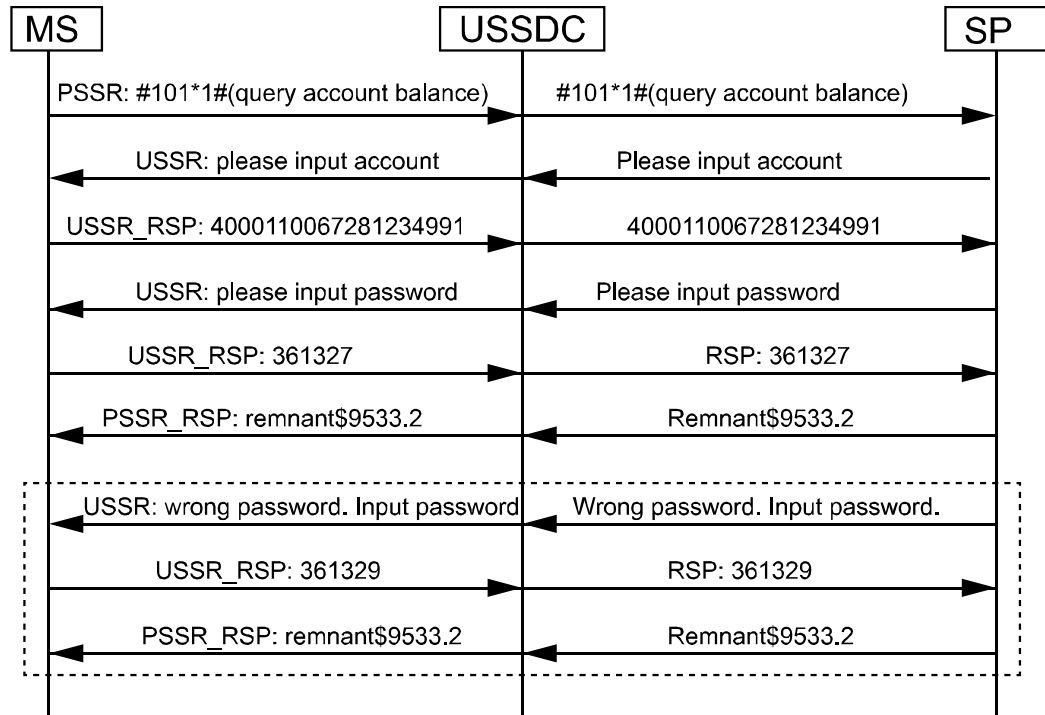
Response: OK

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

Response: +CUUSD: 0, "139037601", 15

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

Figure 4-1 USSD service process



NOTE

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

- MT: Mobile Terminal
- USSDC: USSD Center
- SP: the server that provides the service

4.16 +CUSD-Unsolicitedly Report USSD of Network

4.16.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CUSD: <m>[,<str>,<dcs>]<CR><LF>

4.16.2 Interface Description

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

4.16.3 Parameter Description

The definition of its parameters and the use of this command, see section 4.15 AT+CUSD–USSD Command.

4.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.16.5 Example

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

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

4.17 AT+CNUM–Subscriber Number

4.17.1 Command Syntax

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

4.17.2 Interface Description

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

4.17.3 Parameter Description

<alphax>: optional alphanumeric string associated with <numberx>; used character set should be the one selected with command 2.12 AT+CSCS–Select TE Character Set.

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

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

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

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

0	Asynchronous modem
1	Synchronous modem
2	PAD Access (asynchronous)
3	Packet Access (synchronous)
4	Voice
5	Fax
Other values below 128	Reserved

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

0	3.1 kHz
1	UDI (Unified Display Interface)

4.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.17.5 Example

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

Run: AT+CPBS="ON"

Response: OK

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

Response: OK

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

Response: OK

Run: AT+CNUM

Response: +CNUM: "CC", "+8613987654321", 145
+CNUM: "USER", "123", 129

OK

- Run the following commands to clear the numbers:

Run: AT+CPBS="ON"

Response: OK

Run: AT+CPBW=1

Response: OK

Run: AT+CPBW=2

Response: OK

Run: AT+CNUM

Response: OK

5 Serial Interface Control Commands

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

5.1.1 Command Syntax

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

5.1.2 Interface Description

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

In AT&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 AT&D1 or AT&D2 is set).

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

5.1.3 Parameter Description

<value>:

- | | |
|---|---|
| 0 | The DCE always presents the ON condition on circuit 109. |
| 1 | Circuit 109 changes in accordance with the underlying DCE, which may include functions other than the physical layer functions (e.g. Recommendations V.42, V.110, V.120 and V.13).(default value) |



NOTE

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

5.1.4 Property Description

Saving upon Power-off	PIN
N	N

5.1.5 Example

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

Run: AT&C0

Response: OK

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

Run: AT&C1

Response: OK

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

5.2.1 Command Syntax

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

5.2.2 Interface Description

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

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

5.2.3 Parameter Description

<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.
- 2 Upon an on-to-off transition of circuit 108/2, the DCE instructs the underlying DCE to perform an orderly clear-down 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.(default value)



NOTE

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

5.2.4 Property Description

Saving upon Power-off	PIN
N	N

5.2.5 Example

- DCE ignores circuit 108/2.

Run: AT&D0

Response: OK

- Upon an on-to-off transition of circuit 108/2, the DCE enters online command state and issues an OK result code; the call remains connected.

Run: AT&D1

Response: OK

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

Run: AT&D2

Response: OK

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

5.3.1 Command Syntax

AT&S[<value>]

Possible Response(s)

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

5.3.2 Interface Description

The command determines how ITU-T V.25 circuit 107 (or equivalent) relates to the detection of received line signal from remote end.

5.3.3 Parameter Description

<value>:

- | | |
|---|--|
| 0 | DSR line always is ON. (default value) |
| 1 | DSR line is ON when connected. |

5.3.4 Property Description

Saving upon Power-off	PIN
N	N

5.3.5 Example

- DSR line always is ON.
Run: AT&S0
Response: OK
- DSR line is ON when connected.
Run: AT&S1
Response: OK

5.4 AT+IPR-Set Fixed Data Rate

5.4.1 Command Syntax

AT+IPR[=<rate>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+IPR?
Possible Response(s)

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

5.4.2 Interface Description

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

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

5.4.3 Parameter Description

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

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

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

5.4.4 Property Description

Saving upon Power-off	PIN
Y	N

5.4.5 Example

- Set the baudrate as 115200:
Run: AT+IPR=115200
Response: OK
- Query current baudrate:
Run: AT+IPR?

Response: +IPR: 115200

OK

- List of supported fixed-only rates:

Run: AT+IPR=?

Response: +IPR:
(9600,19200,38400,57600,115200), (9600,19200,38400,57600,115200,230400,460800,921600)

OK

5.5 AT+ICF-Set Character Framing

5.5.1 Command Syntax

AT+ICF[=<format>[,<parity>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+ICF?
Possible Response(s)
<CR><LF>+ICF: <format>[,<parity>]<CR><LF><CR><LF>OK<CR><LF>
AT+ICF=?
Possible Response(s)
<CR><LF>+ICF: (list of supported <format>s), (list of supported <parity>s)<CR><LF><CR><LF>OK<CR><LF>

5.5.2 Interface Description

This extended-format compound parameter is used to determine the local serial port start-stop (asynchronous) character framing that the DCE shall use while accepting DTE commands and while transmitting information text and result code, if this is not automatically determined; AT+IPR=0 forces AT+ICF=0 (see +IPR, 6.2.10 in ITU V.250). Note that the definition of fixed character format for OnLine Data State is for further study.

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

5.5.3 Parameter Description

<format>: valid numeric values.

0	Auto detect (not supported currently)
1	8 Data 2 Stop
2	8 Data 1 Parity 1 Stop
3	8 Data 1 Stop (default value)
4	7 Data 2 Stop
5	7 Data 1 Parity 1 Stop
6	7 Data 1 Stop

<parity>: defined numeric value.

0	Odd
1	Even
2	Mark
3	Space (default value)



NOTE

- When using UART to do PS data service, sending the setting command of AT+ICF will return ERROR.
- AT+ICF is equivalent to AT+ICF=3, 3.

5.5.4 Property Description

Saving upon Power-off	PIN
Y	N

5.5.5 Example

```
Run:      AT+ICF=?
Response: +ICF: (1-6), (0-3)

          OK

Run:      AT+ICF?
Response: +ICF: 3, 3

          OK

Run:      AT+ICF=2, 1
```



```
Response:  OK
Run:      AT+ICF?
Response:  +ICF: 2,1

          OK
```

5.6 AT+IFC-Control Local Flow

5.6.1 Command Syntax

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

5.6.2 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:

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

5.6.3 Parameter Description

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

0 None (default value)

- 1 DC1/DC3 on circuit 103; do not pass DC1/DC3 characters to the remote DCE (not supported currently)
- 2 Circuit 133 (Ready for Receiving)
- 3 DC1/DC3 on circuit 103 with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control (not supported currently)
- 4–127 Reserved for future standardization
- Other values Reserved for manufacturer-specific use.

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

- 0 None (default value)
- 1 DC1/DC3 on circuit 104 (not supported currently)
- 2 Circuit 106 (Clear to Send/Ready for Sending)
- 3–127 Reserved for future standardization
- Other values Reserved for manufacturer-specific use.



NOTE

- DC1 is IA5 1/1; DC3 is IA5 1/3.
- AT+IFC is equivalent to AT+IFC=0, 0.

5.6.4 Property Description

Saving upon Power-off	PIN
N	N

5.6.5 Example

- None flow control:
 - Run: AT+IFC=0, 0
 - Response: OK
- Query current control state:
 - Run: AT+IFC?
 - Response: +IFC: 0, 0
 - OK
- Query supported parameters:

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

OK

- Enable flow control:

Run: AT+IFC=2,2
Response: OK

5.7 AT+CMUX–Multiplexing Mode

5.7.1 Command Syntax

```
AT+CMUX=<mode>[, <subset>[, <port_speed>[, <N1>[, <T1>[, <N2>[, <T2>[, <T3>[, <k>]]]]]]]]
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT+CMUX?
```

Possible Response(s)

```
<CR><LF>+CMUX:  
<mode>[, <subset>[, <port_speed>[, <N1>[, <T1>[, <N2>[, <T2>[, <T3>[, <k>]]]]]]<CR><LF>OK<CR><LF>
```

In case of an MT-related error:

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

```
AT+CMUX=?
```

```
<CR><LF>+CMUX: (list of supported <mode>s) , (list of supported  
<subset>s) , (list of supported <port_speed>s) , (list of supported  
<N1>s) , (list of supported <T1>s) , (list of supported <N2>s) , (list of supported  
<T2>s) , (list of supported <T3>s) , (list of supported  
<k>s) <CR><LF><CR><LF>OK<CR><LF>
```

5.7.2 Interface Description

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

The read command is used to return the current mode and the settings.

The test command is used to return the supported modes and parameters.

It is necessary to use `AT+IPR` to set fixed data rate before enabling the multiplexing protocol control channel. It shall return a `+CME ERROR: <err>` response if the MT/TA/TE autobaud to the `AT+CMUX` command up to and including an interface speed of 9600 bit/s.

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

5.7.3 Parameter Description

`<mode>`: an integer type value indicates the multiplexer transparency mechanism.

- | | |
|---|---|
| 0 | Basic option |
| 1 | Advanced option (not supported currently) |

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

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

`<port_speed>`: an integer type value indicates the transmission rate.

- | | |
|---|------------------------------|
| 1 | 9600 bit/s |
| 2 | 19200 bit/s |
| 3 | 38400 bit/s |
| 4 | 57600 bit/s |
| 5 | 115200 bit/s (default value) |
| 6 | 230400 bit/s |
| 7 | 460800 bit/s |
| 8 | 921600 bit/s |

`<N1>`: an integer type value indicates the maximum frame size.

- | | |
|---------|---|
| 31–1540 | The default value for Basic option is 31. |
|---------|---|

`<T1>`: an integer type value indicates the acknowledgement timer in units of 10 ms.

- | | |
|--------|--|
| 10–250 | The default value is 10, that is 100 ms. |
|--------|--|

`<N2>`: an integer type value indicates the maximum number of re-transmissions.

- | | |
|------|-------------------------|
| 0–10 | The default value is 3. |
|------|-------------------------|

<T2>: an integer type value indicates the response timer for the multiplexer control channel in units of 10 ms.

10–250 The default value is 90, that is 900 ms.



NOTE

The value of <T2> must be greater than <T1>.

<T3>: an integer type value indicates the wake up response timer in seconds. (not supported currently)

1–255 The default value is 10.

<k>: an integer type value indicates the window size, for advanced operation with Error recovery options. (not supported currently)

1–7 The default value is 2.

5.7.4 Property Description

Saving upon Power-off	PIN
N	N

5.7.5 Example

- Enable Multiplexing mode.

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

Response: OK

- Query current multiplexing mode state.

Run: AT+CMUX?

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

OK

- Query supported parameters.

Run: AT+CMUX=?

Response: +CMUX:
(0),(0),(1-8),(31-1540),(10-250),(0-10),(10-250),(1-255),(1-7)

OK

6 Mobile Termination Control and Status Commands

6.1 AT+CFUN–Set Operation Mode

6.1.1 Command Syntax

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

6.1.2 Interface Description

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

The read command is used to return the current mode.

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

6.1.3 Parameter Description

<fun>:

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

<rst>: whether to restart MT before setting.

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

6.1.4 Property Description

Saving upon Power-off	PIN
NA	N

6.1.5 Example

- Query the MT's current mode.

Run: AT+CFUN?

Response: +CFUN: 1

Ok

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

Run: AT+CFUN=5,0

Response: OK

- Query which mode MT supports.

Run: AT+CFUN=?

Response: +CFUN: (0,1,4,5,6,7),(0,1)

OK

6.2 AT+CPIN–Enter PIN

6.2.1 Command Syntax

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



NOTE

TLS_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_RC4_128_MD5, TLS_RSA_WITH_NULL_SHA, TLS_RSA_WITH_NULL_SHA256 and TLS_RSA_WITH_3DES_EDE_CBC_SHA have low safety coefficient. It is recommended you choose other encryption algorithms. For details, please see HUAWEI MU709 Series HSPA+ Module AT Command Interface Specification.

6.2.2 Interface Description

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

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

- 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.

6.2.3 Parameter Description

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

<code>: a string type without quotation marks.

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

6.2.4 Property Description

Saving upon Power-off	PIN
NA	N

6.2.5 Example

- Run the read command:

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

OK



NOTE

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

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

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

- Try the read command again:

Run: AT+CPIN?
Response: +CPIN: READY

OK

- Run the test command:

Run: AT+CPIN=?
Response: OK

6.3 AT+CSQ-Signal Quality

6.3.1 Command Syntax

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

6.3.2 Interface Description

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

The test command is used to return supported <rssI> and <ber> values.

6.3.3 Parameter Description

<rssI>: indicates received signal strength indication.

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

<ber>: the integer type value indicates channel bit error rate (in percent). Only 99 can be displayed. (not supported currently)

6.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.3.5 Example

- Query the MT's signal strength:

Run: AT+CSQ

Response: +CSQ: 19,99

OK

- Run the test command:

Run: AT+CSQ=?

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

OK

6.4 AT+CPBS-Select Phonebook Memory Storage

6.4.1 Command Syntax

AT+CPBS=<storage>[,<reserved>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBS?
Possible Response(s)
<CR><LF>+CPBS: <storage>[,<used>,<total>]<CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT+CPBS=?
Possible Response(s)

```
<CR><LF>+CPBS: (list of supported
<storage>s) <CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

6.4.2 Interface Description

The set command is used to select 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 is used to return currently selected memory and, optionally, the number of used locations and total number of locations in the memory.

The test command is used to return supported phonebook storages.

6.4.3 Parameter Description

`<storage>`: a string type value indicates the phonebook storage type.

"SM"	SIM/UICC phonebook (default value)
"ME"	NV phonebook (not supported currently)
"ON"	Phone number in (U)SIM/UICC card
"EN"	Emergency number in (U)SIM/UICC card
"FD"	SIM/USIM fix dialing 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 EF _{F_{DN}} under DF _{Telecom} is selected. If a UICC with an active USIM application is present, the information in EF _{F_{DN}} under AD _{FUSIM} is selected. (not supported currently)

`<reserved>`: reserved.

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

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

6.4.4 Property Description

Saving upon Power-off	PIN
N	Y

6.4.5 Example

- Query the MT's phonebook storage which it supports.

Run: AT+CPBS=?
Response: +CPBS: ("SM", "EN", "ON")

OK

- Query the MT's current selecting memory.

Run: AT+CPBS?
Response: +CPBS: "SM", 249, 250

OK

- Select ON memory to storage phonebook.

Run: AT+CPBS="ON"
Response: OK

6.5 AT+CPBR-Read Phonebook Entries

6.5.1 Command Syntax

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

6.5.2 Interface Description

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

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

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

6.5.3 Parameter Description

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

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

<type>: indicates 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 2.12 AT+CSCS–Select TE Character Set.

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

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

6.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.5.5 Example

- Run the test command

Run: AT+CPBR=?

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

OK

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

Run: AT+CPBR=1

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

OK



NOTE

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

6.6 AT+CPBW-Write Phonebook Entry

6.6.1 Command Syntax

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

6.6.2 Interface Description

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

- If an entry is written successfully and <index> is not provided, +CPBW: <written_index> is returned, indicating the location of the entry. The <number> field cannot be null and the <text> field can be null.
- If no location is free, +CME ERROR: memory full is returned. Phonebook entries can be written only when the phonebook storage type <storage> of the selected phonebook memory storage is "SM" or "ON". If the phonebook storage is of any other type, an error message will be returned, indicating that the write operation is not allowed.
- If the UE is unable to display the full text or email, they are cut from the tail end.

The read command is used to return the latest value of <written_index> or returns -1 when the value of <written_index> is invalid.



NOTE

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

The test command returns:

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

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

6.6.3 Parameter Description

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

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

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

<text>: string type field of maximum length <tlength>, indicates the name of a phone number entry; character set as specified by command 2.12 AT+CSCS–Select TE Character Set.

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

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

6.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.6.5 Example

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

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

Response: OK

- Query last setting phonebook memory's index.

Run: AT+CPBW?

Response: +CPBW: 1

OK

- Test command:

Run: AT+CPBW=?

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

OK

6.7 AT+CRSM-Restricted SIM Access

6.7.1 Command Syntax

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

Possible Response(s)

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

In case of an MT-related error:

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

```
AT+CRSM=?
```

Possible Response(s)

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

6.7.2 Interface Description

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

6.7.3 Parameter Description

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

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

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

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

<data>: indicates information in hexadecimal format

<pathid>: a string type value that contains the path of an elementary file on the SIM/UICC in hexadecimal format (for example, "7F205F70"), and shall only be used in the mode "select by path from MF" as defined in ETSI TS 102 221.

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

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

6.7.4 Property Description

Saving upon Power-off	PIN
NA	N

6.7.5 Example

- Read the current state of SIM folder:

Run: AT+CRSM=242

Response: +CRSM:
108,41,"62278202782183023F00A50D8001718302E573C1048
00F55FF8A01058B032F0601C606900100830101"

OK



NOTE

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

- Run the test command:

Run: AT+CRSM=?

Response: OK

6.8 AT+CLVL-Tune Loudspeaker Volume Level

6.8.1 Command Syntax

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

6.8.2 Interface Description

This command is used to select the volume of the internal loudspeaker of the MT.

The test command is used to return supported values as compound value.

6.8.3 Parameter Description

<level>: an integer type value with manufacturer specific range.

1–12 Smallest value represents the lowest sound level. Default value is 5.
Module updating will reset the value to default value.

6.8.4 Property Description

Saving upon Power-off	PIN
Y	N

6.8.5 Example

Sets the loudspeaker volume level to 5.

Run: AT+CLVL=5

Response: OK

Run: AT+CLVL?

Response: +CLVL: 5

OK

6.9 AT+CMUT-Switch Mute Status

6.9.1 Command Syntax

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

6.9.2 Interface Description

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

The read command is used to return the current value of the uplink voice mute status.

The test command is used to return the supported value of the uplink voice mute setting.

The mute state is switched off when the call is over.

6.9.3 Parameter Description

<n>: indicates mute switch.

0	Mute off (default value)
1	Mute on

6.9.4 Property Description

Saving upon Power-off	PIN
N	N

6.9.5 Example

Run: AT+CMUT=1

This command can be used only when a voice call is established otherwise it will return ERROR.

Response: ERROR

Run: AT+CMUT?

Response: +CMUT: 0

OK

Run: AT+CMUT=?

Response: +CMUT: (0-1)

OK

6.10 AT+CMIC-Tune Microphone Gain Level

6.10.1 Command Syntax

AT+CMIC=<level>
Possible Response(s)
<CR><LF>OK<CR><LF>

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

6.10.2 Interface Description

This command is used to adjust the microphone gain of the MT.

The test command returns supported values as compound value.

6.10.3 Parameter Description

<level>: an integer type value with manufacturer specific range.

1–12 Smallest value represents the lowest gain. Default value is 5. Firmware updating will reset the value to default value.

6.10.4 Property Description

Saving upon Power-off	PIN
Y	N

6.10.5 Example

Sets the microphone gain level to 5.

Run: AT+CMIC=5

Response: OK

Run: AT+CMIC?

Response: +CMIC: 5

OK

6.11 AT+CCLK-Return Current Time of the Module

6.11.1 Command Syntax

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

6.11.2 Interface Description

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

The read command is used to return the current setting of the clock.

6.11.3 Parameter Description

<time>: an string type value; format is "yyyy/MM/dd,hh:mm:ss±zz", where characters indicate year, month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -96...+96). E.g. 6th of May 2013, 22:10:00 GMT+2 hours equals to "2013/05/06, 22:10:00+08".

NOTE

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

6.11.4 Property Description

Saving upon Power-off	PIN
N	N

6.11.5 Example

```

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

              OK
Run:          AT+CCLK=?
Response:     OK
  
```

6.12 AT^AUDIOCFG-Set Tone Volume Level

6.12.1 Command Syntax

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

6.12.2 Interface Description

This command is used to set the volume of specific type tone.

The test command returns supported values as compound value.

6.12.3 Parameter Description

<tone_type>: integer type value with manufacturer specific range.

0 Incoming call ring

<tone_volume>: integer type value with manufacturer specific range. Module updating will reset the value to default value.

Incoming call ring:

0 Turning off the incoming call ring function (default value)

1–3 Volume level (smallest value represents the lowest sound level).

6.12.4 Property Description

Saving upon Power-off	PIN
Y	N

6.12.5 Example

Run: AT^AUDIOCFG=0,1

Response: OK

Run: AT^AUDIOCFG?

Response: ^AUDIOCFG: 0,1

OK

Run: AT^AUDIOCFG=?

Response: ^AUDIOCFG: (0)

OK

7 UMTS Packet Domain Commands

7.1 AT+CGDCONT-Define PDP Context

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

7.1.1 Command Syntax

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

7.1.2 Interface Description

The MT locally saves a group of PDP contexts with <cid> as the index. Each record of the saved setting environment contains a group of PDP-related parameters. The

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

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

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>`: indicates the index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context. The value range is 1–11.

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

"IP" Internet Protocol

"PPP" Point to point Protocol (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 99 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 SDCP only)
- 3 RFC2507
- 4 RFC3095 (applicable for PDCP only)



NOTE

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

7.1.4 Property Description

Saving upon Power-off	PIN
Y	N

7.1.5 Example

Run: AT+CGDCONT=?

Response: +CGDCONT: (1-11), "IP", , , (0-2), (0-4)

OK

Run: AT+CGDCONT?

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

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

OK

Run: AT+CGDCONT=11, "IP", "abc.com
"

Saves one PDP context to the MT and the <cid> value is 11

Response: OK

Run: AT+CGDCONT?

Response: +CGDCONT:
1, "IP", "XXX.com", "0.0.0.0",
0,0
+CGDCONT:
11, "IP", "abc.com", "0.0.0.0",
0,0

The PDP context has been successfully saved to the MT at the previous step

OK

Run: AT+CGDCONT=11

Removes the PDP context with <cid> 11

```

Response:  OK

Run:      AT+CGDCONT?

Response:  +CGDCONT: 1,"IP","XXX.com","0.0.0.0",0,0
                                     The PDP context with <cid>
                                     11 has been removed

Response:  OK
  
```

7.2 AT+CGACT-Activate or Deactivate PDP Context

7.2.1 Command Syntax

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

7.2.2 Interface Description

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

The read command returns the defined PDP Activation state.

7.2.3 Parameter Description

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

0	Deactivated
1	Activated

<cid>: indicates the index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context. The value range is 1–11.

7.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2.5 Example

- Query the value range of PDP Activation state:

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

OK
```

- Query the current PDP Activation state:

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

OK
```

- Activate or deactivate PDP contexts:

```
Run:      AT+CGACT=1,1
Response: OK

Run:      AT+CGACT=0,1
Response: OK
```

7.3 AT+CGATT-Attach or Detach PS Domain

7.3.1 Command Syntax

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

7.3.2 Interface Description

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

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

The read command returns the current GPRS service state.

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

7.3.3 Parameter Description

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

0 Detached

1	Attached
Other values	Reserved and will result in an <code>ERROR</code> response to the set command.

7.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.3.5 Example

- Query the value range of PS domain service states:

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

OK
```

- Query the current GPRS service state:

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

OK
```

- Attach or Detach PS Domain:

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

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

7.4 AT+CGREG-PS Domain Registration Status

7.4.1 Command Syntax

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

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

7.4.2 Interface Description

The set command is used to control the presentation of an unsolicited result code +CGREG.

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

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

The test command is used to return the <n>'s values supported by the UE.

7.4.3 Parameter Description

<n>:

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

<stat>:

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

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

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

<ci>: a string type value indicates 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 (not supported currently)
- 2 UTRAN
- 3 GSM w/EGPRS^[1]
- 4 UTRAN w/HSDPA^[2]
- 5 UTRAN w/HSUPA^[2]
- 6 UTRAN w/HSDPA and HSUPA^[2]
- 7 E-UTRAN (not supported currently)



NOTE

- [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>: a string type value indicates one byte routing area code in hexadecimal format. (not supported currently)



NOTE

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

7.4.4 Property Description

Saving upon Power-off	PIN
N	Y

7.4.5 Example

Run: AT+CGREG?

```
Response:  +CGREG: 0,1

           OK

Run:       AT+CGREG=?

Response:  +CGREG: (0-2)

           OK
```

7.5 AT+CGSMS–SMS Bearer Domain

7.5.1 Command Syntax

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

7.5.2 Interface Description

The set command is used to set the SMS bear domain, that is, the selection of the CS/PS domain.

The read command is used to return the current SMS bearer domain.

The test command is used to return 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)



NOTE

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

7.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

7.5.5 Example

- Query the value range of SMS Bearer Domain:

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

OK

- Query the current domain type which SMS used:

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

OK

- Set the SMS Bearer Domain type:

Run: AT+CGSMS=0
Response: OK

Run: AT+CGSMS=1
Response: OK

Run: AT+CGSMS=2
Response: OK

7.6 AT+CGPADDR>Show PDP Address

7.6.1 Command Syntax

AT+CGPADDR=[<cid>[, <cid>[, ...]]]
Possible Response(s)
<pre><CR><LF>+CGPADDR: <cid>,<PDP_addr>[<CR><LF>+CGPADDR: <cid>,<PDP_addr><CR><LF>[...]]<CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>
AT+CGPADDR=?
Possible Response(s)
<pre><CR><LF>+CGPADDR: (list of supported <cid>s)<CR><LF><CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>

7.6.2 Interface Description

The execution command returns a list of PDP addresses for the specified context identifiers.

The test command returns a list of supported <cid>s.

7.6.3 Parameter Description

<cid>: a numeric parameter which specifies a particular PDP context definition (see the AT+CGDCONT and AT+CGDSCONT commands). If no <cid> is specified, the addresses for all defined contexts are returned.

<PDP_addr>: a string that identifies the MS in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the AT+CGDCONT and AT+CGDSCONT commands when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation that used the context definition referred to by <cid>. <PDP_address> is omitted if none is available.

7.6.4 Property Description

Saving upon Power-off	PIN
NA	Y



7.6.5 Example

- If the terminal is configured with three profiles: 1, 15, and 16:

Run: AT+CGPADDR=?

Response: +CGPADDR: (1,15,16)

OK

- If the terminal obtains the IP address 192.168.70.1 with profile 1:

Run: AT+CGPADDR=1

Response: +CGPADDR: 1,192.168.70.1

OK

8 Normal Commands for SMS

8.1 AT+CPMS–Preferred Message Storage

8.1.1 Command Syntax

AT+CPMS=<mem1>[, <mem2>[, <mem3>]]
Possible Response(s)
<CR><LF>+CPMS : <used1>, <total1>, <used2>, <total2>, <used3>, <total3><CR><LF><C R><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CPMS?
Possible Response(s)
<CR><LF>+CPMS : <mem1>, <used1>, <total1>, <mem2>, <used2>, <total2>, <mem3>, <used3 >, <total3><CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CPMS=?
Possible Response(s)
<CR><LF>+CPMS : (list of supported <mem1>s) , (list of supported <mem2>s) , (list of supported <mem3>s) <CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

8.1.2 Interface Description

The set command is used to select 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 is used to return the names and the usage of the selected memory storages.

The test command is used to return lists of memory storages supported by the MT.

8.1.3 Parameter Description

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

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

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

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

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

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

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

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

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

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



NOTE

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

8.1.4 Property Description

Saving upon Power-off	PIN
N	Y

8.1.5 Example

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

Run: AT+CPMS=?

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

OK

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

Run: AT+CPMS?

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

OK

- Set the storage type using the set command:

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

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

OK

8.2 AT+CMGF-Message Format

8.2.1 Command Syntax

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

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

8.2.2 Interface Description

The set command is used to set the message format. The format is specified by <mode>, which can be either PDU Mode or Text Mode.

The read command is used to return the currently selected mode.

The test command is used to return available values of <mode>.

8.2.3 Parameter Description

<mode>:

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

8.2.4 Property Description

Saving upon Power-off	PIN
N	N

8.2.5 Example

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

Run: AT+CMGF=0

Response: OK



NOTE

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

8.3 AT+CSCB—Select Cell Broadcast Message Types

8.3.1 Command Syntax

AT+CSCB=[<mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT+CSCB?
Possible Response(s)
<CR><LF>+CSCB: <mode>, <mids>, <dcss><CR><LF><CR><LF>OK<CR><LF>
AT+CSCB=?
Possible Response(s)
<CR><LF>+CSCB: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

8.3.2 Interface Description

The set command is used to select which types of CBMs are to be received by the ME.

The test command is used to return supported modes as a compound value.

8.3.3 Parameter Description

<mode>:

- 0 Message types specified in <mids> and <dcss> are accepted
- 1 Message types specified in <mids> and <dcss> are not accepted

<mids>: a string type value indicates all different possible combinations of CBM message identifiers (refer <mid>) (default is empty string); e.g. "0, 1, 5, 320–478, 922".

<dcss>: a string type value indicates all different possible combinations of CBM data coding schemes (refer <dc>) (default is empty string); e.g. "0–3, 5".

8.3.4 Property Description

Saving upon Power-off	PIN
N	Y

8.3.5 Example

None

8.4 AT+CNMI-New Message Indications to TE

8.4.1 Command Syntax

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

8.4.2 Interface Description

The set command is used to select the procedure of receiving new messages from the network.

The read command is used to query the current parameter values.

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

NOTE

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

8.4.3 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**

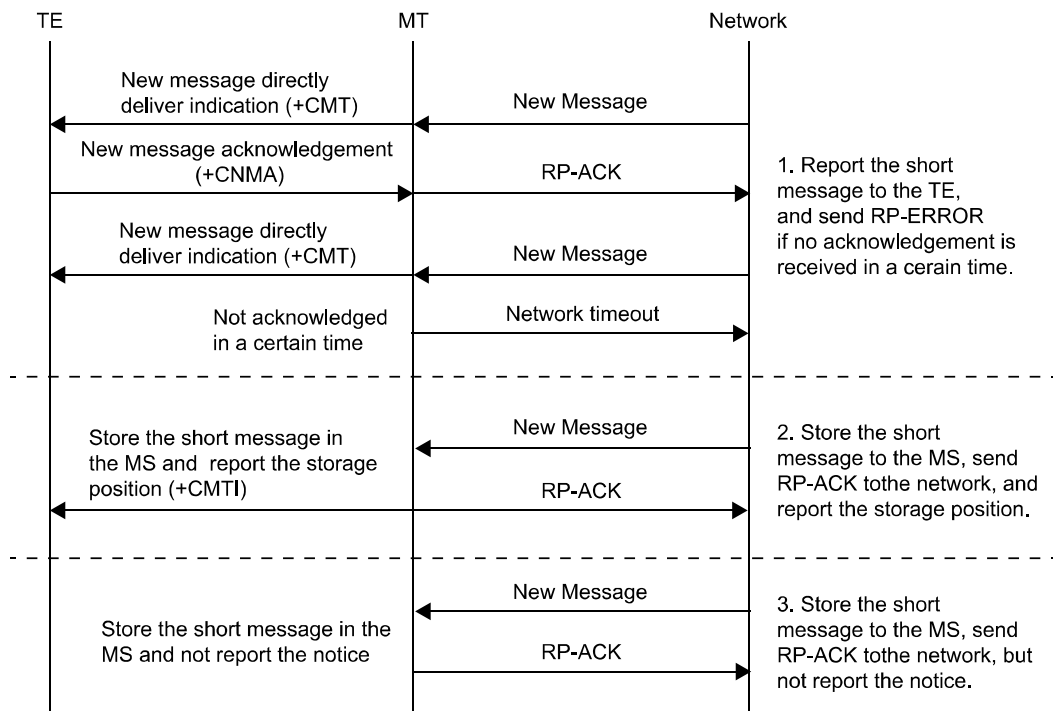
SMS-DELIVER indications are buffered in the MT's volatile memory. If the MT is powered off before the indications are sent, messages may be lost. Therefore, when `<mode>` is set to 0 or 2, messages are not recommended to be directly sent to the TE (that is, `<mt>` is not recommended to be set to 2 or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

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

- 0 No SMS-DELIVER indications are routed to the TE(default value).
- 1 Stores SMS-DELIVER indications on the MT and sends storage location indication to the TE.
`+CMTI: <mem>,<index>`
- 2 Does not store SMS-DELIVER indications on the MT but directly sends them to the TE.
 - If PDU Mode enabled:
`+CMT: [<reserved>],<length><CR><LF><pdu>`
 - If TEXT mode enabled:
`+CMT:
<oa>,<alpha>,<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>
,<tosca>,<length>]<CR><LF><data>`
- 3 Stores SMS-DELIVER indications on the MT, but does not send SMS-DELIVER indications to the TE.

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

Figure 8-1 Interaction between the TE and the MT



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

Table 8-1 <mt> Parameter

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

NOTE

- The SMS class is defined by the TP-DCS domain of the SMS. For details, see the description of <DCS> in 8.22.3 AT+CMGS—Send Message (PDU Mode).
- " +CMT & +CNMA " indicates that the TE is required to send the confirmation (+CNMA).

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

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

- 1 If CBM is stored into ME/TA, indication that the memory location is routed to the TE using unsolicited result code:
+CBMI: <mem>, <index> (not supported currently)
- 2 New CBMs are routed directly to the TE using unsolicited result code:
 - If PDU Mode enabled:
+CBM: <length><CR><LF><pdu> (PDU Mode enabled)
 - If TEXT mode enabled:
+CBM: <sn>, <mid>, <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 8-2 <bm> parameter

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

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

- 0 Do not send message status reports(default value)
- 1 Do not store message status reports to the MT and directly send the reports to the TE.

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

- 2 Store message status reports to the MT and send the storage location to the TE using `AT+CDSI`
`+CDSI: <mem>, <index>`
- <bfr>:
- 0 TA buffer of unsolicited result codes defined within this command is flushed to the TE when `<mode>` ranges from 0 to 2 is entered (OK response shall be given before flushing the codes) (default value)
- 1 TA buffer of unsolicited result codes defined within this command is cleared when `<mode> 0...2` is entered.

8.4.4 Property Description

Saving upon Power-off	PIN
N	N

8.4.5 Example

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

Class 1 messages are stored to the MT, and then storage locations are reported (`+CMTI: "SM", 1`). Message status reports are directly sent (`+CDS:`).
If SMS-DELIVER indications cannot be sent (for example, when in online data state), they will be discarded.
- `AT+CNMI=1, 1, 0, 2, 0`

Class 1 messages are stored to the MS, and then storage locations are reported (`+CMTI: "SM", 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.

8.5 AT+CNMA–New Message Acknowledgement

8.5.1 Command Syntax

<p>If PDU Mode (AT+CMGF=0): AT+CNMA[=<n>[, <length>[<CR>PDU is given <ctrl-z/ESC>]]]</p> <p>If Text Mode (AT+CMGF=1): AT+CNMA</p>
Possible Response(s)
<p><CR><LF>OK<CR><LF></p> <p>In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF></p>
AT+CNMA=?
Possible Response(s)
<p>If PDU Mode (AT+CMGF=0): <CR><LF>+CNMA: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF></p> <p>If Text Mode (AT+CMGF=1): <CR><LF>OK<CR><LF></p> <p>In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF></p>

8.5.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. For the use of this command, see section 8.3 AT+CSCB–Select Cell Broadcast Message Types

NOTE

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

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

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

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

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

8.5.3 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

 **NOTE**

- 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 bits 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)	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



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

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

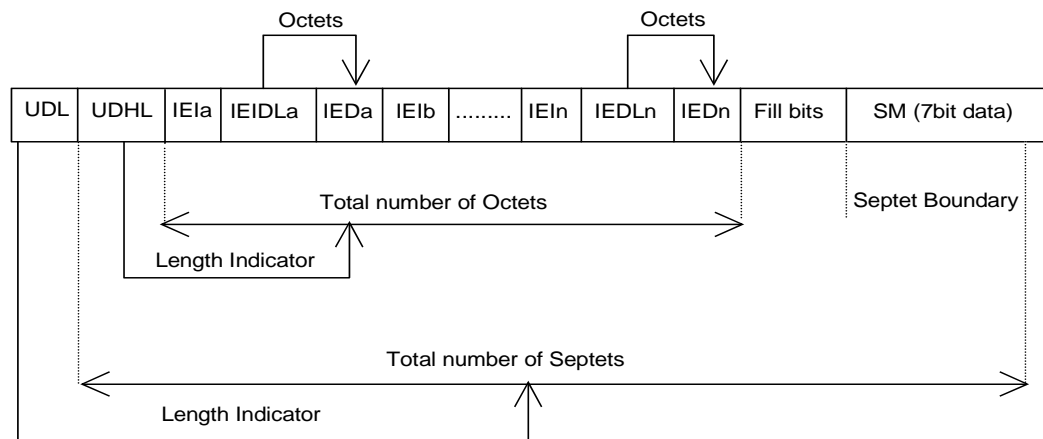
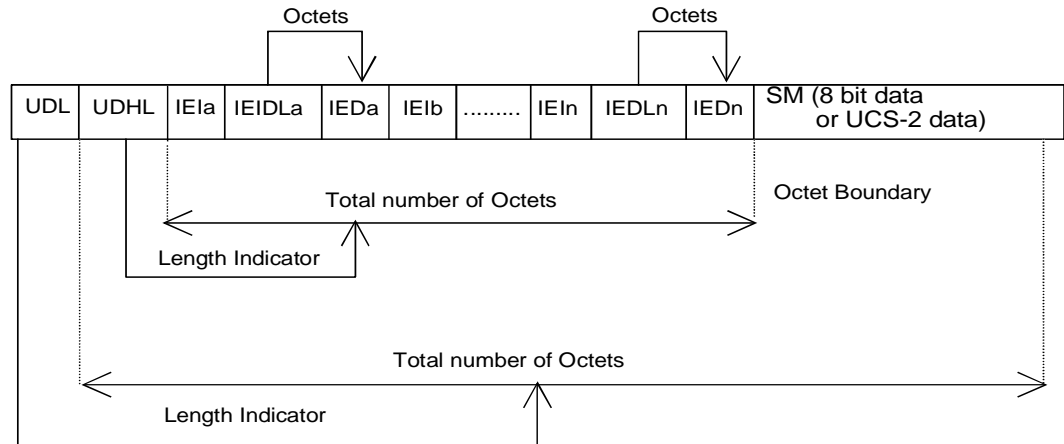


Figure 8-3 User data encoded using the 8-bit or UCS2 encoding scheme



In Figure 8-2 and Figure 8-3 , IEI is short for Information Element Identifier.

8.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.5.5 Example

- Firstly, set AT commands orderly as follows:

Run: AT+CSMS=1

Response: +CSMS: 1,1,1

OK

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

Response: OK

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

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

HELLO

Run: AT+CNMA

Response: OK

8.6 +CMTI-New SMS-DELIVER Indication

8.6.1 Command Syntax

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

8.6.2 Interface Description

This command indicates that a new message is received.

8.6.3 Parameter Description

<mem>:

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

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

8.6.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.6.5 Example

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

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

8.7 +CDSI–New SMS Status Report Indication

8.7.1 Command Syntax

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

8.7.2 Interface Description

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

8.7.3 Parameter Description

<mem>:

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

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

8.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.7.5 Example

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

Response: +CDSI: "SM",17

8.8 AT+CMGD-Delete Message

8.8.1 Command Syntax

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

8.8.2 Interface Description

The execution command is used to delete the message at location <index> in the storage <mem1>. For details about <mem1>, see section 8.1 AT+CPMS-Preferred Message Storage. If <delflag> is set to a value other than 0, the MT ignores <index> and executes the command as specified by <delflag>. For details about the value definitions of <delflag>, see section 8.8.3 . If the deletion fails, +CMS ERROR: <err> is returned.

The test command is used to return storage locations that have messages and supported <delflag> values.

8.8.3 Parameter Description

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

<delflag>:

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

- 4 Delete all messages saved in the preferred storage, including the unread ones.

8.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.8.5 Example

- Delete the message stored in index 1.
Run: AT+CMGD=1
Response: OK
- Delete all the message in the current storage.
Run: AT+CMGD=1, 4
Response: OK

8.9 +CMT–New Message Directly Deliver Indication

8.9.1 Command Syntax

URC
Possible Response(s)
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>

8.9.2 Interface Description

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

8.9.3 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 8.22 AT+CMGS–Send Message (PDU Mode).

For other parameters, see section 8.22 AT+CMGS–Send Message (PDU Mode).

8.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.9.5 Example

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

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



NOTE

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

8.10 +CDS–SMS Status Report Indication Directly Displayed

8.10.1 Command Syntax

URC
Possible Response(s)
If PDU Mode enabled: <CR><LF>+CDS: <length><CR><LF><pdu><CR><LF>
If Text mode enabled: <CR><LF>+CDS: <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st><CR><LF>

8.10.2 Interface Description

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

8.10.3 Parameter Description

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

<pdu>: indicates protocol data unit.

The format of a PDU is as follows:

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

For the specific format of <SCA>, see section 8.22 AT+CMGS–Send Message (PDU Mode).

The structure of TPDU data is as follows:

Abbr.	Reference	P1)	R2)
TP-MTI	TP-Message-Type-Indicator	M	2b
TP-UDHI	TP-User-Data-Header-Indication	O	b
TP-MMS	TP-More-Messages-to-Send	M	b
TP-SRQ	TP-Status-Report-Qualifier	M	b
TP-MR	TP-Message-Reference	M	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
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 (l), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2-12 octets (2-12o).

For other parameters, see section 8.22 AT+CMGS–Send Message (PDU Mode).

8.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

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+CSCA–Service Center Address

8.11.1 Command Syntax

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

8.11.2 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 8.22 AT+CMGS–Send Message (PDU Mode)).

8.11.3 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 8.22 AT+CMGS–Send Message (PDU Mode).

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



NOTE

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

8.11.4 Property Description

Saving upon Power-off	PIN
Y	Y

8.11.5 Example

- Sets the service center number.

Run: AT+CSCA="8613800688509",145

Response: OK

8.12 AT+CSMS–Select Messaging Service

8.12.1 Command Syntax

