



HUAWEI ME909s Series LTE Module
V100R001

AT Command Interface Specification

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About This Document

Revision History

Document Version	Date	Chapter	Description
01	2015-06-09		Creation
02	2018-04-12	2.14.2	Updated interface description of ATZ
		2.21	Added AT^CUSTFEATURE-Control Customized Feature
		4.12	Updated parameter description and example of AT+CHLD
		6.11.4	Updated property description of AT+CCLK
		11.3.3	Updated parameter description of AT^WAKEUPCFG
		11.14.3	Updated parameter description of AT^SLEPCFG
		11.22	Added AT^WAKEUPBYPIN-Enable and Disable the Judgment of the USB Status in Remote Pin Wake-up
		12.6	Added AT^CALLSRV-Set the CS Voice Function
		15.4	Updated command syntax and interface description of AT^EONS
		16.17	Updated command syntax and parameter description of AT^IPRCV
		16.20.3	Updated parameter description of AT^SSLCFG
		16.21.1	Updated command syntax of AT^SSLMNG
16.28	Added AT^HBEACTEX-Control Heartbeat Function		
16.29	Added AT^HBECONTDATA-Set the Heartbeat Packet Data		



Document Version	Date	Chapter	Description
		16.30	Added AT^HBECONTEX-Set Heartbeat Parameters
		20.3	Updated AT^NDISSTATQRY-Query the Connection Status
		20.8	Added AT^PORTCTRL-Control Custom Data Transmission Channel
		20.9	Added ^PORTSTAT-Report Downlink Data in the Custom Data Transmission Channel
		27.3	Modify description of CMS ERROR:321
		13.12	Added AT^AUDIOCFG- Set Tone Volume Level
		11.23	Added AT^SETETHNUM - Configure the ECM ports
		11.24	Added AT^NDISALIVE-NDIS Dial-up in Linux
		20.3.1	Modify test command AT^NDISSTATQRY
03	2019-03-13	1.1	Added new product ME909s-821a/821ap
		2.21	Added the features whose IDs are 19 and 20 in the AT^CUSTFEATURE command
			Added the feature description of the feature ID 21 of the AT command CUSTFEATURE.
			Added the feature description of the feature ID 23 of the AT command CUSTFEATURE
		11.23	The AT^SETETHNUM command is modified to support the configuration of three ECM ports
		13.13	Added AT^ECHOSWITCH
		15.18	Added AT^HFREQINFO
		15.19	Added ^REJINFO
		16.2	Extended AT^IPOPEN, AT^HTTPCMD, ^IPSTATE commands to support IPv6
		16.10	
		16.13	
		16.31	Added AT^IPINITEX, AT^IPLISTENEX, and AT^IPDNSCFG commands to support IPv6
		16.32	
		16.33	



Scope

ME909s-821

ME909s-821 Mini PCIe

ME909s-821a

ME909s-821a Mini PCIe

ME909s-120

ME909s-120 Mini PCIe



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1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by Huawei Mobile Broadband product ME909s module.

Please read the Release Notes released with the firmware before using ME909s module and this document.

Products	Bands
ME909s-821 ME909s-821 Mini PCIe	FDD LTE: Band 1, Band 3, Band 8, all bands with diversity TDD LTE: Band 38, Band 39, Band 40, Band 41, all bands with diversity DC-HSPA+/HSPA+/HSPA/UMTS: Band 1, Band 5, Band 8, Band 9, all bands with diversity TD-SCDMA: Band 34, Band 39 GSM/GPRS/EDGE: 1800 MHz/900 MHz
ME909s-821a ME909s-821a Mini PCIe	FDD LTE: Band 1, Band 3, Band 5, Band 8, all bands with diversity TDD LTE: Band 38, Band 39, Band 40, Band 41, all bands with diversity DC-HSPA+/HSPA+/HSPA/UMTS: Band 1, Band 5, Band 8, Band 9, all bands with diversity TD-SCDMA: Band 34, Band 39 GSM/GPRS/EDGE: 1800 MHz/900 MHz
ME909s-120 ME909s-120 Mini PCIe	FDD LTE: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20, all bands with diversity WCDMA/HSDPA/HSUPA/HSPA+: Band 1, Band 2, Band 5, Band 8, all bands with diversity GSM/GPRS/EDGE: 850 MHz/900 MHz/1800 MHz/1900 MHz



1.2 Overview

This document describes certain AT commands (implemented by terminal devices) of international standards, such as 3GPP and ITU-T, according to the requirements of terminal devices. In addition, this document describes the Huawei proprietary AT command interfaces that are implemented by terminal devices. These Huawei 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 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 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 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 is referred to as ME, MS, TA or DCE. 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, DTE 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 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

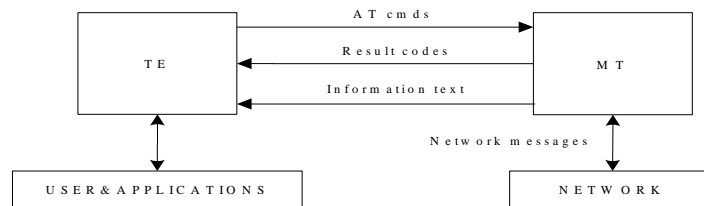
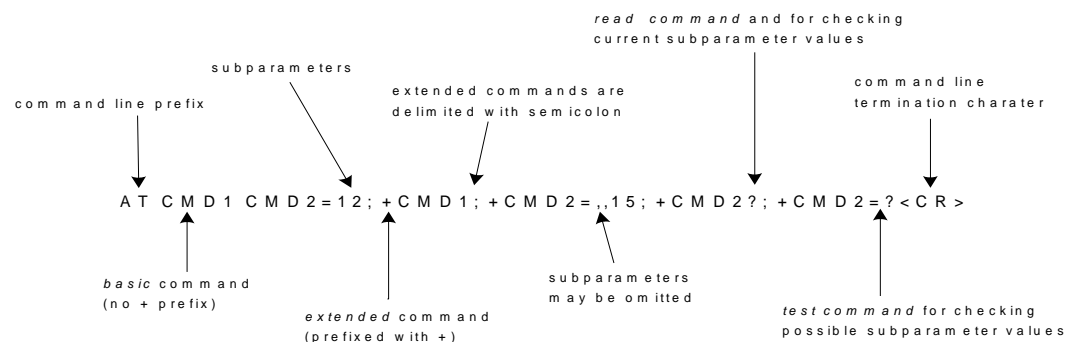


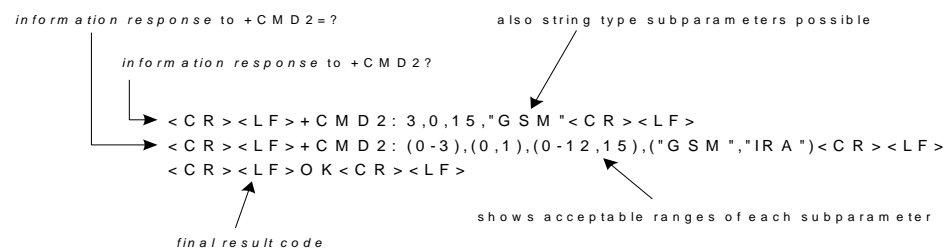
Figure 1-2 shows the basic organization format of the AT command line.

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 1-1 Types of AT commands

AT command type	Sub-type	Syntax	Function
-----------------	----------	--------	----------

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 each parameter related to the command.
	Test command	AT<name>=?	A test command is executed to return the available value range of each parameter supported by the command.
Basic command	Basic command	AT<command>[<number>]	<p>In the command format, <command> indicates a single letter (A-Z) or the & symbol plus a single letter.</p> <p>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.</p>
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: $\langle \rangle$ and $[\]$, which are described as follows:

- $\langle \dots \rangle$: The parameter inside these angle brackets is mandatory. The $\langle \rangle$ does not exist in a command.
- $[\dots]$: The parameter inside these square brackets is optional. The $[\]$ does not exist in a command or a response.
- $\langle \text{CR} \rangle$: Carriage return character, which value is specified with command S3.
- $\langle \text{LF} \rangle$: 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^IPINITEX
AT^IPOPEN
AT^IPSEND
AT^IPSENDEX
AT^IPCLOSE
AT^EMSEND
AT^HTTPCMD
AT^FTPCMD
AT^SSLO
AT^SSLTX
AT^SSLRX

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



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 ATSO-Ring Before Automatic Answer

2.2.1 Command Syntax

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

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

2.2.2 Interface Description

The set command disables or enables the DCE automatic to answer the incoming call. If <value> is 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 queries the current value.

For PS and CS incoming call:

When ATSO=0, the call will not be auto-answered. Otherwise, the call will be auto-answered after ATSO rings. The maximum number of rings is determined by the network configuration. When PS call is incoming and ATSO is set to more than the maximum number, the current PS call will not be auto-answered.

2.2.3 Parameter Description

<value>:

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

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

2.2.5 Example

```
Run:           ATSO=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 returned immediately 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:           ATN3=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 returned immediately 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 setting <value> to 0 and sending successfully: 0<CR>
If setting <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)

2.6.3 Parameter Description

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



NOTE

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

2.6.4 Property Description

Saving upon Power-off	PIN
N	N

2.6.5 Example

```
Run:          ATI

Response:     Manufacturer: Huawei Technologies Co., Ltd.
              Model: ME909s-120
              Revision: 11.670.01.00.00
              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.

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. Both AT+GMI and AT+CGMI have the same function and syntax.

2.8.3 Parameter Description

<manufacturer>: a string type value without double quotation marks that indicates 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 have the same function and syntax.

The model ID's value can be one or more lines of text, determined by the MT's manufacturer. The model ID identifies 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>: a string type value without double quotation marks that indicates product name.

2.9.4 Property Description

Saving upon Power-off	PIN
NA	N

2.9.5 Example

```
Run:          AT+CGMM
Response:    ME909s-120
              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. Both AT+GMR and AT+CGMR have the same function and syntax.

2.10.3 Parameter Description

<version>: indicates software version. It is a string with up to 31 characters, without double quotation marks. 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:     11.670.01.00.00
              OK
```

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

2.11.1 Command Syntax

AT+CGSN
Possible Response(s)
<CR><LF><IMEI><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

Both AT+GSN and AT+CGSN have the same function and syntax.

- 3GPP

This command queries the MT's IMEI.

2.11.3 Parameter Description

- 3GPP

<IMEI>: indicates the MT's IMEI. The returned IMEI is a string without double quotation marks, 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

```
Run:          AT+CGSN
Response:     356112010004540
              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>

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

"GSM"	GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems.
"IRA"	International reference alphabet (ITU-T T.50)
"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.



NOTE

If MT is using GSM 7 bit default alphabet, its characters should 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")

                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

- 3GPP

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

2.13.3 Parameter Description

<IMSI>: indicates the IMSI stored on the USIM or SIM card. It is a string without double quotation marks, consisting of decimal digits, as described in the following table.

Up to 15 Digits		
3 Digits	2 or 3 Digits	-

Up to 15 Digits		
MCC	MNC	MSIN

2.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

2.13.5 Example

```
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 their factory default 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. The AT&W command can store user values. If user values are not set, the parameters are restored to the factory default values.

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

Command
E

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

2.14.3 Parameter Description

<value>:

0 Set all AT commands' parameters to their factory 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 2-2 to their default values.

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

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



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 values, too.