```
AT+CSMS=<service>
```

Possible Response(s)

```
<CR><LF>+CSMS: <mt>,<mo>,<bm><CR><LF><CR><LF>OK<CR><LF>
```

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

8.12.2 Interface Description

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

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

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

8.12.3 Parameter Description

<service>: indicates a messaging service type.

- 0 3GPP TS 23.040, 3GPP TS 23.041 (messaging AT command syntax is compatible with GSM07.05 Phase 2.) (default value)
- 1 3GPP TS 23.040, 3GPP TS 23.041 (messaging AT command syntax is compatible with GSM 07.05 Phase 2+. Note that <service>=1 is required for AT+CNMA.)

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

- 0 Type not supported
- 1 Type supported (default value)

8.12.4 Property Description

Saving upon Power-off	PIN
N	N

8.12.5 Example

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

```
Run:          AT+CSMS=1
Response:     +CSMS: 1,1,1

              OK
```

8.13 AT+CSMP-Set Text Mode Parameters (Text Mode)

8.13.1 Command Syntax

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

8.13.2 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.

8.13.3 Parameter Description

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

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

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

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

8.13.4 Property Description

Saving upon Power-off	PIN
N	Y

8.13.5 Example

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

Run: AT+CSMP=,,0,8

Response: OK

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

Run: AT+CSMP=,,,0

Response: OK

8.14 AT+CMGL-List Messages (Text Mode)

8.14.1 Command Syntax

AT+CMGL[=<stat>]

Possible Response(s)

If Text Mode (AT+CMGF=1), command successful and SMS-SUBMITs and/or SMS-DELIVERs:

<CR><LF>+CMGL:

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

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

<p>If Text Mode (AT+CMGF=1), command successful and SMSSTATUS-REPORTS: <code><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></code></p> <p>If Text Mode (AT+CMGF=1), command successful and SMS-COMMANDS: <code><CR><LF>+CMGL: <index>, <stat>, <fo>, <ct>[<CR><LF><CR><LF>+CMGL: <index>, <stat>, <fo>, <ct>[...]]<CR><LF><CR><LF>OK<CR><LF></code></p> <p>If Text Mode (AT+CMGF=1), command successful and CBM storage: <code><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></code></p> <p>Otherwise: <code><CR><LF>+CMS ERROR: <err><CR><LF></code></p>
<p>AT+CMGL=?</p>
<p>Possible Response(s)</p>
<p><code><CR><LF>+CMGL: (list of supported <stat>s) <CR><LF><CR><LF>OK<CR><LF></code></p> <p>In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code></p>

8.14.2 Interface Description

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

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

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

8.14.3 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, see section 8.22 AT+CMGS–Send Message (PDU Mode), or refer to GSM 07.05.



NOTE

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

8.14.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.14.5 Example

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

```
Run:      AT+CMGL="ALL"
Response: +CMGL: 2, "REC
          READ", "+8613903710742", , "12/05/17,16:12:30+00"
          test1

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

          OK
```

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

8.15.1 Command Syntax

AT+CMGR=<index>

Possible Response(s)

<p>If Text Mode (AT+CMGF=1), command successful and SMS-DELIVER:</p> <pre><CR><LF>+CMGR: <stat>, <oa>, [<alpha>], <scts>[, <tooa>, <fo>, <pid>, <dc>, <sca>, <tosca>, <length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF></pre> <p>If Text Mode (AT+CMGF=1), command successful and SMS-SUBMIT:</p> <pre><CR><LF>+CMGR: <stat>, <da>, [<alpha>][, <toda>, <fo>, <pid>, <dc>, [<vp>], <sca>, <tosca>, <length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF></pre> <p>If Text Mode (AT+CMGF=1), command successful and SMS-STATUS-REPORT:</p> <pre><CR><LF>+CMGR: <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st><CR><LF><CR><LF>OK<CR><LF></pre> <p>If Text Mode (AT+CMGF=1), command successful and SMS-COMMAND:</p> <pre><CR><LF>+CMGR: <stat>, <fo>, <ct>[, <pid>, [<mn>], [<da>], [<toda>], <length><CR><LF><cdata>]<CR><LF><CR><LF>OK<CR><LF></pre> <p>If Text Mode (AT+CMGF=1), command successful and CBM storage:</p> <pre><CR><LF>+CMGR: <stat>, <sn>, <mid>, <dc>, <page>, <pages><CR><LF><data><CR><LF><CR><LF>OK<CR><LF></pre>
<p>Otherwise:</p> <pre><CR><LF>+CMS ERROR: <err><CR><LF></pre>
<p>AT+CMGR=?</p>
<p>Possible Response(s)</p> <pre><CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>

8.15.2 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.

8.15.3 Parameter Description

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

<stat>: indicates SMS type.

"REC UNREAD" Received and unread SMS

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

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

For other parameters, see section 8.22 AT+CMGS—Send Message (PDU Mode).



NOTE

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

8.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.15.5 Example

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

```
Run:      AT+CMGR=4
Response: +CMGR: "REC
          UNREAD", "+8613312345678", , "12/05/17,16:13:08+00"
          huawei

          OK
```

8.16 AT+CMGW—Write Message to Memory (Text Mode)

8.16.1 Command Syntax

If TEXT mode (AT+CMGF=1):

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

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

In case of an MT-related error:

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

8.16.2 Interface Description

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

8.16.3 Parameter Description

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

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

The four high-order bits indicate the number type:

0	Unknown
1	International

The four low-order bits indicate the number plan:

0	Unknown
1	Telephony

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

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

8.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.16.5 Example

For examples of this command, see section 8.22 AT+CMGS—Send Message (PDU Mode)

8.17 AT+CMGS-Send Message (Text Mode)

8.17.1 Command Syntax

If Text Mode (AT+CMGF=1):

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

8.17.2 Interface Description

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

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

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

8.17.3 Parameter Description

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

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

The four high-order bits indicate the number type:

- 0 Unknown
- 1 International

The four low-order bits indicate the number plan:

- 0 Unknown
- 1 Telephony

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

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

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

8.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.17.5 Example

Run:	AT+CMGF=1	Sets the message format to Text format.
Response:	OK	
Run:	AT+CSMP=, , 0, 8	Sets the data coding scheme to UCS2.
Response:	OK	
Run:	AT+CSCA="8613800688509", 145	Sets the service center number.
Response:	OK	
Run:	AT+CSCS="UCS2"	Sets the TE's character set to UCS2 encoding.
Response:	OK	
Run:	AT+CMGS="003100330033003 100320033003400350036003 70038" >534E4E3A \0x1A	Ends the message to the destination address "13312345678" that must be enclosed in double quotation marks. The message content is the UCS2 codes for the Chinese characters "华为". Press ctrl+z (0x1A) to stop entering message content and send the message.
Response:	+CMGS: 6 OK	The message is successfully sent.

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

8.18.1 Command Syntax

AT+CMSS=<index>[, <da>[, <toda>]]
Possible Response(s)
If Text Mode (AT+CMGF=1) and sending successful: <CR><LF>+CMSS: <mr>[, <scts>]<CR><LF><CR><LF>OK<CR><LF>
If sending fails: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMSS=?
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.18.2 Interface Description

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

<da> is controlled by AT+CSCS.

8.18.3 Parameter Description

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

For other parameters description of this command, see section 8.17 AT+CMGS–Send Message (Text Mode)

8.18.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.18.5 Example

Send a stored short message in TEXT mode.

Run: AT+CMGF=1

Response: OK

Run: AT+CMSS=8

A short message at the location whose index is 8.

Response: +CMSS: 21

OK

8.19 AT+CMGL-List Messages (PDU Mode)

8.19.1 Command Syntax

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

8.19.2 Interface Description

The execution command returns messages with status value <stat> from message storage <mem1> to the TE. If the status of the message is 'received unread', status in

the storage changes to 'received read' after the execution command is executed successfully.



NOTE

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

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

8.19.3 Parameter Description

<stat>: indicates message status.

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

<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 8.22 AT+CMGS–Send Message (PDU Mode).

For the TPDU format of messages to be sent, see section 8.22 AT+CMGS–Send Message (PDU Mode). The TPDU format for received messages is described in the following table.

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

<MTI>: see the definition in section 8.22 AT+CMGS–Send Message (PDU Mode).

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

- 0 No
- 1 Yes

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

0	No
1	Yes

<UDHI>: see the definition in section 8.22 AT+CMGS–Send Message (PDU Mode).

<RP>: see the definition in section 8.22 AT+CMGS–Send Message (PDU Mode).

<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 8.22 AT+CMGS–Send Message (PDU Mode).

<DCS>: use data coding scheme. See the definition in section 8.22 AT+CMGS–Send Message (PDU Mode).

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

<UDL>: user data length. See the definition in section 8.22 AT+CMGS–Send Message (PDU Mode).

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

8.19.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.19.5 Example

Lists all the received unread messages using the execution command:

```
Run:      AT+CMGL=0
Response: +CMGL: 1,0,,25
          0891683108608805F9040D91683109730147F2000021507161
          72350005F4F29C4E03

          OK
```

8.20 AT+CMGR–Read Message (PDU Mode)

8.20.1 Command Syntax

AT+CMGR=<index>
Possible Response(s)
If in PDU Mode and the command is executed successfully: <CR><LF>+CMGR: <stat>,[<reserved>],<length><CR><LF><pdu><CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
AT+CMGR=?
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.20.2 Interface Description

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

The test command returns OK.

8.20.3 Parameter Description

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

<stat>: indicates message status.

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

<reserved>: reserved.

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

<pdu>: protocol data unit. For details about the PDU format, see section 8.22 AT+CMGS–Send Message (PDU Mode).

8.20.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.20.5 Example

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

Run: AT+CMGR=1

Response: +CMGR: 1,,25

0891683108608805F9040D91683109730147F20000215071617
2350005F4F29C4E03

OK

8.21 AT+CMGW-Write Message to Memory(PDU Mode)

8.21.1 Command Syntax

If PDU Mode (AT+CMGF=0):

```
AT+CMGW=<length>[,<stat>]<CR>PDU is given <ctrl-Z/ESC>
```

Possible Response(s)

```
<CR><LF>+CMGW: <index><CR><LF><CR><LF>OK<CR><LF>
```

In case of an MS-related error:

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

```
AT+CMGW=?
```

Possible Response(s)

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

In case of an MT-related error:

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

8.21.2 Interface Description

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

8.21.3 Parameter Description

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

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

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

<stat>: storage status of the message.

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

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

For details about the PDU format, see section 8.22 AT+CMGS—Send Message (PDU Mode)

8.21.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.21.5 Example

Run: AT+CMGF=0

Response: OK

Run: AT+CMGW=56

Response: >

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

Response: +CMGW: 10

OK

8.22 AT+CMGS-Send Message (PDU Mode)

8.22.1 Command Syntax

If PDU Mode (AT+CMGF=0):

```
AT+CMGS=<length><CR>
```

```
PDU is given<ctrl-Z/ESC>
```

Possible Response(s)

If PDU Mode (AT+CMGF=0):

```
<CR><LF>+CMGS: <mr>[, <ackpdu>]<CR><LF><CR><LF>OK<CR><LF>
```

In case of an MS-related error:

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

```
AT+CMGS=?
```

Possible Response(s)

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

In case of an MT-related error:

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

8.22.2 Interface Description

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

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

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

8.22.3 Parameter Description

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

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

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

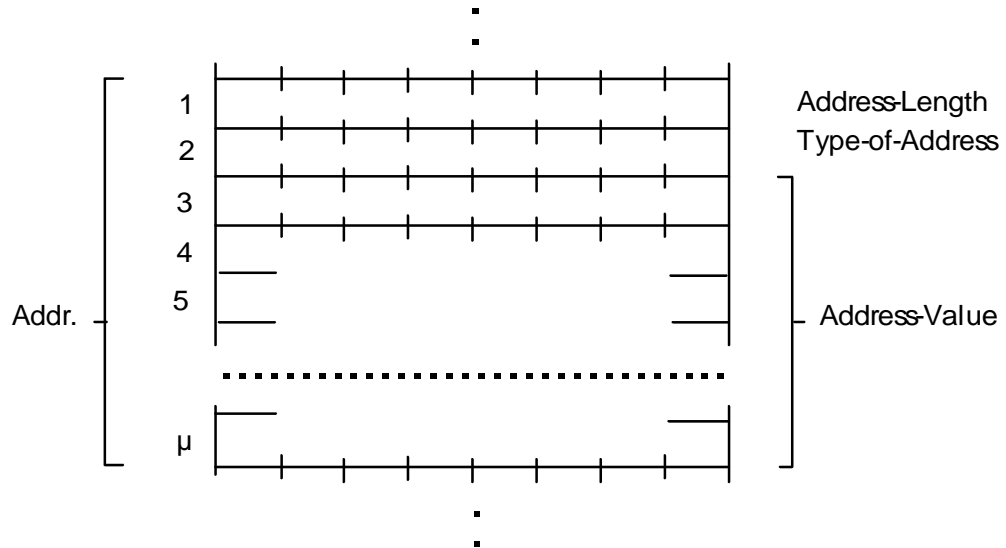
<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

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

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

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

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



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

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



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

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

- 1 0 1 GSM number using the default 7-bit encoding scheme
- 1 1 0 short number. It is not in use currently
- 1 1 1 reserved. It is not in use currently

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

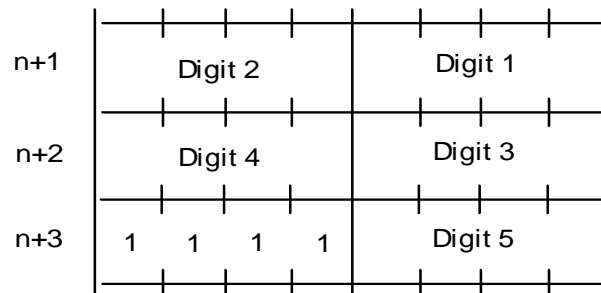


NOTE

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

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

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



NOTE

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

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

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

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

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

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

The TPDU format is described in the following table.



1Octet							1Oct	2Oct~12Oct	1Oct	1Oct	1Oct	1Oct	0~140 Oct
RP	UDHI	SRR	VPF		RD	MTI	MR	DA	PID	DCS	VP	UDL	UD
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0						

<MTI>: message type.

Its values are defined as follows:

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

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

- 0 Yes
- 1 No

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

Bit1	Bit0	
0	0	The VP field is invalid.
1	0	The VP field is valid, and the format is "relative".
0	1	The VP field is valid, and the format is "enhanced".
1	1	The VP field is valid, and the format is "absolute".

<RP>: indicates whether the reply to a message uses the same settings as those for the sent message. Its values are defined as follows:

- 0 No
- 1 Yes. The message reply uses the same SC number and path for sending the message

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

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

<SRR>: status report request indication.

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

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

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

<PID>: protocol identifier.
Its values are defined as follows:

PID							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

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

The values of bit 5 are defined as follows:

- 0 no interworking, but SME-to-SME protocol
- 1 telematic interworking (in this case, the values of bit 4–0 are valid.)

Bit 4...bit 0: Telematic devices type indication

If bit 4...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.
		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.
		<p>Bit 1 Bit 0 message type indication.</p> <p>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.</p> <p>0 1 Class 1, stored to NV (or SIM card if the NV is full)</p> <p>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.</p> <p>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.</p> <p>Bit 3 Bit 2 message type indication</p> <p>0 0 GSM 7-bit encoding scheme; default.</p> <p>0 1 8-bit encoding scheme</p> <p>1 0 UCS2 encoding scheme. TE uses this value when the user inputs Chinese characters.</p> <p>1 1 reserved</p>
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.	<p>Bit 3 enables or disables message waiting indication.</p> <p>0 disables message waiting indication</p> <p>1 enables message waiting indication</p> <p>Bit 2 reserved. The value is 0.</p> <p>Bit 1 Bit 0 message type indication.</p> <p>0 0 voice message waiting</p> <p>0 1 fax message waiting</p> <p>1 0 email message waiting</p> <p>1 1 message of unknown type waiting</p>
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.

Bits 7...4		Bits 3...0
1111	Data coding/message class	<p>Bit 3 reserved. The value is 0.</p> <p>Bit 2 message encoding scheme. Its values are defined as follows:</p> <p>0 GSM 7-bit encoding scheme; default.</p> <p>1 8-bit encoding scheme</p> <p>Bit 1 Bit 0 message type indication.</p> <p>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.</p> <p>0 1 Class 1, stored to NV (or SIM card if the NV is full)</p> <p>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.</p> <p>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.</p>

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

VP Value	Validity Period
0 to 143	(VP + 1) x 5 minutes
144 to 167	12 hours + ((VP -143) x 30 minutes)
168 to 196	(VP - 166) x 1 day
197 to 255	(VP - 192) x 1 week

<UDL>: user data length, depending on the specific encoding scheme.

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

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

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

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

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

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

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

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

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

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

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number.

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

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

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

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

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

8.22.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.22.5 Example

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

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
```

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

8.23.1 Command Syntax

```
AT+CMSS=<index>[, <da>[, <toda>]]
```

Possible Response(s)

If PDU Mode (AT+CMGF=0) and sending successful:

```
<CR><LF>+CMSS: <mr>[, <ackpdu>]<CR><LF><CR><LF>OK<CR><LF>
```

If sending fails:

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

```
AT+CMSS=?
```

Possible Response(s)

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

In case of an MT-related error:

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


8.23.2 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 CMS Error List for a list of `<err>` values. This command should be aborted.

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

8.23.3 Parameter Description

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

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

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

For the response parameter description of this command, see section 8.22 AT+CMGS—Send Message (PDU Mode).

8.23.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.23.5 Example

Send a stored short message in PDU Mode.

Run: AT+CMGF=0

Response: OK

Run: AT+CMSS=8

A short message at the location whose index is 8.

Response: +CMSS: 21

OK

9 Standard STK Interface Commands

9.1 +CUSATP-Unsolicitedly Report a UICC Proactive Command

9.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CUSATP: <proactive_command><CR><LF>

9.1.2 Interface Description

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

9.1.3 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.

9.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

- 2 UICC responded with USAT is busy even after one or more retries by the MT.

9.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.2.5 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

9.3 AT+CUSATT-Send USAT Terminal Response

9.3.1 Command Syntax

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

9.3.2 Interface Description

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

9.3.3 Parameter Description

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

9.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.3.5 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

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

9.4.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CUSATEND<CR><LF>

9.4.2 Interface Description

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

9.4.3 Parameter Description

None



9.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.4.5 Example

- As the following, the proactive command is reported:

Response: +CUSATP:
"D04B810301250082028182050D53494D20536572766963657
3FF8F0D8750686F6E65206E756D6265728F0B8553656C66205
3657276658F10805370656369616C204E756D6265727318032
12421"

- Then user send the terminal response:

Run: AT+CUSATT="810301258082028281830100"

Response: OK

- Then the CUSATEND will be reported as following:

Response: +CUSATEND

10 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

10.1 AT^WAKEUPCFG—Configure Module's Remote Wakeup Function by Host

10.1.1 Command Syntax

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

10.1.2 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.



NOTE

The values that NV saved are not influenced by factory default recovery and will not backup when update. This command supports variable-parameter input. If parameters are not input entirely, the previous value will not be changed.

10.1.3 Parameter Description

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

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

<channel>: sets Remote Wake-up channels.

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

- 0 Disable the channel controlled by the bit.
- 1 Enable the channel controlled by the bit.

The default value of <channel> is 0x03 (Wake up PIN + USB).

<source>: sets Remote Wake-up sources. The length of this parameter is 2 bytes (16 bits). This parameter is entered in decimal format. Each bit of this parameter controls one source, where:

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

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

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

The default value of <source> is 0x000F(VOICE+SMS+DATA+UR).

10.1.4 Property Description

Saving upon Power-off	PIN
Y	N

10.1.5 Example

- The set command if only support USB Remote Wakeup:

Run: AT^WAKEUPCFG=1,2,7

Response: OK

- The read command:

Run: AT^WAKEUPCFG?

Response: ^WAKEUPCFG: 1,2,7

OK

- The test command:

Run: AT^WAKEUPCFG=?

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

OK

10.2 AT^SLEEP CFG—Set Sleep Parameters

10.2.1 Command Syntax

AT^SLEEP CFG=<para>,<value>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^SLEEP CFG?
Possible Response(s)
<CR><LF>^SLEEP CFG: <para>,<value>[<CR><LF>^SLEEP CFG: <para1>,<value1>[<CR><LF>^SLEEP CFG: <para2>,<value2>][...]]<CR><LF><CR><LF>OK<CR><LF>

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

10.2.2 Interface Description

This command is used to set sleep parameters to ensure that the module can respond to the settings of the sleep parameters

The set command is used to configure the sleep parameters.

The test command is used to query all the configurable sleep parameters.

The read command is used to query the current settings of the sleep parameters.

10.2.3 Parameter Description

<para>: indicates the sleep parameter to set.

- | | |
|---|---|
| 0 | Delay settings to report the data to the host when the host is waked up by PIN. |
| 1 | Delay settings to allow the module entering sleep when there is not data on UART interface. |

<value>: indicates the value for the sleep parameter to set.

- If <para> is set to 0, the available values for <value> are an integer ranging from 0 ms to 5000 ms. The default value is 2000 ms.
- If <para> is set to 1, the available values for <value> are an integer ranging from 1s to 3600s. The default value is 10s.



NOTE

The values that NV saved are not influenced by factory default recovery and will not backup when update. This command supports variable-parameter input. If parameters are not input entirely, the previous value will not be changed.

10.2.4 Property Description

Saving upon Power-off	PIN
Y	N

10.2.5 Example

- Run the set command:

Run: AT^SLEEPCFG=0,3000

Response: OK

- Run the read command:

Run: AT^SLEEPCFG?

Response: ^SLEEPCFG: 0,2000
^SLEEPCFG: 1,10

OK

- Run the test command:

Run: AT^SLEEPCFG=?

Response: ^SLEEPCFG: (0-1)

OK

10.3 AT^CURC–Set Presentation of Unsolicited Results

10.3.1 Command Syntax

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

10.3.2 Interface Description

The set command is used to select the control mode for the presentation of unsolicited results.

The read command is used to query the current control mode for the presentation of unsolicited results.

The test command is used to list the supported control mode for the presentation of unsolicited results.

10.3.3 Parameter Description

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

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

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

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

10.3.4 Property Description

Saving upon Power-off	PIN
N	N

10.3.5 Example

- Set <mode> to 0:
Run: AT^CURC=0
Response: OK
- Set <mode> to 1:

Run: AT^CURC=1

Response: OK

- Query the current mode:

Run: AT^CURC?

Response: ^CURC: 1

OK

10.4 ^SYSSTART-Unsolicitedly Report Module Startup

10.4.1 Command Syntax

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

10.4.2 Interface Description

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

10.4.3 Parameter Description

None

10.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.4.5 Example

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

Response: ^SYSSTART

10.5 AT^ICCID-Query the ICCID

10.5.1 Command Syntax

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

10.5.2 Interface Description

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

10.5.3 Parameter Description

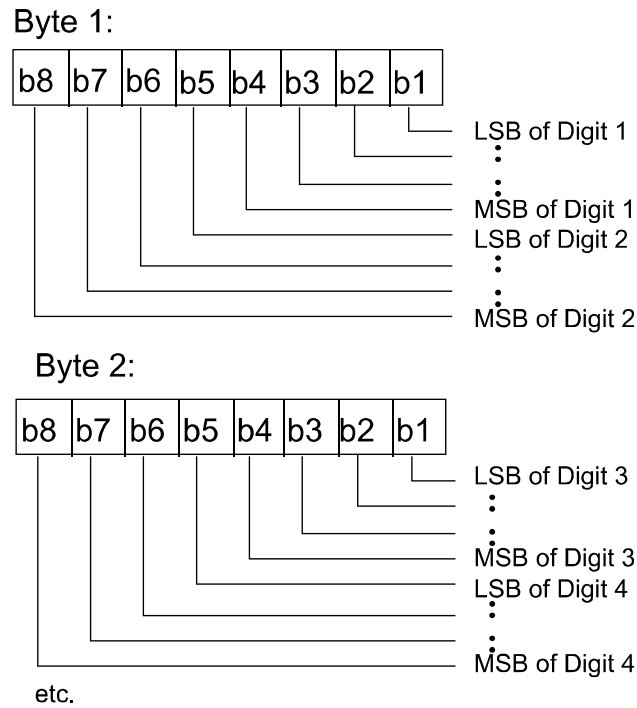
<iccid>: a string value type that indicates ICCID, containing up to 20 characters.



NOTE

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

Figure 10-1 Bit sequence



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

10.5.4 Property Description

Saving upon Power-off	PIN
NA	N

10.5.5 Example

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

```
Run:          AT^ICCID?
Response:     ^ICCID: 89860460097552020196

OK
```

10.6 AT^CPIN-Manage PIN

10.6.1 Command Syntax

AT^CPIN=<pin>[, <newpin>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^CPIN?
Possible Response(s)
<CR><LF>^CPIN: <code>,[<times>],<puk_times>,<pin_times>,<puk2_times>,<pin2_times><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^CPIN=?
Possible Response(s)
<CR><LF>OK<CR><LF>

10.6.2 Interface Description

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

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

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



NOTE

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

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

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

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

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

10.6.4 Property Description

Saving upon Power-off	PIN
N	N

10.6.5 Example

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

- Verify and unblock PIN:

```
Run:          AT^CPIN="1234"
Response:     OK
```

```

Run:          AT^CPIN?
Response:    ^CPIN: READY           Indicate a password is not
                                         required.

                                         OK

Run:          AT^CPIN=?
Response:    OK
  
```

10.7 AT^MSO-Shutdown Command

10.7.1 Command Syntax

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

10.7.2 Interface Description

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

10.7.3 Parameter Description

None

10.7.4 Property Description

Saving upon Power-off	PIN
NA	N

10.7.5 Example

```

Run:          AT^MSO
Response:    OK

Run:          AT^MSO=?
  
```

Response: OK

10.8 AT^IOCTRL-Control the GPIO

10.8.1 Command Syntax

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

10.8.2 Interface Description

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

The test command returns supported values as compound value.

This command controls 5 GPIO pins and the corresponding relationship between the GPIO and LGA pin (from right to left) are as follows.

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

10.8.3 Parameter Description

<sel>: enable GPIOs.

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

<options>: set the GPIO's mode.

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

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

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

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

10.8.4 Property Description

Saving upon Power-off	PIN
N	N

10.8.5 Example

- Get the GPIO state:

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

OK

- Set the GPIO state:

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

10.9 AT^ADCREADEX-Query the ADC Value

10.9.1 Command Syntax

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

10.9.2 Interface Description

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

10.9.3 Parameter Description

<id>: an integer type value indicates the query ID.

- 1 The adc value of ADC1 pin
- 2 The adc value of ADC2 pin

<adc_value>: an integer type value indicates the ADC value, the unit is millivolt.

10.9.4 Property Description

Saving upon Power-off	PIN
N	N

10.9.5 Example

- Query the ADC value of the ADC1 pin:

Run: AT^ADCREADEX=1

Response: ^ADCREADEX: 678

OK

- Query the ADC value of the ADC2 pin:

Run: AT^ADCREADEX=2
Response: ^ADCREADEX: 571

OK

- Test command

Run: AT^ADCREADEX=?
Response: ^ADCREADEX: (1-2)

OK

10.10 AT^LEDCTRL-Control LED GPIO PIN

10.10.1 Command Syntax

```
AT^LEDCTRL=<mode>[,<stat>,<index>[,<ON_duration1>,<OFF_duration1>[,<ON_duration2>,<OFF_duration2>]]]
```

Possible Response(s)

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

```
AT^LEDCTRL?
```

Possible Response(s)

```
<CR><LF>^LEDCTRL:  
<mode>[,<stat>,<index>[,<ON_duration1>,<OFF_duration1>  
[,<ON_duration2>,<OFF_duration2>]]][<CR><LF>^LEDCTRL:  
<mode>,<stat>,<index>[,<ON_duration1>,<OFF_duration1>[,<ON_dur  
ation2>,<OFF_duration2>]]][...]]<CR><LF><CR><LF>OK<CR><LF>
```

```
AT^LEDCTRL=?
```

Possible Response(s)

```
<CR><LF>^LEDCTRL: (list of supported <mode>s), (list of  
supported<stat>s), (list of supported <index>s), (list of supported  
<ON_duration1>s), (list of supported <OFF_duration1>s), (list of supported  
<ON_duration2>s), (list of supported  
<OFF_duration2>s)<CR><LF><CR><LF>OK<CR><LF>
```

10.10.2 Interface Description

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



The read command is used to query the blinking mode of the current module.

The test command is used to return the supported parameters.

10.10.3 Parameter Description

<mode>: indicates blinking mode.

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

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

Parameter Value	Service Status
00000001	Airplane mode
00000002	Power-on and initiation
00000004	Registration failure and no service
00000008	Network disconnection during connecting
00000010	Registration success in GSM mode
00000020	Radio bearer establishment success in GSM/GPRS/EDGE mode
00000040	Data transmission in GSM/GPRS/EDGE mode
00000080	Registration success in WCDMA mode
00000100	Radio bearer establishment success in WCDMA mode
00000200	Data transmission in WCDMA mode
00000400	Radio bearer establishment success in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00000800	Data transmission in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
3FFFFFFF	All service states

<index>: indicates GPIO pin of the LED indicator. The length is 8 bits and the valid value ranges from 0 to 1.

The least significant 1 bit (Bit [0]) indicate the GPIO pin configuration of the LED indicator.

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

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

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

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

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

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



NOTE

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

10.10.4 Property Description

Saving upon Power-off	PIN
Y	N

10.10.5 Example

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

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

Response: OK

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

Run: AT^LEDCTRL?

Response: ^LEDCTRL: 2,0000000F,0

^LEDCTRL: 2,00000FF0,1,1,19

OK

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

Run: AT^LEDCTRL=?

Response: ^LEDCTRL:
(0-2), 00000FFF, (0-1), (1-100), (1-100), (1-100), (1-100)
OK

**NOTE**

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

10.11 AT^SIMSWITCH-Switch the SIM Card

10.11.1 Command Syntax

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

10.11.2 Interface Description

The set command is used to specify which SIM card to switch.

The read command is used to query the current SIM card selection.

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

10.11.3 Parameter Description

<n>: an integer type value.

- | | |
|---|-------------------------------|
| 0 | Use SIM CARD2 |
| 1 | Use SIM CARD1 (default value) |

10.11.4 Property Description

Saving upon Power-off	PIN
NA	N

10.11.5 Example

```
Run:          AT^SIMSWITCH=0
Response:    OK

Run:          AT^SIMSWITCH?
Response:    ^SIMSWITCH: 0

                OK

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

                OK
```

10.12 AT^RESET-Reset the Module

10.12.1 Command Syntax

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

10.12.2 Interface Description

This command is used to reset the module.

10.12.3 Parameter Description

None

10.12.4 Property Description

Saving upon Power-off	PIN
N	N

10.12.5 Example

Run: AT^RESET

Response: OK

10.13 ^SIMRESET-Report SIM Reset Event

10.13.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SIMRESET: <type><CR><LF>

10.13.2 Interface Description

As long as the SIM reset event happens, the MS will report the event to the TE. The SIM reset can be generated by STK refresh command if the refresh command's type is 4 or 5.

10.13.3 Parameter Description

<type>: specifies the type of a SIM reset event. It ranges from 1 to 5.

- | | |
|--------------|---|
| 1 | UICC reset caused by STK refresh command. Please refer to 3GPP TS31.111. If the PIN code is enabled, re-entering the PIN is requested. |
| 2 | USIM application reset caused by STK refresh command (please refer to 3GPP TS31.111). If the PIN code is enabled, re-entering the PIN is requested. |
| Other values | Reserved |



10.13.4 Property Description

Saving upon Power-off	PIN
N	N

10.13.5 Examples

Response: ^SIMRESET: 2

11 Huawei Proprietary Interface: Voice Call Interface

11.1 ^ORIG–Indicate the Origination of a Call

11.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ORIG: <call_x>,<call_type><CR><LF>

11.1.2 Interface Description

This command indicates that the MT is originating a call.

11.1.3 Parameter Description

<call_x>: specifies the call ID, uniquely identifying the call. Integer, with a product-specific value.

<call_type>: specifies the call type.

0	Voice call
9	Emergency call

11.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.1.5 Example

Dial a normal number:

Response: ^ORIG: 1,0

11.2 ^CONF-Ringback Tone Indication

11.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^CONF: <call_x><CR><LF>

11.2.2 Interface Description

If an MT receives a ringback tone after initiating a call, the MT presents this indication to the TE.

11.2.3 Parameter Description

<call_x>: an integer type with a product-specific value range.

11.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.2.5 Example

Dial a normal number:

Response: ^CONF: 1

11.3 ^CONN-Call Connection Indication

11.3.1 Command Syntax

URC
Possible Response(s)

```
<CR><LF>^CONN: <call_x>,<call_type><CR><LF>
```

11.3.2 Interface Description

When a call is connected, the MT presents this indication to the TE, indicating that a call starts.

11.3.3 Parameter Description

<call_x>: specifies the call ID, uniquely identifying the call. Integer, with a product-specific value.

<call_type>: specifies the call type.

0	Voice call
1	CS domain data call (GW) (not supported currently)
2	PS domain data call (GW) (not supported currently)
9	Emergency call

11.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.3.5 Example

Answer a normal number:

Response: ^CONN: 1,0

11.4 ^CEND–Call End Indication

11.4.1 Command Syntax

URC

Possible Response(s)

```
<CR><LF>^CEND:  
<call_x>,<duration>,<end_status>[,<cc_cause>]<CR><LF>
```

11.4.2 Interface Description

After a call is terminated, the MT reports this indication to the TE to notify the TE of the call end cause and the call duration.

11.4.3 Parameter Description

<call_x>: an integer type with a product-specific value range.

<duration>: indicates call duration in the unit of second.

<end_status>: indicates call end cause.

<end_status>	Comments
21	The board is out of service.
29	The call is ended normally at the client.
100	The call is released from the bottom layer, and cc_cause must be queried.
102	The MT rejects an incoming call.
104	The call is released from the network, and cc_cause must be queried.

<cc_cause>: call control information

1	UNASSIGNED_CAUSE
3	NO_ROUTE_TO_DEST
6	CHANNEL_UNACCEPTABLE
8	OPERATOR_DETERMINED_BARRING
16	NORMAL_CALL_CLEARING
17	USER_BUSY
18	NO_USER_RESPONDING
19	USER_ALERTING_NO_ANSWER
21	CALL_REJECTED
22	NUMBER_CHANGED
26	NON_SELECTED_USER_CLEARING
27	DESTINATION_OUT_OF_ORDER
28	INVALID_NUMBER_FORMAT
29	FACILITY_REJECTED
30	RESPONSE_TO_STATUS_ENQUIRY



31	NORMAL_UNSPECIFIED
34	NO_CIRCUIT_CHANNEL_AVAILABLE
38	NETWORK_OUT_OF_ORDER
41	TEMPORARY_FAILURE
42	SWITCHING_EQUIPMENT_CONGESTION
43	ACCESS_INFORMATION_DISCARDED
44	REQUESTED_CIRCUIT_CHANNEL_NOT_AVAILABLE
47	RESOURCES_UNAVAILABLE_UNSPECIFIED
49	QUALITY_OF_SERVICE_UNAVAILABLE
50	REQUESTED_FACILITY_NOT_SUBSCRIBED
55	INCOMING_CALL_BARRED_WITHIN_CUG
57	BEARER_CAPABILITY_NOT_AUTHORISED
58	BEARER_CAPABILITY_NOT_PRESENTLY_AVAILABLE
63	SERVICE_OR_OPTION_NOT_AVAILABLE
65	BEARER_SERVICE_NOT_IMPLEMENTED
68	ACM_GEQ_ACM_MAX
69	REQUESTED_FACILITY_NOT_IMPLEMENTED
70	ONLY_RESTRICTED_DIGITAL_INFO_BC_AVAILABLE
79	SERVICE_OR_OPTION_NOT_IMPLEMENTED
81	INVALID_TRANSACTION_ID_VALUE
87	USER_NOT_MEMBER_OF_CUG
88	INCOMPATIBLE_DESTINATION
91	INVALID_TRANSIT_NETWORK_SELECTION
95	SEMANTICALLY_INCORRECT_MESSAGE
96	INVALID_MANDATORY_INFORMATION
97	MESSAGE_TYPE_NON_EXISTENT
98	MESSAGE_TYPE_NOT_COMPATIBLE_WITH_PROT_STATE
99	IE_NON_EXISTENT_OR_NOT_IMPLEMENTED
100	CONDITIONAL_IE_ERROR
101	MESSAGE_NOT_COMPATIBLE_WITH_PROTOCOL_STATE
102	RECOVERY_ON_TIMER_EXPIRY
111	PROTOCOL_ERROR_UNSPECIFIED
127	INTERWORKING_UNSPECIFIED

160	REJ_UNSPECIFIED
161	AS_REJ_RR_REL_IND
162	AS_REJ_RR_RANDOM_ACCESS_FAILURE
163	AS_REJ_RRC_REL_IND
164	AS_REJ_RRC_CLOSE_SESSION_IND
165	AS_REJ_RRC_OPEN_SESSION_FAILURE
166	AS_REJ_LOW_LEVEL_FAIL
167	AS_REJ_LOW_LEVEL_FAIL_REDIAL_NOT_ALLOWED
168	MM_REJ_INVALID_SIM
169	MM_REJ_NO_SERVICE
170	MM_REJ_TIMER_T3230_EXP
171	MM_REJ_NO_CELL_AVAILABLE
172	MM_REJ_WRONG_STATE
173	MM_REJ_ACCESS_CLASS_BLOCKED
174	ABORT_MSG_RECEIVED
175	OTHER_CAUSE
176	CNM_REJ_TIMER_T303_EXP
177	CNM_REJ_NO_RESOURCES
178	CNM_MM_REL_PENDING
179	CNM_INVALID_USER_DATA



NOTE

If a call is terminated due to network problems, <cc_cause> is presented. If a call is terminated before response from the network side is received, <cc_cause> is not presented.

11.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.4.5 Example

The user disconnect the voice call normally:

Response: ^CEND: 1,2,29,16 The voice call is normally cleared

11.5 AT^CALLSRV-Set the CS Voice Function

11.5.1 Command Syntax

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

11.5.2 Interface Description

The set command is used to enable or disable the CS voice function.

The read command is used to return the current settings.

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

11.5.3 Parameter Description

<n>: indicates whether to enable the CS voice function.

0	Disable
1	Enable

11.5.4 Property Description

Saving upon Power-off	PIN
Y	N

11.5.5 Example

Run: AT^CALLSRV=1



Response: OK

Run: AT^CALLSRV?

Response: ^CALLSRV: 1

OK

Run: AT^CALLSRV=?

Response: ^CALLSRV: (0,1)

OK

12 Huawei Proprietary Interface: Audio Commands

12.1 AT^VMSET-Set the Voice Device Mode

12.1.1 Command Syntax

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

12.1.2 Interface Description

The set command is used to set the current voice device mode.

The read command is used to return the current voice device mode.

The test command is used to obtain the supported voice device modes.

Before a voice call is initiated, run the AT^VMSET command to set the voice device mode. Otherwise, the voice device will be set to headset mode by default.

Other audio related commands are set available only in the current mode.

12.1.3 Parameter Description

<mode>: an integer type value indicating the voice device mode.

0	Handset mode
1	Handset speakerphone mode
2	Carkit mode
3	Headset mode (default value)
4	Bluetooth headset mode

12.1.4 Property Description

Saving upon Power-off	PIN
N	N

12.1.5 Example

```
Run:      AT^VMSET=4
Response: OK

Run:      AT^VMSET?
Response: ^VMSET: 4

          OK

Run:      AT^VMSET=?
Response: ^VMSET: (0-4)

          OK
```

12.2 AT^ECHOEX-Set Echo Suppression Parameters

12.2.1 Command Syntax

AT^ECHOEX=<EchoEnable>,<EchoTime>,<EchoSingleLen>,<EchoSingleDecStr>,<EchoDoubleDecStr>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^ECHOEX?
Possible Response(s)

```
<CR><LF>^ECHOEX:
<EchoEnable>, <EchoTime>, <EchoSingleLen>, <EchoSingleDecStr>, <E
choDoubleDecStr><CR><LF><CR><LF>OK<CR><LF>
```

```
AT^ECHOEX=?
```

Possible Response(s)

```
<CR><LF>^ECHOEX:
<EchoEnable>, <EchoTime>, <EchoSingleLen>, <EchoSingleDecStr>, <E
choDoubleDecStr><CR><LF><CR><LF>OK<CR><LF>
```

12.2.2 Interface Description

The set command is used to enable or disable echo suppression and set the echo suppression parameters for the current voice device mode.

The read command returns the parameters of the current voice device mode.

The test command is used to obtain the supported parameters.

Before a voice call is initiated, run the `AT^VMSET` command to set the voice device mode. Otherwise, running the `AT^ECHOEX` command can only configure parameters of the default handset speakerphone mode.

When performing a voice test for the module, the echo effect is related with the actual environment where the module is used. Add the `AT^ECHOEX` to help the module better adjust to customer environments.

12.2.3 Parameter Description

`<EchoEnable>`: an integer type value indicating the switch of echo suppression.

- | | |
|---|--------------------------|
| 0 | Disable echo suppression |
| 1 | Enable echo suppression |

`<EchoTime>`: an integer type value indicating the fixed latency offset length, which has a value in the range of 0–960.

`<EchoSingleLen>`: an integer type value indicating the end sound elimination length for a single speaker, which has a value in the range of 0–35.

`<EchoSingleDecStr>`: an integer type value indicating the end sound elimination strength for a single speaker, which has a value in the range of 50-300.

`<EchoDoubleDecStr>`: an integer type value indicating the residual voice suppression strength for double speakers, which has a value in the range of 100–30000. The greater the value is, the parameter presents more a single speaker.



NOTE

The preceding parameter values are determined by the voice simulation in the actual environment.

12.2.4 Property Description

Saving upon Power-off	PIN
Y	N

12.2.5 Example

Run: AT^ECHOEX=1,350,30,220,4096

Response: OK

Run: AT^ECHOEX?

Response: ^ECHOEX: 1,350,30,220,4096

OK

Run: AT^ECHOEX=?

Response: ^ECHOEX: (0-1), (0-960), (0-35), (50-300), (100-30000)

OK

12.3 AT^CPCM-Configure PCM Audio

12.3.1 Command Syntax

AT^CPCM=<mode>,<format>,<clock>,<frame>,<offset>

Possible Response(s)

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

In case of an MT-related error:

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

AT^CPCM?

Possible Response(s)

<CR><LF>^CPCM:
<mode>,<format>,<clock>,<frame>,<offset><CR><LF><CR><LF>OK<CR><LF>

AT^CPCM=?

Possible Response(s)


```
<CR><LF>^CPCM: (list of supported <mode>s) , (list of supported  
<format>s) , (list of supported <clock>s) , (list of supported <frame>s) , (list  
of supported <offset>s) <CR><LF><CR><LF>OK<CR><LF>
```

12.3.2 Interface Description

This command is used to configure the PCM audio before a voice call. Module updating will reset the value to default value.

The read command is used to return the current parameter values.

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

12.3.3 Parameter Description

<mode>: PCM working mode.

- | | |
|---|---|
| 0 | MASTER_PRIM mode. In this mode, the CLK and SYN signal clocks are generated by the module. The CLK signal clock is 2.048 MHz, and the SYN signal clock is 8 kHz. The frame format is short frame (default value). |
| 1 | MASTER_AUX mode. In this mode, the CLK and SYN signal clocks are generated by the module. The CLK signal clock is 128 MHz, and the SYN signal clock is 8 kHz. The frame format is long frame. (not supported currently) |
| 2 | SLAVE mode. In this mode, the CLK and SYN signal clocks are generated by the external CODEC chip. |

<format>: data format.

- | | |
|---|---------------------------------|
| 0 | linear (default value) |
| 1 | u-law (not supported currently) |
| 2 | A-law (not supported currently) |

<clock>: clock signal.

- | | |
|---|-------------------------------------|
| 0 | 2.048 MHz (default value) |
| 1 | 1.024 MHz (not supported currently) |
| 2 | 512 kHz (not supported currently) |
| 3 | 256 kHz (not supported currently) |

<frame>: the SYN frame format setting.

- | | |
|---|--------------------------------------|
| 0 | Short frame (default value) |
| 1 | Long frame (not supported currently) |

<offset>: offset setting.

- 0 Offset cleared: the sync launched is aligned to the rising edge of the PCM CLK. (default value)
- 1 Short sync offset set: the short sync sent to the external world in Primary PCM master mode is launched 1/4 cycle after the rising edge of the PCM CLK. (not supported currently)
- 2 Long sync offset set: the long sync sent to the external world in Aux PCM master mode is launched 1/4 cycle ahead of the rising edge of PCM CLK. (not supported currently)

12.3.4 Property Description

Saving upon Power-off	PIN
Y	N

12.3.5 Example

- Set the PCM configuration:

Run: AT^CPCM=0,0,0,0,0

Response: OK
- Query PCM configuration:

Run: AT^CPCM?

Response: ^CPCM: 0,0,0,0,0

OK

12.4 AT^PCMFR—Change the PCM Frequency Response

12.4.1 Command Syntax

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

12.5.3 Parameter Description

<vol>:

0	Sidetone off
1	Sidetone on (default value)

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

12.5.4 Property Description

Saving upon Power-off	PIN
Y	N

12.5.5 Example

Sidetone off:

Run: AT^STN=0
Response: OK

12.6 AT^SMUT-Mute Speaker

12.6.1 Command Syntax

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

```
<CR><LF>^SMUT: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>
```

12.6.2 Interface Description

This command is used to enable or disable the speaker mute function during a voice call.

The read command returns the current value of the speaker mute status.

The test command returns the supported value of the speaker mute setting.

The mute state is switched off when the call is over.



NOTE

The speaker mute setting does not affect the sidetone.

12.6.3 Parameter Description

<n>: mute switch.

0	Mute off (default value)
1	Mute on

12.6.4 Property Description

Saving upon Power-off	PIN
N	N

12.6.5 Example

Mute off:

Run: AT^SMUT=0

Response: OK

12.7 AT^MODEMLOOP-Set the Voice Loop Mode

12.7.1 Command Syntax

```
AT^MODEMLOOP=<mode>
```

Possible Response(s)

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

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

12.7.2 Interface Description

This command is used to set the voice loop mode.



NOTE

Voice call is not supported in the voice loop mode.

12.7.3 Parameter Description

<mode>: an integer indicates the voice loop mode.

- 0 Exit the voice loop mode (default value)
- 1 Enter into the voice loop mode

12.7.4 Property Description

Saving upon Power-off	PIN
N	N

12.7.5 Example

Set the module into the voice loop mode:

```
Run:           AT^MODEMLOOP=1
Response:      OK
```

12.8 AT^ECCLIST-Query Emergency Numbers

12.8.1 Command Syntax

AT^ECCLIST?
Possible Response(s)
<CR><LF>^ECCLIST: <list of supported eccs><CR><LF><CR><LF>OK<CR><LF>

12.8.2 Interface Description

This command is used to obtain emergency numbers.

The read command is used to query real-time data.

12.8.3 Parameter Description

<list of supported eccs>: a string type value indicating the phone number. Valid characters only include '0'-'9', '*', and '#'. The maximum length of a phone number is 6 characters, and the maximum number of emergency numbers is 18.

12.8.4 Property Description

Saving upon Power-off	PIN
NA	N

12.8.5 Example

None

12.9 ^ECCLIST-Unsolicitedly Report Emergency Numbers

12.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECCLIST: <list of supported eccs><CR><LF>

12.9.2 Interface Description

After the module is powered on or any change occurs in the currently supported emergency numbers, such as change to the SIM card status, residing network, or Non-Volatile (NV) emergency numbers, the board unsolicitedly reports its supported emergency numbers. Unsolicited reports are used to inform users of the emergency numbers currently supported by the module.

12.9.3 Parameter Description

<list of supported eccs>: a string type value indicating the phone number. Valid characters only include digits (0–9), asterisks (*), and number signs (#). The maximum length of a phone number is 6 characters, and the maximum number of emergency numbers is 18.

12.9.4 Property Description

Saving upon Power-off	PIN
NA	N

12.9.5 Example

None

12.10 AT^NSSWITCH-Control Noise Suppression

12.10.1 Command Syntax

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

12.10.2 Interface Description

This command is used to enable or disable the noise suppression function. Resetting the module will not affect the value. Running the set command during a voice call will return an ERROR.

12.10.3 Parameter Description

<nsmode>: an integer type value indicates the noise suppression status.

0 Disables the noise suppression function

1 Enables the noise suppression function

12.10.4 Property Description

Saving upon Power-off	PIN
Y	N

12.10.5 Example

Run: AT^NSSWITCH=0

Response: OK

Run: AT^NSSWITCH=?

Response: ^NSSWITCH: (0,1)

OK

Run: AT^NSSWITCH?

Response: ^NSSWITCH: 0

OK

12.11 AT^AMRCFG-Set the Voice Encoding Mode

12.11.1 Command Syntax

```
AT^AMRCFG=<mode>
```

Possible Response(s)

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

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

12.11.2 Interface Description

The set command sets the supported coding format.

The read command queries the supported coding format.

The test command gets the ranges of commands.

12.11.3 Parameter Description

<mode>: 16-bit unsigned integer. The nine low-order bits indicate the supported coding format.

0000 0000 0000 0000	Not support the codec of GSM and WCDMA
0000 0000 0000 0001	Support GSM FR
0000 0000 0000 0010	Support GSM EFR
0000 0000 0000 0100	Support GSM FR AMR
0000 0000 0000 1000	Support GSM HR
0000 0000 0001 0000	Support GSM HR AMR
0000 0000 0010 0000	Support GSM HR AMR-WB (not supported currently)
0000 0000 0100 0000	Support WCDMA AMR1
0000 0000 1000 0000	Support WCDMA AMR2
0000 0001 0000 0000	Support WCDMA WB-AMR (not supported currently)

<value>: the default value is 223.

12.11.4 Property Description

Saving upon Power-off	PIN
Y	N

12.11.5 Example

Set the GSM FR supported by module.

```
Run:          AT^AMRCFG=?
Response:     ^AMRCFG: (0-31,64-95,128-159,192-223)

              OK

Run:          AT^AMRCFG=1
Response:     OK

Run:          AT^AMRCFG?
Response:     ^AMRCFG: 1

              OK
```

12.12 AT^MEDAEC-Set AEC DTD Parameters

12.12.1 Command Syntax

```
AT^MEDAEC=<shwAfTailLen>,<shwDtdMutePowerThd>,<enestflag>,<shwestpowerthd>,<shwestamplthd>,<enNearFarRatioEnable>,<shwEchoSerThd>,<shwSpThdInit>,<shwSpThdMax>,<enEAecEnable>,<shwNlpResdFrmCntReset>,<shwNlpResdPowThd>,<shwNlpSmoothGainDod>
```

Possible Response(s)

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

```
AT^MEDAEC?
```

Possible Response(s)

```
<CR><LF>^MEDAEC:
<shwAfTailLen>,<shwDtdMutePowerThd>,<enestflag>,<shwestpowerthd>,<shwestamplthd>,<enNearFarRatioEnable>,<shwEchoSerThd>,<shwSpThdInit>,<shwSpThdMax>,<enEAecEnable>,<shwNlpResdFrmCntReset>,<shwNlpResdPowThd>,<shwNlpSmoothGainDod><CR><LF><CR><LF>OK<CR><LF>
```

```
AT^MEDAEC=?
```

Possible Response(s)

```
<CR><LF>^MEDAEC:
<shwAfTailLen>,<shwDtdMutePowerThd>,<enestflag>,<shwestpowerthd>,<shwestamplthd>,<enNearFarRatioEnable>,<shwEchoSerThd>,<shwSpThdInit>,<shwSpThdMax>,<enEAecEnable>,<shwNlpResdFrmCntReset>,<shwNlpResdPowThd>,<shwNlpSmoothGainDod><CR><LF><CR><LF>OK<CR><LF>
```

12.12.2 Interface Description

The set command is used to configure the double-talk detector (DTD) settings.

The read command is used to return the DTD settings.

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

12.12.3 Parameter Description

`<shwAfTailLen>`: indicates echo tail length in samples, which has a value in the range of 0–32767.

`<shwDtdMutePowerThd>`: indicates energy threshold, which has a value in the range of 0–30000.

`<enestflag>`:

- | | |
|---|----------------------|
| 0 | Disable enhanced DTD |
| 1 | Enable enhanced DTD |

`<shwestpowerthd>`: indicates enhanced DTD energy threshold, which has a value in the range of 0–30000.

`<shwestamplthd>`: indicates enhanced DTD amplitude threshold, which has a value in the range of 0–30000.

`<enNearFarRatioEnable>`: for DTD in the nonlinear case, whether to enable the ratio of power spectrum density (PSD) between the near and far ends.

- | | |
|---|---------|
| 0 | Disable |
| 1 | Enable |

`<shwEchoSerThd>`: for DTD in the nonlinear case, SER threshold where the probability of echo is 0, which has a value in the range of 0–32767.

`<shwSpThdInit>`: for DTD in the nonlinear case, the initial threshold used to identify whether near-end voice exists. which has a value in the range of 0–32767.

`<shwSpThdMax>`: for DTD in the nonlinear case, the maximum threshold used to identify whether near-end voice exists. which has a value in the range of 0–32767.

`<enEAecEnable>`: whether to enable AEC.

- | | |
|---|-------------|
| 0 | Enable AEC |
| 1 | Disable AEC |

`<shwNlpResdFrmCntReset>`: indicates value of the frame timer in single-talk mode. The unit is frame. which has a value in the range of 0–32767.

`<shwNlpResdPowThd>`: indicates residual signal energy threshold. which has a value in the range of 0–32767.

`<shwNlpSmoothGainDod>`: indicates power exponent for the gain factor. If the value is less than 0, calculate the actual power exponent. Otherwise, use the set power exponent. which has a value in the range of 0–65535.

12.12.4 Property Description

Saving upon Power-off	PIN
Y	N

12.12.5 Example

```

Run:          AT^MEDAEC=?
Response:    ^MEDAEC:
              (0-32767), (0-30000), (0,1), (0-30000), (0-30000), (0,1),
              (0-32767), (0-32767), (0-32767), (0,1), (0-32767), (0-32767),
              (0-65535)

              OK

Run:          AT^MEDAEC=50,1000,1,50,50,1,512,1500,2000,0,32,300,20480
Response:    OK

Run:          AT^MEDAEC?
Response:    ^MEDAEC: 32,2000,0,0,0,0,614,0,0,1,30,220,4096

              OK

```

12.13 AT^MEDAIG-Set AIG Parameters

12.13.1 Command Syntax

```
AT^MEDAIG=<trans_type>,<switch_state>,<shwdncompthr>,<shwupcompthr>,<shwdnexpthr>,<shwdncompslop>,<shwupcompslop>,<shwdnexplop>,<shwexpectmax>,<shwmakeupgain>
```

Possible Response(s)

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

```
AT^MEDAIG?
```

Possible Response(s)

```
<CR><LF>^MEDAIG:  
<tx_switch_state>,<tx_shwdncompthr>,<tx_shwupcompthr>,<tx_shw  
dnexpthr>,<tx_shwdncompslop>,<tx_shwupcompslop>,<tx_shwdnexp  
slop>,<tx_shwexpectmax>,<tx_shwmakeupgain>,<rx_switch_state>,<  
rx_shwdncompthr>,<rx_shwupcompthr>,<rx_shwdnexpthr>,<rx_shwdn  
compslop>,<rx_shwupcompslop>,<rx_shwdnexpopslop>,<rx_shwexpectm  
ax>,<rx_shwmakeupgain><CR><LF><CR><LF>OK<CR><LF>
```

```
AT^MEDAIG=?
```

Possible Response(s)

```
<CR><LF>^MEDAIG:  
<trans_type>,<switch_state>,<shwdncompthr>,<shwupcompthr>,<sh  
wdnexpthr>,<shwdncompslop>,<shwupcompslop>,<shwdnexpopslop>,<sh  
wexpectmax>,<shwmakeupgain><CR><LF><CR><LF>OK<CR><LF>
```

12.13.2 Interface Description

The set command is used to set AIG parameters.

The read command is used to return AIG settings.

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

12.13.3 Parameter Description

<trans_type>:

0	Tx
1	Rx

<switch_state>:

0	Disable AIG
1	Enable AIG

<shwdncompthr>: indicates lower compression area threshold, which has a value in the range of 0–65535.

<shwupcompthr>: indicates upper compression area threshold, which has a value in the range of 0–65535.

<shwdnexpthr>: indicates upper extension area threshold, which has a value in the range of 0–65535.

<shwdncompslop>: indicates lower compression area slope, which has a value in the range of 0–32767.

<shwupcompslop>: indicates upper compression area slope, which has a value in the range of 0–32767.

<shwdnexpopslop>: indicates lower extension area slope, which has a value in the range of 0–32767.

<shwexpectmax>: indicates expected maximum output amplitude, which has a value in the range of 0–65535.

<shwmakeupgain>: indicates structure gain, which has a value in the range of 0–32767.

12.13.4 Property Description

Saving upon Power-off	PIN
Y	N

12.13.5 Example

```

Run:      AT^MEDAIG=?
Response: ^MEDAIG:
          (0,1), (0,1), (0-65535), (0-65535), (0-65535), (0-32767)
          ), (0-32767), (0-32767), (0-65535), (0-32767)

          OK

Run:      AT^MEDAIG=0,1,62464,60416,57856,10,90,256,1800,1200
Response: OK

Run:      AT^MEDAIG?
Response: ^MEDAIG: 0,61696,60416,57856,10,90,166,18000,1200,
          0,61696,60416,57856,10,90,166,18000,1200

          OK

```

12.14 AT^MEDANR1MIC-Set the ANR1 Maximum Noise Suppression

12.14.1 Command Syntax

AT^MEDANR1MIC=<trans_type>,<switch_state>,<shwreducedb>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^MEDANR1MIC?
Possible Response(s)


```

<CR><LF>^MEDANR1MIC:
<tx_switch_state>,<tx_shwreducedb>,<rx_switch_state>,<rx_shwr
ducedb><CR><LF><CR><LF>OK<CR><LF>

```

```

AT^MEDANR1MIC=?

```

Possible Response(s)

```

<CR><LF>^MEDANR1MIC:
<trans_type>,<switch_state>,<shwreducedb><CR><LF><CR><LF>OK<
CR><LF>

```

12.14.2 Interface Description

The set command is used to set the parameters of the ANR1 maximum noise suppression.

The read command is used to return the settings of the ANR1 maximum noise suppression.

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

12.14.3 Parameter Description

<trans_type>:

- 0 Maximum noise suppression in the Tx direction
- 1 Maximum noise suppression in the Rx direction

<switch_state>:

- 0 Disable the maximum noise suppression
- 1 Enable the maximum noise suppression

<shwreducedb>: indicates maximum noise suppression, which has a value in the range of 0–65535.

12.14.4 Property Description

Saving upon Power-off	PIN
Y	N

12.14.5 Example

Run: AT^MEDANR1MIC=?

```
Response: ^MEDANR1MIC: (0,1),(0,1),(0-65535)

OK

Run: AT^MEDANR1MIC= 0,1,355

Response: OK

Run: AT^MEDANR1MIC?

Response: ^MEDANR1MIC: 0,0,0,0

OK
```

12.15 AT^MEDANR2MIC-Set the ANR2 Suppression Gain Lower Limit

12.15.1 Command Syntax

AT^MEDANR2MIC=<shwgainmin>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^MEDANR2MIC?
Possible Response(s)
<CR><LF>^MEDANR2MIC: <shwgainmin><CR><LF><CR><LF>OK<CR><LF>
AT^MEDANR2MIC=?
Possible Response(s)
<CR><LF>^MEDANR2MIC: <shwgainmin><CR><LF><CR><LF>OK<CR><LF>

12.15.2 Interface Description

The set command is used to set the parameters of the NR2 suppression gain lower limit.

The read command is used to return the settings of the NR2 suppression gain lower limit.

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

12.15.3 Parameter Description

<shwgainmin>: indicates suppression gain lower limit, which has a value in the range of 0–32767.

12.15.4 Property Description

Saving upon Power-off	PIN
Y	N

12.15.5 Example

```

Run:          AT^MEDANR2MIC=?
Response:     ^MEDANR2MIC: (0-32767)

              OK

Run:          AT^MEDANR2MIC=4700
Response:     OK

Run:          AT^MEDANR2MIC?
Response:     ^MEDANR2MIC: 4700

              OK

```

12.16 AT^MEDCOMPAIN-Set the Left Offset for Gain

12.16.1 Command Syntax

AT^MEDCOMPAIN=<trans_type>,<switch_state>,<shwcompain>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^MEDCOMPAIN?
Possible Response(s)
<CR><LF>^MEDCOMPAIN: <tx_switch_state>,<tx_shwcompain>,<rx_switch_state>,<rx_shwcompain><CR><LF><CR><LF>OK<CR><LF>
AT^MEDCOMPAIN=?
Possible Response(s)
<CR><LF>^MEDCOMPAIN: <trans_type>,<switch_state>,<shwcompain><CR><LF><CR><LF>OK<CR><LF>

12.16.2 Interface Description

The set command is used to set the left offset value for gain.

The read command is used to return the left offset settings for gain.

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

12.16.3 Parameter Description

<trans_type>:

0 Tx

1 Rx

<switch_state>:

0 Disable Tx COMP

1 Enable Tx COMP

<shwcompgain>: indicates left offset value, which has a value in the range of 0–6.

12.16.4 Property Description

Saving upon Power-off	PIN
Y	N

12.16.5 Example

Run: AT^MEDCOMPAIN=?

Response: ^MEDCOMPAIN: (0,1), (0,1), (0-6)

OK

Run: at^MEDCOMPAIN=0,1,0

Response: OK

Run: AT^MEDCOMPAIN?

Response: ^MEDCOMPAIN: 1,1,1,0

OK

12.17 AT^MEDDEVGAIN–Set the Gain for Uplink or Downlink Device in Single-Talk Mode

12.17.1 Command Syntax

<code>AT^MEDDEVGAIN=<trans_type>,<ashwVol>,<shwdevgain></code>
Possible Response(s) <code><CR><LF>OK<CR><LF></code>
<code>AT^MEDDEVGAIN?</code>
Possible Response(s) <code><CR><LF>^MEDDEVGAIN: <tx_ashwVol>,<tx_shwdevgain>,<rx_ashwVol>,<rx_shwdevgain><CR> ><LF><CR><LF>OK<CR><LF></code>
<code>AT^MEDDEVGAIN=?</code>
Possible Response(s) <code><CR><LF>^MEDDEVGAIN: <trans_type>,<ashwVol>,<shwdevgain><CR><LF><CR><LF>OK<CR><LF> ></code>

12.17.2 Interface Description

The set command is used to set the gain for uplink or downlink device in single-talk mode.

The read command is used to return the gain for uplink or downlink device in single-talk mode.

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

12.17.3 Parameter Description

`<trans_type>`:

- | | |
|---|-----------------|
| 0 | Uplink device |
| 1 | Downlink device |

`<ashwVol>`: indicates sent or received volume, which has a value in the range of 0–80.

`<shwdevgain>`: indicates gain level, which has a value in the range of 0–65535.

12.17.4 Property Description

Saving upon Power-off	PIN
Y	N

12.17.5 Example

```

Run:          AT^MEDDEVGAIN=?
Response:    ^MEDDEVGAIN: (0,1),(0-80),(0-65535)

              OK

Run:          AT^MEDDEVGAIN=0,1,65526
Response:    OK

Run:          AT^MEDDEVGAIN?
Response:    ^MEDDEVGAIN: 4,65532,3,0

              OK

```

12.18 AT^MEDHPF-Enable or Disable HPF

12.18.1 Command Syntax

AT^MEDHPF=<trans_type>,<switch_state>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^MEDHPF?
Possible Response(s)
<CR><LF>^MEDHPF: <tx_switch_state>,<rx_switch_state><CR><LF><CR><LF>OK<CR><LF> >
AT^MEDHPF=?
Possible Response(s)
<CR><LF>^MEDHPF: <trans_type>,<switch_state><CR><LF><CR><LF>OK<CR><LF>

12.18.2 Interface Description

The set command is used to enable or disable high-pass filtering (HPF) in single-talk mode.

The read command is used to return the HPF settings in single-talk mode.

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

12.18.3 Parameter Description

<trans_type>:

0 Tx

1 Rx

<switch_state>:

0 Disable HPF

1 Enable HPF

12.18.4 Property Description

Saving upon Power-off	PIN
Y	N

12.18.5 Example

```
Run: AT^MEDHPF=?
Response: ^MEDHPF: (0,1),(0,1)

OK

Run: AT^MEDHPF=1,0
Response: OK

Run: AT^MEDHPF?
Response: ^MEDHPF: 1,1

OK
```

13 Huawei Proprietary Interface: SMS Service Interface

13.1 ^SMMEMFULL-Message Memory Full

13.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SMMEMFULL: <mem_type><CR><LF>

13.1.2 Interface Description

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

13.1.3 Parameter Description

<mem_type>: a string type value that indicates the type of the storage that is full.

"SM" (U)SIM card

13.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.1.5 Example

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



Response: ^SMMEMFULL: "SM"

14 Huawei Proprietary Interface: Network Service Interfaces

14.1 AT^SYSCFG–System Configuration

14.1.1 Command Syntax

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>
AT^SYSCFG?
Possible Response(s)
<CR><LF>^SYSCFG: <mode>,<acqorder>,<band>,<roam>,<srvdomain><CR><LF><CR><LF>OK<CR><LF>
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>

14.1.2 Interface Description

The set command is used to set the system mode, GW access order, frequency band, roaming support, domain, and other features.

The read command is used to query the current parameter values.

The test command is used to return the values supported as a compound value.

14.1.3 Parameter Description

<mode>: specifies the system mode.

2	Automatic
3	CDMA (not supported currently)
4	HDR (not supported currently)
8	CDMA/HDR HYBRID (not supported currently)
13	GSM
14	WCDMA
15	TD_SCDMA (not supported currently)
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
000400000000000000 (CM_BAND_PREF_WCDMA_IX_1700)	WCDMA_IX_1700
0000000000400000 (CM_BAND_PREF_WCDMA_IMT)	WCDMA_IMT(2100)
000200000000000000	WCDMA 900
00680380	Automatic

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

<roam>: indicates whether roaming is supported.

0	Not supported
1	Supported
2	No change

<srvdomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY
2	CS_PS
3	ANY
4	No change
255	Not supported

14.1.4 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.
- When <mode> is set to 2, the value of <band> must be a combination of 2G and 3G frequency bands.

14.1.5 Example

- Query the current system configuration:

Run: AT^SYSCFG?

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

OK

- Set system configuration:

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

Response: OK

- Query the list of supported system configuration parameters:

Run: AT^SYSCFG=?