2.15.3 Parameter Description

<value>:

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



NOTE

If <value> is not specified, it is equivalent to set <value> 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 AT+CGSN:

```
Run:          AT+CGSN
Response:    356112010004540

              OK

Run:          A/
Response:    356112010004540

              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 the TA transmits result code to the TE or not.

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
------------------------------	------------

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 2-2.

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 are followed in 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: 3,0; +IPR: 0;

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 27.2 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 Customized Feature

2.21.1 Command Syntax

AT^CUSTFEATURE=<ID>,<Val>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^CUSTFEATURE?
Possible Response(s)
<CR><LF>^CUSTFEATURE: <CR><LF>[<ID>,<Val><CR><LF>[...]]<CR><LF>OK<CR><LF>

AT^CUSTFEATURE=?
Possible Response(s)
<CR><LF>^CUSTFEATURE: (0-127),(0-1)<CR><LF><CR><LF>OK<CR><LF>

2.21.2 Interface Description

The set command disables or enables the customized feature.

The read command returns the current enabled customized feature.

The test command returns the supported parameter value.

2.21.3 Parameter Description

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

0	Dial-up is disconnected when the service is not available.
1	The preset APN cannot be used for registration. Error code #33. Use a null APN to initiate a registration.
2	Set network search mode to Auto again and the TE will search for the network again.
3	The customized subnet mask is 255.255.255.255.
4	(Reserved)
5	Ignore usb reset signal when the module is waking up (not supported currently).
6	Disable SMS report delay when the device is waking up (not supported currently).
7	Control LastRat (not supported currently)
8	The ECM-enumerated port name is changed from eth0 to usb0 (not supported currently).
9	Disable data packet source IP address verification.
10	QoS flow control
11	Transparent transmission of DHCP unicast packets
12	Customize the uplink gain multiplier for DTMF audio.
13	(Reserved)
14	Customize GEA3 encryption algorithm (not supported currently).
15	Enable the IO105 pin. The IO 105 pin outputs high level in wakeup mode, and low level in sleep mode.
16	Report the reject cause value during network registration.
17	(Reserved)
18	Control whether to enable DRX.
19	Control whether to enable the SMS resending feature.
20	(Reserved)
21	Control whether the returned gateway IP address is the same as the host IP address.

22	Control IPV6 capabilities. After the change status of IPV6 capability ,it needs reset the module (This feature is only available in the China Area) (not supported currently).
23	GEA algorithm feature switch control (1: turn on GEA3 and turn off GEA1; 0: turn on GEA1 and turn off GEA3)
24-100	(Reserved)
101	VDF APN self-adaptive switch (not supported currently)
102-127	(Reserved)

<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.



NOTE

If <ID> is set to 0 and <Val> is set to 1, the dial-up will be disconnected during redirection.

If <ID> is set to 18 and <Val> is set to 1, the DRX feature will be enabled. The default value of ID 18 is 1.

If <ID> is set to 19 and <Val> is set to 1, The terminal supports SMS retransmission,The default value of ID 19 is 1.

2.21.4 Property Description

Saving upon Power-off	PIN
Y	N

2.21.5 Example

Set the customized feature.

```
Run:          AT^CUSTFEATURE=1,1
Response:    OK
```

Query the current enabled customized feature.

```
Run:          AT^CUSTFEATURE?
```



Response: ^CUSTFEATURE:
 1,1
 18,1
 19,1

 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 27.4 Final Result Code.

3.1.2 Interface Description

This command initiates a voice or data service call.

3.1.3 Parameter Description

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

[I/i]: indicates 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 supports 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 ^CEND.

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

[;]: specifies 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 needs to verify PIN when it is not an emergency call.

3.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.1.5 Example

- Dial a valid number at normal case and initiate a voice call:

```
Run:          ATD13903711825;
Response:     OK
```

- Dial a number when the SIM pin is required and initiate a voice call:

```
Run:          ATD13903711825;
Response:     ERROR
```

3.2 ATA-Answering Command

3.2.1 Command Syntax

ATA
Possible Response(s)
<CR><LF>OK<CR><LF>
About the responses, see 27.4 Final Result Code.

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.
- If ATA is aborted, the incoming call is disconnected.

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 disconnects 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. At present, the ATH command can only disconnect the data service.

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.



NOTE

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

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

Even if the CRC is disabled, the ring will be reported.

```
Response:      RING
               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 3.12 AT+CRIC-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),(list of supported <duration>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 with 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>: indicates tone duration in 1/10 seconds with tolerance. The minimum duration of DTMF signals is 100 ms (default value). The value ranges from 1 to 255.



NOTE

If the tone is generated by MSC, <duration> may influent but could not determine the length of the tone. It all depends on the pre-determined parameters set by the network operator.

3.6.4 Property Description

Saving upon Power-off	PIN
NA	N

3.6.5 Example

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

Run: AT+VTS=A

Response: OK

3.7 AT^VTSEX-Send Multiple DTMF Tones

3.7.1 Command Syntax

AT^VTSEX=<dtmf_char_string>[,<on_length>][,<off_length>][,<send_mode>][,local_play]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^VTSEX=?
Possible Response(s)
<CR><LF>OK<CR><LF>

3.7.2 Interface Description

This command sends multiple DTMF tones during calls.

The set command specifies the DTMF character string to be sent, send duration, interval, and whether simultaneous local playback is allowed. The interval is the time between the sending of DTMF characters.

3.7.3 Parameter Description

<dtmf_char_string>: DTMF character string to be sent. The value contains 1 to 16 following ASCII characters: 0 to 9, A to D, asterisks (*), and number signs (#). Example, 01234567890*#ABCD.

<on_length>: send duration of a single DTMF character in ms. The value range is 65 to 3000. The default value is 100.

<off_length>: interval between the sending of DTMF characters in ms. The value range is 65 to 3000. The default value is 100.

<send_mode>: send mode.

- 0 Signaling mode (default value)
- 1 In-band audio

<local_play >: whether the DTMF tones play locally when being sent.

- 0 No (default value)
- 1 Yes



NOTE

When all DTMF tones specified by the command are sent, ^VTSEX: <send_result> is reported unsolicitedly. If there are DTMF tones unsent, running a command to send new DTMF tones will return an ERROR response.

3.7.4 Property Description

Saving upon Power-off	PIN
N	N

3.7.5 Example

```
Run: AT^VTSEX="0123ABC*#"
Response: OK
```

```
Run:          AT^VTSEX="0123ABC*#",100,100,1,1
Response:     OK

Run:          AT^VTSEX=?
Response:     OK
```

3.8 ^VTSEX-Report DTMF Sending Result Unsolicitedly

3.8.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^VTSEX: <send_result><CR><LF>

3.8.2 Interface Description

This command unsolicitedly reports the DTMF tone sending result after all DTMF tones specified by the AT^VTSEX command are sent. If an error occurs during DTMF tone sending, the module will terminate the sending and report a sending failure message.

3.8.3 Parameter Description

<send_result>: DTMF tone sending result.

- 0 The sending of DTMF tones fails.
- 1 DTMF tones are sent successfully.

3.8.4 Property Description

Saving upon Power-off	PIN
N	N

3.8.5 Example

None

3.9 ATO-Switch Command Mode to Data Mode

3.9.1 Command Syntax

ATO[<value>]
Possible Response(s)
<pre><CR><LF>CONNECT [<text>]<CR><LF></pre> <p>or</p> <pre><CR><LF>NO CARRIER<CR><LF></pre> <p>or</p> <pre><CR><LF>+CME ERROR: <err><CR><LF></pre>

3.9.2 Interface Description

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

3.9.3 Parameter Description

<value>:

- 0 Switch command mode to data state.
- Other Reserved for manufacturer proprietary use.

<text>: indicator of interface speed.



NOTE

- If <value> is not specified, it is equivalent to set <value> to 0.
- This command does not support PCUI port.

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

3.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.9.5 Example

```
Run:          ATO
Response:    CONNECT 9600
```

3.10 +++-Switch Data Mode to Command Mode

3.10.1 Interface Description

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.

3.10.2 Example

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

3.11 AT+CHUP-Call Hangup

3.11.1 Command Syntax

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

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

3.11.2 Interface Description

This command ends a call when the conversation is over and rejects 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.

3.11.3 Parameter Description

None

3.11.4 Property Description

Saving upon Power-off	PIN
NA	N

3.11.5 Example

Disconnect a voice call:

Run: AT+CHUP

Response: OK

3.12 AT+CRC-Cellular Result Codes

3.12.1 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>

3.12.2 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.

3.12.3 Parameter Description

<mode>: an integer type

- | | |
|---|--|
| 0 | Disables extended format.(default value) |
| 1 | Enables extended format. |

<type>:

- | | |
|-------|----------------------|
| VOICE | Normal voice (TS 11) |
|-------|----------------------|

3.12.4 Property Description

Saving upon Power-off	PIN
N	N

3.12.5 Example

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

Run:          AT+CRING?
Response:     +CRING: 0
              OK

Run:          AT+CRING=?
Response:     +CRING: (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 command queries the network state and registers network selection mode currently by the MS.

The execution command selects the network automatically or manually.

The read command queries 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.
- When the LTE network is manually registered through AT+COPS command with the parameter `<AcT>`, CSFB voice is unavailable.

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 AT+COPS?), 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 3GPP TS 24.008 subclause 10.5.1.3) which consists of a three BCD digit country code coded as in ITU-T E.212 Annex A, plus a two BCD digit network code, which is administration specific; returned `<oper>` shall not be in BCD format, but in IRA characters converted from BCD. Hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1).

- | | |
|---|---|
| 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>: indicates access technology selected.

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

4.1.4 Property Description

Saving upon Power-off	PIN
NA	Y



NOTE

The setting of <mode> is saved upon power-off.

4.1.5 Example

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

```
Run: AT+COPS=?  
Response: +COPS: (3, "CHN-UNICOM", "UNICOM", "46001", 0), (3, "CHINA  
MOBILE", "CMCC", "46000", 0), (0, 1, 3), (0, 1, 2)  
OK
```

- Automatically search of network:

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

**NOTE**

In the execution command, if <mode> equals to 0, it makes other parameters invalid.

- Manually search of network:

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

Response: OK

**NOTE**

- +CME ERROR: <err> 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, and no operator:

Run: AT+CREG?

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 which set by AT^SYSCFGEX.
- We cannot manually search the GSM network when current setting is WCDMA ONLY mode which set by AT^SYSCFGEX.
- ERROR will be returned in the situations above.
- Query the information of the network currently logged in:

Run: AT+CREG?

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

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.

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

4.2.3 Parameter Description

<n>:

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

<stat>:

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

<lac>: a string type value that indicates two byte location area code or tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>: a string type value that indicates four byte serving cell ID in hexadecimal format.

<AcT>: an integer type value that indicates access technology of the serving cell.

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



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 status of the current network registration:

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

The test command returns the facilities supported.

4.3.3 Parameter Description

<fac>: specifies the target of this command.

"SC"	SIM card (if this parameter is set, MT will request the password during startup)
"AB"	All barring services (applicable only for <mode>=0)
"AC"	All incoming barring services (applicable only for <mode>=0)
"AG"	All outgoing barring services (applicable only for <mode>=0)
"AI"	Bar all incoming calls
"AO"	Bar all outgoing calls
"IR"	BIC-Roam (bar incoming calls when roaming outside the home country)
"OI"	Bar outgoing international calls
"OX"	Bar outgoing international calls except to home country
"FD"	SIM card or active application in the UICC (GSM or USIM) fixed dialing memory feature
"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 that indicates operating mode.

0	Unlock
1	Lock
2	Queries status

<status>: an integer type value that 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'.

<classx>:

- 1 Voice
- 2 Data
- 4 Fax (not supported currently)
- 8 Short message

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", "FD")

 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>: string type values that indicate 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>):

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+CLIR-Calling Line Identification Restriction

4.5.1 Command Syntax

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

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

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

4.5.2 Interface Description

This command allows a caller to enable or disable the presentation of the CLI. If the CLIR is enabled, the CLI is not displayed to the called party.

The read command returns actual subscription.

4.5.3 Parameter Description

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

- 0 Use according to the subscription of the CLIR service (default value)
- 1 Enable
- 2 Disable

**NOTE**

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

<m>: specifies CLIR service status.

- 0 CLIR not provided
- 1 CLIR provided in permanent mode
- 2 Unknown (e.g. no network, etc.)
- 3 CLIR temporary mode presentation restricted
- 4 CLIR temporary mode presentation allowed

4.5.4 Property Description

Saving upon Power-off	PIN
N	Y

4.5.5 Example

- Query the status of calling line identification restriction:

```
Run: AT+CLIR?
Response: +CLIR: 0,0
OK
```

- Enable calling line identification restriction:

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

- Query the list of supported <n>s:

```
Run: AT+CLIR=?
```

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

 OK

4.6 AT+CLIP-Calling Line Identification Presentation

4.6.1 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>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

4.6.2 Interface Description

This command allows a called party to get the CLI of the caller. If the CLIP is enabled, +CLIP is presented following the ring indication. For the definition of the interface, see 4.7 +CLIP-CLIP Notifications.

4.6.3 Parameter Description

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

- 0 Disable (default value)
- 1 Enable



NOTE

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

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

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

4.6.4 Property Description

Saving upon Power-off	PIN
N	Y

4.6.5 Example

- Query the status of calling line identification presentation:

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

- Enable calling line identification presentation:

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

- Query the list of supported <n>s:

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


4.7 +CLIP-CLIP Notifications

4.7.1 Command Syntax

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

4.7.2 Interface Description

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

4.7.3 Parameter Description

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

<type>: specifies the number type. "145" indicates an international number. For details about the values of <type>, see the value definitions of <type_addr> in 9.14 AT+CMGS-Send Message (PDU Mode).