Response: ^SYSCFG:
(2,13,14,16), (0-3), ((2000000400380, "GSM900/GSM1800/WCDMA900/WCDMA2100"), (4a80000, "GSM850/GSM1900/WCDMA850/WCDMA1900"), (3fffffff, "All Bands")), (0-2), (0-4)

OK

14.2 AT^SYSINFOEX-Query Extended System Information

14.2.1 Command Syntax

```
AT^SYSINFOEX
```

Possible Response(s)

```
<CR><LF>^SYSINFOEX:  
<srv_status>,<srv_domain>,<roam_status>,<sim_state>,<lock_state>,<sysmode>,<sysmode_name>,<submode>,<submode_name><CR><LF>  
><CR><LF>OK<CR><LF>
```

14.2.2 Interface Description

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

14.2.3 Parameter Description

<srv_status>: indicates the system service status.

0	No services
1	Restricted services
2	Valid services

- 3 Restricted regional services
- 4 Power saving or hibernate state

<srv_domain>: indicates the system service domain.

- 0 No services
- 1 CS service only
- 2 PS service only
- 3 PS+CS services
- 4 Not registered to CS or PS; searching now

<roam_status>: indicates the roaming status.

- 0 Not roaming
- 1 Roaming

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

- 0 Invalid SIM card
- 1 Valid SIM card
- 2 Invalid SIM card in CS
- 3 Invalid SIM card in PS
- 4 Invalid SIM card in PS and CS
- 255 No SIM card is found

<lock_state>: indicates whether the SIM card is locked by the CardLock feature.(not support currently)

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

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

- 0 NO SERVICE
- 1 GSM
- 3 WCDMA

**NOTE**

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

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

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

<submode>: indicates the system sub-mode.

0	NO SERVICE
1	GSM
2	GPRS
3	EDGE
41	WCDMA
42	HSDPA
43	HSUPA
44	HSPA
45	HSPA+

<submode_name>: indicates the name of the system sub-mode. (value can be extended).

This parameter returns the name of the current network sub-mode in character string. The value of <submode_name> is the character string corresponding to the value of <submode> in the command. For example, if the value of <submode> is 45, the value of <submode_name> is HSPA+.

14.2.4 Property Description

Saving upon Power-off	PIN
NA	N

14.2.5 Example

Run: AT^SYSINFOEX

Response: ^SYSINFOEX:
2,3,0,1,,3,"WCDMA",41,"WCDMA"

OK

The response indicates that the UE is operating over a WCDMA network in WCDMA mode.

14.3 AT^USSDMODE-Select USSD Mode

14.3.1 Command Syntax

AT^USSDMODE=[<mode>]

Possible Response(s)

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

14.3.2 Interface Description

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

The read command returns the current USSD mode.

The test command returns the list of supported USSD modes.

14.3.3 Parameter Description

<mode>:

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

14.3.4 Property Description

Saving upon Power-off	PIN
N	N

14.3.5 Example

- Query the current USSD mode:

Run: AT^USSDMODE?

Response: ^USSDMODE: 1

OK

- Set USSD mode:

Run: AT^USSDMODE=0

Non-transparent mode

Response: OK

- Query the list of supported <mode>s:

Run: AT^USSDMODE=?

Response: ^USSDMODE: (0-1)

OK

14.4 AT^EONS—Query the Service Provider Name and the EF_{SPN} Information of the SIM Card

14.4.1 Command Syntax

```
AT^EONS=<type>[,<plmn_id>[,<plmn_name_len>]]
```

Possible Response(s)

<CR><LF>^EONS:

<type>,<plmn_id>,<plmn_name1>,<plmn_name2>[,<spn_cond>,<spn>]<CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

```
AT^EONS=?
```

Possible Response(s)

<CR><LF>^EONS: (list of supported<type>s)<CR><LF><CR><LF>OK<CR><LF>

14.4.2 Interface Description

This command is used to query the service provider name and the information contained in the EF_{SPN} file of the SIM card.

<type> specifies the query type.

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

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

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

In the response, `<spn_cond>` and `<spn>` are handled as follows: If the SIM card for the current registered network has an `EFSPN` file that is not empty, the content of the `EFSPN` file is returned. Otherwise, nothing is returned.

- When `<type>` is set to 5:

The command format is `AT^EONS=<type>` or `AT^EONS=<type>,,<plmn_name_len>`. If `<plmn_name_len>` is not included, its default value is used.

In the response, the maximum number of hexadecimal characters that can be contained in the value of `<plmn_name1>` is the value of `<plmn_name_len>` divided by 4. An empty value is returned for `<plmn_name2>`.

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

A UCS-2 hexadecimal character string is converted using the big-endian encoding scheme. For example, character "A" is represented by 0041.

14.4.3 Parameter Description

`<type>`: operation type.

- | | |
|---|---|
| 1 | Automatic mode. <ul style="list-style-type: none">• Information saved in the <code>EF_{PNN}</code> file corresponding to the USIM <code>EF_{OPL}</code>• Information released from the network side (MM/GMM/EMM information)• Information saved in the internal network name list |
| 2 | Query the network name in the MM/GMM/EMM information. |
| 3 | Query the network name in the <code>EF_{PNN}</code> file corresponding to the USIM <code>EF_{OPL}</code> . |
| 4 | Query the information saved in the internal network name list. |
| 5 | Automatic length limit mode. |

Processing logic for `<plmn_name1>`:

1. If a long name exists and its length does not exceed the limit set by `<plmn_name_len>`.

	(Non-Roaming or RPLMN Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Roaming and RPLMN Is Not Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	Long name

2. If a short name exists and its length does not exceed the limit set by <plmn_name_len>.

	(Non-Roaming or RPLMN Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Roaming and RPLMN Is Not Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	Short name

3. In other cases

	(Non-Roaming or RPLMN Is Listed in EF_{SPDI}) and EF_{SPN} Is Valid	Roaming and RPLMN Is Not Listed in EF_{SPDI}) or EF_{SPN} Is Invalid
<plmn_name1> returns	SPN	"MCC MNC"

The priority for the long and short names (from high to low) is as follows:

- Information saved in the EF_{PNN} file corresponding to the EF_{OPL}
- Information released from the network side (MM/GMM/EMM information)
- Information saved in the internal network name list

If the long and short names obtained from a preferred location are invalid, specifically, the name does not exist or its length exceeds the limit, the next preferred location is turned to.

<plmn_id>: PLMN ID of the network, without double quotation marks. For detailed format, see the description of the numeric <oper> field in the +COPS command in the 3GPP TS 27.007 protocol.

<plmn_name_len>: an integer type value that specifies the maximum length of <plmn_name1>. When the field is not delivered, the default value is 20. Modules do not support the extension of the field.

<plmn_name1>: a string type value in the format of a UCS2 hexadecimal character string.

<plmn_name2>: a string type value in the format of a UCS2 hexadecimal character string. When the <type> parameter is set to 5, a null character string is reported in "" format.

<spn_cond>: an integer type value ranging from 0 to 255. The value of the <spn_cond> parameter is the first byte in the EF_{SPN} file of the SIM card. For details in 3GPP, see the explanation of the <Display Condition> field in the definition of the EF_{SPN} file in the 3GPP TS 31.102 protocol. For details in 3GPP2, see the explanation of the <Display Condition> field in the definition of the EF_{SPN} file in the 3GPP2 C.S0023 protocol.

<spn>: a string type value in the format of a UCS2 hexadecimal character string that indicates the content of the EF_{SPN} file.

14.4.4 Property Description

Saving upon Power-off	PIN
N	Y

14.4.5 Example

If the currently registered 3GPP network is 46009. The long name of network 46009 is "HUAWEI TEST W09" and the short name is "HTW09" in the EF_{PNN} file of the current SIM card. The <Display Condition> field of the EF_{SPN} is set to 0x03 and the <Service Provider Name> field is set to "HUAWEI". The long and short names delivered by network 46009 are "HUAWEI TEST W09 NETWORK" and "HTW09NET" respectively.

Run: AT^EONS=1

Response: ^EONS:
1,46009,"0048005500410057004500490020005400450053005
40020005700300039","00480054005700300039",3,"0048005
50041005700450049"

OK

Run: AT^EONS=2

Response: ^EONS:
2,46009,"00480055004100570045004900200054004500530
05400200057003000390020004E004500540057004F0052004
B","00480054005700300039004E00450054",3,"004800550
041005700450049"

OK

Run: AT^EONS=2,46010

Response: ^EONS: 2,46010,"","",3,"004800550041005700450049"

OK

Run: AT^EONS=5

<p>Response: ^EONS: 5,46009,"00480055004100570 0450049", ""</p> <p>OK</p> <p>^EONS: 5,46009,"00480055004100570 04500490020005400450053005 40020005700300039", ""</p> <p>OK</p>	<p>When network 46009 is an H_{PLMN} or belongs to an EH_{PLMN}, or in EF_{SPDI}.</p> <p>When network 46009 is not in an H_{PLMN}, EH_{PLMN}, or EF_{SPDI}.</p>
--	---



NOTE

- "HUAWEI TEST W09" (UCS-2 hexadecimal character string):
004800550041005700450049002000540045005300540020005700300039
- "HTW09" UCS2 (UCS-2 hexadecimal character string): 00480054005700300039
- "HUAWEI" UCS2 (UCS-2 hexadecimal character string): 004800550041005700450049
- "HUAWEI TEST W09 NETWORK" (UCS-2 hexadecimal character string):
0048005500410057004500490020005400450053005400200057003000390020004E0045
00540057004F0052004B
- "HTW09NET" UCS2 (UCS-2 hexadecimal character string):
00480054005700300039004E0045005

14.5 AT^HCSQ-Query and Report Signal Strength

14.5.1 Command Syntax

AT^HCSQ?
Possible Response(s)
<CR><LF>^HCSQ: <sysmode>[, <value1>[, <value2>[, <value3>[, <value4>[, <value5>]]]]<CR><LF><CR><LF>OK<CR><LF>
AT^HCSQ=?
Possible Response(s)
<CR><LF>^HCSQ: (list of supported <sysmode>) s<CR><LF><CR><LF>OK<CR><LF>
URC
Possible Response(s)
<CR><LF>^HCSQ: <sysmode>[, <value1>[, <value2>[, <value3>[, <value4>[, <value5>]]]]<CR><LF>

14.5.2 Interface Description

This command is used to query and report the signal strength of the current service network. If the MT is registered with multiple networks in different service modes, you can query the signal strength of networks in each mode.

No matter whether the MT is registered with a network or not, you can run this command to query the signal strength or allow the MT to unsolicitedly report the detected signal strength if the MT camps on the network. If the MT is not using any service network or the service mode is uncertain, "NOSERVICE" will be returned as the query result.

The read command is used to query the current network signal strength detected by the MT.

The test command is used to return the list of service modes supported by the MT.

The URC command allows the MT to unsolicitedly report the current signal strength when the strength changes.

14.5.3 Parameter Description

<sysmode>: a string type value indicates the service mode in which the MT will unsolicitedly report the signal strength.

"NOSERVICE"	NOSERVICE mode
"GSM"	GSM/GRPS/EDGE mode
"WCDMA"	WCDMA/HSDPA/HSPA mode

<value1>, <value2>, <value3>, <value4>, <value5>: the following table lists the signal strength type corresponding to each service mode.

<sysmode>	<value1>	<value2>	<value3>	<value4>	<value5>
"NOSERVICE"	-	-	-	-	-
"GSM"	gsm_rssi	-	-	-	-
"WCDMA"	wcdma_rssi	wcdma_rscp	wcdma_ecio	-	-

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

0	RSSI < -120 dBm
1	-120 dBm ≤ RSSI < -119 dBm
2	-119 dBm ≤ RSSI < -118 dBm
...	
94	-27 dBm ≤ RSSI < -26 dBm
95	-26 dBm ≤ RSSI < -25 dBm

- 96 $-25 \text{ dBm} \leq \text{RSSI}$
- 255 Unknown or undetectable

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

- 0 $\text{RSCP} < -120 \text{ dBm}$
- 1 $-120 \text{ dBm} \leq \text{RSCP} < -119 \text{ dBm}$
- 2 $-119 \text{ dBm} \leq \text{RSCP} < -118 \text{ dBm}$
- ...
- 94 $-27 \text{ dBm} \leq \text{RSCP} < -26 \text{ dBm}$
- 95 $-26 \text{ dBm} \leq \text{RSCP} < -25 \text{ dBm}$
- 96 $-25 \text{ dBm} \leq \text{RSCP}$
- 255 Unknown or undetectable

<wcdma_ecio>: an integer indicates the downlink carrier-to-interference ratio.

- 0 $\text{Ec/lo} < -32 \text{ dB}$
- 1 $-32 \text{ dB} \leq \text{Ec/lo} < -31.5 \text{ dB}$
- 2 $-31.5 \text{ dB} \leq \text{Ec/lo} < -31 \text{ dB}$
- ...
- 63 $-1 \text{ dB} \leq \text{Ec/lo} < -0.5 \text{ dB}$
- 64 $-0.5 \text{ dB} \leq \text{Ec/lo} < 0 \text{ dB}$
- 65 $0 \text{ dB} \leq \text{Ec/lo}$
- 255 Unknown or undetectable

14.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.5.5 Example

```

Run:          AT^HCSQ=?
Response:    ^HCSQ: "NOSERVICE", "GSM", "WCDMA"

              OK

Run:          AT^HCSQ?

```

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

OK

14.6 ^SRVST–Service State Change Indication

14.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SRVST: <srv_status><CR><LF>

14.6.2 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.

14.6.3 Parameter Description

<srv_status>: indicates the system service status.

0	No services
1	Restricted services
2	Valid services
3	Restricted regional services
4	Power saving or hibernate state

14.6.4 Property Description

Saving upon Power-off	PIN
N	NA

14.6.5 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
```

14.7 ^SIMST-SIM Card State Change Indication

14.7.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SIMST: <sim_state>[,<lock_state>]<CR><LF>

14.7.2 Interface Description

When the state of the SIM card is changed, the MT uses this command to unsolicited send the new state to the TE. Meanwhile, the indication also indicates whether the SIM card is locked.

14.7.3 Parameter Description

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

- | | |
|---|--------------------------------|
| 0 | Invalid SIM card. |
| 1 | Valid SIM card. |
| 2 | Invalid SIM card in CS domain. |
| 3 | Invalid SIM card in PS domain. |

- 4 Invalid SIM card in PS domain and CS domain.
- 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.

14.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.7.5 Example

```
Run:          AT+CPIN=1234
Response:    OK

              ^SIMST: 1,0
```

14.8 AT^NWTIME-Query Presentation of Network System Time

14.8.1 Command Syntax

AT^NWTIME?
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF>

14.8.2 Interface Description

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

14.8.3 Parameter Description

<date>: specifies date in the format of yy/MM/dd.

<time>: specifies the time and time zone in the format of hh:mm:ss+tz. The value of <time> consists of time and time zone, for example, 05:56:13+32. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, + 8 hours.

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

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

14.8.4 Property Description

Saving upon Power-off	PIN
N	Y

14.8.5 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

14.9 ^NWTIME-Unsolicitedly Report Network System Time

14.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF>

14.9.2 Interface Description

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

14.9.3 Parameter Description

<date>: specifies date in the format of yy/MM/dd.

<time>: specifies the time and time zone in the format of hh:mm:ss+tz. The value of <time> consists of time and time zone, for example, 05:56:13+32. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, + 8 hours.

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

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

14.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.9.5 Example

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

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

14.10 AT^MONSC-Query Serving Cell Information Through Network Monitor

14.10.1 Command Syntax

AT^MONSC
Possible Response(s)
<CR><LF>^MONSC: <RAT>[, <cell_paras>]<CR><LF><CR><LF>OK<CR><LF>

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

14.10.2 Interface Description

This command is used to query the parameter values of the current serving cell.

When the network standard is WCDMA, in data transmission state, multiple serving cells are involved. Running this command returns the parameter values of the serving cell with the strongest signal.

14.10.3 Parameter Description

<RAT>: a string indicates the access technology.

GSM	Reside on a GSM cell. <cell_paras> will be returned.
WCDMA	Reside on a WCDMA cell. <cell_paras> will be returned.
NONE	No network. <cell_paras> will not be returned.

<cell_paras>: serving cell parameters. The returned parameters vary with the access technology and network condition. If no valid value is obtained for a parameter, the parameter will be left empty.

- GSM

<MCC>	Mobile Country Code, which is a decimal number
<MNC>	Mobile Network Code, which is a decimal number
<BAND>	Frequency Band, which is a decimal number. The value range is 0–3: <ul style="list-style-type: none">• 0: GSM 850• 1: GSM 900• 2: GSM 1800• 3: GSM1900
<ARFCN>	Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 0–1023.
<BSIC>	Base Station Identity Code, which is a decimal number. The value range is 0–63.
<Cell_ID>	Cell ID, which is a hexadecimal. The value range is 0–FFFF.
<LAC>	Location Area Code, which is a hexadecimal. The value range is 0–FFFF.
<RXLEV>	Receiving Signal Strength in dBm, which is a decimal number. The value range is –120–37.

- <RxQuality> Quality of Reception, which is a decimal number. This parameter is valid in data transmission or dedicated state. The value range is 0–7.
- <TA> Timing Advance, which is a decimal number. The value range is 0–63.

 **NOTE**

- <RxQuality> has valid values only when the module is used in a voice call.
- <TA> has a valid value only when the module is used for voice or data services.
- When the module is residing on a cell for the first time, reselecting a cell, or switching a cell, a valid value for <RXLEV> may fail to be obtained temporarily.

- **WCDMA**

- <MCC> Mobile Country Code, which is a decimal number.
- <MNC> Mobile Network Code, which is a decimal number.
- <ARFCN> Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 0–16383.
- <PSC> Primary Scrambling Code, which is a decimal number. The value range is 0–511
- <Cell_ID> Cell identity in the SIB3 message, which is a hexadecimal and includes the RNC ID and cell ID. The value range is 0–FFFFFFFF.
- <LAC> Location Area Code, which is a hexadecimal. The value range is 0–FFFF.
- <RSCP> Received Signal Code Power in dBm, which is a decimal number. The value range is –120–25.
- <RXLEV> Receiving Signal Strength in dBm, which is a decimal number. The value range is –120–25.
- <EC/N0> Ratio of energy per modulating bit to the noise spectral density, which is a decimal number. The value range is –25–0.
- <DRX> Discontinuous Reception Cycle Length, which is a decimal number, The value range is 6–9.
- <URA> UTRAN Registration Area Identity, which is a decimal number, The value range is 0–65535.

 **NOTE**

When the module is residing on a cell for the first time, reselecting a cell, or switching a cell, valid values for <PSC>, <Cell_ID>, <LAC>, <RSCP>, <RXLEV>, <EC/N0>, <DRX>, and <URA> may fail to be obtained temporarily.

14.10.4 Property Description

Saving upon Power-off	PIN
N	N

14.10.5 Example

Query the parameter values of the current serving cell:

```
Run:          AT^MONSC
Response:     ^MONSC:
              WCDMA,472,99,10738,304,120514,2513,-79,-73,-6,6,0

              OK
```

14.11 AT^MONNC-Query Neighboring Cell Information Through Network Monitor

14.11.1 Command Syntax

AT^MONNC
Possible Response(s)
<CR><LF>^MONNC: <RAT>[, <cell_paras>][<CR><LF>^MONNC: <RAT>[, <cell_paras>]][...]<CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>

14.11.2 Interface Description

This command is used to query the parameter values of the current neighboring cells.

When the network standard is WCDMA, in data transmission state, multiple cells are involved. Running this command returns all the parameter values of the serving cell and the neighboring cells.

14.11.3 Parameter Description

<RAT>: a string indicates the access technology.

GSM	The neighboring cells are GSM cells.
WCDMA	The neighboring cells are WCDMA cells.
NONE	No neighboring cells. <cell_paras> will not be returned.

<cell_paras>: parameters of neighboring cells. The returned parameters vary with the network condition. If no valid value is obtained for a parameter, the parameter will be left empty.

- GSM (a maximum of six neighboring GSM cells are supported)

<code><BAND></code>	Frequency Band, which is a decimal number. The value range is 0–3: <ul style="list-style-type: none"> • 0: GSM 850 • 1: GSM 900 • 2: GSM 1800 • 3: GSM1900
<code><ARFCN></code>	Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 0–1023.
<code><BSIC></code>	Base Station Identity Code, which is a decimal number. The value range is 0–63.
<code><Cell_ID></code>	Cell ID, which is a hexadecimal number. The value range is 0–FFFF.
<code><LAC></code>	Location Area Code, which is a hexadecimal. The value range is 0–FFFF.
<code><RXLEV></code>	Receiving Signal Strength Indication in dBm, which is a decimal number. The value range is –120–37.



NOTE

When the network condition is unstable, valid values for `<BSIC>`, `<Cell_ID>`, and `<LAC>` may fail to be obtained temporarily.

- WCDMA (a maximum of sixteen WCDMA neighboring cells are supported)

<code><ARFCN></code>	Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 0–16383.
<code><PSC></code>	Primary Scrambling Code, which is a decimal number. The value range is 0–511.
<code><RSCP></code>	Received Signal Code Power in dBm, which is a decimal number. The value range is –120–25.
<code><EC/N0></code>	Ratio of energy per modulating bit to the noise spectral density, which is a decimal number. The value range is –25–0.

14.11.4 Property Description

Saving upon Power-off	PIN
NA	N

14.11.5 Example

- Query the parameter values of the current neighboring cells (when no neighboring cells are available):

Run: `AT^MONNC`

Response: ^MONNC: NONE

OK

- Query the parameter values of the current neighboring cells (when one neighboring GSM cell is available):

Run: AT^MONNC

Response: ^MONNC: GSM,1,124,0,0,1,-79

OK

14.12 AT^NETSCAN–Network Scan

14.12.1 Command Syntax

```
AT^NETSCAN=<n>,<pow>[,<mode>[,<band>]]
```

Possible Response(s)

```
[<CR><LF>^NETSCAN:  
<arfcn>,<c1>,<c2>,<lac>,<mcc>,<mnc>,<bsic>,<rxlvel>[,<cid>[,<b  
and>[,<psc>]]]<CR><LF>[<CR><LF>^NETSCAN:  
<arfcn>,<c1>,<c2>,<lac>,<mcc>,<mnc>,<bsic>,<rxlvel>[,<cid>[,<b  
and>[,<psc>]]]<CR><LF>[...]]<CR><LF><CR><LF>OK<CR><LF>
```

If the command is not successfully executed:

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

```
AT^NETSCAN=?
```

Possible Response(s)

```
<CR><LF>^NETSCAN: (list of supported <n>s), (list of supported <pow>s), (list of  
supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>
```

14.12.2 Interface Description

After the MT is powered on, enter the signal strength threshold and number of desired cells to obtain the information.

The set command queries <n> frequency points with signal strength from strong to weak.

The test command queries the parameter ranges of AT^NETSCAN.

14.12.3 Parameter description

<arfcn>: Absolute Radio Frequency Channel Number (ARFCN) (GSM) or UTRAN Absolute Radio Frequency Channel Number (UARFCN) (UMTS) of the cell that was scanned.

<C1>: cell reselection coefficient, for GSM only. (not supported currently)

<C2>: cell reselection coefficient, for GSM only. (not supported currently)

<lac>: location or tracking area code, which is a 4-digit hexadecimal number.

<mcc>: country code, which is a 2-digit or 3-digit decimal number.

<mnc>: network code, which is a 2-digit or 3-digit decimal number.

<bsic>: base station identification code, which is a 2-digit decimal number, (If no base station identification code is found, this parameter will be left blank in the response.) for GSM only. UMTS and LTE report 0.

<rxlevel>: receive signal level (dBm), ranging from -110 dBm to -47 dBm.

- For GSM: indicates RSSI. Received signal level of the BCCH carrier. This is in accordance with a formula specified in 3GPP TS 45.008.
- For UMTS: indicates RSCP. Parameter determines the received signal code power level of the cell that was scanned.

<cid>: cell identity in the SIB3 message. In GSM mode, only the cell ID is included. In WCDMA mode, the RNC ID and cell ID are included.

<band>: the radio band of the cell, refer to the 14.1 AT^SYSCFG–System Configuration.

<psc>: Primary Scrambling Code, which is a decimal number, for UMTS only.

<n>: the number of cells that power level is greater than the <pow>. The value range is from 1 to 20.

<pow>: minimum power value to scan. The value range is from -110 dBm to -47 dBm.

<mode>: system mode reference.

0	GSM (default value)
1	UTRAN

NOTE

- This command can be interrupted. For voice calling, frequency point locking, TCP, and UDP services and etc, this command will not find anything, and "operation not allowed" will be returned.
- To avoid a potential conflict with normal module operations, it is strongly suggested to not use this command such as "incoming call", "periodic location update", "periodic routing area update" and so on.
- The command is executed within max. 2 minutes.

14.12.4 Property Description

Saving upon Power-off	PIN
N	N

14.12.5 Example

- Query information of two frequency points with the strongest signal strength above the threshold -110 dBm.

Run: AT^NETSCAN=2,-110

Response: ^NETSCAN: 735,,,1,003,01,0,-61,0,80
^NETSCAN: 91,,,2,460,09,0,-75,7,100300

OK

- Check the parameter ranges.

Run: AT^NETSCAN=?

Response: ^NETSCAN: (1-20),(-110--47),(0,1)

OK

14.13 AT^FREQLOCK-Frequency Lock

14.13.1 Command Syntax

```
AT^FREQLOCK=<n>[,<mode>,<freq>,<band>],[<psc>]]
```

Possible Response(s)

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

If the command is not successfully executed:

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

```
AT^FREQLOCK?
```

Possible Response(s)

```
<CR><LF>^FREQLOCK:  
<n>,<mode>[,<freq>,<band>],[<psc>]][<CR><LF>^FREQLOCK:<n>,<mode>[,<freq>,<band>],[<psc>]][...]<CR><LF><CR><LF>OK<CR><LF>
```

14.13.2 Interface Description

This command is used to query, enable, or disable the frequency lock.

The set command is used to enable, or disable the frequency lock.

The read command is used to query the current status information of the frequency lock.

14.13.3 Parameter description

<n>: an integer type value indicating whether the frequency lock is enabled.

0	The frequency lock is disabled. (default value)
1	The frequency lock is enabled.

<mode>: a character type value indicating the network mode of the frequency lock.

"01"	GSM
"02"	WCDMA

<freq>: an integer type value indicating the locked frequency.

<band>: a character type value indicating the band of the locked frequency. This parameter is used to differentiate bands with the same locked frequency. This parameter can be set in GSM mode only.

"00"	850
"01"	900
"02"	1800
"03"	1900

<psc>: an integer type value, which is a primary scrambling code parameter only valid in WCDMA mode. When not configured, only the function of frequency lock is available. When configured, the function of scrambling code lock is also available. The value range is 0–511.



NOTE

- When the `AT^FREQLOCK?` command is run, if <n> is 0, the other parameters are not returned.
- Running `AT^FREQLOCK=0` disables the frequency lock for all network modes.

14.13.4 Property Description

Saving upon Power-off	PIN
N	N

14.13.5 Example

- Lock the frequency 54 of the GSM 900 frequency band.
Run: `AT^FREQLOCK=1,"01",54,"01",`
Response: `OK`
- Lock the frequency 10738 of the WCDMA, and the scrambling code is 30.
Run: `AT^FREQLOCK=1,"02",10738,,30`
Response: `OK`
- Disable the frequency lock.
Run: `AT^FREQLOCK=0`
Response: `OK`
- Query the current status of the frequency lock.
Run: `AT^FREQLOCK?`
Response: `^FREQLOCK: 1,"01",54,"01",`
`^FREQLOCK: 1,"02",10738,,`

`OK`

14.14 AT^DDTMFCFG—Configure the DTMF Decoder

14.14.1 Command Syntax

<code>AT^DDTMFCFG=<para>,<value></code>
Possible Response(s)
<code><CR><LF>OK<CR><LF></code>
<code>AT^DDTMFCFG?</code>
Possible Response(s)
<code><CR><LF>^DDTMFCFG: <para>,<value><CR><LF><CR><LF>OK<CR><LF></code>
<code>AT^DDTMFCFG=?</code>
Possible Response(s)
<code><CR><LF>^DDTMFCFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF></code>

14.14.2 Interface Description

This command is used to set the DTMF decoder parameters. <para> indicates the parameter to configure. <value> indicates the desired value. Currently this command can enable or disable the DTMF RX decoder only, that is, this command sets whether to decode the network side's DTMF tones into an ASCII character ('0' to '9', 'A' to 'D', '*', or '#') and reports it to the TE.

The set command is used to specify the DTMF decoder parameters.

The read command is used to query the values of DTMF decoder parameters.

The test command is used to return all configurable DTMF decoder parameters.

14.14.3 Parameter description

<para>: DTMF decoder parameters.

0 The DTMF RX decoder is enabled.

<value>: values of the DTMF decoder parameters.

If <para> is set to 0, the available values for <value> are:

0 The DTMF RX decoder is disabled. (default value)

1 The DTMF RX decoder is enabled.

14.14.4 Property Description

Saving upon Power-off	PIN
Y	N

14.14.5 Example

Run: AT^DDTMFCFG=0,1

Response: OK

Run: AT^DDTMFCFG?

Response: ^DDTMFCFG: 0,1

OK

Run: AT^DDTMFCFG=?

Response: ^DDTMFCFG: (0)

OK

14.15 ^DDTMF–Unsolicitedly Report the DTMF Character Sent from the Communication Peer

14.15.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^DDTMF: <key><CR><LF>

14.15.2 Interface Description

When the DTMF RX decoder is enabled, DTMF signals are sent from the communication peer during a call is decoded into an ASCII character ('0' to '9', 'A' to 'D', '*', or '#') and then the ^DDTMF command automatically reports the character to the TE.

14.15.3 Parameter description

<key>: character type value ('0' to '9', 'A' to 'D', '*', or '#').

14.15.4 PropertyDescription

Saving upon Power-off	PIN
NA	NA

14.15.5 Example

Response: ^DDTMF: 1

14.16 AT^JDETEX–Detect the Jammer

14.16.1 Command Syntax

AT^JDETEX=<mode>[, <method>[, <para1>[, <para2>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In the case of an error during command execution: <CR><LF>+CME ERROR: <err><CR><LF>

AT^JDETEX?
Possible Response(s)
<CR><LF>^JDETEX: <mode>, <method>, <para1>, <para2><CR><LF><CR><LF>OK<CR><LF>
AT^JDETEX=?
Possible Response(s)
<CR><LF>^JDETEX: (list of supported <mode>s), (list of supported <method>s), (list of supported <para1>s), (list of supported <para2>s)<CR><LF><CR><LF>OK<CR><LF>

14.16.2 Interface Description

This command can be used to enable and disable Jammer detection and set the thresholds of the function, para1 and para2. It can also be used to query the current parameter settings and supported ranges of parameters.



NOTE

Currently, the interruption that can be detected by the module is the strong one which can disconnect the module from the network or which makes the module re-search and re-register to the network. Meanwhile, the module cannot detect the interruption which is caused by intelligent Jammer.

14.16.3 Parameter description

<mode>

- 0 Jammer detection is disabled (default value)
- 1 Jammer detection is enabled

<method>: this parameter decide which method to use to detect a jamming condition and depend the function of <para1> and <para2>.

- 1 Use the method 1(not supported currently)
- 2 Use the method 2

- When <method> is 1:

<para1> Increase threshold of the number of available frequency points. The value range is 1–548, and the default value is 90.

<para2> Increase threshold of available frequency points' statistical average RxLevel. The value range is 1–55, and the default value is 20.

- When <method> is 2:

<para1> Noise power threshold, the value range is 0–70. The default value is 10, indicating that the noise power threshold is –60 dBm (10 – 70 = –60).

<para2> Useless channel number, the value range is 0–255. The default value is 30, indicating that the number of useless channels for reaching the noise power threshold is 30.

 **NOTE**

- AT^JDETEX=1 is equivalent to AT^JDETEX=1,2,<para1>,<para2>.
- If Jammer is not detected, nothing will be reported. (The voltage level of the pin RI will not change.)
- If Jammer is detected, ^JDET: "JAMMED" will be unsolicitedly reported at once, and the voltage of pin RI is pulled low for 500 ms.
- If Jammer can no longer be detected, ^JDET: "DETECTING" will be unsolicitedly reported, and the voltage of pin RI is pulled low for 200 ms. This scenario occurs only after a jammed condition has occurred.
- If the jam is already exist before the module powers on, the module cannot detect the jam.

14.16.4 PropertyDescription

Saving upon Power-off	PIN
Y	N

14.16.5 Example

- Enable Jammer detection, use method 2, and set noise power threshold to 10 and useless channel number to 30:

Run: AT^JDETEX=1,2,10,30

Response: OK

- Query the parameter settings of Jammer detection:

Run: AT^JDETEX?

Response: ^JDETEX: 1,2,10,30

OK

14.17 ^JDET-Indicate JAMMER State Change Change

14.17.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^JDET: <jammer_state><CR><LF>

14.17.2 Interface Description

This command reports the module's Jammer state when the state changes. Currently only two Jammer states are available.



NOTE

Currently, the interruption that can be detected by the module is the strong one which can disconnect the module from the network or which makes the module re-search and re-register to the network. Meanwhile, the module cannot detect the interruption which is caused by intelligent Jammer.

14.17.3 Parameter Description

<jammer_state>: a string type value that indicates the Jammer state.

JAMMED	Jammer detected
DETECTING	Jammer not detected

14.17.4 Property Description

Saving upon Power-off	PIN
NA	NA

14.17.5 Example

```
Run:          AT^JDETEX=1
Response:    OK

              ^JDET: JAMMER
```

14.18 AT^CELLLOCK–Control the Cell Lock

14.18.1 Command Syntax

AT^CELLLOCK=<n>[,<mode>,<lac>[,<ci1>[,<ci2>[,<ci3>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^CELLLOCK?
Possible Response(s)

<pre><CR><LF>^CELLLOCK: <n>[, <mode>, <lac>[, <ci1>[, <ci2>[, <ci3>]]]]<CR><LF>^CELLLOCK:<n>[, < mode>, <lac>[, <ci1>[, <ci2>[, <ci3>]]]]...<CR><LF><CR><LF>OK<CR><LF> ></pre>
<pre>AT^CELLLOCK=?</pre>
<p>Possible Response(s)</p>
<pre><CR><LF>^CELLLOCK: (list of supported <n>s), (list of supported <mode>s), (list of supported <lac>s), (list of supported <ci1>s), (list of supported <ci2>s), (list of supported <ci3>s)<CR><LF><CR><LF>OK<CR><LF></pre>

14.18.2 Interface Description

The set command is used to enable or disable the cell lock function and set the cell location and information.

The read command is used to query the information of the currently locked locations and cells.

The test command is used to return the parameter ranges of the currently locked cells.

14.18.3 Parameter description

<n>: an integer type value indicating whether the cell lock function is enabled. If the cell lock function is disabled, no subsequent parameters are required.

- | | |
|---|---|
| 0 | The cell lock function is disabled (default value). |
| 1 | The cell lock function is enabled. |

<mode>: an integer type value indicating the lock frequency mode, which depends on the actual products. When the cell lock function is enabled, this parameter is required.

- | | |
|---|-------|
| 0 | GSM |
| 1 | WCDMA |

<lac>: four-character location area code in the hexadecimal format, (e.g. "00C3" equals 195 in the decimal format). When the cell lock function is enabled, this parameter is required.

<ci>: eight-character cell ID, similar to <lac>. When the cell lock function is required, this parameter is optional.

NOTE

- Execute the AT^CELLLOCK command to enable the cell lock function. A maximum of three cells can be set, indicating that the cell lock is simultaneously functional in the set cells. When none of the cell be set, indicating that the cell lock is functional in the set lac.
- Running AT^CELLLOCK=0 disables the cell lock function for all network modes.

14.18.4 Property Description

Saving upon Power-off	PIN
N	N

14.18.5 Example

- Enable the device to work only in the location 00C3, cell 00000001 in GSM mode

Run: AT^CELLLOCK=1,0,"00C3","00000001"

Response: OK

- Query currently locked location 00C3, cell 00000001 in GSM mode and location 00B3, cell 00000001 in WCDMA mode

Run: AT^CELLLOCK?

Response: ^CELLLOCK: 1,0,"00C3","00000001"

^CELLLOCK: 1,1,"00B3","00000001"

OK

- Query the parameter ranges.

Run: AT^CELLLOCK=?

Response: ^CELLLOCK:
(0-1),(0-1),("0000"- "FFFF"),("00000000"- "FFFFFFFF")
,("00000000"- "FFFFFFFF"),("00000000"- "FFFFFFFF")

OK

15 Huawei Proprietary Interface: Record Interface

15.1 AT^AUDREC-Record Audio

15.1.1 Command Syntax

AT^AUDREC=<op>[,<file_name>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^AUDREC?
Possible Response(s)
<CR><LF>^AUDREC: <file_name1>,<len1><CR><LF>[^AUDREC: <file_name2>,<len2><CR><LF>[...]]<CR><LF>OK<CR><LF>
AT^AUDREC=?
Possible Response(s)
<CR><LF>^AUDREC: (list of supported <op>s)<CR><LF><CR><LF>OK<CR><LF>

15.1.2 Interface Description

The command is used to record and play recording files.

The set command is used to record or play audio.

The read command is used to query the information of recordings.

The test command is used to query the supported audio recording parameters.



NOTE

On modules that do not support RECORD, and ERROR will be returned when this command is executed.

15.1.3 Parameter Description

<op>: an integer type value indicating recording and playback.

0	Stop recording
1	Start recording
2	Play recordings
3	Stop playing recordings

<file_name>: a string type indicates the file name.



NOTE

- If recording files are stored in the RAM, the value of <file_name> is "RAM" by default. If recording files are stored in the flash memory, the value of <file_name> can be "REC1.AMR", "REC2.AMR", "REC3.AMR", "REC4.AMR", or "REC5.AMR", which are all capital letters.
- The flash memory can store 5 files whose total size must not exceed 300 KB (The actual recording time may vary with sampling rates).The recording stops when the size of recordings reaches 300 KB.
- The RAM memory cannot exceed 60 KB (The actual recording time may vary with sampling rates). The recording stops when the size of recordings reaches 60 KB.
- If <op> is set to 1 or 2, <file_name> cannot be left blank. If <op> is set to 0 or 3, <file_name> is not configurable.

15.1.4 Property Description

Saving upon Power-off	PIN
NA	N

15.1.5 Example

```

Run:      AT^AUDREC=?
Response: ^AUDREC: (0-3)

          OK

Run:      AT^AUDREC=1, "REC1.AMR"
Response: OK

Run:      AT^AUDREC=0
  
```

Response: OK

^AUDEND: 0,0,4987

15.2 ^AUDEND–Unsolicitedly Report the End of Audio Playback

15.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^AUDEND: <end_type>,<end_cause>[,<len>]<CR><LF>

15.2.2 Interface Description

The command is used to report the end of audio playback to users.



NOTE

On modules that do not support RECORD, and ERROR will be returned when this command is executed.

15.2.3 Parameter Description

<end_type>: an integer indicating recording and playback.

- | | |
|---|------------------------|
| 0 | Audio recording ends. |
| 1 | Audio playback ends. |
| 2 | The TTS playback ends. |

<end_cause>: the value of <end_cause> varies according to the value of <end_type>.

- When <end_type>=0, values of <end_cause> are as follows:

0	The user stops recording.
1	The memory to store audio recordings is full.
2	The module receives an incoming call.
3	The module initiates a call.
- When <end_type>=1, values of <end_cause> are as follows:

0	The user stops recording.
1	Recordings playing stops when finished.

- 2 The module receives an incoming call.
- 3 The module initiates a call.
- When <end_type>=2, values of <end_cause> are as follows:
 - 0 The TTS playback ends.
 - 1 The user runs a TTS command to end the TTS playback.
 - 2 A call interrupts the playback.
 - 3 The TTS playback times out or encounters an exception.

<len>: an integer indicating the data length after audio recording ends. The unit is Byte.



NOTE

If <end_type> is set to 0, the <len> may exist.

15.2.4 Property Description

Saving upon Power-off	PIN
NA	N

15.2.5 Example

Run: AT^AUDREC=1, "REC1.AMR"

Response: OK

(The module begins recording and returns the following when the recording space is full)

^AUDEND: 0,1,307200

15.3 AT^RECCFG—Change the Recording Settings

15.3.1 Command Syntax

AT^RECCFG=<op>,<value>

Possible Response(s)

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

In case of an MT-related error:

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

AT^RECCFG?
Possible Response(s)
<CR><LF>^RECCFG: <op1>, <value1><CR><LF>[^RECCFG: <op2>, <value2><CR><LF>[...]]<CR><LF>OK<CR><LF>
AT^RECCFG=?
Possible Response(s)
<CR><LF>^RECCFG: (list of supported <op>s)<CR><LF><CR><LF>OK<CR><LF>

15.3.2 Interface Description

The set command is used to change the recording settings.

The read command is used to query the current recording settings.

The test command is used to return the supported recording settings.



NOTE

On modules that do not support RECORD, and ERROR will be returned when this command is executed.

15.3.3 Parameter Description

<op>: an integer indicates the recording settings.

- | | |
|---|--|
| 0 | DSP sampling compression format (see the values of <codec_type>) |
| 1 | DSP sampling rate (see the values of <codec_rate>) |

<value>: the value of this parameter varies with the value of <op>.

- | | |
|--------------|---------------------------------|
| <codec_type> | DSP sampling compression format |
| <codec_rate> | DSP sampling rate |

<codec_type>:

- | | |
|---|--------------------------------------|
| 0 | FR format (not supported currently) |
| 1 | HR format (not supported currently) |
| 2 | EFR format (not supported currently) |
| 3 | AMR format (default value) |

<codec_rate>:

- | | |
|---|--|
| 0 | Mode 0 - AMR 4.75 - Encodes at 4.75 kbit/s (not supported currently) |
| 1 | Mode 1 - AMR 5.15 - Encodes at 5.15 kbit/s (not supported currently) |

2	Mode 2 - AMR 5.9 - Encodes at 5.9 kbit/s (not supported currently)
3	Mode 3 - AMR 6.7 - Encodes at 6.7 kbit/s (not supported currently)
4	Mode 4 - AMR 7.4 - Encodes at 7.4 kbit/s (not supported currently)
5	Mode 5 - AMR 7.95 - Encodes at 7.95 kbit/s (default value)
6	Mode 6 - AMR 10.2 - Encodes at 10.2 kbit/s (not supported currently)
7	Mode 7 - AMR 12.2 - Encodes at 12.2 kbit/s (not supported currently)

15.3.4 Property Description

Saving upon Power-off	PIN
N	N

15.3.5 Example

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

              OK

Run:          AT^RECCFG?
Response:    ^RECCFG: 0,3
              ^RECCFG: 1,5

              OK

Run:          AT^RECCFG=0,1
Response:    +CMEE ERROR: invalid parameter

Run:          AT^RECCFG=1,0
Response:    +CMEE ERROR: invalid parameter
```

15.4 AT^FILEIO—Operate File

15.4.1 Command Syntax

```
AT^FILEIO=<mode>,<file_name>[,<mem>,[<file_type>],<para1>,<para2>,<pkg_data>]
```

Possible Response(s)

<ul style="list-style-type: none"> • When <code><mode>=1</code>: <code><CR><LF>^FILEIO: <rcv_len>,<file_size><CR><LF><file content><CR><LF><CR><LF>OK<CR><LF></code> Or <code><CR><LF>^FILEIO: <file_name>,<file_size><CR><LF><CR><LF>OK<CR><LF></code> • When <code><mode>=2</code>: <code><CR><LF>^FILEIO: <para1>,<rcv_len><CR><LF><CR><LF>OK<CR><LF></code> • When <code><mode>=3</code>: <code><CR><LF>OK<CR><LF></code> <p>In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code></p>
AT^FILEIO=?
Possible Response(s)
<code><CR><LF>^FILEIO: (list of supported <mode>s), , (list of supported <mem>s), (list of supported <file_type>s), (list of supported <para1>s), (list of supported <para2>s)<CR><LF><CR><LF>OK<CR><LF></code>

15.4.2 Interface Description

This command is used by the host to deliver files to modules.

The set command is used to operate files.

The test command is used to query the parameter range supported by this command.



NOTE

- The value range of `<para1>` and `<para2>` vary with the `<mem>` value, and the `AT^FILEIO=?` command always returns the maximum parameter range (1–600).
- On modules that do not support RECORD, and ERROR will be returned when this command is executed.

15.4.3 Parameter Description

`<mode>`: an integer indicates the mode of the operation.

- 1 Indicate the read operation.

If only the parameters `<mode>` and `<file_name>` exist, the file information is returned. If the parameters `<para1>` and `<para2>` exist, read the file using the `<para1>` value as the data reading offset value and the `<para2>` value as the length.

`<para1>`: data offset value in bytes

`<para2>`: data length to be read in bytes, can be set to 512 at most.

- 2 Indicate the write operation. When `<mode>` is set to 2, the `AT^FILEIO` command must include all the parameters (exclude `<file_type>`). If files already exist, they are replaced directly, and no error is returned.
`<para1>`: an integer type value indicating a packet number, which is used to save or read recording files. If `<mem>` is 0 (RAM), the `<para1>` has a value range of 1–120; else if `<mem>` is 1 (Flash), the value range is 1–600.
`<para2>`: an integer type value indicating the total number of packets, which is used to save or read recording files. If `<mem>` is 0 (RAM), the `<para2>` has a value range of 1–120; else if `<mem>` is 1 (Flash), the value range is 1–600.
- 3 Indicate the delete operation. When `<mode>` is set to 3, the `AT^FILEIO` command only needs to include `<mode>` and `<file_name>`.

`<file_name>`: indicates the file name with quotation mark. This command is used to save or read the recording files, which are named RAM, REC1.AMR, EC2.AMR, REC3.AMR, REC4.AMR, and REC5.AMR. To ensure the file integrity, send one file only after the previous one is completely sent. Otherwise, an error will be returned. If you want to change the file that is being sent, use the delete operation to delete the file.

`<mem>`: an integer type value indicates the storage media.

- 0 RAM. Only one file can be saved, and its name is fixed at "RAM". This file is not saved upon a power-off. For the recorded file access function, the maximum size of each file is 60 KB.
- 1 Flash memory. Multiple files can be saved, and they are saved upon a power-off. For the recorded file access function, a maximum of five files can be saved, and each file's size does not exceed 60 KB.

`<file_type>`: an integer indicates the type of files. The value ranges from 0 to 255. This parameter helps to distinguish various files for a product that supports the function to download these files. (not supported currently)

`<pkg_data>`: indicates packet data with the quotation mark. The value is in the format of ASCII characters with a range of '0'–'9' and 'A'–'F'. If the data (without the quotation mark) is empty or has a length over 1024, an error is returned.

 **NOTE**

The hexadecimal code data of each byte in the uploaded file is converted into two-byte ASCII characters. For example, 0x65 is converted into 65.)

`<rcv_len>`: an integer indicates the length of the received data, in bytes.

`<file_size>`: an integer indicates the total length of the data, in bytes.

`<file_content>`: indicates the contents of the data, containing double quotation marks. The value is a string of ASCII characters, ranging from '0' to '9' and 'A' to 'F'. The maximum length of data (without the double quotation marks) is 512 bytes. The encoded contents with the double quotation marks are converted into ASCII characters, and the total length cannot exceed 1024 bytes.



15.4.4 Property Description

Saving upon Power-off	PIN
NA	N

15.4.5 Example

- Do the write operation. (The file name indicates the file storage location, and the <file type> field is neglected here. There are three packets in total, and the No.3 packet is written here)

Run: AT^FILEIO=2, "REC1.AMR", 1,, 3, 3, "AD2A3AB12BAD2A3AB12
BAD2A3AB12B"

Response: ^FILEIO: 3,15

OK

- Do the read operation.

Run: AT^FILEIO=1, "REC1.AMR", 1,, 0, 100

Response: ^FILEIO: 15,15
"AD2A3AB12BAD2A3AB12BAD2A3AB12B"

OK

Run: AT^FILEIO=1, "REC1.AMR"

Response: ^FILEIO: "REC1.AMR", 15

OK

- Do the delete operation.

Run: AT^FILEIO=3, "REC1.AMR"

Response: OK

Run: AT^FILEIO=?

Response: ^FILEIO: (1-3),, (0-1), (0-255), (1-600), (1-512)

OK

 **NOTE**

- If the parameters <para1> and <para2> do not exist, the file information is returned, and the file information is allowed to query.
- If the file to be read does not exist, an error is returned.
- If data is stored in RAM, after a segment of data is read, it will be automatically deleted.
- If data is stored in RAM, the offset value must be set to 0. Otherwise, an error is returned.
- If the file to be deleted does not exist, OK is returned.
- The host sends 0x32 to the module, the module will just save 0x32. But AT^FILEIO needs to display the data, all characters will be encoded to ASCII. The ASCII codes of '3' and '2' are respectively "33" and "32", so the content of AT^FILEIO is 0x33 0x32. And the maximum length of each packet is 512 Byte, if you need to write 300 KB data to the module, the host should totally send 600 packets.
- When AT^FILEIO is used to write data, the data must have AMR file header. If not, the module will consider the data is illegal and reponse +CME ERROR: 65290 (amr file header lost).
- The operating exclusive rules:

Data store Media	Want to do	Module in Recording status	Module in Playing status
FLASH	read the same file	Disable	Disable
	read the different file	Enable, not delete the file	Enable, not delete the file
	write the same file	Disable	Disable
	write the different file	Enable	Enable
	delete the same file	Disable	Disable
	delete the different file	Enable	Enable
	record the same file	Disable	Disable
	record the different file	Disable	Disable
	play the same file	Disable	Disable
	play the different file	Disable	Disable
RAM	read file	Enable, and delete the file	Disable
	write file	Disable	Disable
	delete file	Disable	Disable
	record file	Disable	Disable
	play file	Disable	Disable

16 Huawei Proprietary Interface: Built-in TCP/IP Protocol Stacks and AT Interfaces

Internet services refer to data services based on built-in TCP/IP protocol stacks of terminals. A user can deliver AT commands to terminals to establish an IP/PPP link for user data transmission. This chapter describes the AT commands related to the Internet services. Services related to built-in protocol stacks are limited to physical ports.

16.1 AT^IPINIT—Initialize Embedded TCP/IP Service

16.1.1 Command Syntax

```
AT^IPINIT=<APN>[,<user_name>[,<password>[,<ip_addr>[,<auth_type>]]]]
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT^IPINIT?
```

Possible Response(s)

If initialized:

```
<CR><LF>^IPINIT:  
<state>,<ip_addr>,<APN>,<pri_dns_address>,<sec_dns_address><CR><LF><CR><LF>OK<CR><LF>
```

If not initialized:

```
<CR><LF>^IPINIT: 0<CR><LF><CR><LF>OK<CR><LF>
```

```
AT^IPINIT=?
```

Possible Response(s)

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

16.1.2 Interface Description

This command has the same dialing function as a modem.

This command is used to configure basic parameters for dialing and establish connections with networks. A local IP is obtained after the command is run. Only after network connections are established by running the `AT^IPINIT` command, you can perform further operations such as opening the TCP links and transmitting UDP data.



NOTE

Aborting `AT^IPINIT` will not abort the PDP activation operation. It will only abort the `AT^IPINIT` command to allow other AT commands to be run. But if any new AT commands about IPStack are run when the PDP deactivation operation is in progress, `+CME ERROR: 1042` ("PDP operation in progress, please wait.") will be reported.

16.1.3 Parameter Description

`<APN>`: string type with quotation marks indicating the access point name (APN), with a maximum of 100 characters, as shown in the example. (If only comma is specified or no character is specified , which indicates that APN is null)

`<user_name>`: string type with quotation marks, with a maximum of 31 characters, which can be left out.

`<password>`: string type with quotation marks, with a maximum of 31 characters, which can be left out.

`<ip_addr>`: string type with quotation marks, with a maximum of 40 characters. This parameter can be set to a static IPv4 address by a request. However, an actual IPv4 address may be obtained for this parameter.

`<auth_type>`: indicates the authentication mode. CHAP authentication is defaulted.

- | | |
|---|---------------------|
| 0 | No authentication |
| 1 | PAP authentication |
| 2 | CHAP authentication |

`<state>`: initialization completion identifier

- | | |
|---|--|
| 0 | The network is not initialized, or network connection fails to be established. |
| 1 | Network connection is successfully established. |

`<pri_dns_address>`: string type with quotation marks, indicating the IP address of the preferred DNS server.

`<sec_dns_address>`: string type with quotation marks, indicating the IP address of the alternate DNS server.

16.1.4 Property Description

Saving upon Power-off	PIN
N	Y

16.1.5 Example

Take the WCDMA module as an example:

```
Run:          AT^IPINIT="1234"
Response:     OK

Run:          AT^IPINIT?
Response:     ^IPINIT:
              1, "192.168.70.59", "1234", "172.22.44.200", "172.22.4
              4.201"

              OK

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

              OK
```

16.2 AT^IPOPEN-Open TCP/UDP Link

16.2.1 Command Syntax

```
AT^IPOPEN=<link_id>,<type>,<remote_addr>,<remote_port>[,<local_port>[,<username>,<password>]]
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT^IPOPEN?
```

Possible Response(s)

<p>If link has been open: <CR><LF>^IOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[<CR><LF>^IOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[...]]<CR><LF><CR><LF>OK<CR><LF></p> <p>If link has not been open: <CR><LF>OK<CR><LF></p>
AT^IOPEN=?
Possible Response(s)
<CR><LF>^IOPEN: (list of supported <link_id>s), (list of supported <local_port>s), (list of supported <remote_port>s) <CR><LF><CR><LF>OK<CR><LF>

16.2.2 Interface Description

This command is used to establish links with single or multiple remote servers using wireless modes. TCP, UDP, SMTP(S), FTP(S) and HTTP(S) are supported.

At a time only one link, FTP[S]/HTTP[S]/SMTP[S] can be established.

16.2.3 Parameter Description

<link_id>: link ID

1-5 The range of link ID

<type>: string type with quotation marks, indicating the type of the link.

"TCP" Establishing a TCP link

"UDP" Establishing a UDP link

"FTP" Establishing a FTP link

"FTPS" Establishing a FTPS link

"HTTP" Establishing a HTTP link

"HTTPS" Establishing a HTTPS link

"SMTP" Establishing a SMTP link

"SMTPS" Establishing a SMTPS 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.

When a bearer is shared, please make sure the protocol, local IP address, local IP port, remote IP address, and remote IP port used cannot be all the same with each service like as the ECM or modem dial-up connection or FOTA. Otherwise, the service to which the ports are allocated cannot be determined.

<username>: a string type indicating the user name used to log in to the FTP server. The maximum character is 64, while the maximum character is 255 in SMTP/SMTPS. It must begin and end with letters or digits, and supports all uppercase and lowercase letters, digits, and any of the following characters: "_", ".", and "@".

<password>: a string type indicating the password used to log in to the FTP/SMTP server. The maximum character is 64. It must begin and end with letters or digits, and supports all uppercase and lowercase letters, digits, and any of the following characters: "_", ".", and "@".

<SIO_port>: the physical port number bound with this link (the port for communication between a host-computer and the terminal) ranging from 0 to 10.

0	Reserved
1	UART
3	PCUI
4-10	Reserved

<MSS>: a TCP-type link indicating the maximum length of the TCP packet segment negotiated with the peer end.

16.2.4 Property Description

Saving upon Power-off	PIN
N	Y

16.2.5 Example

- Three links are consecutively established, as shown below:

Run: AT^IPOPEN=1,"TCP","129.11.18.8",10000,9000

Response: OK

Run: AT^IPOPEN=2,"TCP","129.11.18.8",10000,8000

Response: OK

Run: AT^IPOPEN=3,"UDP","129.11.18.8",7000,6000

Response: OK

Run: AT^IPOPEN?



Response: ^IPOPEN: 1, "TCP", 9000, "129.11.18.8", 10000, 1, 1460
^IPOPEN: 2, "TCP", 8000, "129.11.18.8", 10000, 1, 1460
^IPOPEN: 3, "UDP", 6000, "129.11.18.8", 7000, 1, 0

OK

- One link is established using the URL mode, as shown below:

Run: AT^IPOPEN=1, "TCP", "www.baidu.com", 80, 3081

Response: OK

Run: AT^IPOPEN?

Response: ^IPOPEN: 1, "TCP", 3081, "220.181.111.147", 80, 1, 1440

OK

Run: AT^IPOPEN=1, "SMTP", "192.166.63.41", 25, , "m2mtest@m2m.huawei.com", "m2mhuawei"

Response: OK

Run: AT^IPOPEN=1, "SMTPS", "192.166.63.41", 465, , "m2mtest@m2m.huawei.com", "m2mhuawei"

Response: OK

Run: AT^IPOPEN=2, "FTP", "192.166.63.41", 21, , "m2m", "m2m"

Response: OK

^IPSRVST: 2, 10, 230

Run: AT^IPOPEN=2, "FTPS", "192.166.63.41", 990, , "m2m", "m2m"

Response: OK

^IPSRVST: 2, 10, 230

Run: AT^IPOPEN=4, "HTTP", "192.166.63.41", 9001

Response: OK

Run: AT^IPOPEN=4, "HTTPS", "192.166.63.41", 448

Response: OK

16.3 AT^IPLISTEN—Configure TCP/UDP as a Server

16.3.1 Command Syntax

AT^IPLISTEN=<type>,<listen_port>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPLISTEN?
Possible Response(s)
<CR><LF>^IPLISTEN: <type>,<listen_port>,<idle_num><CR><LF><CR><LF>OK<CR><LF>
AT^IPLISTEN=?
Possible Response(s)
<CR><LF>^IPLISTEN: (list of supported <type>s) , (list of supported <listen_port>s) , (list of supported <idle_num>s) <CR><LF><CR><LF>OK<CR><LF>

16.3.2 Interface Description

This command is used to enable listening function. The server and client can be parallelized, and 5 clients are supported at most.

16.3.3 Parameter Description

<type>: string type with quotation marks, indicating the type of the link.

- "TCP" Establishing a TCP link
- "UDP" Establishing a UDP link



NOTE

If the listening function is not enabled, the read command returns a null string.

<listen_port>: an integer ranging from 1 to 65535, indicating the local listening port.



NOTE

If the listening function is not enabled, <listen_port> in the read command response is 0.

<idle_num>: an integer ranging from 0 to 5, indicating the number of current idle links

16.3.4 Property Description

Saving upon Power-off	PIN
N	Y

16.3.5 Example

```
Run:          AT^IPLISTEN?
Response:    ^IPLISTEN: "",0,2

              OK

Run:          AT^IPLISTEN=?
Response:    ^IPLISTEN: ("TCP","UDP"),(1-65535),(0-5)

              OK

Run:          AT^IPLISTEN="TCP",12000
Response:    OK

Run:          AT^IPLISTEN?
Response:    ^IPLISTEN: "TCP",12000,2

              OK
```

16.4 AT^IPSEND—Send TCP/UDP Data

16.4.1 Command Syntax

<code>AT^IPSEND=<link_id>,<data></code>
Possible Response(s)
<code><CR><LF>^IPSEND: <link_id><CR><LF><CR><LF>OK<CR><LF></code>
In case of an MT-related error:
<code><CR><LF>+CME ERROR: <err><CR><LF></code>
<code>AT^IPSEND=?</code>
Possible Response(s)
<code><CR><LF>OK<CR><LF></code>

16.4.2 Interface Description

This command is used to send user data based on established links. If the user data is sent to socket, OK is returned. Otherwise, an error message is returned.

16.4.3 Parameter Description

<link_id>: the ID of established links ranging from 1 to 5.

<data>: indicates user data. The maximum length of the user data that can be sent is 1500 bytes. The user data must be put in quotation marks.



NOTE

The user data only supports visible characters and quotation marks are not required. Users can use AT^IPSENDEX to obtain more functions.

16.4.4 Property Description

Saving upon Power-off	PIN
N	Y

16.4.5 Example

Run: AT^IPSEND=3, "ASDF"

Response: ^IPSEND: 3

OK

16.5 ^IPDATA-Notify IPStack Arrival Data

16.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPDATA: <link_id>,<data_len>,<data><CR><LF>

16.5.2 Interface Description

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

16.5.3 Parameter Description

<link_id>: the number of established links, ranging from 1 to 5.

<data_len>: an integer indicating the length of data, ranging from 1 to 1500.

<data>: a character string that contains any characters without quotation marks, indicating newly received data information.

16.5.4 Property Description

Saving upon Power-off	PIN
N	Y

16.5.5 Example

Response: ^IPDATA:
1,71,123456781234561234567234567234567234678234782
34782345678234678903489034

16.6 AT^IPCLOSE—Close TCP/UDP Link

16.6.1 Command Syntax

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>
AT^IPCLOSE?
Possible Response(s)
<CR><LF>^IPCLOSE: <link1_state>,<link2_state>,<link3_state>,<link4_state>,<link 5_state><CR><LF><CR><LF>OK<CR><LF>
AT^IPCLOSE=?
Possible Response(s)
<CR><LF>^IPCLOSE: (list of supported <link_id>s) <CR><LF><CR><LF>OK<CR><LF>

16.6.2 Interface Description

This command is used to close links, disable the server's listening function, or close radio network connections.

- When <link_id> is any of 1 to 5, the link corresponding to the link ID is closed.
- When <link_id> is 6, the server's listening function is disabled and connections with the server are closed.
- When <link_id> is 7, the radio network connections are closed. If a link's or the server's listening function is available, the function is also disabled.



NOTE

Aborting AT^IPCLOSE=7 will not abort the PDP deactivation operation. It will only abort the AT^IPCLOSE command to allow other AT commands to be run. But if any new AT commands about IPStack are run when the PDP deactivation operation is in progress, +CME ERROR: 1042 ("PDP operation in progress, please wait.") will be reported.

16.6.3 Parameter Description

<link_id>: indicates the link ID ranging from 1 to 7.

- | | |
|-----|--|
| 1-5 | The number of established links |
| 6 | A local server and established links with the server |
| 7 | Closed radio network connections |

<linkx_state>: indicates the state of link x.

- | | |
|---|-------------------------------------|
| 0 | The link is closed and can be used. |
| 1 | The link is open and in use. |

16.6.4 Property Description

Saving upon Power-off	PIN
N	Y

16.6.5 Example

```

Run:      AT^IPCLOSE?
Response: ^IPCLOSE: 1,1,0,0,0

          OK

Run:      AT^IPCLOSE=1
Response: OK

Run:      AT^IPCLOSE?
Response: ^IPCLOSE: 0,1,0,0,0

          OK

```

16.7 AT^IPENTRANS-Enable Transparent Transfer Mode

16.7.1 Command Syntax

AT^IPENTRANS=<link_id>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^IPENTRANS?
Possible Response(s)
<CR><LF>^IPENTRANS: <link_id><CR><LF><CR><LF>OK<CR><LF>
When no transparent transmission link exists: <CR><LF>OK<CR><LF>

16.7.2 Interface Description

This command is used to transfer the command mode of a physical port where a link locates to data mode. In data mode, all the data input except the +++ command for exiting the data mode is transmitted as user data. This command returns OK if it runs successfully, and then the user can receive and send data in data mode.

If a user enters three consecutive signs (+++), the physical port exists the transparent transmission mode.

Requirements of the three consecutive plus signs are detected as follows: No data is input 900 ms before the three consecutive plus signs are entered. The time interval between two '+' input must be less than 900 ms. No other data is required 900 ms after the third plus sign is entered.

The twelfth parameter of the AT^IPCFL command sets the transparent transmission mode of a UDP link to mode 0 or mode 1 .

In mode 0, the module sends any data from the host computer to socket as user data, and determines delay and timing of the assembled data packets and data packet sending length based on parameters 5 and 11 of IPCFL.

In mode 0, data is sent as follows:

- If the length of the data received from the host computer reaches the data packet sending length, the module sends the data to socket and continues to process the data.
- If the length of the rest data received from the host computer does not reach the data packet sending length, the module starts or resets the packet delay timer.
- If the timer expires, the module sends the rest data to socket.
- If the module receives new data from the host computer when the packet delay timer is running, repeat steps 1 to 3.

In mode 1, the host computer needs to add the 0x7E end character for each data packet of the user data. If the module detects 0x7E, the module considers that a data packet ends and then sends it to socket. Therefore, end characters of the user data need to be escaped. That is, the host computer needs to check all the user data and convert their end characters. The module then escapes the converted end characters to the original characters and sends the original characters to socket.

The escape rule of the user data to be sent is as follows: The 0x7E end characters contained in the user data are escaped as the 0x7D 0x5E end characters. The 0x7D end characters contained in the user data are escaped as the 0x7D 0x5D end characters.

At the same time, the host computer needs to process the data received from the module. The host computer escapes the 0x7D 0x5E end characters to the 0x7E end characters, and escapes the 0x7D 0x5D end characters to the 0x7D end characters. The 0x7E end characters indicate the end of a UDP packet and are not the actual user data. Mode 0 is applicable to sending and receiving data packets with an invariable length over a UDP link. Mode 1 is applicable to sending and receiving data packets with a variable length.

16.7.3 Parameter Description

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

16.7.4 Property Description

Saving upon Power-off	PIN
N	Y

16.7.5 Example

Run: AT^IPENTRANS=1

Response: OK

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

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

16.8.1 Command Syntax

```
AT^IPSENDEX=<link_id>,<mode>,<len>[,<eof>]<CR>entered data
```

Possible Response(s)

```
<CR><LF>^IPSENDEX: <link_id><CR><LF><CR><LF>OK<CR><LF>
```

In case of an MT-related error:

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

```
AT^IPSENDEX=?
```

Possible Response(s)

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

16.8.2 Interface Description

This command is used to send the user data based on established links. Among three data sending modes available, mode 2 is recommended.

- Mode 0 is compatible with the ^IPSEND functions backwards.
- Mode 1 is a mandatory data conversion mode. In this mode, the original data requested by a user to be sent must be converted from hexadecimal digits to character strings. After the character strings are converted to the original data, the module sends the original data to the peer. For example, the user can enter the ^IPSENDEX=1,1,"01081B2C" command to send the quartet data: 0x01, 0x08, 0x1B, and 0x2C. The receiving end will receive the quartet data.
- Mode 2 is a length-limited full-character mode. In this mode, the user sends a command to notify the module of the length of the data to be sent first. After the module returns OK, the user enters data until the data length reaches the requested length.



NOTE

If the length of the input data is less than the expected length, the module waits for the user to enter the rest data. If the length of the input data is greater than the requested length, an error is returned.

16.8.3 Parameter Description

<link_id>: the ID of established links ranging from 1 to 5.

<mode>:

- | | |
|---|------------------------------------|
| 0 | Compatible with AT^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.

<eof>: indicates that finish the user data, which have been input into FTP and SMTP.

- | | |
|---|--------------------------|
| 0 | Data is pending |
| 1 | End to send file or data |



NOTE

It is suggested that the user data be sent over a TCP link with the MSS value being the maximum length. Otherwise extra packets are generated, affecting the transmission rate. For example, if the MSS value is 1460, 1460 characters are recommended for the maximum length of <len>.

16.8.4 Property Description

Saving upon Power-off	PIN
N	Y

16.8.5 Example

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

Response: ^IPSENDEX: 1

OK

Run: AT^IPSENDEX=1,2,3

Response: OK

Input: input user data

Response: ^IPSENDEX: 1

OK

16.9 AT^IPFLOWQ-Request and Clear TCP/UDP Link Data Packet Statistics

16.9.1 Command Syntax

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

<pre><CR><LF>^IPFLOWQ: <link1>, <TX_FROM_USER>, <TX_TO_SOCKET>, <TX_ACK_SUM>, <RX_FROM_S OCKET>, <RX_TO_USER>[<CR><LF>^IPFLOWQ: <link2>, <TX_FROM_USER>, <TX_TO_SOCKET>, <TX_ACK_SUM>, <RX_FROM_S OCKET>, <RX_TO_USER>[...]]<CR><LF><CR><LF>OK<CR><LF></pre>
<pre>AT^IPFLOWQ=?</pre>
<p>Possible Response(s)</p>
<pre><CR><LF>^IPFLOWQ: (list of supported <link_id>s)<CR><LF><CR><LF>OK<CR><LF></pre>

16.9.2 Interface Description

When data is sent over a TCP link, the peer end, if it receives the data, sends ACK to the sending end. After the ME receives the ACK from the peer end, the ME confirms that the data is successfully sent.

No ACK is required when data is received or sent over a UDP link. Only the sums of the data packets sent to and received from the peer end are recorded.

The set command is used to clear the data packet statistics of the designated TCP/UDP link, including:

- Uplink: the sum of the data packets received from the host computer, and the sum of the data packets sent to socket, the sum of the confirmed data packets.
- Downlink: the sum of data packets received from socket and the sum of data packets sent to the host computer.

The read command is used to query the data packet statistics of all current TCP/UDP links.

The test command is used to query the sequence number of the supported TCP/UDP link.

16.9.3 Parameter Description

<link_id>: an integer indicating the TCP/UDP sequence number.

- | | |
|-----|---|
| 0 | Indicates clearing the statistics of all TCP links and used for setting commands. |
| 1–5 | Indicates the link number of the statistics to be cleared. |

<TX_FROM_USER>: indicates the sum of the statistics received from the host computer. The maximum value is $2^{32}-1$ bytes.

<TX_TO_SOCKET>: indicates the sum of the statistics sent to socket. The maximum value is $2^{32}-1$ bytes.

<TX_ACK_SUM>: indicates the sum of statistics that is acknowledged to be received over a TCP link. This value should not exceed the current <send_sum>. This parameter is not supported in the UDP protocol, and an invariable value 0 is reported. The maximum value is $2^{32}-1$ bytes.

<RX_FROM_SOCKET>: indicates the sum of the statistics received from socket. The maximum value is $2^{32}-1$ bytes.

<RX_TO_USER>: indicates the sum of the statistics sent to the host computer. The maximum value is $2^{32}-1$ bytes.

16.9.4 Property Description

Saving upon Power-off	PIN
N	Y

16.9.5 Example

None

16.10 ^IPSTATE-Indicate TCP/UDP Data Link State

16.10.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPSTATE: <link_id>,<state>,<errcode><CR><LF>

16.10.2 Interface Description

This command is used by the module to notify the host computer of the current link information and state when the TCP/UDP link state changes.

16.10.3 Parameter Description

<link_id>: TCP/UDP link ID.

- 0 An illegal ID
- 1–5 ID of established links
- 6 Local server
- 7 Network connection

<state>: link state.

- 0 Indicates that the link is closed
- 1 Indicates that the link is established

2–255: Reserved

<errcode>: error message.

- 0 Indicates that the peer end closes the link
- 1 Indicates that the server receives a new link
- 2 Indicates that a network error occurs
- 3 Indicates that the supported link reaches the threshold
- 4 Indicates that the server rejects new connections in the transparent transmission mode
- 5–254 Reserved
- 255 No error

16.10.4 Property Description

Saving upon Power-off	PIN
N	Y

16.10.5 Example

After the ME establishes the 1 TCP link, the server delivers a normal command to disconnect the link, and the module notifies the host computer of the disconnection.

Response: ^IPSTATE: 1,0,0

16.11 AT^IPCFL—Configure TCP/UDP Static Parameters

16.11.1 Command Syntax

AT^IPCFL=<parameter_id>,<value>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^IPCFL?
Possible Response(s)
<CR><LF>^IPCFL: <parameter_id>,<value>[<CR><LF>^IPCFL: <parameter_id>,<value>[...]]<CR><LF><CR><LF>OK<CR><LF>

AT^IPCFL=?
Possible Response(s)
<CR><LF>^IPCFL: <parameter_id>, (list of supported <value>s)[<CR><LF>^IPCFL: <parameter_id>, (list of supported <value>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

16.11.2 Interface Description

This command is used to configure static parameters related to IPStack, including the sending delay timer, the maximum packet length during transparent transmission, and the selection of the transparent transmission mode.

The set command is used to set one parameter at a time. The user needs to enter parameter ID and the corresponding value.

The read command returns the supported parameters and their corresponding values. Parameters that are not supported by the terminal are not returned.

The test command returns the value range corresponding to the supported parameters.

16.11.3 Parameter Description

<parameter_id>	Value Range(Unit)	Description
5	1–100 (0.1s) (10 by default)	Specifies the value of the timer for the transparent transmission.
10	1–1472 (byte) (1024 by default)	Specifies the length of the TCP/UDP data packet for packet sending.
12	0–1 (0 by default)	For selecting the transparent transmission mode, see the description of AT^IPENTRANS.
13	0–1 (default value: 0)	0: The FTP/HTTP file data obtained from the server is transparently reported and forwarded to the user. 1: The FTP/HTTP file data obtained from the server add the 0x7E end character and forwarded to the user.(not supported currently)
14	0–2 (default value: 0)	0: The transparent transmission mode 1: The command mode 2: The get buffer transmission mode

16.11.4 Property Description

Saving upon Power-off	PIN
N	Y

16.11.5 Example

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

Response: OK

16.12 AT^HBECONT-Set Heartbeat Parameters

16.12.1 Command Syntax

AT^HBECONT=<type>,<server_IP>,<port>,<time>,<data>,<socket_id>,<apn>,[<username>],[<password>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^HBECONT?
Possible Response(s)
<CR><LF>^HBECONT: <type>,<server_IP>,<port>,<time>,<data>,<socket_id>,<apn>,[<username>],[<password>]]<CR><LF><CR><LF>OK<CR><LF>
AT^HBECONT=?
Possible Response(s)
<CR><LF>^HBECONT: (list of supported <port>s) , (list of supported <time>s) , (list of supported <socket_id>s) <CR><LF><CR><LF>OK<CR><LF>

16.12.2 Interface Description

This command is used to set the heartbeat parameters, including the link type, server IP address, remote server port number, interval for sending heartbeat packets, heartbeat packet data, link ID of the transmit channel, APN, username, and password.

16.12.3 Parameter Description

<type>: indicates the link type. The value is a string that shall be enclosed in quotation marks. It can be "TCP" or "UDP".

<server_IP>: indicates the remote server IP address. The value is a string that shall be enclosed in quotation marks, for example, "129.11.18.8".

<port>: indicates the remote server port number. The value is an integer ranging from 1 to 65535.

<time>: indicates the sending interval in seconds. The value is an integer ranging from 5 to 90.

<data>: indicates the heartbeat packet data. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 100 bytes.

<socket_id>: indicates the link ID of the transmit channel. The value is an integer ranging from 1 to 5.

<APN>: indicates the APN. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 29 characters.