<CLI validity>:

- 0 The 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 the payphone type.
- 4 CLI is not available due to other reasons.

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

4.7.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.7.5 Example

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

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

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

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

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

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

4.8 AT+CLCC-List Current Calls

4.8.1 Command Syntax

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

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

4.8.2 Interface Description

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

4.8.3 Parameter Description

<idx>: specifies the call ID.

<dir>: specifies the call direction.

0 Mobile originated call

1 Mobile terminated 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 (not supported currently)

<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)

4.8.4 Property Description

Saving upon Power-off	PIN
NA	N

4.8.5 Example

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

```
Run:          AT+CLCC
Response:     +CLCC: 1,0,0,0,0,"139037606",129
              +CLCC: 2,1,5,0,0,"139037601",129

              OK
```

4.9 AT+CCFC-Call Forwarding

4.9.1 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>

4.9.2 Interface Description

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

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

The test command returns supported reason values.

4.9.3 Parameter Description

<reason>: specifies the call forwarding type.

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

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

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

<number>: a string type value that indicates 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 9.14 AT+CMGS-Send Message (PDU Mode).

<reserved1>: reserved.

<reserved2>: reserved.

<class>: specifies service type, a sum of integers each representing a class of information (default 7 -voice, data and fax).

- | | |
|----|---|
| 1 | Voice (telephony) |
| 2 | Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128) |
| 4 | Fax (not supported currently) |
| 8 | Short message service |
| 16 | Data circuit sync |
| 32 | Data circuit async |
| 64 | Dedicated packet access (not supported currently) |

128 Dedicated PAD access (not supported currently)

<time>: when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded. The value ranges from 1 to 30 seconds and the default value is 20. Only allow to set 5\10\15\20\25\30 seconds by increasing each 5 seconds. (refer 3GPP TS 22.082 subclause 3.3.3).

<status>:

0 Not active
1 Active

4.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.9.5 Example

Register the current number with unconditional call transfer to 13987654321:

Run: AT+CCFC=0,3,"13987654321",,1

Response: OK

4.10 AT+CCWA-Call Waiting

4.10.1 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>

4.10.2 Interface Description

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

The test command returns supported values.

4.10.3 Parameter Description

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

- 0 Disable (default value)
- 1 Enable



NOTE

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

<mode>:

- 0 Disable
- 1 Enable (default value)
- 2 Query status



NOTE

When the number of parameters is greater than 1 and <mode> is not input, <mode> is set to 1.

<class>: specifies service type, a sum of integers each representing a class of information (default 7 - voice, data and fax).

- 1 Voice (telephony)

- 2 Data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
- 4 Fax (not supported currently)
- 8 Short message service
- 16 Data circuit sync
- 32 Data circuit async
- 64 Dedicated packet access (not supported currently)
- 128 Dedicated PAD access (not supported currently)

**NOTE**

When the setting value of <class> is invalid and an error is returned, if the setting value of <n> is valid, the module will still set <n>.

<status>:

- 0 Not Activated
- 1 Activated

4.10.4 Property Description

Saving upon Power-off	PIN
N	Y

4.10.5 Example

- Enable the voice call waiting function and enable the presentation of call waiting information.

Run: AT+CCWA=1,1,1

Response: OK

- Enable the presentation of call waiting information.

Run: AT+CCWA=1

Response: OK

- Enable the call waiting function (with <class> set to 1) and enable the presentation of call waiting information.

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

4.11 +CCWA-Call Waiting Notifications

4.11.1 Command Syntax

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

4.11.2 Interface Description

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



NOTE

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

4.11.3 Parameter Description

<number>: specifies the waiting number.

<type>: specifies the number type. For detailed value, see the definition of the <type_addr> parameter in 9.14 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 4.10 AT+CCWA-Call Waiting.

<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 the payphone type.
- 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)

4.11.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.11.5 Example

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

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

4.12 AT+CHLD-Call Hold

4.12.1 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>

4.12.2 Interface Description

This command allows operations related to call hold.

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. AT+CHLD=2 cannot hold the emergency call (see 3GPP TS 22.173 subclause 8.2.9.1).

4.12.3 Parameter Description

<n>:

- | | |
|----|---|
| 0 | Release all calls on hold or sets UDUB for incoming or waiting calls. |
| 1 | Release all activated calls and activate other calls (in incoming, held or waiting status). |
| 1x | Release a specified call (in originate connecting status, held or active status). |
| 2 | Hold all activated calls and accept another call (in incoming, held or waiting status). |
| 2x | Hold all activated calls except the specified call. |
| 3 | Put through a held call. |
| 4 | Connect the called party to the current incoming call, and disconnect the calling party. |



NOTE

If <n> is not specified, it is equivalent to set <n> to 2.

4.12.4 Property Description

Saving upon Power-off	PIN
NA	N

4.12.5 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

4.13 AT+CSSN-Set Supplementary Service Notification Presentation

4.13.1 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>

4.13.2 Interface Description

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

4.13.3 Parameter Description

<n>: sets the presentation of +CSSI.

0 Disable

1 Enable

<m>: sets the presentation of +CSSU.

0 Disable

1 Enable



NOTE

- If <n> is not specified, it is equivalent to set <n> 0.
- If <m> is not specified, it is equivalent to set <m> 0.

4.13.4 Property Description

Saving upon Power-off	PIN
NA	N

4.13.5 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

4.14 +CSSI-Supplementary Service Notifications

4.14.1 Command Syntax

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

4.14.2 Interface Description

If the AT+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.

4.14.3 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.
- 6 Incoming calls are barred. (not supported currently)
- 7 CLIR suppression rejected. (not supported currently)
- 8 Call has been forwarded. (not supported currently)

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

<number>: a string type value that indicates phone number of format specified by <type>.

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

<subaddr>: a string type value that indicates subaddress of format specified by <satype>.

<satype>: indicates 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 +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

4.15 +CSSU-Supplementary Service Notifications

4.15.1 Command Syntax

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

4.15.2 Interface Description

If the AT+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.

4.15.3 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.

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

<number>: a string type value that indicates phone number of format specified by <type>.

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

<subaddr>: a string type value that indicates subaddress of format specified by <satype>.

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

4.15.4 Property Description

Saving upon Power-off	PIN
NA	NA

4.15.5 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

4.16 AT+CUSD-USSD Command

Users can run 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.

4.16.1 Command Syntax

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

AT+CUUSD?
Possible Response(s)
<CR><LF>+CUUSD: <n><CR><LF><CR><LF>OK<CR><LF>

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

4.16.2 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> disables or enables 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:

+CUUSD: <m>[,<str>,<dcs>]

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 +CUUSD result code.

Besides, <n>=2 exits the current USSD session.

The test command returns all the supported n values.

4.16.3 Parameter Description

<n>:

- 0 Disable the result code presentation to the TE.
- 1 Enable the result code presentation to the TE.

2 Cancel session.



NOTE

- If <n> is not specified, it is equivalent to set <n> to 0.
- When other parameters are setted wrong and an error is returned, <n> will still be setted if <n> is inputed correctly.

<str>: a string type value that indicates USSD-string. Valid USSD characters are '0'-'9', '*' and '#'.

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

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



NOTE

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

<dcs>: an integer type value that indicates USSD coding. (see 3GPP TS 23.038 Cell Broadcast Data Coding Scheme in integer format).

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

<m>:

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

4.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.16.5 Example

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

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

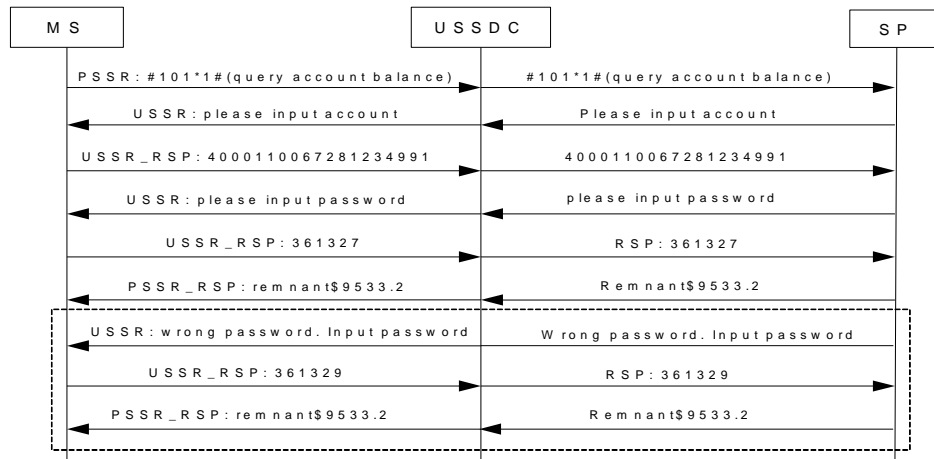
Run: AT+CUSD=1,"*99#",15

Response: OK

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

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

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



NOTE

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

- MT: Mobile Terminal
- USSDC: USSD Center
- SP: Service Provider

4.17 +CUSD-Unsolicitedly Report USSD of Network

4.17.1 Command Syntax

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

4.17.2 Interface Description

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

4.17.3 Parameter Description

For the definition of its parameters, see 4.16 AT+CUSD-USSD Command.

4.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.17.5 Example

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

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

4.18 AT+CNUM-Subscriber Number

4.18.1 Command Syntax

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

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

4.18.2 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.

4.18.3 Parameter Description

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

<typex>: indicates 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>: refer 3GPP TS 27.007-b10 subclause 6.7. (not supported currently)

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

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

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

0	3.1 kHz
1	UDI

4.18.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----



Saving upon Power-off	PIN
NA	Y

4.18.5 Example

- 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
```

- Clear the numbers:

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

Run:          AT+CPBW=1
Response:    OK

Run:          AT+CPBW=2
Response:    OK

Run:          AT+CNUM
Response:    OK
```

4.19 AT+CGEQREQ-Set QoS Parameters

4.19.1 Command Syntax

AT+CGEQREQ=[<cid>],[<Traffic class>],[<Maximum bitrate UL>],[<Maximum bitrate DL>],[<Guaranteed bitrate UL>],[<Guaranteed bitrate DL>],[<Delivery order>],[<Maximum SDU size>],[<SDU error ratio>],[<Residual bit error ratio>],[<Delivery of erroneous SDUs>],[<Transfer delay>],[<Traffic handling priority>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT+CGEQREQ?
Possible Response(s)
<CR><LF>+CGEQREQ: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority><CR><LF><CR><LF>OK<CR><LF>

AT+CGEQREQ=?
Possible Response(s)
<CR><LF>+CGEQREQ: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s)[<CR><LF>+CGEQREQ: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

4.19.2 Interface Description

This command allows the TE to specify a UMTS QoS Profile that is used when the MT sends an Activate PDP Context Request message to the network.

A special form of set command, AT+CGEQREQ=<cid> causes the requested profile for context number <cid> to become undefined.

The read command returns the current settings for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

4.19.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 7.1 AT+CGDCONT-Define PDP Context).

The following parameters are defined in 3GPP TS 23.107. If a value is omitted for a particular class, and then the value is considered to be unspecified.

<Traffic class>: specifies application type of the UMTS bearer service.

0	Conversational
1	Streaming
2	Interactive
3	Background
4	Subscribed

If the <Traffic class> is specified as conversational or streaming, and then the guaranteed and maximum bit rate parameters should also be provided. Other values are reserved.

<Maximum bitrate UL>: specifies maximum uplink rate in kbit/s.

<Maximum bitrate DL>: specifies maximum downlink rate in kbit/s.

<Guaranteed bitrate UL>: specifies guaranteed uplink rate in kbit/s.

<Guaranteed bitrate DL>: specifies guaranteed downlink rate in kbit/s.

<Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	No
1	Yes
2	Subscribed value

<Maximum SDU size>: indicates the maximum allowed SDU size in octets.

<SDU error ratio>: indicates the target SDU error ratio.

<Residual bit error ratio>: indicates the target value for the undetected bit error ratio in the delivered SDUs. The format of this field is the same as that of the <SDU error ratio> field.

<Delivery of erroneous SDUs>: indicates whether SDUs detected as erroneous shall be delivered or not.



- 0 No
- 1 Yes
- 2 No detect
- 3 Subscribed value

<Transfer delay>: indicates the targeted transmission delay in milliseconds.

<Traffic handling priority>: a numeric parameter (0-3) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers.

<PDP_type>: see 7.1 AT+CGDCONT-Define PDP Context.

4.19.4 Property Description

Saving upon Power-off	PIN
N	Y

4.19.5 Example

```
Run: AT+CGEQREQ=1,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
Response: OK
Run: AT+CGEQREQ?
```



Response: +CGEQREQ: 1,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 2,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 3,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 4,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 5,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 6,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 7,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 8,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 9,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 10,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 11,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 12,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 13,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 14,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 15,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 16,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 17,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 18,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 19,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 20,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 21,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 22,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 23,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 24,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 25,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 26,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 27,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 28,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 29,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 30,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQREQ: 31,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

OK

Run: AT+CGEQREQ=?

Response: +CGEQREQ:
"IP", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (0-2),
(0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6", "1E1"
) , ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5", "1E6",
"6E8"), (0-3), (0-4100), (0-3)
+CGEQREQ:
"IPV6", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (0-2)
) , (0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6", "1E
1"), ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5", "1E6
", "6E8"), (0-3), (0-4100), (0-3)
+CGEQREQ:
"IPV4V6", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (0
-2), (0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6", "
1E1"), ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5", "1
E6", "6E8"), (0-3), (0-4100), (0-3)

OK

4.20 AT+CGEQNEG-3G Negotiated QoS Profile

4.20.1 Command Syntax

AT+CGEQNEG=[<cid>[,<cid>[...]]]
Possible Response(s)
<CR><LF>+CGEQNEG: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority>[<CR><LF>+CGEQNEG: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority>[...]]<CR><LF><CR><LF>OK<CR><LF>

AT+CGEQNEG=?
Possible Response(s)
<CR><LF>+CGEQNEG: (list of <cid>s associated with active contexts)<CR><LF><CR><LF>OK<CR><LF>

4.20.2 Interface Description

This command allows the TE to retrieve the negotiated QoS profiles returned in the PDP context establishment procedure.

The execution command returns the negotiated QoS profile for the specified context identifiers, <cid>s. The QoS profile consists of a number of parameters, each of which may have a separate value.

The test command returns a list of <cid>s associated with active contexts.

4.20.3 Parameter Description

<cid>: an index that specifies a particular PDP context definition (see 7.1 AT+CGDCONT-Define PDP Context).

The following parameters are defined in the 3GPP TS 23.107.

<Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimized.

- | | |
|---|----------------|
| 0 | Conversational |
| 1 | Streaming |
| 2 | Interactive |
| 3 | Background |

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbit/s delivered to UMTS (up-link traffic) at a SAP. As an example, a bit rate of 32 kbit/s would be specified as 32 (e.g. +CGEQNEG:...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbit/s delivered by UMTS (down-link traffic) at a SAP, As an example a bit rate of 32 kbit/s would be specified as 32 (e.g. +CGEQNEG:...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbit/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example, a bit rate of 32 kbit/s would be specified as 32 (e.g. +CGEQNEG:...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbit/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example, a bit rate of 32 kbit/s would be specified as 32 (e.g. +CGEQNEG:...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Delivery order>: indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

- 0 No
- 1 Yes

<Maximum SDU size>: indicates the maximum allowed SDU size in octets.

<SDU error ratio>: indicates the target SDU error ratio.

<SDU error ratio> is defined only for conforming traffic. This is a string represented in the format of scientific notation. For example, an SDU error ratio of 5×10^{-3} is specified as "5E3".

<Residual bit error ratio>: indicates the target value for the undetected bit error ratio in the delivered SDUs. The format of this field is the same as that of the <SDU error ratio> field.

<Delivery of erroneous SDUs>: indicates whether SDUs detected as erroneous shall be delivered or not.

- 0 No
- 1 Yes
- 2 No detect

<Transfer delay>: indicates the targeted transmission delay in milliseconds.

<Traffic handling priority>: a numeric parameter (0-3) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers.

4.20.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----

AT+CGEQMIN?
<pre><CR><LF>+CGEQMIN: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority>,<Source statistics descriptor>,<Signalling indication>[<CR><LF>+CGEQMIN: <cid>,<Traffic class>,<Maximum bitrate UL>,<Maximum bitrate DL>,<Guaranteed bitrate UL>,<Guaranteed bitrate DL>,<Delivery order>,<Maximum SDU size>,<SDU error ratio>,<Residual bit error ratio>,<Delivery of erroneous SDUs>,<Transfer delay>,<Traffic handling priority>[...]]<CR><LF><CR><LF>OK<CR><LF></pre>

AT+CGEQMIN=?
Possible Response(s)
<pre><CR><LF>+CGEQMIN: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s),(list of supported <Source statistics descriptor>s),(list of supported <Signalling indication>s)[<CR><LF>+CGEQMIN: <PDP_type>,(list of supported <Traffic class>s),(list of supported <Maximum bitrate UL>s),(list of supported <Maximum bitrate DL>s),(list of supported <Guaranteed bitrate UL>s),(list of supported <Guaranteed bitrate DL>s),(list of supported <Delivery order>s),(list of supported <Maximum SDU size>s),(list of supported <SDU error ratio>s),(list of supported <Residual bit error ratio>s),(list of supported <Delivery of erroneous SDUs>s),(list of supported <Transfer delay>s),(list of supported <Traffic handling priority>s)[...]]<CR><LF><CR><LF>OK<CR><LF></pre>

4.21.2 Interface Description

This command allows the TE to specify a minimum acceptable profile, which is checked by the MT against the negotiated profile returned in the PDP context establishment and PDP context modification procedures.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and checked against the negotiated profile only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in 7.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT (refer to 3GPP TS 27.007 subclause 10.1.2), the AT+CGEQMIN command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

A special form of the set command, AT+CGEQMIN=<cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.

The read command returns the current settings for each defined context.

The test command returns values supported as a compound value. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line.

4.21.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 7.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT).

The following parameters are defined in 3GPP TS 23.107:

<PDP_type>: see 7.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT.

<Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimized.

0	Subscribe
1	Conversational
2	Streaming
3	Interactive
4	Background

<Maximum bitrate UL>: a numeric parameter that indicates the maximum number of kbit/s delivered to UMTS (up-link traffic) at a SAP. As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Maximum bitrate DL>: a numeric parameter that indicates the maximum number of kbit/s delivered by UMTS (down-link traffic) at a SAP. As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Guaranteed bitrate UL>: a numeric parameter that indicates the guaranteed number of kbit/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbit/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32 kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

0	No
1	Yes

<Maximum SDU size>: a numeric parameter (1,2,3,...) that indicates the maximum allowed SDU size in octets (refer 3GPP TS 24.008 subclause 10.5.6.5).

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as "mEe". As an example a target SDU error ratio of 5×10^{-3} would be

specified as "5E3" (e.g. AT+CGEQMIN=..., "5E3", ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as "mEe". As an example a target residual bit error ratio of 5×10^{-3} would be specified as "5E3" (e.g. AT+CGEQMIN=..., "5E3", ...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Delivery of erroneous SDUs>: a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

- 0 No
- 1 Yes
- 2 No detect

<Transfer delay>: a numeric parameter (0,1,2,...) that indicates the targeted time between request to transfer an SDU at one SAP to its delivery at the other SAP, in milliseconds (refer 3GPP TS 24.008 subclause 10.5.6.5).

<Traffic handling priority>: a numeric parameter (1,2,3,...) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SDUs of other bearers (refer 3GPP TS 24.008 subclause 10.5.6.5).

If a value is omitted for a particular class, then the value is considered to be unspecified.

4.21.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.21.5 Example

```

Run: AT+CGEQMIN=11,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
Response: OK
Run: AT+CGEQMIN?
Response: +CGEQMIN: 1,2,0,0,0,0,2,0,"0E0","0E0",3,0,0
+CGEQMIN: 11,2,0,0,0,0,2,0,"0E0","0E0",3,0,0

OK
Run: AT+CGEQMIN=?

```




```
Response: +CGEQMIN:
"IP", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (0-2)
, (0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6", "1E
1"), ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5", "1E
6", "6E8"), (0-3), (0,4100), (0-3)
+CGEQMIN:
"IPV6", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (0-
2), (0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6", "
1E1"), ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5", "
1E6", "6E8"), (0-3), (0,4100), (0-3)
+CGEQMIN:
"IPV4V6", (0-4), (0-11480), (0-42000), (0-11480), (0-42000), (
0-2), (0-1520), ("0E0", "1E2", "7E3", "1E3", "1E4", "1E5", "1E6"
, "1E1"), ("0E0", "5E2", "1E2", "5E3", "4E3", "1E3", "1E4", "1E5"
, "1E6", "6E8"), (0-3), (0,4100), (0-3)

OK
```

5 Serial Interface Control Commands

5.1 AT&C-Set Data Carrier Detection 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. ITU-T 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 1.

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 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-T 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)

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 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 (recommended default 0 i.e. 109 operation relates to detection of received signal).

5.3.3 Parameter Description

<value>:

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

5.3.4 Property Description

Saving upon Power-off	PIN
N	N

5.3.5 Example

- DSR line always is ON.

Run: AT&S0

Response: OK

- DSR line is ON when connected.

Run: AT&S1

Response: OK

5.4 AT+IPR-Set Fixed Data Rate

5.4.1 Command Syntax

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.

- 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.

5.4.3 Parameter Description

<rate>: the rate in bits per second at which the DTE-DCE interface should operate

0	Auto detect mode
Baud rate	Set fixed baud date

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.



NOTE

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

- At present, the ME909s supports the following autodetectable baud rates: 9600 bit/s, 19200 bit/s, 38400 bit/s, 57600 bit/s and 115200 bit/s.
- Fixed baud rates supported by ME909s: 300bit/s, 600bit/s, 1200bit/s, 2400bit/s, 4800bit/s, 9600bit/s, 19200bit/s, 38400bit/s, 57600bit/s, 115200bit/s, 230400bit/s, 1000000bit/s and 3000000bit/s

5.4.4 Property Description

Saving upon Power-off	PIN
Y	N

5.4.5 Example

- Set the baud rate as 115200:

Run: AT+IPR=115200

Response: OK

- Query current baud rate:

Run: AT+IPR?

Response: +IPR: 115200

OK

- List of supported fixed-only rates:

Run: AT+IPR=?

Response: +IPR:

(9600,19200,38400,57600,115200), (300,600,1200,2400,4800,9600,19200,38400,57600,115200,230400,1000000,3000000)

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 determines 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 5.4 AT+IPR-Set Fixed Data Rate). 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>: indicates 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>: indicates defined numeric value.

- 0 Odd (default value)
- 1 Even
- 2 Mark (not supported currently)
- 3 Space (not supported currently)



NOTE

- When using UART to do PS data service, sending the set command of AT+ICF will return ERROR.
- If <format> is not specified, it is equivalent to set <format> to 3.
- If <parity> is not specified, it is equivalent to set <parity> to 0.