<user_name>: indicates the username. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 13 characters. **This parameter can be omitted.**

<password>: indicates the user password. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 13 characters. **This parameter can be omitted.**

16.12.4 Property Description

Saving upon Power-off	PIN
Y	Y

16.12.5 Example

```

Run:      AT^HBECONT="UDP","211.1.1.11",8000,5,"abcdef",1,"i
          ipv4","name","password"

Response: OK

Run:      AT^HBECONT?

Response: ^HBECONT:
          "UDP","211.1.1.11",8000,5,"abcdef",1,"ipv4","name"
          ,"password"

          OK

Run:      AT^HBECONT=?
  
```

Response: ^HBECONT: (1-65535), (5-90), (1-5)

OK

16.13 AT^HBEACT-Set Heartbeat Function

16.13.1 Command Syntax

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

16.13.2 Interface Description

This command is used to enable or disable the heartbeat function.

16.13.3 Parameter Description

<state>: indicates whether the heartbeat function is enabled or disabled.

0	Disabled (default value)
1	Enabled

16.13.4 Property Description

Saving upon Power-off	PIN
N	Y

16.13.5 Example

```
Run:          AT^HBEACT=1
Response:    OK
Run:          AT^HBEACT=0
Response:    OK
Run:          AT^HBEACT?
Response:    ^HBEACT: 0

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

                OK
```

16.14 AT^FTPCMD—Create File Transfer Service

16.14.1 Command Syntax

```
AT^FTPCMD=<link_id>,<ftp_cmd>[,<filename>][,<data_offset>]
```

Possible Response(s)

If data is saved on the MT, neglect <CR><LF><file content>:

In the case of successful execution of "FILESIZE":

```
<CR><LF>^FTPCMD:
"FILESIZE",<File_length><CR><LF><CR><LF>OK<CR><LF>
```

If the "GET" and "PUT" are successfully executed::

Transparent mode of transmission:

```
<CR><LF>CONNECT<CR><LF><file
content><CR><LF><CR><LF>OK<CR><LF>
```

Command mode of transmission:

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

If the command is unsuccessfully executed:

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

or

```
<CR><LF>CONNECT<CR><LF><file
content><CR><LF><CR><LF>ERROR<CR><LF>
```

AT^FTPCMD=?
Possible Response(s)
<CR><LF>^FTPCMD: (list of supported <link_id>s), (list of supported <ftp_cmd>s)<CR><LF><CR><LF>OK<CR><LF>

16.14.2 Interface Description

After an FTP connection is successfully established, this command is used for exchanging data with, uploading data to, and downloading data from the specified FTP server. During data transmission, the ME enters the transparent transmission mode and does not respond to any AT command. After data is downloaded, the ME quits the transparent transmission mode; after data is uploaded, the user must manually enter "+++" to enable the ME to quit the transparent transmission mode.

16.14.3 Parameter Description

<link_id>: indicates the link ID. The value ranges from 1 to 5 and is the same as the FTP link ID.

<data_offset>: indicates the offset of a data file (this parameter must be smaller than the file length; unit: byte). For a 1000-byte file, if downloaded 600 bytes, offset should be 600.

<ftp_cmd>: indicates the type of the FTP service. The value is a character string without quotation marks ("").

GET	FTP downloads data
PUT	FTP uploads data
PASV	establishes data connection in PASV mode(default value)
PORT	establishes data connection in PORT mode
FILESIZE	Gets the specified file size

<filename>: indicates the name of the file downloaded using FTP. The value is a character string with a maximum of 256 characters and cannot contain any of the following characters: '|', ':', '*', '<', '>', '"', '?'.



NOTE

You do not need to specify the parameter <filename> when setting the <ftp_cmd> for establishing data connection.

16.14.4 Property Description

Saving upon Power-off	PIN
N	Y

16.14.5 Example

- Configure the connection mode for downloading data. (In the following examples, the link ID of the FTP link is 1).

Run: AT^FTPCMD=1,PORT

Response: OK

- Download the file "test.txt". The content of the file is "ftp test".

Run: AT^FTPCMD=1,GET,"test.txt"

Response: CONNECT
ftp test!

OK

- Download the file "ftp_download.txt" in Command Mode Transmission.

Run: AT^IPCFL=14,1

Response: OK

Run: AT^FTPCMD=1,GET,"ftp_download.txt"

Response: OK

^IPDATA: 1,1500,ABC.....

^IPDATA: 1,1500,ABC.....

^IPSRVST: 1,11,1

- Download the file "ftp_download.txt" in Buffer Mode Transmission.

Run: AT^IPCFL=14,2

Response: OK

Run: AT^FTPCMD=1,GET,"ftp_download.txt"

Response: OK

^IPRCVST: 1,1

Run: AT^IPRCV: 1,1500

Response: <Content of file -1500 characters>

OK

^IPSRVST: 1,11,1

- Getting the file size.

Run: AT^FTPCMD=1, FILESIZE, "test.txt"

Response: ^FTPCMD: "FILESIZE", 4500

OK

- Downloading file from certain offset.

Run: AT^FTPCMD=1, FILESIZE, "test.txt"

Response: <Size of the file will be displayed>

OK

Run: AT^FTPCMD=1, GET, "test.txt", 10

Response: CONNECT
< Content of file from the offset 10 to end of file>

OK

- Query the range of the parameters supported by FTPCMD.

Run: AT^FTPCMD=?

Response: ^FTPCMD:
(1-5), ("GET", "PUT", "PORT", "PASV", "FILESIZE")

OK

16.15 AT^HTTPCMD-HTTP Data Services

16.15.1 Command Syntax

```
AT^HTTPCMD=<http_linkID>,<http_cmd>,<http_data_path>[,<http_data_length>[,<http_data_type>]]
```

Possible Response(s)

In the transparent transmission mode:

```
<CR><LF>CONNECT<CR><LF><http data content><CR><LF><CR><LF>OK<CR><LF>
```

In the command transmission mode:

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



```
In the case of an error during command execution:
<CR><LF>+CME ERROR: <err><CR><LF>
or
<CR><LF>CONNECT<CR><LF><http data
content><CR><LF>ERROR<CR><LF>
AT^HTTPCMD=?
Possible Response(s)
<CR><LF>^HTTPCMD: (list of supported <http_linkID>s), (list of supported
<http_cmd>s)<CR><LF><CR><LF>OK<CR><LF>
```

16.15.2 Interface Description

When a connection is established over HTTP, this command is used for data operations over HTTP.

16.15.3 Parameter Description

<http_linkID>: indicates the link ID. The value ranges from 1 to 5 and is the same as the HTTP link ID.

<http_cmd>: a character string without quotation marks; indicates HTTP service types.

- GET HTTP GET request
- POST HTTP POST request

<http_data_path>: a character string, and the maximum length is 255 bytes. The parameter consists of a URL (Uniform Resource Locator), whose format is as follows: <protocol>://<host>:<port>/<path>.

<http_data_length>: indicates the length of HTTP POST data. The length has no limit in HTTP protocol, but is restricted by HTTP server in most cases.

<http_data_type>: indicates the type of HTTP POST data, and the maximum length is 255 bytes. If <http_data_type> is not specified, the default value is "text/plain".

 **NOTE**

You do not need to specify the parameter <http_data_path> when setting the <http_cmd> for establishing data connection

16.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.15.5 Example

- Query the range of the parameters supported by AT^HTTPCMD.

Run: AT^HTTPCMD=?
Response: ^HTTPCMD: (1-5), ("GET", "POST")

OK

- HTTP GET

Run: AT^IPOPEN=1, "HTTP", "news.yahoo.com", 80
Response: OK
Run: AT^HTTPCMD=1, GET, "http://news.yahoo.com:80/b
ombings-rock-egyptian-capital-killing-5-peop
le-094759738.html"
Response: CONNECT
<file Content>

OK

^IPSRVST: 1,12,200

- HTTP GET in Command Transmission Mode.

Run: AT^IPCFL=14,1
Response: OK
Run: AT^IPOPEN=1, "HTTP", "news.yahoo.com", 80
Response: OK
Run: AT^HTTPCMD=1, GET, "http://news.yahoo.com:80/b
ombings-rock-egyptian-capital-killing-5-peop
le-094759738.html"
Response: OK

^IPDATA: 1,1500,ABC..

^IPDATA: 1,1500,ABC..

^IPSRVST: 1,12,200

- HTTP POST

Run: AT^IPOPEN=1, "HTTP", "www.baidu.com", 80
Response: OK



Run: AT^HTTPCMD=1,POST,"http://www.baidu.com:80/index.html",3500,"text/plain"
Response: CONNECT
<User enter 3500 characters>
<Server Response>

OK

^IPSRVST: 1, 12,200

- HTTP POST in Command mode

Run: AT^IPCFL=14,1
Response: OK
Run: AT^HTTPCMD=1,POST,"http://www.baidu.com:80/index.html",1000,"text/plain"
Response: OK
Run: AT^IPSENDEX=1,2,1000
Response: OK
<User enter 1000 characters>

^IPSENDEX: 1

OK

^IPDATA: 1,100,ABC...

^IPSRVST: 1,12,200

- HTTP GET in Buffer Mode.

Run: AT^IPCFL=14,2
Response: OK
Run: AT^IPOPEN=1,"HTTPS","news.google.com",443
Response: OK
Run: AT^HTTPCMD=1,GET,"https://news.google.com:443/nwshp?hl=en&tab=wn"
Response: OK

^IPRCVST: 1,1
Run: AT^IPRCV=1,1500

Response: ^IPRCV: 1,1500
 <Content of file -1500 characters>

 OK

 ^IPSRVST: 1,12,200

**NOTE**

Users can also use AT^IPSEND to send data in command mode.
AT^IPSEND=1, "agddhmdgwcfcjgjdgdgjsjsjsjsdfg"
OK

16.16 AT^EMSEND–Send Emails

16.16.1 Command Syntax

```
AT^EMSEND=<link_id>,<ds_addr>[,<subj>][,<charset>][,<attachmen  
t>[,<file_name>]]<CR>
```

Possible Response(s)

<CR><LF>>email text to be entered here followed by
<CTRL-Z>/<Esc><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

16.16.2 Interface Description

This command is used to set the target email address, email subject, content encoding method, whether to attach files to the email, and the attachments' format and name.

Sending email through secure or non-secure environment is dependent on the protocol type selection in AT^IPOPEN command.

The email content is sent in data mode. Press CTRL+Z at the end of the email, and the email will be sent to the server.

<Esc> will cancel sending mail. It will cancel all AT^EMSEND command. Once user gives <Esc>, the SMTP connection will be closed. To send another mail, user has to open the SMTP connection again.

16.16.3 Parameter Description

<link_id>: the link number, the value ranges from 1 to 5.

<ds_addr>: this is destination email address and it must have the domain name also along with user name. The maximum length is 255 bytes.

<subj>: a string that specifies the email subject. The maximum length is 128 bytes

<charset>: a string that specifies the content encoding method (default: UTF-8).
The maximum length is 16 bytes.

<attachment>: a number that specifies whether to attach a file to the email.

- | | |
|---|--|
| 0 | Without attachments (default) |
| 1 | With attachments, encoding method: 7 bit |
| 2 | With attachments, encoding method: base 64 |

<file_name>: a string that specifies the file name. The maximum length is 64 bytes.



NOTE

- If the email has attachments, use `AT^IPSENDEX` to send the attachments after the email content is sent and OK is returned.
- Use `<eodFlag>` of `IPSENDEX` to mark the last data packet of the attachment.
- If the email without attachments, the attachments' name should not be entered. If the email with attachments, the attachments' name cannot be left blank.
- The email's subject and attachment only support ASCII characters. If the total size of the mailing exceeds the recipient server's limits, error code of 523 will be sent to clients, and users will be notified through `IPSRVST` with that error code. In this case of error, the smtp connection will be closed.

16.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.16.5 Example

- The email without attachments

```
Run:      AT^EMSEND=1,"m2mtest@m2m.huawei.com","this is a
          test mail","utf-8",0
          >Test mail without attachment<Ctrl-Z>
```

```
Response: OK
```

- The email with attachments.

```
Run:      AT^EMSEND=1,"m2mtest@m2m.huawei.com","testwithatta
          chment","utf-8",2,"test.txt"
          >Test mail with attachment <Ctrl-Z>
```

```
Response: OK
```

```
Run:      AT^IPSENDEX=1,2,16,1
```

```
Response: OK
```

```
<The user enters 16 characters here.>
```

Response: ^IPSENDEX: 1

OK

**NOTE**

- To use SMTPS, please find the configuration in AT^IPOPEN command.
- The email subject is not displayed even when command output is enabled.

16.17 ^IPSRVST-Report the Socket Service State

16.17.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPSRVST: <link_id>,<state_type>,<state_code><CR><LF>

16.17.2 Interface Description

This command is used to report the current service operating state of the socket when the socket service state changes. The service operating state can be the user operating state or data transmission state.

16.17.3 Parameter Description

<link_id>: indicates the link ID of the socket service. The value ranges from 1 to 5.

<state_type>: specifies the type of the state to report.

0-9	Reserved
10	FTP service, indicating the user operating state.
11	FTP service, indicating the data transmission state.
12	HTTP service event
13	SMTP service, indicating the user operating state
14	SMTP service, indicating the data transmission state
15-255	Reserved

<state_code>: indicates the state information.

<state_type>	<state_code>	Meaning
0-9	Reserved	Reserved
10	100	The server does not respond



<state_type>	<state_code>	Meaning
	110	Restart the marker reply
	120	Get prepared in n minutes.
	125	The connection is open. Prepare to transmit data.
	150	Open data connection.
	200	The command succeeds.
	202	The command fails.
	211	System status
	212	Directory status
	213	File status
	214	Help information
	215	Name system type
	220	The new user service is ready.
	221	Close the control connection of a specified service. The user can log out.
	225	The data connection is open, and no transmission is in process.
	226	lose the data connection. The requested file operation succeeds.
	227	Enter the passive mode.
	230	User login
	250	The requested file operation is completed.
	257	Create "PATHNAME".
	331	The user name is correct and a password is required.
	332	Require account information for login.
	350	Next step command
	421	Services cannot be provided. Close the control connection.
	425	Failed to open the data connection.
	426	Close the connection and terminate the transmission.
	450	The requested file operation is not executed.



<state_type>	<state_code>	Meaning
	451	Terminate the requested operation: a local error occurs.
	452	The requested operation is not executed: insufficient system storage space.
	500	The commands is unable to identify because of incorrect format.
	501	Syntax error
	502	Command not executed
	503	Command sequence error
	504	The command specifying the parameter is not executed.
	530	Users do not log in.
	532	Account information is required for file storage.
	550	The requested operation is not executed.
	551	The requested operation is terminated: unknown page type.
	552	The requested file operation is terminated: storage space exceeded.
	553	The requested operation is not executed: invalid file name.
	600	Unknown error
11	0	Data transmission failed.
	1	Data transmission completed.
12	200	The requested operation is succeeding.
	400	The requested operation is not understood by the server.
	401	User name and password is required for the requested page
	Other value	List the general responses. For the details, you can see HTTP1.1 protocol.
13	421	Service not available
	450	Requested mail command failed
	451	Command has been aborted due to server error.

<state_type>	<state_code>	Meaning
	500	The server could not recognize the command due to syntax error.
	502	Command is not implemented
	551	Receptent is not local to server.
	552	Exceeded storage allocation
	553	Mailbox name is invalid.
	550	Mail box unavailable
	535	Authentication Fail
	235	Authentication Successful
	221	The server is closing its transmission channel
14	250	Server has transmitted message.
	354	State Mail input end.
	334	Wait for user information
	500	Unrecognized command
	550	Mail box unavailable
	551	Receptent is not local to server.
	554	SMTP Transaction failed
	503	Bad sequence of commands
	221	The server is closing its transmission channel
15–255	Reserved	Reserved

16.17.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.17.5 Example

- An FTP user is successfully logged in to an FTP.

Run: `AT^IPOPEN=1,"FTP","172.22.44.4",21,, "loader", "loader"`

Response: OK

^IPSRVST: 1,10,230

- FTP data transmission succeeds.

Run: AT^FTPCMD=1,GET,"test.txt"

Response: CONNECT
ftp test!

OK

^IPSRVST: 1,11,1

**NOTE**

^IPSRVST will be reported only after all the data is transferred. i.e., when the data is downloaded in buffer mode, ^IPSRVST will be reported only after the application reads all the data.

16.18 AT^DVCFG-Set Priority of Voice Call and Data Service

16.18.1 Command Syntax

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

16.18.2 Interface Description

This command sets and queries the priority of voice call and data service.

16.18.3 Parameter Description

<mode>:

- 0 Voice call prefer (default value)
In this state, an incoming voice call will suspend the data transmission. If data service is not in transparent transmission mode, all ports (PCUI port, MODEM port, and UART port) will report RING message. If data service is in transparent transmission mode, all ports will report RING message except the port which is processing data service, and the RING pin is dredged. The data transmission will keep on going after stopping the voice call. But there is one risk that the transmitted data maybe loss during the process of voice call, only the last packet (less than 1600 byte) can be sent successfully.
- 1 Data service prefer
In this state, When the TE performing IP Stack asynchronous command or in the transparent transmission mode, an incoming voice call will be hung up by the module automatically.
In this state, the TE can originate a voice call. And a new incoming voice call during the call will not be hung up automatically.

To change the priority of voice call and data service by using `AT^DVCFG=0` command, or using command `AT^IPCLOSE=7` to close IPStack, which can return back to answer the voice call when it coming.

16.18.4 Property Description

Saving upon Power-off	PIN
N	Y

16.18.5 Example

Run: `AT^DVCFG=0`

Response: OK

16.19 AT^IPRCV-Read Network Service Data

16.19.1 Command Syntax

`AT^IPRCV=<link_id>,<reqReceiveLength>`

Possible Response(s)

- When the buffer contains data:
<CR><LF>^IPRCV: <link_id>,<reqReceiveLength><CR><LF>...(returns reads data)<CR><LF><CR><LF>OK<CR><LF>

- When the buffer contains no data:
<CR><LF>^IPRCV: <link_id>,0<CR><LF><CR><LF>OK<CR><LF>

- When the reqReceiveLength is 0:
<CR><LF>^IPRCV:
<link_id>,<reqRemainLength><CR><LF><CR><LF>OK<CR><LF>

In case of an MT-related error:

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

AT^IPRCV=?

Possible Response(s)

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

In case of an MT-related error:

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

16.19.2 Interface Description

This command reads data out from the service buffer.

16.19.3 Parameter Description

<link_id>: link number.

1–5 The expression has established link number.

<reqReceiveLength>: an integer type indicates the data length requested from the buffer.

0 Peek Operator, which queries the number of bytes received by the internal buffer.

1–1500 Number of data bytes read by the Internet service whose <link_id> is specified.

<reqRemainLength>: an integer type indicates the data length remainder from the buffer.

0–32768 Number of the service buffer data bytes.32768 is most of the service buffer



16.19.4 Property Description

Saving upon Power-off	PIN
N	Y

16.19.5 Example

Precondition: The data service connection has been established and successfully enabled, and there is data in the buffer

Run: AT^IPRCV=1,25

Response: ^IPRCV: 1,25
Message is here.

OK

16.20 ^IPRCVST-Unsolicitedly Report Data Arrival in Data Receive Buffer

16.20.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPRCVST: <link_id>,<urcCauseid><CR><LF>

16.20.2 Interface Description

The command notifies unsolicited reports to the user by indicating the data arrival in data receive buffer.

16.20.3 Parameter Description

<link_id>: link number, the value ranges from 1 to 5.

<urcCauseid>: indicates whether there is data to be read.

- | | |
|---|---|
| 1 | Indicates that data is available and can be read by sending the AT^IPRCV command. |
|---|---|

16.20.4 Property Description

Saving upon Power-off	PIN
N	Y

16.20.5 Example



NOTE

If the buffer is not read or queried by the `AT^IPRCV` command when data is available, no report will be submitted to the upper layer when new data arrives.

Response: `^IPRCVST: 1,1`

16.21 AT^SLEN-Initialize Secure Service

16.21.1 Command Syntax

<code>AT^SLEN=<SSL_id>,<Enable>[,<encode_ok>]</code>
Possible Response(s)
<code><CR><LF>OK<CR><LF></code>
In case of an MT-related error:
<code><CR><LF>+CME ERROR: <err><CR><LF></code>
<code>AT^SLEN?</code>
Possible Response(s)
<code><CR><LF>^SLEN: <SSL_id>,<Enable>,<encode_ok>,<Target_IP_addr><CR><LF><CR><LF>OK<CR><LF></code>
<code>AT^SLEN=?</code>
Possible Response(s)
<code><CR><LF>^SLEN: (list of supported <SSL_id>s) , (list of supported <Enable>s) , (list of supported <encode_ok>s)<CR><LF><CR><LF>OK<CR><LF></code>

16.21.2 Interface Description

This command is used to enable/disable secure or normal socket.

The read command is used to obtain the current values of parameters and the target IP address.

The test command is used to obtain the SSL (Secure Sockets Layer) enable command capabilities.

16.21.3 Parameter Description

<SSL_id>: SSL socket ID.

- | | |
|---|--------------------------|
| 0 | Normal socket connection |
| 1 | Secure socket connection |

<Enable>: enable flag.

- | | |
|---|----------------|
| 0 | Disable socket |
| 1 | Enable socket |

<encode_ok>: encode type for AT^SSLRX and AT^SSLTX commands.

- | | |
|---|--|
| 0 | No encoded (ASCII format) data shall be taken by AT^SSLTX command and plain data shall be displayed on "Tera term" for AT^SSLRX. |
| 1 | Base 64 encoded format data shall be taken by AT^SSLTX command and displayed on "Tera term" for AT^SSLRX. (default value) |



NOTE

- AT^SLEN command would also automatically load the existing certificates stored in file system when it is in proper PEM format. But it will not show any error while loading during SLEN when the certificate is not in proper format.
- Only first 10 certificates will be loaded for CA certificates. If more than one client certificates are available in the file system, then users need to load the corresponding certificate by using AT^SSLMNG command with the <action> as 2 (read/load data) to succeed the hand shake during socket open.

16.21.4 Property Description

Saving upon Power-off	PIN
N	Y

16.21.5 Example

Preconditions:

- The network connection and wireless network connection are supported by the targets.

Run: AT^SLEN=1,1,1

Response: OK

Run: AT^SLEN?

Response: ^SLEN: 1,1,1,"192.168.70.59"

OK

Run: AT^SLEN=?

Response: ^SLEN: (0-1),(0-1),(0-1)

OK

- The SSL is not enabled

Run: AT^SLEN?

Response: ^SLEN: 1,0,1,"0.0.0.0"

OK

Examples for abnormal cases:

- Without enabling a socket, if the socket is disabled:

Run: AT^SLEN=1,0

Response: +CME ERROR: Socket not enabled

- The socket is enabled again (without disabling the previously enabled socket):

Run: AT^SLEN=1,0

Response: +CME ERROR: Socket already enabled

- A secure socket is enabled by AT^SLEN=1,1, and the normal socket is disabled:

Run: AT^SLEN=0,0

Response: +CME ERROR: Invalid Operation

- Any one of the input parameter is out of range, for example: <SSL_id> is 2.

Run: AT^SLEN=2,1

Response: +CME ERROR: Invalid arguments

- The socket is enabled when there is no network.

Run: AT^SLEN=1,1

Response: +CME ERROR: The network has not been opened yet

16.22 AT^SSLCFG-Configure SSL

16.22.1 Command Syntax

AT^SSLCFG=<SSL_id>,<Timeout>[,<cipher_suite>,<scur_level>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^SSLCFG?
Possible Response(s)
<CR><LF>^SSLCFG: <SSL_id>,<Timeout>,<cipher_suite>,<scur_level><CR><LF><CR><LF>OK<CR><LF>
AT^SSLCFG=?
Possible Response(s)
<CR><LF>^SSLCFG: (list of supported <SSL_id>s), (list of supported <Timeout>s), (list of supported <cipher_suite>s), (list of supported <scur_level>s)<CR><LF><CR><LF>OK<CR><LF>

16.22.2 Interface Description

This command is used to configure the properties of secure socket.

The read command is used to obtain the current values of the parameters.

The test command is used to get the AT^SSLCFG command capabilities.

16.22.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- | | |
|---|--------------------------|
| 1 | Secure socket connection |
|---|--------------------------|

<Timeout>: an integer indicates the maximum blocking timeout for Rx and Tx operations, unit: seconds. The value ranges from 1 to 60. The default value is 60.

<ciphers_suit>: all the available cipher suites supported by SSL are proposed to the server. It is responsibility of the remote server to select one of them. When all the available cipher suites supported by SSL are proposed to the server, the value of the <ciphers_suit> is 0. The value ranges from 0 to 15.

The table below is the supported cipher suite list (**currently supported 15 cipher suites**):

<ciphers_suit>	Cipher_suites
0	All supported Ciphers (default value)
1	TLS_RSA_WITH_RC4_128_SHA
2	TLS_RSA_WITH_RC4_128_MD5
3	TLS_RSA_WITH_NULL_SHA
4	TLS_RSA_WITH_NULL_SHA256
5	TLS_RSA_WITH_AES_256_CBC_SHA
6	TLS_RSA_WITH_AES_128_CBC_SHA
7	TLS_RSA_WITH_AES_128_CBC_SHA256
8	TLS_RSA_WITH_AES_256_CBC_SHA256
9	TLS_RSA_WITH_3DES_EDE_CBC_SHA
10	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
11	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
12	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
13	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
14	Not supported currently
15	Not supported currently



NOTE

TLS_RSA_WITH_RC4_128_SHA, TLS_RSA_WITH_RC4_128_MD5, TLS_RSA_WITH_NULL_SHA, TLS_RSA_WITH_NULL_SHA256 and TLS_RSA_WITH_3DES_EDE_CBC_SHA have low safety coefficient. It is recommended you choose other encryption algorithms.

The client sends all supported algorithms to the server, and the server chooses one from them.

<scur_level>: authentication mode.

- 0 Not authorized (default value)
- 1 Server side authentication.
- 2 Server & client both sides are authorized

 **NOTE**

- We can ignore any of the optional parameters by giving only comma ",". In this case, it will take the default values for the corresponding optional parameters.
- Once the SSL is disabled using `AT^SSLEN=1,0`, the module will restore the parameter values of `AT^SSLCFG` to their default values.

16.22.4 Property Description

Saving upon Power-off	PIN
N	Y

16.22.5 Example

Preconditions: The secure socket is enabled by using `AT^SSLEN` command.

Run: `AT^SSLCFG=1,60,1,1`

Response: OK

Run: `AT^SSLCFG?`

Response: `^SSLCFG: 1,60,1,1`

OK

Run: `AT^SSLCFG=?`

Response: `^SSLCFG: (1), (1-60), (0-15), (0-2)`

OK

Examples for abnormal cases

- Without the secure socket is enabled (`AT^SSLEN`), run the `AT^SSLCFG` command.

Run: `AT^SSLCFG=1,60,1,0`

Response: `+CME ERROR: Invalid Operation`

- Any one of the input parameter is out of range, for example: `<SSL_id>` is 2.

Run: `AT^SSLCFG=2,60,1,0`

Response: `+CME ERROR: Invalid arguments`

- Run `AT^SSLCFG` command after the socket is opened.

Run: `AT^SSLCFG=1,60,1,1`

Response: `+CME ERROR: Invalid Operation`

16.23 AT^SSLMNG-Manage Certificate or Key

16.23.1 Command Syntax

<pre>AT^SSLMNG=<SSL_id>,<data_type>,<action>,<file_name>[,<package_id>,<total_no_of_packages>,<cert_info>][,<password>]</pre>
<p>Possible Response(s)</p> <pre><CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>
<pre>AT^SSLMNG?</pre>
<p>Possible Response(s)</p> <pre><CR><LF>^SSLMNG: [<data_type>,<file_name>[...]<CR><LF>][<data_type>,<action>,<file_name>[,<package_id>,<total_no_if_packages>]<CR><LF>]<CR><LF>OK<CR><LF></pre> <p>If no certificate is present:</p> <pre><CR><LF>OK<CR><LF></pre>
<pre>AT^SSLMNG=?</pre>
<p>Possible Response(s)</p> <pre><CR><LF>^SSLMNG: (list of supported <SSL_id>s) , (list of supported <data_type>s) , (list of supported <action>s) , , (list of supported <package_id>s) , (list of supported <total_no_of_packages>s) , , <CR><LF><CR><LF>OK<CR><LF></pre>

16.23.2 Interface Description

This command is used to manage certificates and other security data like private key.

Brief information about AT^SSLMNG command:

- Certificates MUST be in PEM format.
- For large size of certificate (greater than 1024 bytes), we have to break the certificate data into packages and maximum size of each package is 1024 bytes.
- Each package should have the unique identification number (1–10).
- It supports upto 10 kb (10 * 1024) size.
- Packages can be given by any order in AT^SSLMNG command.

Example:

```
AT^SSLMNG=1,1,0,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVvkFURSB
LRVktLS0tLQo="
```

OK

```
AT^SSLMNG=1,1,0,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcy  
BjBmRmY5SBQcm12YXRlbGltaxRlZC4s"
```

OK

- After giving all the packages, the SSLMNG will integrate all the packages and do the Base 64 decoding and finally store/delete/load the file into/from file system.
- If any error appears in any one of the package, then all previously received packages will be cleared.
- If the module starts to execute any of the SSLMNG operation with multiple packages, before completing that operation (before giving all the packages), any other operation cannot be executed in AT^SSLMNG.

The read command is used to obtain the name of files (certificates) stored in the file system. When the module is powered off and reset, the last operation of SSLMNG will not be saved. When the certificate is not completely stored, the return of AT^SSLMNG? will not contain the file name of certificate and key.

The test command is used to obtain the SSL manage command capability.



NOTE

Only the following encryption types are supported for password protected encrypted certificates.

- DES-CBC
- DES-EDE3-CBC
- AES-128-CBC
- AES-192-CBC
- AES-256-CBC

16.23.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

1 Secure socket connection

<data_type>: an integer indicates the certificate or key to be stored.

0 Certificate of the client (the module). It is needed when the server or client authentication mode has been configured.

1 Root CA certificate of the remote server, used to authenticate the remote server. It is needed when <scur_level> of AT^SSLCFG is set to 1 or 2.

2 RSA private key of the client (module). It is needed if the Server or Client authentication mode has been configured.

<action>:

0 Store certificate

1 Delete certificate

2 Load certificate

<file_name>: the file name for "". The maximum length of the file name is 254.

<package_id>: package identification number. The value ranges from 1 to 10.

<total_no_of_packages>: total number of packages after splitting the Base 64 encoded format certificate data of each package, of which the maximum size is 1024 bytes. The value ranges from 1 to 10.

<cert_info>: a string type indicates the broken certificate package (converted into Base 64 encoded format before splitting the package) data. The length ranges from 1 byte to 1024 bytes.

<password>: a string type indicates the password for private key (the length ranges from 4 bytes to 80 bytes) plain text.

 **NOTE**

- <package_id>, <total_no_of_packages> and <cert_info> are optional if <action> is 1 or 2.
- <password> is applicable only if <action> is 2 and when loading the private key with password.
- It is not required to give the password in every package, but the last package must contains the correct password.

<list_of_file_names>: the name of the files stored in file system.

 **NOTE**

- On "Delete" action, currently the certificate is only deleted from the file system. To delete from SSL library context, socket needs to be disabled and re-enabled again.
- Before loading client private key, the users need to load the corresponding certificate by using AT^SSLMNG command with the <action> as 2 (read data) to succeed the hand shake during socket open.
- Please load the certificate first and then client key. Based on this order module can validate certificate and key matching.
- AT^SSLMNG for <action>=0 (storing data) can store a maximum of 10 certificates (10 each for ca-cert, client cert and client key) in the file system beyond which it would display error "Certificate maximum limit reached".
- AT^SSLMNG? command would display first 10 certificates stored in the file system for each type (CA, Client, Private Key) of certificates.
- Usage of <password> parameter is applicable in case of "Load" of "Private Key" during client authentication and it is required to set the password if the private key is encrypted. So this password parameter is an optional parameter.

16.23.4 Property Description

Saving upon Power-off	PIN
N	Y

16.23.5 Example

- Certificate store case (<package_id>, <total_no_of_packages> and <cert_info> are mandatory).

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcyBJbmRpYsBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfFURSBLRVktLS0tLQo="

Response: OK

- Certificate delete case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

Run: AT^SSLMNG=1,1,1,"ca_cert2.pem"

Response: OK

 **NOTE**

In this example, the buffer is not passed. If the file with the specified name exists, certificates are deleted by the file name. Otherwise, an error is returned.

- Certificate delete case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

Run: AT^SSLMNG=1,1,1,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcyBJbmRpYsBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG=1,1,1,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfFURSBLRVktLS0tLQo="

Response: OK

 **NOTE**

In this example, both the filename and the buffer are passed. So the certificate is deleted if both the file data and the buffer matches, else an error is displayed.

Preconditions: the secure socket is enabled by using AT^SLEN command.

- Certificate load/read case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem"

Response: OK

 **NOTE**

In this example, the buffer is not passed. So the certificate is loaded using the file name passed from the file system if present, else an error is displayed.

- Certificate load/read case (<file_name> is mandatory and [<package_id>,<total_no_of_packages>,<cert_info>] are optional)

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcyBJbmRpYsBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfFURSBLRVktLS0tLQo="

Response: OK

- Private key case
(`<package_id>`, `<total_no_of_packages>`, `<cert_info>` are mandatory and `<password>` is mandatory only if the private key is generated with password).

Run: `AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcyBJbmRpYSBQcm12YXRlbGltaxRlZC4s","huaweim2m"`

Response: OK

Run: `AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkfFURSBLRVktLS0tLQo=","huaweim2m"`

Response: OK

**NOTE**

Error message will be shown on trying to store the private key with password as it's allowed only while loading the private key.

- After the module is reset or before any SSLMNG operation is done and if no certificates are presented.

Run: `AT^SSLMNG?`

Response: `^SSLMNG:`

OK

- After the module is reset or before any SSLMNG operation is done and if certificates are presented.

Run: `AT^SSLMNG?`

Response: `^SSLMNG:
1,ca-cert.pem
0,client-cert.pem
2,client-key.pem`

OK

- The SSLMNG operation is performed before.

Run: `AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2llcyBJbmRpYSBQcm12YXRlbGltaxRlZC4s"`

Response: OK

Run: `AT^SSLMNG?`


```
Response: ^SSLMNG:
          1,ca-cert.pem
          0,client-cert.pem
          2,client-key.pem
          1,2,"ca_cert2.pem",1,2

          OK

Run:      AT^SSLMNG=?

Response: ^SSLMNG: (1),(0-2),(0-2),,(1-10),(1-10),,

          OK
```

Examples for abnormal cases

Preconditions: the secure socket is enabled by using `AT^SSELEN` command.

- Without the secure socket is enabled (`AT^SSELEN`), run `AT^SSLMNG` command:

```
Run:      AT^SSLMNG=1,1,2,"ca_cert2.pem"
Response: +CME ERROR: Invalid Operation
```

- Any one of the input parameter is out of range, for example: `<SSL_id>` is 2.

```
Run:      AT^SSLMNG=0,1,2,"ca_cert2.pem"
Response: +CME ERROR: Invalid arguments
```

16.24 AT^SSLO-Open Secure or Normal Socket

16.24.1 Command Syntax

```
AT^SSLO=<SSL_id>,<remote_ip>,<remote_port>[,<mode>,<TimeOut>]
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT^SSLO?
```

Possible Response(s)

If the link has been open:

```
<CR><LF>^SSLO:
<SSL_id>,<remote_ip>,<remote_port>,<mode>,<Timeout><CR><LF><
CR><LF>OK<CR><LF>
```

If the link hasn't been opened:

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

```
AT^SSLO=?
```

Possible Response(s)

```
<CR><LF>^SSLO: (list of supported <SSL_id>s) , , (list of supported  
<remote_port>s) , (list of supported <mode>s) , (list of supported  
<Timeout>s) <CR><LF><CR><LF>OK<CR><LF>
```

16.24.2 Interface Description

This command is used to create and open a secure/normal socket.

The read command is used to obtain the current values of parameters.

The test command is used to obtain the socket open command capability.

16.24.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- | | |
|---|--------------------------|
| 0 | Normal socket connection |
| 1 | Secure socket connection |

<remote_ip>: a string type indicates the long-distance IP address; IP or the hostname of the server. The maximum length is 255 characters.

<remote_port>: a string type indicates the long-distance port or remote port of the server (usually 443). The value ranges from 1 to 65535; .

<mode>: an integer type indicates the async mode.

- | | |
|---|---------------------------|
| 0 | Sync Mode (default value) |
| 1 | Async Mode |

- For the Sync mode, the data will be received in the synchronous mode. If `AT^SSLRX` command is run, then module will receive the data from server.
- For the Async mode, the data will be received in the asynchronous mode. Whenever the data is available in the server, it will be received automatically.

<TimeOut>: indicates the timeout value in seconds. The value ranges from 60 seconds to 180 seconds and the default value is 90 seconds.

While running `AT^SSLO` command, <TimeOut> specifies the time taken for connection of TCP socket. A minimal additional time is also required for the handshake and resolving of the hostname from DNS server for executing `AT^SSLO` command.