5.5.4 Property Description

Saving upon Power-off	PIN
N	N

5.5.5 Example

```

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

              OK

Run:          AT+ICF?
Response:    +ICF: 3,0

              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

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

AT+IFC?
Possible Response(s)
<CR><LF>+IFC: <DCE_by_DTE>,<DTE_by_DCE><CR><LF><CR><LF>OK<CR><LF>

AT+IFC=?
Possible Response(s)
<CR><LF>+IFC: (list of supported <DCE_by_DTE>s),(list of supported <DTE_by_DCE>s)<CR><LF><CR><LF>OK<CR><LF>

5.6.2 Interface Description

This extended-format compound parameter controls 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 to be used by the DTE to control the flow of received data from the DCE.

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.
- If <DCE_by_DTE> is not specified, it is equivalent to set <DCE_by_DTE> to 0.
- If <DTE_by_DCE> is not specified, it is equivalent to set <DTE_by_DCE> to 0.
- If <DCE_by_DTE> is set to 2, <DTE_by_DCE> is not supported to be set to 0.
- If <DCE_by_DTE> is set to 0, <DTE_by_DCE> is not supported to be set to 2.

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><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 returns the current mode and the settings.

The test command returns 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 +CMUX command up to and including an interface speed of 9600 bit/s.

If AT+CMUX command is run 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 that indicates the multiplexer transparency mechanism.

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

<subset>: an integer type. This parameter defines 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>: integer type that 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

9	1000000 bit/s
10	1152000 bit/s
11	1500000 bit/s
12	2000000 bit/s
13	2500000 bit/s
14	3000000 bit/s

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

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

<T1>: an integer type that indicates the acknowledgement timer in units of ten milliseconds.

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

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

0–10 The default value is 3.

<T2>: an integer type that indicates the response timer for the multiplexer control channel in units of ten milliseconds.

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 that indicates the wake up response timer in seconds. (not supported currently)

1–255 The default value is 10.

<k>: an integer type that 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),(1-14),(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 sets the MT mode or restarts the MT.

The read command queries the current mode.

The test command returns 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 (previous mode must not be offline). (default value) |
| 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>

6.2.2 Interface Description

The set command verifies and unblocks PIN and PIN2.

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

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

- If the current password required is PUK or PUK2, run `AT+CPIN=<pin>[,<newpin>]` to unblock the PIN. In "`AT+CPIN=<pin>[,<newpin>]`", `<pin>` is the SIM PUK or SIM PUK2, and `<newpin>` is the new PIN or PIN2.
- If the set command is executed when PIN is not requested, `+CME ERROR: <err>` is returned.



NOTE

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

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

The test command returns supported <rsi> and <ber> values.

6.3.3 Parameter Description

<rsi>: indicates received signal strength indication.

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

<ber>: an integer type value that 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 selects phonebook memory storage <storage>, which is used by other phonebook commands. After the MT is restarted, the value of <storage> is restored to its default value "SM".

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

The test command returns supported phonebook storages.

6.4.3 Parameter Description

<storage>: indicates phonebook storage type.

"SM"	SIM/UICC phonebook
"ME"	NV phonebook (not supported currently)

- "ON" Phone number in (U)SIM/UICC card
- "EN" Emergency number in (U)SIM/UICC card
- "FD" SIM/USIM 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_{FDN} under DFTelecom is selected. If a UICC with an active USIM application is present, the information in EF_{FDN} under ADF_{USIM} is selected. (not supported currently)

<reserved>: reserved.

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

<total>: an integer type value that 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>, that indicates 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 that indicates the maximum length of field <number>. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 40.

<lenght>: an integer type value that indicates the maximum length of field <text>. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 90.

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
```



NOTE

The module will return the different value if the inserted SIM card is different.

- Query <index1>'s phonebook content (<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+CRSM-Restricted SIM Access

6.6.1 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>

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

In case of an MT-related error:

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

AT+CRSM=?

Possible Response(s)

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

6.6.2 Interface Description

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

The set command accesses the SIM card through restricted permissions.

6.6.3 Parameter Description

<command>: indicates 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 that 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 that indicates 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.

6.6.4 Property Description

Saving upon Power-off	PIN
NA	N

6.6.5 Example

- Read the current state of SIM folder:

Run: AT+CRSM=242

Response: +CRSM:
108,41,"62278202782183023F00A50D8001718302E573C104800F55FF
8A01058B032F0601C606900100830101"

OK



NOTE

- SW1=108
 - SW2=41
 - SIM
content="62278202782183023F00A50D8001718302E573C104800F55FF8A01058B032F0601C606900100830101"
 - These values are described in GSM 11.11.
- Run the test command:

Run: AT+CRSM=?

Response: OK

6.7 AT+CPBW-Write Phonebook Entry

6.7.1 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>

6.7.2 Interface Description

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

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

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



NOTE

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

The test command returns:

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

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

6.7.3 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>, that indicates 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>, that 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 that indicates the maximum length of field <number>. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 40.

<tlength>: an integer type value that indicates the maximum length of field <text>. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 90.

6.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.7.5 Example

- Set phonebook memory index 1's value as follows: <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

6.8 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 selects the volume of the internal loudspeaker of the MT.

The test command returns 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

Set 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 enables and disables the uplink voice muting during a voice call.

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

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

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

AT+CMIC=?
Possible Response(s)
<CR><LF>+CMIC: (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>

6.10.2 Interface Description

This command adjusts 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

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

The read command returns the current setting of the clock.

6.11.3 Parameter Description

<time>: a 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, and 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

```

7 UMTS Packet Domain Commands

7.1 AT+CGDCONT-Define PDP Context

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

7.1.1 Command Syntax

AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<IPv4AddrAlloc>[,<emergency indication>[,<PCSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>]]]]]]]]]
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>[,<IPv4AddrAlloc>[,<emergency indication>[,<PCSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>]]]]<CR><LF>+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<IPv4AddrAlloc>[,<emergency indication>[,<PCSCF_discovery>[,<IM_CN_Signalling_Flag_Ind>]]]][...]<CR><LF><CR><LF>OK<CR><LF>

AT+CGDCONT=?
Possible Response(s)

AT+CGDCONT=?

```
<CR><LF>+CGDCONT: (list of supported <cid>s),<PDP_type>,,(list of supported
<d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of
supported <emergency indication>s)[,(list of supported <PCSCF_discovery>s),(list of
supported <IM_CN_Signalling_Flag_Ind>s)]<CR><LF>+CGDCONT: (list of supported
<cid>s),<PDP_type>,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of
supported <IPv4AddrAlloc>s),(list of supported <emergency indication>s)[,(list of
supported <PCSCF_discovery>s),(list of supported
<IM_CN_Signalling_Flag_Ind>s)][...]<CR><LF><CR><LF>OK<CR><LF>
```

7.1.2 Interface Description

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

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

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

 **NOTE**

Because the LTE module needs a default PDP context (profile 0) to register on the LTE network, the default PDP context should not be removed. And the corresponding <cid> is 0, so you cannot execute AT+CGDCONT=0.

The read command queries 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>:

- | | |
|-------|---|
| 0-11 | Index of a PDP context. Other PDP-related commands can use this index to use the defined PDP context. |
| 12-20 | Reserved for internal use, not configurable. |
| 21-31 | Reserved for the network side for initiation of PDP context activation, not configurable. |

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

"IP"	Internet Protocol
"PPP"	Point to point protocol (not supported currently)
"IPV6"	IPV6 Protocol
"IPV4V6"	IPV4V6 Dual Stack

<APN>: a string parameter which is a logical name that is used to select the GGSN or the external packet data network. The maximum length of <APN> is 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.

0	Off
1	On
2	RFC1144 (applicable for SNDCP only)
3	RFC2507
4	RFC3095 (not supported currently)

**NOTE**

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

<IPv4AddrAlloc>: a numeric parameter that controls the mode for obtaining an IPv4 address. (not supported currently, it is invalid if the parameter is set)

0	NAS mode
1	DHCP mode

<emergency indication>: a numeric parameter that specifies whether PDP can be used for emergency bearer services. (not supported currently, it is invalid if the parameter is set).

- 0 PDP cannot be used for emergency bearer services.
- 1 PDP can be used for emergency bearer services.

<PCSCF_discovery>: an integer type value indicates how the MT/TA requests to get the P-CSCF address.

- 0 Preference of P-CSCF address discovery not influenced by AT+CGDCONT
- 1 Preference of P-CSCF address discovery through NAS signalling
- 2 Preference of P-CSCF address discovery through DHCP

<IM_CN_Signalling_Flag_Ind>: an integer type value indicates to the network whether the PDP context is for IM CN subsystem-related signalling only or not.

- 0 UE indicates that the PDP context is not for IM CN subsystem-related signalling only.
- 1 UE indicates that the PDP context is for IM CN subsystem-related signalling only.

7.1.4 Property Description

Saving upon Power-off	PIN
Y	N

7.1.5 Example

```

Run:          AT+CGDCONT=?
Response:     +CGDCONT:
              (0-11), "IP", , , (0-2), (0-3), (0,1), (0,1), (0-2), (0,1)
              +CGDCONT:
              (0-11), "IPV6", , , (0-2), (0-3), (0,1), (0,1), (0-2), (0,1)
              +CGDCONT:
              (0-11), "IPV4V6", , , (0-2), (0-3), (0,1), (0,1), (0-2), (0,1)

              OK

Run:          AT+CGDCONT?

```

```
Response: +CGDCONT: 0,"IP","vcol.com","0.0.0.0",0,0,0,0,0,0
          +CGDCONT: 11,"IP","xyz.com","0.0.0.0",0,0,0,0,0,0

          OK
```



NOTE

The MT saves one PDP context, and the <cid> value of this context is 10.

```
Run: AT+CGDCONT=10,"IP","abc.com"

Response: OK
```



NOTE

This command saves one PDP context to the MT and the <cid> value is 10.

```
Run: AT+CGDCONT?

Response: +CGDCONT: 0,"IP","vcol.com","0.0.0.0",0,0,0,0,0,0
          +CGDCONT: 10,"IP","abc.com","0.0.0.0",0,0,0,0,0,0
          +CGDCONT: 11,"IP","xyz.com","0.0.0.0",0,0,0,0,0,0

          OK
```



NOTE

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

```
Run: AT+CGDCONT=10

Response: OK
```



NOTE

This command removes the PDP context with <cid>=10.

```
Run: AT+CGDCONT?

Response: +CGDCONT: 0,"IP","vcol.com","0.0.0.0",0,0,0,0,0,0
          +CGDCONT: 11,"IP","xyz.com","0.0.0.0",0,0,0,0,0,0

          OK
```



NOTE

The response shows that the PDP context with <cid>=10 has been removed.

7.2 AT+CGACT-Activate or Deactivate PDP Context

7.2.1 Command Syntax

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

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

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

7.2.2 Interface Description

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

The read command queries the defined PDP Activation state.

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

7.2.3 Parameter Description

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

- 0 Deactivated
- 1 Activated

<cid>: the index of a PDP context, specifies a particular PDP context definition, see 7.1
AT+CGDCONT-Define PDP Context.

7.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.2.5 Example

- Query the value range of PDP Activation state:

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

OK
```

- Query the current PDP Activation state:

```
Run:          AT+CGACT?
Response:     +CGACT: 1,0
              +CGACT: 21,0
              +CGACT: 22,0
              +CGACT: 23,0
              +CGACT: 24,0
              +CGACT: 25,0
              +CGACT: 26,0
              +CGACT: 27,0
              +CGACT: 28,0
              +CGACT: 29,0
              +CGACT: 30,0
              +CGACT: 31,0

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 attaches the MT to, or detaches the MT from the PS domain service. After the command has been completed, the MT remains in ITU-T V.25 ter command state. If the MT is already in the requested state, the command is ignored and OK is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR: <err> 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 the detachment state.

The read command queries the current GPRS service state.

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

7.3.3 Parameter Description

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

- 0 Detached
- 1 Attached

Other values are reserved and will result in an ERROR response to the 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>]

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

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

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

7.4.2 Interface Description

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

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

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

The test command returns the <n>'s values supported by the UE.

7.4.3 Parameter Description

<n>:

- 0 Disable unsolicited result code +CGREG. (default value)
- 1 Enable unsolicited result code +CGREG: <stat>.

- 2 Enable network registration and location information unsolicited result code
+CGREG: <stat>[,<lac>,<ci>[,<AcT>,<rac>]].



NOTE

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

<stat>:

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

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

<ci>: a string type value that 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 |
| 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 |



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 that indicates one byte routing area code in hexadecimal format.
(not supported currently)

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+CIREG-IMS Registration Information

7.5.1 Command Syntax

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

AT+CIREG?
Possible Response(s)
<CR><LF>+CIREG: <n>,<reg_info><CR><LF><CR><LF>OK<CR><LF>

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

7.5.2 Interface Description

The set command controls the presentation of an unsolicited result code +CIREGU: <reg_info> when there is a change in the MT's IMS registration information.

The read command returns <n>, that shows whether reporting is enabled or disabled, <reg_info> that shows whether one or more of the public user identities are registered.

The test command returns the supported values for <n> as a compound value.

7.5.3 Parameter Description

<n>: an integer type that enables or disables reporting of changes in the MT's IMS registration information.

- 0 Disable reporting.
- 1 Enable reporting (parameter <reg_info>).



NOTE

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

<reg_info>: an integer type indicates the IMS registration status. The UE is seen as registered as long as one or more of its public user identities are registered with any of its contact addresses, see 3GPP TS 24.229.

- 0 Not registered.
- 1 Registered.

7.5.4 Property Description

Saving upon Power-off	PIN
N	N

7.5.5 Example

```

Run:          AT+CIREG=1
Response:    OK

Run:          AT+CIREG?
Response:    +CIREG: 0,1

              OK

Run:          AT+CIREG=?

```


Response: +CIREG: (0-1)

 OK

7.6 AT+CGSMS-SMS Bearer Domain

7.6.1 Command Syntax

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

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

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

7.6.2 Interface Description

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

The read command queries the current SMS bearer domain.

The test command returns the supported parameter values.

7.6.3 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.

7.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.6.5 Example

- Query the value range of SMS bearer domain:

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

- Query the current domain type which SMS used:

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

- Set the SMS bearer domain type:

```
Run:          AT+CGSMS=0  
Response:     OK  
  
Run:          AT+CGSMS=1  
Response:     OK  
  
Run:          AT+CGSMS=2  
Response:     OK
```

7.7 AT+CGPADDR-Show PDP Address

7.7.1 Command Syntax

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

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

7.7.2 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.

7.7.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 7.1 AT+CGDCONT-Define PDP Context and AT+CGDCONT (refer to 3GPP TS 27.007 subclause 10.1.2)). 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 7.1 AT+CGDCONT-Define PDP Context and AT+CGDCONT 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.

7.7.4 Property Description

Saving upon Power-off	PIN
NA	Y



7.7.5 Example

- If the terminal is configured with two profiles numbered 1 and 10:

```
Run:          AT+CGPADDR=?  
  
Response:     +CGPADDR: (1,10)  
  
              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><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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

AT+CPMS=?
Possible Response(s)
<CR><LF>+CPMS: (list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>s)<CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

8.1.2 Interface Description

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

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

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

8.1.3 Parameter Description

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

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

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

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

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

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

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

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

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

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

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



NOTE

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

8.1.4 Property Description

Saving upon Power-off	PIN
N	Y

8.1.5 Example

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

```
Run:          AT+CPMS=?
Response:     +CPMS: ("SM"), ("SM"), ("SM")

OK
```

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

```
Run:          AT+CPMS?
Response:     +CPMS: "SM", 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, 23, 0, 23, 0, 23

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)

AT+CMGF?
<CR><LF>+CMGF: <mode><CR><LF><CR><LF>OK<CR><LF>

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

8.2.2 Interface Description

The set command sets the message format. The format is specified by <mode>, which can be either PDU mode or text mode.

The read command queries the currently selected mode.

The test command returns available values of <mode>.

8.2.3 Parameter Description

<mode>:

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



NOTE

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

8.2.4 Property Description

Saving upon Power-off	PIN
N	N

8.2.5 Example

Set the message format to PDU format:

Run : AT+CMGF=0

Response : OK



NOTE

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

8.3 AT+CNMI-New Message Indications to TE

8.3.1 Command Syntax

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

AT+CNMI?
Possible Response(s)
<CR><LF>+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr><CR><LF><CR><LF>OK<CR><LF>

AT+CNMI=?
Possible Response(s)
<CR><LF>+CNMI: (list of supported <mode>s),(list of supported <mt>s),(list of supported <bm>s),(list of supported <ds>s),(list of supported <bfr>s)<CR><LF><CR><LF>OK<CR><LF>

8.3.2 Interface Description

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

The read command queries the current parameter values.

The test command returns 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.

8.3.3 Parameter Description

<mode>: controls how new message indications are sent.

- | | |
|---|---|
| 0 | Buffer SMS-DELIVER indications in the ME. If the ME buffer is full, then the oldest indication is overwritten by the latest indication. (default value) |
|---|---|

- 1 Directly send SMS-DELIVER indications to the TE. When a SMS-DELIVER indication cannot be sent (for example, when in online data mode), it will be discarded.
- 2 Directly send SMS-DELIVER indications and message status reports to the TE. When a SMS-DELIVER indication and message status report cannot be sent (for example, when in online data mode), they are buffered in the ME and sent to the TE when they can be sent.

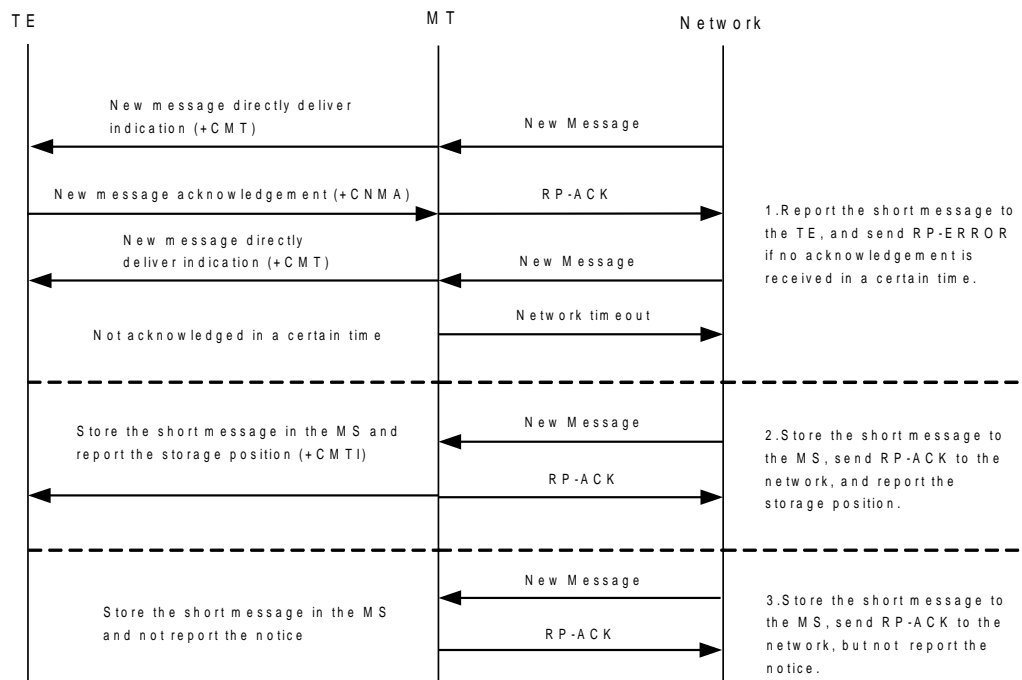
**NOTE**

SMS-DELIVER indications are buffered in the MT's volatile memory. If the MT is powered off before the indications are sent, messages may be lost. Therefore, when <mode> is set to 0 or 2, messages are not recommended to be directly sent to the TE (that is, <mt> is not supported 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 (AT+CMGF=0):
+CMT: [<reserved>],<length><CR><LF><pdu>
 - If text mode enabled (AT+CMGF=1):
+CMT:
<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>
- 3 Stores SMS-DELIVER indications on the MT, but does not send SMS-DELIVER indications to the TE.

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



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

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

 **NOTE**

- The SMS class is defined by the TP-DCS domain of the SMS. For details, see the description of <DCS> in 9.14 AT+CMGS-Send Message (PDU Mode).
- +CMT & +CNMA indicates that the TE is required to send the confirmation (+CNMA).

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

- 0 No CBM indications are routed to the TE. (default value)
- 1 If CBM is stored into ME/TA, indication that the memory location is routed to the TE using unsolicited result code:
+CBMI: <mem>,<index> (not supported currently)

- 2 New CBMs are routed directly to the TE using unsolicited result code:
 - If PDU mode enabled (AT+CMGF=0):
+CBM: <length><CR><LF><pdu>
 - If text mode enabled (AT+CMGF=1):
+CBM: <sn>,<mid>,<dc>,<page>,<pages><CR><LF><data>
 - If ME supports data coding groups which define special routing also for messages other than class 3 (e.g. (U)SIM specific messages), ME may choose not to route messages of such data coding schemes into TE (indication of a stored CBM may be given as defined in <bm>=1).
- 3 Class 3 CBMs are routed directly to TE using unsolicited result codes defined in <bm>=2. If CBM storage is supported, messages of other classes result in indication as defined in <bm>=1. (not supported currently)

Table 8-1 <bm> parameter

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

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

- 0 Do not send message status reports. (default value)
- 1 Do not store message status reports to the MT and directly send the reports to the TE.
 - If PDU mode enabled (AT+CMGF=0):
+CDS: <length><CR><LF><pdu>
 - If text mode enabled (AT+CMGF=1):
+CDS: <fo>,<mr>,[<ra>],[<tora>],[<scts>,<dt>,<st>
- 2 Store message status reports to the MT and send the storage location to the TE using +CDSI.
+CDSI: <mem>,<index>

<bfr>:

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

8.3.4 Property Description

Saving upon Power-off	PIN
N	N

8.3.5 Example

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

8.4 AT+CNMA-New Message Acknowledgement (PDU Mode)

8.4.1 Command Syntax

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

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

AT+CNMA[=<n>[,<length>[<CR>PDU is given<ctrl-Z/ESC>]]]
<CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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

8.4.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. For the use of this command, see 8.3 AT+CNMI-New Message Indications to TE.



NOTE

- Set AT+CSMS=1 before AT+CNMI is set.
- 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 9.14 AT+CMGS-Send Message (PDU Mode), except that the format of <ackpdu> is used instead of <pdu>. PDU shall not be bounded by double quotation marks.

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

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

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

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

8.4.3 Parameter Description

<n>:

- 0 Command operates similarly as defined for the text mode.
- 1 Send RP-ACK (or buffered result code received correctly).
- 2 Send RP-ERROR.

<ackpdu>: indicates 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 (I), Bit (b), 2 bits (2b), octet (o).
- Depending on TP-DCS.

Number of Octets	7	6	5	4	3	2	1	0	
1	-	-	-	-	-	-	-	-	TP-MTI, TP-UDHI
1	-	-	-	-	-	-	-	-	TP-PI
0,1	-	-	-	-	-	-	-	-	TP-PID
0,1	-	-	-	-	-	-	-	-	TP-DCS
0,1	-	-	-	-	-	-	-	-	TP-UDL
0 to 159	-	-	-	-	-	-	-	-	TP-UD

Bits 7 and 2-5 of the first byte are not used in SMS-DELIVER-REPORT. The sender should set them to zero. If any of those bits is not zero, it will be omitted by the recipient.

Description of the basic elements:

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

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

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

<TP-UD>: indicates the user data field may contain a user data header. If the header is contained (that is, the value of bit 6 in byte 0 is 1), the value of TP-UDL equals to the length of the User-Data-Header plus the length of the User-Data. The value of <TP-UDL> depends on the encoding scheme:

- If the default encoding scheme (7-bit encoding) is used, <TP-UDL> indicates the number of septets contained in the user data.
- If the 8-bit encoding scheme is used, <TP-UDL> indicates the number of octets contained in the user data.
- If the UCS2 encoding scheme is used, <TP-UDL> also indicates the number of octets contained in the user data.
- If 7-bit, 8-bit or UCS2 compression encoding is used, <TP-UDL> indicates the number of octets contained in the compressed user data.

Figure 8-1 and Figure 8-2 illustrate the formats of the user data encoded using different schemes.

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

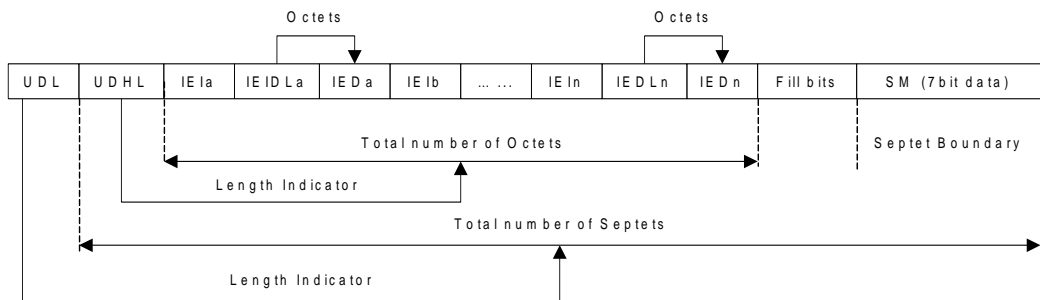
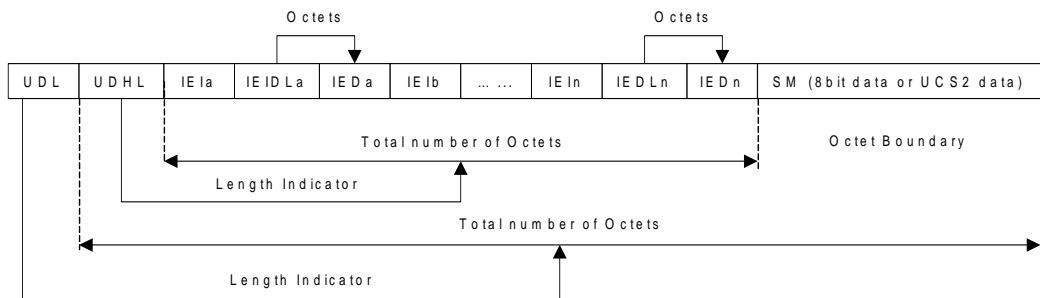


Figure 8-2 User data encoded using the 8-bit or UCS2 encoding scheme



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

8.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.4.5 Example

- Firstly, set AT commands orderly as follows:

Run: AT+CSMS=1

Response: +CSMS: 1,1,1

OK

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

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: ,24
0891683108608805F9240D91683109731147F40000313050124360000
4F4F29C0E

Run: AT+CNMA

Response: OK

8.5 AT+CNMA-New Message Acknowledgement (Text Mode)

8.5.1 Command Syntax

If text mode enabled (AT+CMGF=1):

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

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

8.5.2 Interface Description

The 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 8.3 AT+CNMI-New Message Indications to TE.



NOTE

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

8.5.3 Parameter Description

None

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, 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 that 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 deletes the message at location <index> in the storage <mem1>. For details about <mem1>, see 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>.
- If the deletion fails, +CMS ERROR: <err> is returned.

The test command returns 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 using the execution command:

Run : AT+CMGD=1

Response: OK

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

Run : AT+CMGD=1, 4

Response: OK

8.9 AT+CSCB-Select Cell Broadcast Message Types

8.9.1 Command Syntax

AT+CSCB=[<mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

AT+CSCB?
Possible Response(s)
<CR><LF>+CSCB: <mode>,<mids>,<dcss><CR><LF><CR><LF>OK<CR><LF>

AT+CSCB=?

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

8.9.2 Interface Description

The set command selects which types of CBMs are to be received by the ME.

The test command returns supported modes as a compound value.

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

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

8.9.4 Property Description

Saving upon Power-off	PIN
N	Y

8.9.5 Example

- Set the accepted type of CBMs to be message types specified in <mids> and <dcss>.

Run: AT+CSCB=0

Response: OK

- Query the current accepted type of CBMs, and only the combination of <mids> is returned.

Run: AT+CSCB?

Response: +CSCB: 0, "0–65535", ""

OK



- Query the supported modes.

Run: AT+CSCB=?

Response: +CSCB: (0,1)

OK

9 SMS Service Interface (3GPP)

9.1 +CMT-New Message Directly Deliver Indication (PDU Mode)

9.1.1 Command Syntax

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

URC
Possible Response(s)
<CR><LF>+CMT: [<reserved>],<length><CR><LF><pdu><CR><LF>

9.1.2 Interface Description

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

9.1.3 Parameter Description

<reserved>: reserved.

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

<pdu>: indicates protocol data unit. For details about the PDU format, see 9.14 AT+CMGS-Send Message (PDU Mode).

9.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.1.5 Example

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

<p>Response: +CMT: ,24 0891683108608805F9240D91683109731128 F50000411061518333000462B1580C</p>	<p>Presents an indication, without solicitation, when the message storage is full.</p>
---	--

9.2 +CMT-New Message Directly Deliver Indication (Text Mode)

9.2.1 Command Syntax

If text mode enabled (AT+CMGF=1):

URC
Possible Response(s)
<CR><LF>+CMT: <oa>,<[alpha]>,<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data><CR><LF>

9.2.2 Interface Description

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

9.2.3 Parameter Description

For parameters, see 9.15 AT+CMGS-Send Message (Text Mode).

9.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.2.5 Example

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