16.24.4 Property Description

Saving upon Power-off	PIN
N	Y

16.24.5 Example

Preconditions: the secure socket is enabled by using `AT^SLEN` command.

Run: `AT^SSLO=1,"192.166.63.155",443,1,60`

Response: `OK`

Run: `AT^SSLO=1,"accounts.google.com",443,1,90`

Response: `OK`

Run: `AT^SSLO?`

Response: `^SSLO: 1,"192.166.63.155",443,1,60`

`OK`

Run: `AT^SSLO=?`

Response: `^SSLO: (0-1),,(1-65535),(0-1),(60-180)`

`OK`

Examples for abnormal cases

- Without the socket is enabled (`AT^SLEN`), if run the `AT^SSLO` command.

Run: `AT^SSLO=1,"192.166.63.155",443,1,60`

Response: `+CME ERROR: Socket not enabled`

- The server is down.

Run: `AT^SSLO=1,"192.166.63.155",443,1,60`

Response: `+CME ERROR: Fail to connect specified address`

- Any of the input parameter is out of range, for example: `<SSL_id>` is 2.

Run: `AT^SSLO=2,"192.166.63.155",443,1,60`

Response: `+CME ERROR: Invalid arguments`

- The IP or host name value is given without quotes.

Run: `AT^SSLO=1,192.166.63.155,443,1,60`

Response: `+CME ERROR: Invalid arguments`

Run: `AT^SSLO=1,www.m2mhuawei.com,443,1,60`

Response: +CME ERROR: Invalid arguments

- After the socket is enabled with `<SSL_id> = 1` (`AT^SSLEN=1, 1`), and open the connection with `<SSL_id> = 0`.

Run: AT^SSLO=0, "192.166.63.155", 475, 1, 60

Response: +CME ERROR: Invalid Operation

16.25 AT^SSLC–Close Socket

16.25.1 Command Syntax

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

16.25.2 Interface Description

This command is used to turn off a secure socket. It can also turn off the normal socket.

The test command is used to obtain the SSL close command capability.

16.25.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

0	Normal socket connection
1	Secure socket connection

16.25.4 Property Description

Saving upon Power-off	PIN
N	Y

16.25.5 Example

Preconditions: the connection is opened by using `AT^SSLO` command.

```
Run:          AT^SSLC=1
Response:     OK
Run:          AT^SSLC=0
Response:     OK
Run:          AT^SSLC=?
Response:     ^SSLC: (0-1)

                OK
```

Examples for abnormal cases

- After the socket is enabled (`AT^SSLEN`), run `AT^SSLC` command.

```
Run:          AT^SSLC=1
Response:     +CME ERROR: Invalid Operation
```

- Without the socket is opened (`AT^SSLO`), run `AT^SSLC` command.

```
Run:          AT^SSLC=1
Response:     +CME ERROR: Socket not connected
```

- The socket is opened with `<SSL_id> = 1`, and then the socket is closed with `<SSL_id> = 0`.

```
Run:          AT^SSLC=0
Response:     +CME ERROR: Invalid Operation
```

- Any one of the input parameter is out of range, for example: `<SSL_id>` is 2.

```
Run:          AT^SSLC=2
Response:     +CME ERROR: Invalid arguments
```

- Run `AT^SSLC?` command.

```
Run:          AT^SSLC?
Response:     +CME ERROR: Operation not allowed
```

16.26 AT^SSLSTAT-Query SSL Status

16.26.1 Command Syntax

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

16.26.2 Interface Description

This command is used to query the status of the secure or normal socket.

The test command is used to get the current support SSL query capabilities.

16.26.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- 0 Normal socket connection
- 1 Secure socket connection

<conn_state>:

- 1 Normal connection is opened
- 2 Normal connection is closed
- 3 Secure connection is opened
- 4 Secure connection is closed

16.26.4 Property Description

Saving upon Power-off	PIN
N	Y

16.26.5 Example

Preconditions: the socket is enabled by using `AT^SSLEN` command.

- The socket connection is established.

Run: `AT^SSLSTAT=1`

Response: `^SSLSTAT: Secure connection opened`

OK

- The socket connection is not established.

Run: `AT^SSLSTAT=1`

Response: `^SSLSTAT: Secure connection not opened`

OK

Run: `AT^SSLSTAT=?`

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

OK

Examples for abnormal cases:

- Without the socket is enabled (`AT^SSLEN`), run `AT^SSLSTAT` command.

Run: `AT^SSLSTAT=1`

Response: `+CME ERROR: Invalid Operation`

- After the socket is enabled with `<SSL_id> = 1` (`AT^SSLEN=1, 1`), check the status of `<SSL_id> = 0`.

Run: `AT^SSLSTAT=0`

Response: `+CME ERROR: Invalid Operation`

- Any one of the input parameter is out of range, for example: `<SSL_id>` is 2.

Run: `AT^SSLSTAT=2`

Response: `+CME ERROR: Invalid arguments`

- Run `AT^SSLSTAT?` command.

Run: `AT^SSLSTAT?`

Response: `+CME ERROR: Operation not allowed`

16.27 AT^SSLRX-Receive Data

16.27.1 Command Syntax

AT^SSLRX=<SSL_id>,<Maxlength>[,<TimeOut>]
Possible Response(s)
<p><CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF><CR><LF>OK<CR><LF></p> <p>If no data received: <CR><LF>^SSLRX: 0<CR><LF>TIMEOUT<CR><LF><CR><LF>OK<CR><LF></p> <p>In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF></p>
AT^SSLRX=?
Possible Response(s)
<p><CR><LF>^SSLRX: (list of supported <SSL_id>s) , (list of supported range <MaxLength>s) , (list of supported range <TimeOut>s) <CR><LF><CR><LF>OK<CR><LF></p>

16.27.2 Interface Description

This command is used to receive the data through the secure or normal socket.

The test command is used to obtain the SSL received command capabilities.

- For the Sync mode (if the socket is opened with <mode> = 0), the AT^SSLRX will work in the synchronous mode. If run AT^SSLRX command, then module will receive the data from server.
- For the ASync mode (if the socket is opened with <mode> = 1), the AT^SSLRX will work in the asynchronous mode. Whenever the data is available in the server, the module will receive the data automatically.
- In the Sync mode, if the server sends data that exceed the maximum length, AT^SSLRX is executed to read the entire data.
- In 2G network, AT^DVCFG can be used to set the priority of call or data.

If the AT^SSLRX operation time exceeds the preset threshold, a timeout occurs.

16.27.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- | | |
|---|---|
| 0 | Normal socket connection (In the normal socket connection, its effect and process are the same as TCP.) |
| 1 | Secure socket connection |

<Maxlength>: indicates the maximum number of bytes that will read from the socket. The value ranges from 1 to 1024.

<TimeOut>: the maximum blocking timeout in seconds. It is optional parameter. It can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be used for both secure socket RX and normal socket RX, the default <TimeOut> value (60) will be used.

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.



NOTE

If <encode_ok> in AT^SLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

16.27.4 Property Description

Saving upon Power-off	PIN
N	Y

16.27.5 Example

Preconditions: the connection is opened by using AT^SSLO command.

- The <encode_ok> is set to 1 in AT^SLEN command.

Run: AT^SSLRX=1, 5, 60

Response: ^SSLRX: 5
SGVsbG8=

OK

- The <encode_ok> is set to 0 in AT^SLEN command.

Run: AT^SSLRX=1, 5, 60

Response: ^SSLRX: 5
Hello

OK

Run: AT^SSLRX=?

Response: ^SSLRX: (0-1), (1-1024), (1-60)

OK

Examples for abnormal cases:

- If no data received:
Run: `AT^SSLRX=1,10,60`
Response: `^SSLRX: 0`
`TIMEOUT`

`OK`
- Without the socket is enabled (`AT^SLEN`), run `AT^SSLRX` command.
Run: `AT^SSLRX=1,10,60`
Response: `+CME ERROR: Invalid Operation`
- Without the socket is opened (`AT^SSLO`), run `AT^SSLRX` command.
Run: `AT^SSLRX=1,10,60`
Response: `+CME ERROR: Socket not connected`
- The secure socket is opened (`<SSL_id>` is 1) and receives the data from the normal socket.
Run: `AT^SSLRX=0,10,60`
Response: `+CME ERROR: Invalid Operation`
- Any one of the input parameter is out of range, for example: `<SSL_id>` is 2.
Run: `AT^SSLRX=2,10,60`
Response: `+CME ERROR: Invalid arguments`
- Run `AT^SSLRX?` command.
Run: `AT^SSLRX?`
Response: `+CME ERROR: Operation not allowed`

16.28 ^SSLRX-Notify SSL Arrival Data

16.28.1 Command Syntax

URC
Possible Response(s)
<code><CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF></code>

16.28.2 Interface Description

This command automatically reports the received data when the socket is opened in the ASync mode.

In 2G network, `AT^DVCFG` can be used to set the priority of call or data.

16.28.3 Parameter Description

<LengthOfRec>: the actual number of bytes received.

<Received_data>: the received data.



NOTE

If <encode_ok> in AT^SLEN command is 1, then it is Base 64 encoded format data (the length of the <Received_data> is differ from <LengthOfRec>, because the <Received_data> is in Base64 encoded format). Otherwise, the actual plain data will be displayed.

16.28.4 Property Description

Saving upon Power-off	PIN
N	Y

16.28.5 Example

```
Response:  ^SSLRX: 5
           Hello
           ^SSLRX: 5
           SGVsbG8=
```

16.29 AT^SSLTX-Send Data

16.29.1 Command Syntax

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

16.29.2 Interface Description

This command is used to send data through the secure or normal socket.

The test command is used to obtain the SSL transmit data command capability.

16.29.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- | | |
|---|--------------------------|
| 0 | Normal socket connection |
| 1 | Secure socket connection |

<data_buffer>: a string type indicates the data needing to be transmitted. The length ranges from 1 byte to 1024 bytes.

- If the <encode_ok> is set to 1, then the input buffer should be 768 bytes of raw data.
- If the <encode_ok> is set to 0, then the input buffer should be 1024 bytes of raw data.
- If <encode_ok> in AT^SSLEN command is 1, then it should be Base 64 encoded format data. Otherwise, it should be normal plain data.

<TimeOut>: the maximum blocking timeout in seconds. It is optional parameter, and can be omitted, and in this case the default timeout configurable with AT^SSLCFG will be used for secure socket TX and for normal socket TX, the default <Time Out> value (60) will be used.

16.29.4 Property Description

Saving upon Power-off	PIN
N	Y

16.29.5 Example

Preconditions: a connection is opened using AT^SSLO command.

- The <encode_ok> is set to 1 in AT^SSLEN command

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: OK

- The <encode_ok> is set to 0 in AT^SSLEN command

Run: AT^SSLTX=1, "Hello", 60

Response: OK

Run: AT^SSLTX=?

Response: ^SSLTX: (0-1), , (1-60)

OK

Examples for Abnormal cases

- Without the socket is enabled (AT^SLEN), run AT^SSLTX command.

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: +CME ERROR: Invalid Operation

- Without the socket is opened (AT^SSLO), run AT^SSLTX command.

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: +CME ERROR: Socket not connected

- The secure socket is opened (<SSL_id> is 1) and try to send the data from normal socket.

Run: AT^SSLTX=0, "SGVsbG8=", 60

Response: +CME ERROR: Invalid Operation

- Any one of the input parameter is out of range, for example: <SSL_id> is 2:

Run: AT^SSLTX=2, "SGVsbG8=", 60

Response: +CME ERROR: Invalid arguments

- Run AT^SSLTX? command.

Run: AT^SSLTX?

Response: +CME ERROR: Operation not allowed

17 Huawei Proprietary Interface: STK Interface

17.1 AT^STSF—Configure the Mode of STK

17.1.1 Command Syntax

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

17.1.2 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).

17.1.3 Parameter Description

<Mode>:

- | | |
|---|----------------------------|
| 0 | Disable STK |
| 1 | Active STK (default value) |

<RawMode>:

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



NOTE

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

17.1.4 Property Description

Saving upon Power-off	PIN
Y	N

17.1.5 Example

- Disable STK:
Run: AT^STSF=0
Response: OK
- Parameter setting error:
Run: AT^STSF=3,0
Response: ERROR
- Active STK and set STK to standard raw data mode:
Run: AT^STSF=1,2
Response: OK

17.2 AT^CUSATM-Query the Main Menu

17.2.1 Command Syntax

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

17.2.2 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".

17.2.3 Parameter Description

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

17.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

17.2.5 Example

Query the main menu:

Run: AT^CUSATM?



Response: ^CUSATM:
"D0818A81030125008202818285118051687403901A005500
530049004D53618F0D01444953504C415920544558548F0A0
247455420494E4B45598F0A0347455420494E5055548F0A04
4D4F52452054494D458F0A05504C415920544F4E458F0E065
04F4C4C20494E54455256414C8F0807524546524553488F13
0853454E442053484F5254204D455353414745"

OK

18 Huawei Proprietary Interface: Main And AUX Switch Interface

18.1 AT^ANTMODE-Set Operation Mode of Main and AUX Antennas

18.1.1 Command Syntax

AT^ANTMODE=<ant_mode>[, <nw_mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^ANTMODE?
Possible Response(s)
<CR><LF>^ANTMODE: <ant_mode>,<nw_mode><CR><LF>[^ANTMODE: <ant_mode>,<nw_mode><CR><LF>][...]<CR><LF>OK<CR><LF>
AT^ANTMODE=?
Possible Response(s)
<CR><LF>^ANTMODE: (list of supported <ant_mode>s) , (list of supported <nw_mode>s) <CR><LF><CR><LF>OK<CR><LF>

18.1.2 Interface Description

The set command is used to set the operation mode of main and AUX antennas on different networks. The module will be reset after running the command and returning OK.

The read command is used to query the current operation mode of main and AUX antennas on different networks.

The test command is used to return the list of operation modes of main and AUX antennas supported by the module.

18.1.3 Parameter Description

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

- 0 The main and AUX antennas are all enabled. (default value)
- 1 The main antenna is enabled.
- 2 The AUX antenna is enabled. (not supported currently)

<nw_mode>: indicates the network.

- 0 All networks (default value)
- 1 Reserved (not supported currently)
- 2 WCDMA
- 3 LTE (not supported currently)
- 4 CDMA 1x (not supported currently)
- 5 TD-SCDMA (not supported currently)
- 6 WiMAX (not supported currently)
- 7 CDMA EVDO (not supported currently)



NOTE

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

18.1.4 Property Description

Saving upon Power-off	PIN
Y	N

18.1.5 Example

- Query the current operation mode of the main and AUX antennas:

Run: AT^ANTMODE?

Response: ^ANTMODE: 0,2 The response indicates that the main and AUX antennas are all enabled on the WCDMA network.
OK

- Query the list of operation modes of main and AUX antennas supported by the module:

Run: AT^ANTMODE=?

Response: ^ANTMODE: (0,1), (0,2)

OK



- Set the main and AUX antennas to be all enabled on all networks:

Run: AT^ANTMODE=0

Response: OK

- Set the main antenna to be enabled on the WCDMA network:

Run: AT^ANTMODE=1, 2

Response: OK

19 Huawei Proprietary Interface: FOTA Interfaces

19.1 AT^FOTAMODE-Set Operation Mode

19.1.1 Command Syntax

<pre>AT^FOTAMODE=<detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]</pre>
<p>Possible Response(s)</p> <pre><CR><LF>OK<CR><LF></pre> <p>In case of an MT-related error:</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>
<pre>AT^FOTAMODE?</pre>
<p>Possible Response(s)</p> <pre><CR><LF>^FOTAMODE: <detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]<CR><LF><CR><LF>OK<CR><LF></pre>
<pre>AT^FOTAMODE=?</pre>
<p>Possible Response(s)</p> <pre><CR><LF>^FOTAMODE: (list of supported <detect_mode>s), (list of supported <download_mode>s), (list of supported <update_mode>s), (list of supported <en_resume>s), (list of supported <period>s)<CR><LF><CR><LF>OK<CR><LF></pre>

19.1.2 Interface Description

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

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

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

19.1.3 Parameter Description

`<dectect_mode>`: specifies the version detection mode.

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

`<download_mode>`: specifies the version download mode.

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

`<update_mode>`: specifies the update mode.

- | | |
|---|--|
| 0 | Manual update. In this mode, the module starts the update only after the user confirms the update operation. (default value) |
| 1 | Automatic update. In this mode, the module starts the update once the download is complete. |

`<en_resume>`: enables or disables resumable data transfer is supported.

- | | |
|---|--|
| 0 | Disables resumable data transfer. |
| 1 | Enables resumable data transfer. (default value) |

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

NOTE

- When `<dectect_mode>` is set to 1, the module will check for a new version when the time specified by `<period>` times out, regardless of whether the module is awake.
- There are two timing methods for `<period>`: local timing and network timing. If the module is able to obtain the network time, network timing will be used; otherwise, the local timing will be used. Yet there may be time errors when local timing is used.
- The parameters will be restored to their default values after updates.

19.1.4 Property Description

Saving upon Power-off	PIN
Y	N

19.1.5 Example

```
Run:          AT^FOTAMODE=1,0,1,1,22
Response:     OK
Run:          AT^FOTAMODE?
Response:     ^FOTAMODE: 1,0,1,1,22

              OK
Run:          AT^FOTAMODE=?
Response:     ^FOTAMODE: (0-1),(0-1),(0-1),(0-1),(1-65535)

              OK
Run:          AT^FOTAMODE=0,0,1,1
Response:     OK
Run:          AT^FOTAMODE?
Response:     ^FOTAMODE: 0,0,1,1,7

              OK
Run:          AT^FOTAMODE=0,0,1,1,22
Response:     ERROR
```

19.2 AT^FOTACFG-Set FOTA Connection Parameters

19.2.1 Command Syntax

```
AT^FOTACFG=<APN>,<username>,<password>,<auth_type>
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT^FOTACFG?
```

Possible Response(s)

```
<CR><LF>^FOTACFG:  
<APN>,<username>,<password>,<auth_type><CR><LF><CR><LF>OK<CR>  
><LF>
```

19.2.2 Interface Description

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

19.2.3 Parameter Description

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

<username>: specifies the user name. Its value is a string with double quotation marks, consisting of a maximum of 63 bytes. This parameter can be omitted, but only when <password> is also omitted.

<password>: specifies the password. Its value is a string with double quotation marks, consisting of a maximum of 63 bytes. This parameter can be omitted, but only when <username> is also omitted.

<auth_type>: indicates the authentication mode. This parameter is not supported when 3GPP2 is used. The authentication mode is determined based on the negotiation between the module and network.

0	No authentication
1	PAP
2	CHAP (default value)

19.2.4 Property Description

Saving upon Power-off	PIN
Y	N

19.2.5 Example

When the module is not detecting or downloading a new version or being updated, run `AT^FOTACFG` to set the APN, user name, password, and authentication mode for dial-up connections.

Run: `AT^FOTACFG="1234", "12", "12", 1`

Response: `OK`

Run: AT^FOTACFG?
Response: ^FOTACFG: "1234", "12", "12", 1

OK

19.3 AT^FOTADET-Manually Detect a New Version

19.3.1 Command Syntax

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

19.3.2 Interface Description

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



NOTE

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

19.3.3 Parameter Description

None

19.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

19.3.5 Example

When the module is not detecting or downloading a new version or being updated, run AT^FOTADET to initiate a new version detection.

Each detection attempt consumes 1 KB to 3 KB traffic.

- If the command is executed successfully, the following is returned:

Run: AT^FOTADET

Response: OK

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

Response: ^FOTASTATE: 12,12.815.00.01.00,86763,"feature1: add fota future;feature2: repair some bugs of sms"

- If the module detects no new version, the following is returned:

Response: ^FOTASTATE: 14

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

Run: AT^FOTADET

Response: +CME ERROR: <err>

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

Response: ^FOTASTATE: 13,18

19.4 AT^FOTADL-Manually Download a New Version

19.4.1 Command Syntax

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

19.4.2 Interface Description

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

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

19.4.3 Parameter Description

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

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

19.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

19.4.5 Example

When the module is downloading a new version, run `AT^FOTADL=0` to stop the download.

If no download or update is undergoing on the module, and the module has detected a new version available, run `AT^FOTADL=1` to download the new version.

```
Run:      AT^FOTADL=?
Response: ^FOTADL: (0-2)

          OK

Run:      AT^FOTADL=1
Response: OK

          ^FOTASTATE: 30

          ^FOTASTATE: 40
```

19.5 AT^FWUP—Start a FOTA Update

19.5.1 Command Syntax

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

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

19.5.2 Interface Description

This command is used to start a Firmware FOTA update.

19.5.3 Property Description

Saving upon Power-off	PIN
NA	N

19.5.4 Example

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

Run: `AT^FWUP`

Response: `OK`

`^FOTASTATE: 50`

- If the update succeeds:

Response: `^FOTASTATE: 90`

- If the update fails:

Response: `^FOTASTATE: 80,55`

19.6 AT^FOTASTATE-Report the FOTA Status

19.6.1 Command Syntax

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

```
If <status> is 12:  
<CR><LF>^FOTASTATE:  
<status>,<version>,<packet_size>,<description><CR><LF>  
In other cases:  
<CR><LF>^FOTASTATE: <state>[,<error_code>]<CR><LF>
```

19.6.2 Interface Description

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

19.6.3 Parameter Description

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

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

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

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

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

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

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

<error_code>	Description
01	Operation failed due to unknown error
02	Previous command is not complete
03	Error command parameters
04	Operation not supported
05	Operation failed due to system error
11	The network has not been opened yet
12	The network has been opened already
13	Fail to open network
14	The link has not been established yet
15	The link has been established already
16	Fail to establish link
17	Fail to bind the specified port
18	Fail to connect to the specified address
19	Invalid domain name
20	Fail to resolve DNS
21	Http server error
22	File type is not correct
23	File source is not correct
51	Fail to get file list
52	MD5 check failed
54	FOTA is in collision state
101	Fail to send data because TE cancel
102	Fail to send data because retry times are bigger than 10
103	Fail to send data because input file size is error
104	Fail to send data because packet number is error
105	Fail to send data because the protocol is not 1K-Xmodem
106	Fail to send data because invalid port
107	Fail to send data because file CRC or subfile CRC is error
108	Fail to send data because update type is error

<error_code>	Description
109	Fail to send data because model product is error
110	Fail to send data because source version is error
111	Fail to send data because some tag length is error
112	Fail to send data because file num error
113	Fail to send data because open subfile failed
114	Fail to send data because write subfile to flash error
151	Fail to write flag
152	Fail to read flag
153	Fail to erase region
154	Fail to copy osbl
155	Fail to replace image
156	Fail to copy xnv
157	Fail to write xnv
158	Fail to backup nv
159	Fail to restore nv

19.6.4 Property Description

Saving upon Power-off	PIN
Y	N

19.6.5 Example

During an update, the module unsolicitedly reports the current update state whenever the status changes.

The module will not report <status> as 11 if the following conditions are met:

The module is forced to sleep.

The interval between version detections times out.

- If the download succeeds:

Run: AT^FOTADL=1

Response: OK

^FOTASTATE: 30

^FOTASTATE: 40

- If the download fails:

Run: AT^FOTADL=1

Response: OK

^FOTASTATE: 30

^FOTASTATE: 20,18

Run: AT^FOTASTATE?

Response: ^FOTASTATE: 10

OK

19.7 AT^FOTADLQ-Query Download Status of Update Files

19.7.1 Command Syntax

```
AT^FOTADLQ
```

Possible Response(s)

```
[<CR><LF>^FOTADLQ:  
<index>,<file_type>,<dl_size>,<file_size>[<CR><LF>^FOTADLQ:  
<index>,<file_type>,<dl_size>,<file_size>[...]]<CR><LF>]<CR><LF>  
OK<CR><LF>
```

In case of an MT-related error:

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

19.7.2 Interface Description

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

19.7.3 Parameter Description

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

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

"FIRMWARE1" Firmware differential file.

<dl_size>: an integer type value that indicates the number of downloaded bytes.

<file_size>: an integer type value that indicates the number of total bytes.

19.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

19.7.5 Example

During an update (when <status> is 30 or 31), run AT^FOTADLQ to query the list of update files to download, the size of downloaded files, and the total size of update files to download.

Run: AT^FOTADLQ

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

OK

19.8 AT^FWLOAD—Perform a Local Upgrade

19.8.1 Command Syntax

```
AT^FWLOAD=<update_type>
```

Possible Response(s)

```
<CR><LF>><CR><LF>(1K-Xmodem ctrl character)<CR><LF>
```

In case of an MT-related error:

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

19.8.2 Interface Description

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

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

You can run `AT+IPR?` to query the baud rates supported by the current module. To set the baud rates for a module, run the `AT+IPR` command. When you do so, refer to the following baud rates supported by the full differential upgrades.



NOTE

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

19.8.3 Parameter Description

<update_type>: an integer type value that indicates the upgrade type.

- 0 Full upgrade
- 1 Differential upgrade

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

19.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.8.5 Example

- Local full upgrade

Run: `AT^FWLOAD=0`

Response: `>`
`C`

- The board restarts, and the upgrade starts.

Response: `^FWLSTATE: 90`



NOTE

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

19.9 ^FWLSTATE–Report the Upgrade Status

19.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^FWLSTATE: <state>[,<error_code>]<CR><LF>

19.9.2 Interface Description

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

19.9.3 Parameter Description

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

80	Update failed
90	Update succeeded

<error_code>: an integer type value that indicates the cause of the upgrade failure. See the error list in AT^FOTASTATE–Report the FOTA Status.

19.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.9.5 Example

- Local full upgrade

Run: AT^FWLOAD=0

Response: >

 C
- The board restarts, and the upgrade starts.

Response: ^FWLSTATE: 90

19.10 AT^FOTASMSCFG-Set FOTA SMS Auto-Upgrade

19.10.1 Command Syntax

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

19.10.2 Interface Description

This command enables and disables the FOTA SMS auto-upgrade function.

- When the function is enabled, the module automatically downloads the update file if it does not receive AT^FOTAP within 10 seconds after ^FOTASMS is reported.
- When the function is disabled, the module does the FOTA upgrade only if it receives AT^FOTAP after ^FOTASMS is reported.



NOTE

Update file downloads may incur data usage fees charged by the operator.

19.10.3 Parameter Description

<operation>: an integer indicating whether the FOTA SMS auto-upgrade function is enabled.

0	Disable
1	Enable (default value)

19.10.4 Property Description

Saving upon Power-off	PIN
Y	N

19.10.5 Example

```
Run:          AT^FOTASMSCFG=1
Response:     OK
Run:          AT^FOTASMSCFG?
Response:     ^FOTASMSCFG: 1

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

              OK
```

19.11 ^FOTASMS–Notify Users to Decide on FOTA Upgrade

19.11.1 Command Syntax

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

19.11.2 Interface Description

This command is used by the FOTA module to report to the host computer to decide whether to perform an update after receiving a forcible update request from the modem.

NOTE

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

19.11.3 Parameter Description

None

19.11.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.11.5 Example

None

19.12 AT^FOTAP—Confirm FOTA Upgrade

19.12.1 Command Syntax

AT^FOTAP=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^FOTAP?
Possible Response(s)
<CR><LF>^FOTAP: <n><CR><LF><CR><LF>OK<CR><LF>
If link has not been open:
<CR><LF>OK<CR><LF>
AT^FOTAP=?
Possible Response(s)
<CR><LF>^FOTAP: (list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

19.12.2 Interface Description

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

The read command is used to query whether the host computer allows an update.

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

**NOTE**

When the upgrade file is downloaded unsuccessfully because of the signal strength or the network problem, the module will query and download the new version again in half an hour. And during the FOTA retry process, the host can issue `AT^FOTADET` and `AT^FOTADL=1` to propel the module upgrade successfully.

19.12.3 Parameter Description

<n>: an integer type value that indicates update policy.

- 0 Reject FOTA updates.
- 1 Allow FOTA updates.

19.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

19.12.5 Example

```
Run:            AT^FOTAP=1
Response:       OK

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

                 OK
```

20 Huawei Proprietary Interface: ECM Interfaces

20.1 AT^NDISDUP-NDIS-Based Dialing

20.1.1 Command Syntax

```
AT^NDISDUP=<cid>,<connect>[,<APN>[,<username>[,<passwd>[,<auth_<br>type>]]]]
```

Possible Response(s)

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

In case of an MT-related error:

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

```
AT^NDISDUP?
```

Possible Response(s)

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

```
AT^NDISDUP=?
```

Possible Response(s)

```
<CR><LF>^NDISDUP: (list of supported <cid>s) , (list of supported<br><connect>s) <CR><LF><CR><LF>OK<CR><LF>
```

20.1.2 Interface Description

This command implements NDIS-based dialing.

- AT^NDISDUP=1,1 indicates that other parameters are not required.
- AT^NDISDUP=1,0 indicates that the network connection must be disabled.

This command can be used only when an NDIS port is available.

20.1.3 Parameter Description

<cid>:

1–11 Index of a PDP context.

<connect>:

0 The connection is disabled.

1 The connection is set up.

<APN>: indicates the access point name in the format of character strings. The value ranges from 0 bytes to 99 bytes.

<username>: indicates the user name in the format of character strings. The value ranges from 0 bytes to 255 bytes.

<passwd>: indicates the password in the format of character strings. The value ranges from 0 bytes to 255 bytes.

<auth_type>: authentication reference.

0 No authentication

1 PAP authentication

2 CHAP authentication.

3 CHAP authentication and PAP authentication.

20.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

20.1.5 Example

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

Response: OK

Run: AT^NDISDUP?

Response: OK

Run: AT^NDISDUP=?

Response: ^NDISDUP: (1-11),(0-1)

OK



NOTE

When there are no <APN>/<username>/<passwd>/<auth_type> input, it will use the profile <cid> to connect. For example "AT^NDISDUP=1,1", this will use profile 1 to connect which is defined by "AT+CGDCONT". Otherwise, it will use the parameter of this command to connect.

20.2 ^NDISSTAT-Unsolicited Report of Connection Status

20.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NDISSTAT: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]]<CR><LF>

20.2.2 Interface Description

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

20.2.3 Parameter Description

<stat>: indicates the connection status.

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>:

0	Unknown error/unspecified error
other error codes	Defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions.

<wx_state>: indicates the sub-state of the WiMAX data card. It is applicable only to the WiMAX data card.(not supported currently)

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition

- 4 Ranging
- 5 Handover ranging
- 6 Capabilities negotiation
- 7 Authorization
- 8 Registration

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

"IPV4"

20.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

20.2.5 Example

- IPv4 changes from the connected state to the disconnected state:
Response: ^NDISSTAT: 0,0,, "IPV4"
- IPv4 changes from the disconnected state to the connected state:
Response: ^NDISSTAT: 1,,, "IPV4"

20.3 AT^NDISSTATQRY-Query the Connection Status

20.3.1 Command Syntax

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

20.3.2 Interface Description

The TE delivers this command to query the ECM (NDIS/WWAN) connection status of the MT.

20.3.3 Parameter Description

<stat>: indicates connection status.

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>: (not supported currently)

0	Unknown error/unspecified error
other error codes	Defined in accordance with section 10.5.6.6 "SM Cause" in the 3GPP TS 24.008 V5.5.0 (2002-09) and later versions

<wx_state>: sub-state of the WiMAX data card. It is applicable only to the WiMAX data card. (not supported currently)

1	DL synchronization
2	Handover DL acquisition
3	UL acquisition
4	Ranging
5	Handover ranging
6	Capabilities negotiation
7	Authorization
8	Registration

<PDP_type>: a string parameter that specifies the type of packet data protocol.

"IPV4"

20.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

20.3.5 Example

If the MT supports IPv4 only, the IPv4 connection is in the connected state. In this case, only one group of connection status is reported:

```
Run:          AT^NDISSTATQRY?
Response:     ^NDISSTATQRY: 1,,, "IPV4"

              OK
```

20.4 AT^AUTHDATA-Set Username and Password

20.4.1 Command Syntax

AT^AUTHDATA=<cid>[,<Auth_type>[,<PLMN>[,<passwd>[,<username>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^AUTHDATA?
Possible Response(s)
<CR><LF>^AUTHDATA: <cid>,<auth_type>,<passwd>,<username>,<PLMN>[<CR><LF>^AUTHDATA: A: <cid>,<auth_type>,<passwd>,<username>,<PLMN>[...]]<CR><LF><CR><LF>OK<CR><LF>
AT^AUTHDATA=?
Possible Response(s)
<CR><LF>^AUTHDATA: (list of supported <cid>s), (list of supported <auth_type>), , <CR><LF><CR><LF>OK<CR><LF>

20.4.2 Interface Description

Local save a group of <cid> indexed username and password, etc., each one contains a set of saved settings environmental parameters associated with a handshake agreement.

The set command to a set of parameters stored in the handshake protocol to <cid> indexed data store. Each set of initial data storage is undefined, a set of parameters passed into the set command, then become a defined state. At the same time can be saved in a defined number of data storage group is determined by the range of <cid>.

A special set command AT^AUTHDATA=<cid>, storage parameters <cid> will clear indication of this data storage group returned to an undefined state.

The read command returns all parameter values have been defined, wrap handshake agreement between the bar display.

The test command returns all the values that can be supported, wrap between the bar display.

20.4.3 Parameter Description

<cid>:

1-11 Index of a PDP context.

<Auth_type>: a string value that indicates handshake protocol, and represents the type of packet switching protocol.

0 No authentication

1 PAP

2 CHAP

<PLMN>: a string type value indicates provider id (operator PLMN).

<passwd>: a string type value indicates the password value, The value ranges from 0 to 127.

<username>: a string type value that indicates the user name. The value ranges from 0 to 127.

20.4.4 Property Description

Saving upon Power-off	PIN
Y	N

20.4.5 Example

```
Run:                AT^AUTHDATA=?
Response:           ^AUTHDATA: (1-11), (0-2), ,
                      OK

Run:                AT^AUTHDATA=2, 0, "46009", "", ""
Response:           OK

Run:                AT^AUTHDATA?
Response:           ^AUTHDATA: 1, 3, "", "", ""
                      OK

Run:                AT^AUTHDATA
Response:           OK
```

20.5 AT^DHCP-Query DHCP/IP

20.5.1 Command Syntax

AT^DHCP?
Possible Response(s)
<CR><LF>^DHCP: <clip>,<netmask>,<gate>,<dhcp>,<pDNS>,<sDNS>,<max_rx_data>,<max_tx_data><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^DHCP=?
Possible Response(s)
<CR><LF>OK<CR><LF>

20.5.2 Interface Description

The command queries PC DHCP IP related values, including the host IP address, default gateway, subnet mask, and DHCP server.

After dial-up connection is established, the command issued by the PC obtains the corresponding IP address.

The command does not currently support IPv6 address lookup, follow-up will extend the command.

The command must wait after dialing commands issued under, 5s later to use this command to query the IP address, if it is not taken, the need after the interval 1s issued the command again, if the total time over 15s, can be considered the query fails.

20.5.3 Parameter Description

IP addresses as described below in hexadecimal notation, are counted forward from the back. Eg: 192.168.50.32, is expressed as: 0x2032A8C0, which 32 is represented as 0x20, 50 is represented as 0x32, 168 is represented as 0xA8, 192 is represented as 0xC0.

<clip>: indicates Host IP Address: The value ranges from 0x00000000 to 0xFFFFFFFF.

<netmask>: indicates Subnet Mask: The value ranges from 0x000000FF to 0xFCFFFFFF.

<gate>: indicates default Gateway: The value ranges from 0x00000000 to 0xFFFFFFFF.

<dhcp>: indicates DHCP server address. The value ranges from 0x00000000 to 0xFFFFFFFF.



<pDNS>: indicates DNS first address. The value ranges from 0x00000000 to 0xFFFFFFFF.

<sDNS>: indicates DNS next address. The value ranges from 0x00000000 to 0xFFFFFFFF.

<max_rx_data>: indicates the maximum receive rate (bps).

<max_tx_data>: indicates the maximum transmission rate (bps).

20.5.4 Property Description

Saving upon Power-off	PIN
N	N

20.5.5 Example

Run: AT^DHCP=?
Response: OK

21 Huawei Proprietary Interface: Temperature Protection

21.1 AT^CHIPTEMP-Query the Temperature of the PA/SIM/Battery/Crystal Oscillator Command

21.1.1 Command Syntax

AT^CHIPTEMP?
Possible Response(s)
<CR><LF>^CHIPTEMP: <G PAtemp>,<W PAtemp>,<L PAtemp>,<SIMtemp>,<BATTERYtemp>,<CRYSTALtemp><CR><LF><CR><LF>>OK<CR><LF>
AT^CHIPTEMP=?
Possible Response(s)
<CR><LF>^CHIPTEMP: <G PAtemp Range>,<W PAtemp Range>,<L PAtemp Range>,<SIMtemp Range>,<BATTERYtemp Range>,<CRYSTALtemp Range><CR><LF><CR><LF>OK<CR><LF>

21.1.2 Interface Description

This command queries temperature on hardware spots, such as GSM PA, WCDMA PA, LTE PA, SIM card slot, battery, crystal and oscillator.

21.1.3 Parameter Description

<G PAtemp>: an integer type value indicates the GSM PA chip's current temperature.

65535 Not supported currently

<W PAtemp>: an integer type value indicates the WCDMA PA chip's current temperature.