```

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

9.3 +CDS-SMS Status Report Indication Directly Displayed (PDU Mode)

9.3.1 Command Syntax

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

URC
Possible Response(s)
<CR><LF>+CDS: <length><CR><LF><pdu><CR><LF>

9.3.2 Interface Description

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

9.3.3 Parameter Description

<length>: an integer type value that indicates 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 9.14 AT+CMGS-Send Message (PDU Mode).

The structure of TPDU data is as follows:

Abbr.	Reference	P1)	R2)
TP-MTI	TP-Message-Type-Indicator	M	2b
TP-UDHI	TP-User-Data-Header-Indication	O	b
TP-MMS	TP-More-Messages-to-Send	M	b
TP-SRQ	TP-Status-Report-Qualifier	M	b
TP-MR	TP-Message-Reference	M	I

Abbr.	Reference	P1)	R2)
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	



NOTE

- Mandatory (M) or Optional (O).
- Integer (I), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2-12 octets (2-12o).

9.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.3.5 Example

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

```
Response: +CDS: 26
          0891683108608805F906F80D91683109731128F54110615183330041106
          15183630000
```

9.4 +CDS-SMS Status Report Indication Directly Displayed (Text Mode)

9.4.1 Command Syntax

If text mode enabled (AT+CMGF=1):

URC

URC
Possible Response(s)
<CR><LF>+CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF>

9.4.2 Interface Description

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

9.4.3 Parameter Description

For parameters, see 9.15 AT+CMGS-Send Message (Text Mode).

9.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

9.4.5 Example

If MS does not store message status reports received to the MT and directly sends 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","12/03/1
                3,12:10:39+00",0
```

9.5 AT+CSCA-Service Center Address

9.5.1 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?

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

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

9.5.2 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 9.14 AT+CMGS-Send Message (PDU Mode)).

9.5.3 Parameter Description

<sca>: a string type value that specifies the SMSC address. '*', '#', '+' and '0'-'9' are allowed in the SMSC address. The maximum length of the SMSC address is 20 characters (excluding '+').

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in 9.14 AT+CMGS-Send Message (PDU Mode).

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



NOTE

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

9.5.4 Property Description

Saving upon Power-off	PIN
Y	Y

9.5.5 Example

Sets the service center number using the test command:


```
Run:          AT+CSCA="8613800688509",145
Response:    OK
```

9.6 AT+CSMS-Select Messaging Service

9.6.1 Command Syntax

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

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

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

9.6.2 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 queries supported message types along the current service setting.

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

9.6.3 Parameter Description

<service>: indicates a messaging service type.

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

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

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

9.6.4 Property Description

Saving upon Power-off	PIN
N	N

9.6.5 Example

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

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

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

9.7.1 Command Syntax

If text mode enabled (AT+CMGF=1):

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

AT+CSMP?
Possible Response(s)
<CR><LF>+CSMP: <fo>,<vp>,<pid>,<dcs><CR><LF><CR><LF>OK<CR><LF>

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

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

9.7.2 Interface Description

The set command selects 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 queries the supported parameters.

9.7.3 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 EVVPF is supported, in enhanced format (hexadecimal coded string with double quotes).

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

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

9.7.4 Property Description

Saving upon Power-off	PIN
N	Y

9.7.5 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 7 bit using the set command:

Run: AT+CSMP=,,,0

Response: OK

9.8 AT+CMGL-List Messages (PDU Mode)

9.8.1 Command Syntax

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

AT+CMGL[=<stat>]
Possible Response(s)
<p>If the command is executed successfully:</p> <p>[<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></p>
<p>Otherwise:</p> <p><CR><LF>+CMS ERROR: <err><CR><LF></p>

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

9.8.2 Interface Description

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

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

9.8.3 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



NOTE

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

<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 9.14 AT+CMGS-Send Message (PDU Mode).

For the TPDU format of messages to be sent, see 9.14 AT+CMGS-Send Message (PDU Mode). The TPDU format for received messages is described in the following table.

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

<MTI>: see the definition in 9.14 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 9.14 AT+CMGS-Send Message (PDU Mode).

<RP>: see the definition in 9.14 AT+CMGS-Send Message (PDU Mode).

<OA>: indicates originating address. Its definition is the same as <sca>. There are a total of 2-12 octets. Therefore, the longest address in the <oa> field contains 20 digits.

<PID>: indicates protocol identifier. See the definition in 9.14 AT+CMGS-Send Message (PDU Mode).

<DCS>: indicates use data coding scheme. See the definition in 9.14 AT+CMGS-Send Message (PDU Mode).

<SCTS>: indicates 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>: indicates user data length. See the definition in 9.14 AT+CMGS-Send Message (PDU Mode).

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

9.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.8.5 Example

List all the received unread messages using the execution command:

```
Run:          AT+CMGL=0
Response:    +CMGL: 1,0,,25
              0891683108608805F9040D91683109730147F200002150716172350005
              F4F29C4E03
              OK
```

9.9 AT+CMGL-List Messages (Text Mode)

9.9.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGL[=<stat>]

AT+CMGL[=<stat>]
Possible Response(s)
<p>If command successful and SMS-SUBMITs and/or SMS-DELIVERs:</p> <pre><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></pre>
<p>If command successful and SMS-COMMANDs:</p> <pre><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></pre>
<p>If command successful and SMS-COMMANDs:</p> <pre><CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[<CR><LF><CR><LF>+CMGL: <index>,<stat>,<fo>,<ct>[...]]<CR><LF><CR><LF>OK<CR><LF></pre>
<p>If command successful and CBM storage:</p> <pre><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></pre>
<p>Otherwise:</p> <pre><CR><LF>+CMS ERROR: <err><CR><LF></pre>

AT+CMGL=?
Possible Response(s)
<pre><CR><LF>+CMGL: (list of supported <stat>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>

9.9.2 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.

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

9.9.3 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 9.15 AT+CMGS-Send Message (Text Mode), or refer to GSM 07.05.



NOTE

- The <oa/da>, <tooa/toda>, and <data> fields are controlled by AT+CSCS.
- If <stat> is not specified, it is equivalent to set <stat> to "REC UNREAD".

9.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.9.5 Example

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

```
Run:          AT+CMGL="ALL"

Response:    +CMGL: 2,"REC READ", "+8613903710742", , "12/05/17,16:12:30+00"
              test1

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

              OK
```


9.10 AT+CMGR-Read Message (PDU Mode)

9.10.1 Command Syntax

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

AT+CMGR=<index>
Possible Response(s)
<CR><LF>+CMGR: <stat>,[<reserved>],<length><CR><LF><pdu><CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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

9.10.2 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.

9.10.3 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>: indicates protocol data unit. For details about the PDU format, see 9.14 AT+CMGS-Send Message (PDU Mode).

9.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.10.5 Example

Read the message stored in index 1:

```
Run:          AT+CMGR=1

Response:    +CMGR: 1,,25
             0891683108608805F9040D91683109730147F200002150716172350005
             F4F29C4E03

             OK
```

9.11 AT+CMGR-Read Message (Text Mode)

9.11.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGR=<index>
Possible Response(s)
If command successful and SMS-DELIVER: <CR><LF>+CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<des>,<sca>,<tosca>,<length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF>
If command successful and SMS-SUBMIT: <CR><LF>+CMGR: <stat>,<da>,[<alpha>],[<toda>,<fo>,<pid>,<des>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data><CR><LF><CR><LF>OK<CR><LF>
If command successful and SMS-STATUS-REPORT: <CR><LF>+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st><CR><LF><CR><LF>OK<CR><LF>
If command successful and SMS-COMMAND: <CR><LF>+CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>]<CR><LF><cdata>]<CR><LF>><CR><LF>OK<CR><LF>

AT+CMGR=<index>
If command successful and CBM storage: <CR><LF>+CMGR: <stat>,<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data><CR><LF><CR><LF>OK<CR><LF>
Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF>

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

9.11.2 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.

9.11.3 Parameter Description

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

For other parameters, see 9.15 AT+CMGS-Send Message (Text Mode).



NOTE

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

9.11.4 Property Description

Saving upon Power-off	PIN
------------------------------	------------

Saving upon Power-off	PIN
NA	Y

9.11.5 Example

Read the message stored in index 4:

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

9.12 AT+CMGW-Write Message to Memory (PDU Mode)

9.12.1 Command Syntax

If PDU mode enabled (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>

9.12.2 Interface Description

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

9.12.3 Parameter Description

<length>: indicates 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>: indicates the 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 9.14 AT+CMGS-Send Message (PDU Mode).

9.12.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.12.5 Example