65535 Not supported currently

<L PAtemp>: an integer type value indicates the LTE PA chip's current temperature.

65535 Not supported currently

<SIMtemp>: an integer type value indicates the current temperature of the SIM card.

65535 Not supported currently

<BATTERYtemp>: an integer type value indicates the current temperature of the battery.

65535 Not supported currently

<CRYSTALtemp>: an integer type value indicates the crystal's current temperature..

–400–1100 The crystal's current temperature in the unit of 0.1°C.

<G PAtemp Range>: an integer type value indicates the temperature range of the GSM PA chip in the unit of 0.1°C.

(65535–65535) Not supported currently

<W PAtemp Range>: an integer type value indicates the temperature range of the WCDMA PA chip in the unit of 0.1°C.

(65535–65535) Not supported currently

<L PAtemp Range>: an integer type value indicates the temperature range of the LTE PA chip in the unit of 0.1°C.

(65535–65535) Not supported currently

<SIMtemp Range>: an integer type value indicates the temperature range of the SIM card slot in the unit of 0.1°C.

(65535–65535) Not supported currently

<BATTERYtemp Range>: an integer type value indicates the temperature range of the battery in the unit of 0.1°C.

(65535–65535) Not supported currently

<CRYSTALtemp Range>: an integer type value indicates the temperature range of the crystal oscillator in the unit of 0.1°C.

(–400, 1100) The crystal oscillator temperature range.

 **NOTE**

- If the query of a component's temperature fails, 65535 is returned.
- The temperature unit is 0.1°C. For example, if the returned value range is (-200,1000), the temperature ranges from -20°C to 100°C.
- When actual temperature of the spots exceeds its range, the read command will not return the accurate temperature value. In this case, the queried temperature is not correct and physical protection must be adapted to avoid device damaged.

21.1.4 Property Description

Saving upon Power-off	PIN
NA	N

21.1.5 Example

```

Run:          AT^CHIPTEMP?
Response:    ^CHIPTEMP:
              65535,65535,65535,65535,65535,300
              OK
The response indicates the current temperature on hardware spots.

Run:          AT^CHIPTEMP=?
Response:    ^CHIPTEMP:
              (65535-65535), (65535-65535), (65535-65535),
              (65535-65535), (65535-65535), (65535-65535), (-400-1100)
              OK
The response indicates the temperature ranges on hardware spots.

```

21.2 AT^THERMFUN-Enable or Disable the Temperature Protection Function Command

21.2.1 Command Syntax

AT^THERMFUN=<switch>
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^THERMFUN?
Possible Response(s)
<CR><LF>^THERMFUN: <switch><CR><LF><CR><LF>OK<CR><LF>

AT^THERMFUN=?
Possible Response(s)
<CR><LF>^THERMFUN: (list of supported <switch>s) <CR><LF><CR><LF>OK<CR><LF>

21.2.2 Interface Description

This command is used to enable or disable the temperature protection function.

- If the temperature protection function is enabled, the module performs the protection operation to disable the PA or shut down the system when the temperature reaches the threshold.
- If the temperature protection function is disabled, the module does not perform the protection operation to disable the PA or shut down the system when the temperature reaches the threshold.
- If the module is being in the state that the temperature protection function has been enabled, at this point, to disable the temperature protection function, the module performs the operation to enable the PA.
- The protection operation (to disable the PA or shut down the system) varies with the module's features.

21.2.3 Parameter Description

<switch>: an integer type value indicates the switch for enabling or disabling the temperature protection function.

- 0 Disable the temperature protection function.
- 1 Enable the temperature protection function. (default value)



NOTE

A parameter value takes effect immediately after setting.

21.2.4 Property Description

Saving upon Power-off	PIN
NA	N

21.2.5 Example

```
Run:          AT^THERMFUN=?
Response:    ^THERMFUN: (0,1)

              OK
```

```
Run:          AT^THERMFUN?
Response:    ^THERMFUN: 1

              OK

Run:          AT^THERMFUN=1
Response:    OK
```

21.3 ^THERM–Thermal Protection Activated Unsolicited Report

21.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^THERM: <ACTION><CR><LF>

21.3.2 Interface Description

This command is used to send an unsolicited report to the host when thermal protection active/inactive according temperature.

21.3.3 Parameter Description

<ACTION>: value that indicates whether thermal protection takes effect. The possible values are defined as below:

- 0 Thermal protection is inactive.
- 1 Thermal protection is active.
- 2 The module switches from normal status to warning status.
- 3 The module switches from warning status to normal status.

21.3.4 Property Description

Saving upon Power-off	PIN
NA	NA



21.3.5 Example

- The thermal protection is inactive:

Response: ^THERM: 0

- The thermal protection is active:

Response: ^THERM: 1

22 Huawei Proprietary Interface: TTS Function

22.1 AT^TTSCFG—Set TTS Parameters

22.1.1 Command Syntax

```
AT^TTSCFG=<op>,<value>
```

Possible Response(s)

```
<CR><LF>OK<CR><LF>
```

In case of an MT-related error:

```
<CR><LF>+CME ERROR: <err><CR><LF>
```

```
AT^TTSCFG?
```

Possible Response(s)

```
<CR><LF>^TTSCFG: <op>,<value>[<CR><LF>^TTSCFG:  
<op>,<value>[...]]<CR><LF><CR><LF>OK<CR><LF>
```

```
AT^TTSCFG=?
```

Possible Response(s)

```
<CR><LF>^TTSCFG: (list of supported  
<op>s) <CR><LF><CR><LF>OK<CR><LF>
```

22.1.2 Interface Description

The set command is used to set parameters for the TTS function

The read command is used to query the current TTS function settings

The test command is used to query the parameters supported by the TTS function.

This command is affected by the TTS protection function. On modules that do not support TTS, TTS protection is enabled, and ERROR will be returned when this command is executed.

22.1.3 Parameter Description

<op>: an integer type value that indicates the parameter value of TTS function.

- 0 Enable or disables the TTS function
- 1 Adjust the volume
- 2 Adjust the speed
- 3 Adjust the tone
- 4 Second-line volume of TTS, which can adjust the volume more accurately
- 5 language

<value>: indicates parameters of TTS function.

Parameter_id	Value Range	Description
0	0–1 (0 by default)	<on_off>: integer 0: Disables TTS function (default value) 1: Enables TTS function
1	1–3 (level) (2 by default)	TTS play volume 1: Level 1 volume 2: Level 2 volume (default value) 3: Level 3 volume
2	1–3 (level) (2 by default)	TTS play speed 1: Level 1 speed 2: Level 2 speed (default value) 3: Level 3 speed
3	1–3 (level) (2 by default)	TTS play tone 1: Level 1 tone 2: Level 2 tone (default value) 3: Level 3 tone
4	0–9 (level) (0 by default)	Second-line volume of TTS, which can adjust the volume more accurately 0: Disables second-line volume
5	1–2 (1 by default)	TTS play language 1: Chinese(by default) 2: Italian



22.1.4 Property Description

Saving upon Power-off	PIN
N	N

22.1.5 Example

```
Run:          AT^TTSCFG=?
Response:     ^TTSCFG: (0-5)

              OK

Run:          AT^TTSCFG?
Response:     ^TTSCFG: 0,0
              ^TTSCFG: 1,2
              ^TTSCFG: 2,2
              ^TTSCFG: 3,2
              ^TTSCFG: 4,1
              ^TTSCFG: 5,1

              OK

Run:          AT^TTSCFG=1,3
Response:     OK

Run:          AT^TTSCFG?
Response:     ^TTSCFG: 0,0
              ^TTSCFG: 1,3
              ^TTSCFG: 2,2
              ^TTSCFG: 3,2
              ^TTSCFG: 4,1
              ^TTSCFG: 5,1

              OK
```

22.2 AT^TTS–Text-to-Speech Command

22.2.1 Command Syntax

AT^TTS=<op> [, <text>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^TTS=?
Possible Response(s)
<CR><LF>^TTS : (list of supported<op>s)<CR><LF><CR><LF>OK<CR><LF>

22.2.2 Interface Description

The set command is used to enable or disable the text to speech (TTS) function. TTS converts GBK character strings into voice, which is played through the voice channel. If TTS is disabled, voice is not played. The set command cannot be issued again until the ^AUDEND command, which indicates that the audio playback ends, is reported. This command is affected by the TTS protection function. On modules that do not support TTS, TTS protection is enabled, and ERROR will be returned when this command is executed.



NOTE

After this command is executed:

- When a voice call is set up, voice is played on the receiving end.
- When a voice call fails to be set up, a new call comes in, or recording is in progress, an error message is returned.

22.2.3 Parameter Description

<op>: controls the TTS function.

- | | |
|---|--|
| 0 | Cancel the TTS playing |
| 1 | Convert character strings and plays them |

<text>: hexadecimal format, GBK (for Chinese) or Unicode-LIT (for Italian) encoded characters enclosed within a double quotation mark. The maximum length is 1200 (for Chinese) or 500 (for Italian) bytes and the number of bytes must be an integer multiple of 2 (for Chinese) or 4 (for Italian) (0 is excluded).

 **NOTE**

- If a long Italy sentence TTS is played, it is suggested to separate the long Italy sentence into short sentences. Otherwise, the MU709 series module may not play the TTS function properly.
- Letters can only be input one by one in the TTS library.

22.2.4 Property Description

Saving upon Power-off	PIN
NA	N

22.2.5 Example

- To query the supported languages:

```
Run:          AT^TTSCFG?
Response:     ^TTSCFG: 0,0
              ^TTSCFG: 1,2
              ^TTSCFG: 2,2
              ^TTSCFG: 3,2
              ^TTSCFG: 4,1
              ^TTSCFG: 5,1
```

OK

- As indicated by the response, the supported language is Chinese. To play voice converted from GBK character strings:

```
Run:          AT^TTS=1, "C4E3BAC3"
```

```
Response:     OK
```

```
^AUDEND: 2,0
```

```
Run:          AT^TTS=1, "CED2C3C7CAC7C4A3BFE9D7E9A1A3"
```

```
Response:     OK
```

```
Run:          AT^TTS=0
```

```
Response:     OK
```

```
^AUDEND: 2,1
```

23 Huawei Proprietary Interface: CODEC Control Commands

23.1 AT^CODECPOW—Initialize Codec Settings After Power-on

23.1.1 Command Syntax

AT^CODECPOW=<codec_type>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
AT^CODECPOW?
Possible Response(s)
<CR><LF>^CODECPOW: <codec_type><CR><LF><CR><LF>OK<CR><LF>
AT^CODECPOW=?
Possible Response(s)
<CR><LF>^CODECPOW: (list of supported <codec_type>s) <CR><LF><CR><LF>OK<CR><LF>

23.1.2 Interface Description

The set command sets the type of codec whose settings will be initialized after power-on.

The read command returns the current codec type.

The test command queries the supported types of codecs.

You can choose one codec type from the supported types to initialize its settings after power-on.

**NOTE**

This AT command setting affects the voice-related function quality, such as Voice call, TTS and Record. When the NAU8814 codec is used, the following processing flow is recommended for each voice-related operation:

- AT^CODECPOW=1 should be set before the voice-related operation is started;
- AT^CODECPOW=0 should be set after the voice-related operation is finished.

23.1.3 Parameter Description

<codec_type>: an integer type value that indicates the codec type. Currently, only the NAU8814 can be configured.

0	Codec other than NAU8814 (default value)
1	NAU8814

23.1.4 Property Description

Saving upon Power-off	PIN
N	N

23.1.5 Example

```
Run:      AT^CODECPOW=1
Response: OK

Run:      AT^CODECPOW?
Response: ^CODECPOW: 1

          OK

Run:      AT^CODECPOW=?
Response: ^CODECPOW: (0-1)

          OK
```

23.2 AT^SETCODECREG—Configure the Codec Register

23.2.1 Command Syntax

```
AT^SETCODECREG=<register_addr>,<data>
```

Possible Response(s)

```
<CR><LF>OK<CR><LF>
```

In case of an MT-related error:

```
<CR><LF>+CME ERROR: <err><CR><LF>
```

23.2.2 Interface Description

The set command sets a value for a specific register address. This command can be executed only after the AT^CODECPOW command is executed. The read and test commands are not supported.

23.2.3 Parameter Description

<register_addr>: a hexadecimal value without the 0x prefix, indicating the register address. The length is 1 byte.

<data>: a hexadecimal value without the 0x prefix, indicating the value to be set. The length is 2 bytes.



NOTE

This command only sends data to an external codec through the module's I2C channel. "OK" is returned once the data is sent successfully. Make sure the values written into the register are correct. For details, see the documentation of the codec chip. No informative messages will be displayed if some bits cannot be written.

23.2.4 Property Description

Saving upon Power-off	PIN
NA	N

23.2.5 Example

Run: AT^SETCODECREG=01,001D

Response: OK

23.3 AT^GETCODECREG—Query the Codec Register

23.3.1 Command Syntax

```
AT^GETCODECREG=<register_addr>
```

Possible Response(s)

```
<CR><LF>^GETCODECREG:  
<register_addr>,<data><CR><LF><CR><LF>OK<CR><LF>
```

In case of an MT-related error:

```
<CR><LF>+CME ERROR: <err><CR><LF>
```

23.3.2 Interface Description

The set command queries the value of a specific register address. This command can be executed only after the AT^CODECPOW command is executed. The read and test commands are not supported.

23.3.3 Parameter Description

<register_addr>: a hexadecimal value without the 0x prefix, indicating the register address. The length is 1 byte.

<data>: a hexadecimal value without the 0x prefix, indicating the value of the register address. The length is 2 bytes.

23.3.4 Property Description

Saving upon Power-off	PIN
NA	N

23.3.5 Example

Run: AT^GETCODECREG=01

Response: ^GETCODECREG: 01,001D

OK

23.4 AT^PCMCODECCFG-Set the Codec

23.4.1 Command Syntax

AT^PCMCODECCFG=<codec_type>[,<codec_outgain>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>
AT^PCMCODECCFG?
Possible Response(s)
<CR><LF>^PCMCODECCFG: <codec_type>[,<codec_outgain>]<CR><LF><CR><LF>OK<CR><LF>
AT^PCMCODECCFG=?
Possible Response(s)
<CR><LF>^PCMCODECCFG: (list of supported <codec_type>s) , (list of supported <codec_outgain>s) <CR><LF><CR><LF>OK<CR><LF>

23.4.2 Interface Description

The set command sets the codec type and audio gain.

The read command returns the current codec type and audio gain.

The test command queries the supported codec type and audio gain.

23.4.3 Parameter Description

<codec_type>: indicates the codec type. The settings are lost after the module is powered off. Currently, only the TLV320AIC1106 can be configured.

0	Codec other than TLV320AIC1106 (default value)
1	TLV320AIC1106

NOTE

To set the module to use TLV320AIC1106, set <codec_type> to 1. To set the module to use a codec other than TLV320AIC1106, retain the default value.

<codec_outgain>: indicates the audio gain. The settings are lost after the module is powered off. When the TLV320AIC1106 codec is used, this parameter is set to 0 by default.

0	3 db
1	0 db

2	-3 db
3	-6 db
4	-9 db
5	-12 db
6	-15 db
7	-18 db

23.4.4 Property Description

Saving upon Power-off	PIN
N	N

23.4.5 Example

```
Run:          AT^PCMCODECCFG=1
Response:     OK

Run:          AT^PCMCODECCFG?
Response:     ^PCMCODECCFG: 1,0

                OK

Run:          AT^PCMCODECCFG=?
Response:     ^PCMCODECCFG: (0-1), (0-7)

                OK
```

24 Huawei Proprietary Interface: eCall

24.1 AT^ECLSTART-Start an eCall Session

24.1.1 Command Syntax

```
AT^ECLSTART=<activation_type>,<type_of_call>[,<dial_num>[,<opr  
t_mode>]]
```

Possible Response(s)

```
<CR><LF>OK<CR><LF>
```

In case of an MT-related error:

```
<CR><LF>CME ERROR<CR><LF>
```

```
AT^ECLSTART=?
```

Possible Response(s)

```
<CR><LF>^ECLSTART: (list of supported <activation_type>s), (list of  
supported <type_of_call>s) , (list of supported  
<opr_t_mode>s) <CR><LF><CR><LF>OK<CR><LF>
```

24.1.2 Interface Description

The set command is used to start an eCall session.

The test command is used to get the supported eCall capability.

24.1.3 Parameter Description

<activation_type>: an integer type value that indicates the triggered conditions to start an eCall session.

- | | |
|---|--------------------------------------|
| 0 | Customer to start an eCall session |
| 1 | Automatically start an eCall session |

<type_of_call>: an integer type value that indicates the current eCall session type.

- 0 Start a TEST call (call type of VOICE)
- 1 Start an EMERGENCY call (call type of EMERGENCY)
- 2 Start a RECONFIG call (call type of RECONFIG)

<dial_num>: ASCII string that indicates the phone number to dial in the TEST call. Valid characters are digits, asterisks (*), number signs (#), and plus signs (+). A plus sign (+) is allowed only in the front of a phone number. The maximum length of a phone number is 18 characters.

When <dial_num> is not set:

- If the USIM supports eCall Only, it will read the EF_{F_{DN}}'s test number for a TEST call and the reconfiguration number for a RECONFIG call.
- If the USIM supports eCall Normal, it will read the EF_{S_{DN}}'s test number for a TEST call and the reconfiguration number for a RECONFIG call.

When <dial_num> is set:

- If the call type is EMERGENCY, an EMERGENCY call will be initiated.
- If the call type is RECONFIG, a RECONFIG call will be initiated.



NOTE

For details about how to configure eCall Only and eCall Normal, see section 5.3.40 in the 3GPP TS 31.102 or sections 7.14 and 7.16 in the DIN EN 16062.

<opr_mode>: an integer type value that indicates MSD transmission mode after an eCall is started.

- 0 PULL mode
- 1 PUSH mode (default value)

24.1.4 Property Description

Saving upon Power-off	PIN
N	N

24.1.5 Example

If <opr_mode> is not specified, enter PUSH mode by default after an eCall is started:

Run: AT^ECLSTART=0,0,"13903702987"

Response: OK

^ORIG: 1,0

^CONF: 1

^CONN: 1,0 Enter a voice call.

^ECLSTAT: 0 In Vehicle System (IVS) starts to send MSD.

^ECLSTAT: 1 MSD is transferred successfully.

24.2 AT^ECLSTOP-Stop an eCall Session

24.2.1 Command Syntax

AT^ECLSTOP
Possible Response(s)
<CR><LF>OK<CR><LF>

24.2.2 Interface Description

This command is used to stop an eCall session.

24.2.3 Parameter Description

None

24.2.4 Property Description

Saving upon Power-off	PIN
N	N

24.2.5 Example

Run: AT^ECLSTOP

Response: OK

^CEND: 1,0,0,16

24.3 ^ECLSTAT-Unsolicitedly Present eCall Session Status

24.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECLSTAT: <eCall_state>[, <description>]<CR><LF>

24.3.2 Interface Description

The MT uses the unsolicited result code ^ECLSTAT: <eCall_state>[, <description>] to present the current eCall session status.

24.3.3 Parameter Description

<eCall_state>: an integer type value that indicates the states of eCall session.

- | | |
|---|---|
| 0 | Start to transmit MSD data |
| 1 | MSD data transmission is successful |
| 2 | MSD data transmission is failed |
| 3 | IVS receives indication from PSAP to update and retransmit MSD data |
- When <eCall_state> is 2, the reasons that <description> indicates MSD transmission failed are as follows:

0	Transmission indication for waiting PSAP timeout
1	MSD data transmission timeout
2	Waiting for the application layer acknowledgement timeout
3	Other error
 - When <eCall_state> is 3, <description> indicates that MSD is allowed to be updated in the specified time duration (integer type with range 500–10000, unit: ms).

24.3.4 Property Description

Saving upon Power-off	PIN
N	N



24.3.5 Example

None

24.4 AT^ECLPUSH-Enable IVS to Issue the MSD Transmission Request

24.4.1 Command Syntax

AT^ECLPUSH
Possible Response(s)
<CR><LF>OK<CR><LF>

24.4.2 Interface Description

During an eCall voice call, this command enables IVS proactive to issue the request for MSD transmission.

24.4.3 Parameter Description

None

24.4.4 Property Description

Saving upon Power-off	PIN
N	N

24.4.5 Example

- Start an eCall in PUSH mode:

Run: AT^ECLSTART=0,0,"13903702987"

Response: OK

^ORIG: 1,0

^CONF: 1

^CONN: 1,0

^ECLSTAT: 0

^ECLSTAT: 2,0

^ECLSTAT: 0

After the command is executed, the IVS enters the voice call status.

^ECLSTAT: 1

- Enable IVS to issue the request for MSD transmission:

Run: AT^ECLPUSH

Response: OK

IVS starts to transfer MSD to PSAP.

^ECLSTAT: 0

24.5 AT^ECLLIST-Query AL_ACK and Timestamp

24.5.1 Command Syntax

AT^ECLLIST?

Possible Response(s)

```
<CR><LF>^ECLLIST:
<timestamp>,<AL_ACK>[<CR><LF>^ECLLIST:<timestamp>,<AL_ACK>[...]]
<CR><LF><CR><LF>OK<CR><LF>
```

24.5.2 Interface Description

The read command queries the last 20 AL_ACK messages sent by the PSAP and the received timestamp record list.

- If the list is empty, OK is returned.
- If more than 20 records are saved in the list, the latest records will replace the earliest one.

24.5.3 Parameter Description

<timestamp>: a string type value that specifies the time when the IVS receives the AL_ACK sent by the PSAP. Format: "yyyy/mm/dd,hh:mm:ss±zz". <timestamp> indicates the internal system time of the board. The value of yyyy ranges from 2000 to 2100. The minimum unit is second.

<AL_ACK>:

0 The PSAP confirms that the MSD data have been verified.

- 2 The PSAP confirms that the MSD data have been verified and requires the IVS to hang up the eCalls.

As the PSAP sends AL_ACKs at a very short interval, AL_ACKs may be reported at the same time.

The PSAP sends the AL_ACK to the IVS when the PSAP receives and successfully verifies the MSD data. The AL_ACK with a clear-down mark requests the IVS to hang up the eCall.

The received AL_ACK contains only the following bits:

- Bit 4 Reserved (currently 0)
- Bit 3 Reserved (currently 0)
- Bit 2 Status - 0 (Positive ACK), 1(Clear-down)
- Bit 1 Format version – 0/1 of the format version (currently 0)

That is, only the last four bits of the AL_ACK are valid. Bit 2 has two options and other bits are all 0. For details, refer to section 7.5.5 in *EN 16062:2013* protocol.

24.5.4 Property Description

Saving upon Power-off	PIN
N	N

24.5.5 Example

- No AL_ACK has been reported.

Run: AT^ECLLIST?

Response: OK

- Query information after a AL_ACK has been reported:

Run: AT^ECLLIST?

Response: ^ECLLIST: "2014/10/17,01:51:05+32",0
^ECLLIST: "2014/10/17,01:51:05+32",0
^ECLLIST: "2014/10/17,01:51:06+32",0
^ECLLIST: "2014/10/17,01:51:06+32",0
^ECLLIST: "2014/10/17,01:51:07+32",0

OK

24.6 ^ECLREC–Unsolicitedly Report AL_ACK and Timestamp Information

24.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECLREC: <timestamp>,<AL_ACK><CR><LF>

24.6.2 Interface Description

Upon receiving an AL_ACK message, the IVS reports the received message and timestamp.

24.6.3 Parameter Description

<timestamp>: see descriptions for AT^ECLLIST–Query AL_ACK and Timestamp.

<AL_ACK>: see descriptions for AT^ECLLIST–Query AL_ACK and Timestamp.

24.6.4 Property Description

Saving upon Power-off	PIN
N	N

24.6.5 Example

Enable auto-reporting of AL_ACK message:

Run: AT^ECLSTART=0,0,"13907552006"

Response: OK

^ORIG:1,0

^CONF:1

^CONN:1,0

^ECLSTAT: 0

^ECLSTAT: 1

^ECLREC: "2014/10/17,01:51:05+32",0

^ECLREC: "2014/10/17,01:51:05+32",0

^ECLREC: "2014/10/17,01:51:06+32",0

^ECLREC: "2014/10/17,01:51:06+32",0

^ECLREC: "2014/10/17,01:51:07+32",0

24.7 AT^ECLCFG-Configure eCall

24.7.1 Command Syntax

AT^ECLCFG=<mode>[,<voc_config>[,<redial_config>]]
Possible Response(s)
<CR><LF>OK<CR><LF>
AT^ECLCFG?
Possible Response(s)
<CR><LF>^ECLCFG: <mode>,<voc_config>,<redial_config><CR><LF><CR><LF>OK<CR><LF> >
AT^ECLCFG=?
Possible Response(s)
<CR><LF>^ECLCFG: (list of supported <mode>s) , (list of supported <voc_config>s) , (list of supported <redial_config>s) <CR><LF><CR><LF>OK<CR><LF>

24.7.2 Interface Description

The set command is used to configure the mode that MT gets MSD data and whether enable or disable mute for IVS side speaker in MSD transmission.

The read command is used to get the current settings information.

The test command is used to get the available value range of each parameter.

24.7.3 Parameter Description

<mode>: an integer type indicates the mode that MT gets MSD data.

0 Transparent transmission mode

<voc_config>: an integer type indicates whether enable or disable mute for IVS side speaker in MSD transmission.

0 Disable mute and noise will be heard (default value)

1 Enable mute

<redial_config>: an integer value that indicates whether to enable or disable the automatic redial function.

0 Disable the automatic redial function.

1 Enable the automatic redial function. (default value)



NOTE

If the redial eCall is in progress, setting <redial_config> to 0 cannot stop this eCall, but can disable the automatic redial function for the next eCall.

24.7.4 Property Description

Saving upon Power-off	PIN
N	N

24.7.5 Example

Run: AT^ECLCFG=0,1,0

Response: OK

Run: AT^ECLCFG?

Response: ^ECLCFG: 0,1,0

OK

Run: AT^ECLCFG=?

Response: ^ECLCFG: (0),(0-1),(0-1)

OK



Response: ERROR

^ECLREDIAL:0

^ECLREDIAL:1

25 Appendix

25.1 List of URC Commands

URC	Function
+CLIP	CLIP notifications
+CCWA	Call waiting notifications
+CRING	Indicate incoming call
+CSSI	Supplementary service notifications
+CSSU	Supplementary service notifications
+CUSD	Unsolicitedly report USSD of network
+CMTI	New SMS-DELIVER indication
+CMT	New message directly deliver indication
+CDSI	New SMS status report indication
+CDS	SMS status report indication directly displayed
+CUSATP	Unsolicitedly report a UICC proactive command
+CUSATEND	Unsolicitedly report of terminating a UICC proactive command session
^ORIG	Indicate the origination of a call
^CONF	Ringback tone indication
^CONN	Call connection indication
^CEND	Call end indication
^SMEMFULL	Message memory full
^IPSTATE	Indicate TCP/UDP data link state
^TIMESETRULT	Notify XTRA time injection
^DATASETRULT	Notify XTRA data injection



^XDSTATUS	Notify XTRA data status
^POSITION	Notify positioning result
^POSEND	Report positioning end information
^WNINV	Notify NI positioning
+CREG	Notify the current registration status
+CGREG	Notify PS Domain Registration Status
^RFSWITCH	Report the RFSWITCH State
+XADPCLKFREQINFO	Unsolicitedly Present of Adaptive Clock Frequency Info
^SIMST	SIM Card State Change Indication
^DSDORMANT	Dormant State Indication
^HWNAT	Indicate Network Mode Change
^IPDATA	Notify IPStack Arrival Data
^SRVST	Service State Change Indication
^THERM	Thermal Protection Activated Unsolicited Report
^HCSQ	Report system mode and Signal Strength
^HCMT	Report a New Short Message
^HCDS	Report a New Status Report Short Message
^HCMGSS	Report Successful Short Message Sending (Text Mode)
^HCMGSF	Report Short Message Sending Failure
^HCMGS	Unsolicitedly Present of Successfully Sending a Short Message (PDU Mode)
^FOTASTATE	Report the FOTA Status
^FWLSTATE	Report the Upgrade Status
^SYSSTART	Unsolicitedly report module startup
^NWTIME	Unsolicitedly report network system time
^RSSI	RSSI or System Mode Change Indication (be replaced by the URC " ^HCSQ ")
^MODE	RSSI or System Mode Change Indication (be replaced by the URC " ^HCSQ ")
^RSSILVL	RSSI or System Mode Change Indication (be replaced by the URC " ^HCSQ ")
^HRSSILVL	RSSI or System Mode Change Indication (be replaced by the URC " ^HCSQ ")



^HDRRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
^CRSSI	RSSI or System Mode Change Indication (be replaced by the URC "^HCSQ")
+CEREG	Notify the current LTE registration status
^ANLEVEL	(Only for the HUAWEI specified client)
^WPDCP	(Only for the HUAWEI specified client)
^NDISEND	(Only for the HUAWEI specified client)
^OTACMSG	(Only for the HUAWEI specified client)
^NDISSTAT	Unsolicited Report of Connection Status
^LOCCHD	Unsolicited Report of Connection Status(Only for the HUAWEI specified client)
^DATAVALIDITY	(Only for the HUAWEI specified client)
^WPDDL	(Only for the HUAWEI specified client)
^BOOT	(Only for the HUAWEI specified client)
^STIN	(Only for the HUAWEI specified client)
^CSNR	(Only for the HUAWEI specified client)
^SIMFILEREFRRESH	(Only for the HUAWEI specified client)
^WPDOP	(Only for the HUAWEI specified client)
^DSFLOWRPT	(Only for the HUAWEI specified client)
^ECCLIST	(Unsolicitedly Report Emergency Numbers)
^ACTIVEBAND	(Only for the HUAWEI specified client)
+CTZV	Notify the time zone is changed
^EARST	(Only for the HUAWEI specified client)
+CBMI	New CBM indication
+CBM	New CBM directly deliver indication
^ERRRPT	Specified error code indication (Only for the HUAWEI specified client)
^AUDEND	Reporting the End of Audio Playback
^SIMRESET	Report SIM Reset Event
^JDET	Jammer Report
^ECLREC	Unsolicitedly Report AL_ACK and Timestamp Information
^ECLSTAT	Unsolicitedly Present eCall Session Status
^DDTMF	Proactively Report the DTMF Character Sent from the Communication Peer

RING	Indicate An incoming call is originated
^FOTASMS	Indicate Receiving a FOTA Message
^IPRCVST	Report Unsolicitedly
^SSLRX	Notify SSL Arrival Data
^IPSRVST	Report the Socket Service State

25.2 General CME Error List

The following describes the mapping between numeric mode and verbose mode.

Table 25-1 General CME ERROR Codes

Numeric mode	Verbose mode
0	phone failure
1	no connection to phone
2	phone adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
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 25-2 General CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
65280	call index error
65281	call state error
65282	sys state error
65283	parameters error
65284	spn file wrong
65285	spn file accessed denied
65286	spn file not exist
65287	another SPN query operation still not finished
65289	input value is out of range
65290	amr file header lost

Table 25-3 IPStack related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
1001	Normal error
1002	The link has not been established yet
1003	The link has been established already
1004	Fail to establish link
1005	Fail to bind the specified port
1006	Fail to connect to the specified address
1007	The server has not been established yet
1008	The server has been established already
1009	Fail to establish server
1010	Fail to bind the specified port with server
1011	Fail to establish listening
1012	The network has not been opened yet
1013	The network has been opened already
1014	Fail to open network
1015	Invalid domain name
1016	Fail to resolve DNS
1017	Port error
1018	Remain data is sending
1019	Previous command is not complete
1020	Too many data to be sent
1021	Forbidden operation in transparent mode
1022	Invalid port for transparent mode
1023	Fail to send data in transparent mode
1024	Fail to send data because it is too long
1025	Quit transparent mode because buffer is full
1026	More than one link in physical port
1027	The physical port is in listen state and has no client
1028	Quit transparent mode because link is down
1030	The TCP or UDP link has been established already
1031	The FTP link has been established already

Numeric mode	Verbose mode
1032	The SMTP link has been established already
1033	The HTTP link has been established already
1038	SSL not enabled
1039	SSL handshake failed
1042	PDP operation in progress, please wait

Table 25-4 SSL related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
2101	Operations failed due to system error
2102	Socket not enabled
2103	Socket not connected
2104	Socket already enabled
2105	Socket already connected
2106	Invalid socket ID
2107	SSL error during handshake
2108	Fail to establish connection
2109	Fail to connect specified address
2110	Invalid arguments
2111	Certification error
2112	Invalid Operation
2113	Certificate maximum limit reached
2114	Network timeout
2115	SSL read failed
2116	SSL write failed
2117	Normal Connecton Opened
2118	Normal Connection Not Opened
2119	Secure Connection Opened
2120	Secure Connection Not Opened

Table 25-5 FOTA related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
1502	Operation failed due to unknown error
1503	Previous command is not complete
1504	Error command parameters
1505	Operation not supported
1512	The network has not been opened yet
1513	The network has been opened already
1514	Fail to open network
1515	The link has not been established yet
1517	Fail to establish link
1518	Fail to bind the specified port
1519	Fail to connect to the specified address
1520	Invalid domain name
1521	Fail to resolve DNS
1523	File type is not correct
1524	File source is not correct
1555	FOTA is in collision state
1602	Fail to send data because TE cancel
1603	Fail to send data because retry times are bigger than 10
1604	Fail to send data because file tag is error
1605	Fail to send data because packet number is error
1606	Fail to send data because the protocol is not 1K-Xmodem
1607	Invalid port for fwload mode
1608	Fail to send data because file crc or subfile crc is error
1609	Fail to send data because update type is error
1610	Fail to send data because model product is error
1611	Fail to send data because source version is error
1612	Fail to send data because some tag length is error
1613	Fail to send data because file num error
1614	Fail to send data because open subfile failed
1615	Fail to send data because write subfile to flash error

25.3 CMS Error List

The following lists the <err> value of CMS ERROR that may be returned by all AT commands of short messages.

<err> values used by common messaging commands:

Numeric mode	Verbose mode
0–127	3GPP TS 24.011 clause E.2 values
128–255	3GPP TS 23.040 clause 9.2.3.22 values.
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU Mode parameter
305	invalid Text Mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid 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

25.4 Final Result Code

Final Result Code	No.	Description
OK	0	A command is executed, and there is no error.
CONNECT	1	A connection is established.
RING	2	An incoming call is originated.
NO CARRIER	3	A connection is terminated.
ERROR	4	There is a common error.
NO DIALTONE	6	There is no dialing tone.
BUSY	7	The peer is busy.
NO ANSWER	8	Timeout occurs when the connection is complete, and there is no reply.
+CME ERROR: <err>		The error type is specified by <err>.
+CMS ERROR: <err>		It is a short message-related error.
COMMAND NOT SUPPORT	numeric is not supported	The command is not supported.
TOO MANY PARAMETERS	numeric is not supported	Too many parameters in the issued command

**NOTE**

The final result code is the termination flag of an AT command.

25.5 References

The following list is most of the references for this document.

- [1] 3GPP TS 22.067
- [2] 3GPP TS 23.003
- [3] 3GPP TS 23.038
- [4] 3GPP TS 23.040
- [5] 3GPP TS 23.041
- [6] 3GPP TS 24.008
- [7] 3GPP TS 24.011
- [8] 3GPP TS 25.331
- [9] 3GPP TS 27.005

- [10] 3GPP TS 27.007
- [11] 3GPP TS 27.010
- [12] 3GPP TS 31.102
- [13] 3GPP TS 31.111
- [14] 3GPP TS 44.060
- [15] 3GPP TS 45.008
- [16] 3GPP2 C.S0023
- [17] ETSI TS 102.221
- [18] ETSI TS 102.223
- [19] GSM MoU SE.13
- [20] GSM 11.11
- [21] ITU-T E.212 Annex A
- [22] ITU-T V.25
- [23] ITU-T T.50: International Reference Alphabet (IRA)
- [24] DIN EN 16062

25.6 Acronyms and Abbreviations

Acronym or Abbreviation	Full spelling
3GPP	Third Generation Partnership Project
AT	ATtention
APN	Access Point Name
BCD	Binary Coded Decimal
BER	Bit Error Rate
CHAP	Challenge Handshake Authentication Protocol
CLIP	Call Line Identifier Presentation
CS	Circuit Switch
CUG	Closed User Group
DCE	Data Circuit-terminating Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
GGSN	Gateway GPRS Support Node



Acronym or Abbreviation	Full spelling
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
MSD	Minimum Set of Data
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
OPL	Operator PLMN List
PAP	Password Authentication Protocol
PD	Position Determination
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PNN	PLMN Network Name
PPP	Point-to-Point Protocol
PUK	PIN Unlocking Key
PS	Packet Switched (PS) domain
QoS	Quality of Service
RPLMN	Registered PLMN
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address



Acronym or Abbreviation	Full spelling
SDU	Service Data Unit
SIM	GSM Subscriber Identity Module
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
SPN	Service Provider Name
SSL	Secure Sockets Layer
TA	Terminal Adapter
TE	Terminal Equipment
TPDU	Transfer Protocol Data Unit
UDI	Unified Display Interface
UICC	Universal Integrated Circuit Card
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
NMEA	National Marine Electronics Association