```
Run: AT+CMGF=0
Response: OK
Run: AT+CMGW=56
Response: >
Run: 07813108608805F911000B813109732008F70000FF30547419347EBB
E965371DF13683DAE5F93C7C2E83EE693A1A0427D741ED37B90C3ABF
CB7310BA2C2F8342<Ctrl-Z>
Response: +CMGW: 10
OK
```

9.13 AT+CMGW-Write Message to Memory (Text Mode)

9.13.1 Command Syntax

If text mode enabled (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>

9.13.2 Interface Description

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

9.13.3 Parameter Description

<oa/da>: indicates 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 subclause 3.1)

<tooa/toda>: indicates 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

9.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.13.5 Example

For examples of this command, see 9.15 AT+CMGS-Send Message (Text Mode).

9.14 AT+CMGS-Send Message (PDU Mode)

9.14.1 Command Syntax

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

AT+CMGS=<length><CR>PDU is given<ctrl-Z/ESC>
Possible Response(s)
<CR><LF>+CMGS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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

9.14.2 Interface Description

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

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

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

9.14.3 Parameter Description

<length>: indicates number of actually sent TPDU characters/2 in decimal format ranging from 0 to 9, and maximum length is 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. This field is not supported currently.

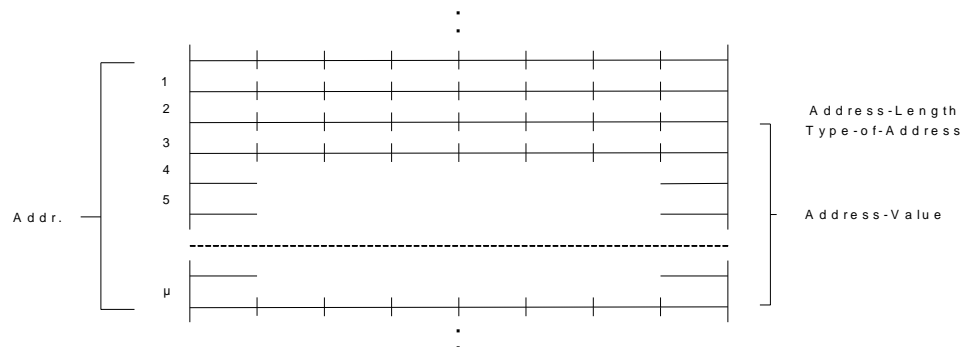
<ctrl-Z>: indicates the end of a PDU. The characters are "0x1A".

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

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

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

<SCA>: indicates SCA. Its structure is illustrated in the following figure.



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

<type_addr>: indicates 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:

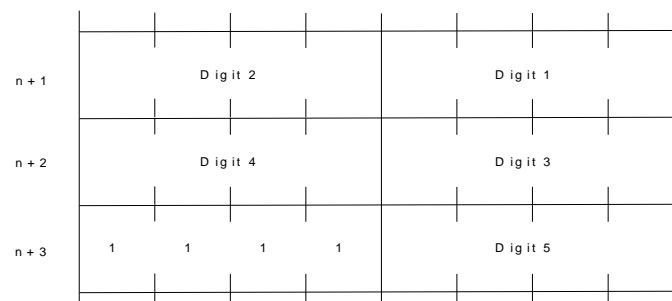


NOTE

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>: indicates 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.

1 Octet								1 Oct	2 Oct-1 2 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0-14 0 Oct
RP	UDHI	SR R	VPF		RD	MTI		MR	DA	PID	DC S	VP	UD L	UD
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	-	-	-	-	-	-	-

<MTI>: indicates message type.

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.

0 Yes

1 No

<VPF>: indicates the validity and format of the VP field.

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.

- 0 No
- 1 Yes. The message reply uses the same SC number and path for sending the message.

<UDHI>: indicates user data header indication.

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

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

<DA>: indicates 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>: indicates protocol identifier.

PID							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

Bit7	Bit6	(At present, Bit 7=0 and Bit 6=0.)
0	0	Allocate bits 0-5.
1	0	Allocate bits 0-5.
0	1	Reserved
1	1	Allocate bits 0-5 for special purpose of the SC.

The values of bit 5 are defined as follows:

- 0 No interworking, but SME-to-SME protocol
- 1 Telematic interworking (in this case, the values of bit 4-0 are valid.)

Bit 4...bit 0: telematic devices type indication

If bit4...bit 0 are 10010, it indicates email. Other values are not supported currently.

<DCS>: indicates user data coding scheme.

Bits 7...4		Bits 3...0	
00xx	Bit 5	0: Message is not compressed.	Bit 1 Bit 0: message type indication. 0 0: Class 0, displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message. 0 1: Class 1, stored to NV (or SIM card if the NV is full) 1 0: Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure. 1 1: Class3, stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE. Bit 3 Bit 2: message type indication 0 0: GSM 7-bit encoding scheme; default. 0 1: 8-bit encoding scheme 1 0: UCS2 encoding scheme. TE uses this value when the user inputs Chinese characters. 1 1: reserved
		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.	
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.	

Bits 7...4		Bits 3...0
1101	The message is stored. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.	Bit 3: enables or disables message waiting indication. 0: disables message waiting indication 1: enables message waiting indication Bit 2: reserved. The value is 0. Bit 1 Bit 0: message type indication. 0 0: voice message waiting 0 1: fax message waiting 1 0: email message waiting 1 1: message of unknown type waiting
1110	The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.	The settings of bits 3...0 are the same as those when bits 7...4=1101.
1111	Data coding/message class	Bit 3: reserved. The value is 0. Bit 2: message encoding scheme. Its values are defined as follows: 0: GSM 7-bit encoding scheme; default. 1: 8-bit encoding scheme Bit 1 Bit 0: message type indication. 0 0: Class 0, displayed on the user interface but not stored. A response is sent to the SC to acknowledge the reception of the message. 0 1: Class 1, stored to NV (or SIM card if the NV is full) 1 0: Class 2. Messages are stored to the SIM card only. After a class 2 message is stored, the storage state will be sent to the SC. If the SIM card is full, a response is sent to the SC to notify it of the occurrence and cause of message storage failure. 1 1: Class3, stored to the TE. When the MT receives the message, it sends a response to the SC before routing the message to the TE.

<VP>: indicates the validity period, which starts from the time when the message is received by the SC. If <VPF>=00, this field is omitted. The following table lists the validity periods.

VP Value	Validity Period
0 to 143	(VP + 1) x 5 minutes
144 to 167	12 hours + ((VP - 143) x 30 minutes)
168 to 196	(VP - 166) x 1 day
197 to 255	(VP - 192) x 1 week

<UDL>: indicates 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>: indicates user data. Its data validity depends on <UDL>.

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

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

<scts>: indicates 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.

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

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in 9.14 AT+CMGS-Send Message (PDU Mode).

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

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

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

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

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

9.14.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----

Saving upon Power-off	PIN
NA	Y

9.14.5 Example

The SMS center number is 13902900. The target number is 13901000453. The content is 0x53 0x4E 0x4E 0x3A (the UCS2 codes for the Chinese characters "华为").

If the AT+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 AT+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 AT+CSCA command.)

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

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

AT+CMGS=17

>05a13109920081000B813109010054F3001804534E4E3A \x1A

9.15 AT+CMGS-Send Message (Text Mode)

9.15.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMGS=<da>[,<toda>]<CR>text is entered<ctrl-Z/ESC>
Possible Response(s)
<CR><LF>+CMGS: <mr><CR><LF><CR><LF>OK<CR><LF>

AT+CMGS=<da>[,<toda>]<CR>text is entered<ctrl-Z/ESC>
In case of an MS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>

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

9.15.2 Interface Description

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

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

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

9.15.3 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 subclause 3.1).

<toda>: indicates 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".

9.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.15.5 Example

- Set the message format to text format.

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

- Set the data coding scheme to UCS2.

```
Run:          AT+CSMP=,,0,8
Response:     OK
```

- Set the service center number.

```
Run:          AT+CSCA="8613800688509",145
Response:     OK
```

- Set the TE's character set to UCS2 encoding.

```
Run:          AT+CSCS="UCS2"
Response:     OK
```

- End the message to the destination address "13312345678" that must be enclosed in double quotation marks.

```
Run:          AT+CMGS="00310033003300310032  The message content is the
003300340035003600370038"  UCS2 codes for the Chinese
>534E4E3A                 characters "华为".
\x0x1A                   Press <ctrl-z> (0x1A) to stop
                           entering message content and
                           send the message.

Response:     +CMGS: 6      The message is successfully
                           sent.
                           OK
```

9.16 AT+CMSS-Send Message from Storage (PDU Mode)

9.16.1 Command Syntax

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

AT+CMSS=<index>[,<da>[,<toda>]]
Possible Response(s)
If sending successful: <CR><LF>+CMSS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF>
If sending fails: <CR><LF>+CMS ERROR: <err><CR><LF>

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

9.16.2 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. This command should be aborted.

<da> is limited by AT+CSCS.

9.16.3 Parameter Description

<index>: an integer type; value in the range of location numbers supported by the associated memory.

<da>: 3GPP TS 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS 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 the default value is 129).

For the response parameter description of this command, see 9.14 AT+CMGS-Send Message (PDU Mode).

9.16.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.16.5 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

9.17 AT+CMSS-Send Message from Storage(Text Mode)

9.17.1 Command Syntax

If text mode enabled (AT+CMGF=1):

AT+CMSS=<index>[,<da>[,<tda>]]
Possible Response(s)
If sending successfully: <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>

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

9.17.2 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 AT+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. This command should be aborted.

<da> is controlled by AT+CSCS.

9.17.3 Parameter Description

<scts>: indicates 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 9.15 AT+CMGS-Send Message (Text Mode).

9.17.4 Property Description

Saving upon Power-off	PIN
NA	Y

9.17.5 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

10 Standard STK Interface Commands

10.1 +CUSATP-Unsolicitedly Report a UICC Proactive Command

10.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CUSATP: <proactive_command><CR><LF>

10.1.2 Interface Description

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

10.1.3 Parameter Description

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

10.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.1.5 Example

Unsolicitedly report a proactive command "GET INPUT".

Response: +CUSATP:
"D01A8103012300820281828D0B043C54494D452D4F55543E9102000A"

10.2 AT+CUSATE-Send USAT Envelope

10.2.1 Command Syntax

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

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

10.2.2 Interface Description

This command sends a USAT envelope command to UICC.

10.2.3 Parameter Description

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

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

<busy>: an integer type.

- | | |
|---|---|
| 0 | Normal ending of the envelope command |
| 1 | UICC responded with USAT is busy, retry to send the envelope command by the MT. |

- 2 UICC responded with USAT is busy even after one or more retries by the MT.

10.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.2.5 Example

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

```
Run:          AT+CUSATE="D30782020181900102"
Response:    +CUSATE: "",0
             OK
```

10.3 AT+CUSATT-Send USAT Terminal Response

10.3.1 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>

10.3.2 Interface Description

This command sends a USAT terminal response to UICC.

10.3.3 Parameter Description

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

10.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.3.5 Example

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

Response: +CUSATP: "D0158103012100820281028D0404434154"

Run: AT+CUSATT="810301218082028281830100"

Response: OK

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

10.4.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+CUSATEND<CR><LF>

10.4.2 Interface Description

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

10.4.3 Parameter Description

None



10.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.4.5 Example

- As the following, the proactive command is reported:

```
Response:  +CUSATP:  
           "D04B810301250082028182050D53494D205365727669636573FF8F0D87  
           50686F6E65206E756D6265728F0B8553656C662053657276658F1080537  
           0656369616C204E756D626572731803212421"
```

- Then user sends the terminal response:

```
Run:       AT+CUSATT="810301258082028281830100"  
Response:  OK
```

- Then the CUSATEND will be reported as following:

```
Response:  +CUSATEND
```

11 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

11.1 AT^CURC-Set Presentation of Unsolicited Results

11.1.1 Command Syntax

AT^CURC=<mode>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^CURC?
Possible Response(s)
<CR><LF>^CURC: <mode><CR><LF><CR><LF>OK<CR><LF>

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

11.1.2 Interface Description

The set command selects the control mode for the presentation of unsolicited results.

The read command queries the current control mode for the presentation of unsolicited results.

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



11.1.3 Parameter Description

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

- 0 The presentation of the unsolicited indications in Table 11-1 is disabled.
- 1 Enable the presentation of the unsolicited indications. (default value)

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

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

11.1.4 Property Description

Saving upon Power-off	PIN
N	N

11.1.5 Example

- Set <mode> to 0:
Run: AT^CURC=0
Response: OK

- Set <mode> to 1:

Run: AT^CURC=1

Response: OK

11.2 ^SYSSTART-Unsolicitedly Report Module Startup

11.2.1 Command Syntax

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

11.2.2 Interface Description

This unsolicited indication notifies the TE when the ME is powered on or reset.

11.2.3 Parameter Description

None

11.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

11.2.5 Example

Notify the TE when the ME is powered on or reset:

Response: ^SYSSTART

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

11.3.1 Command Syntax

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

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

AT^WAKEUPCFG=?
Possible Response(s)
<CR><LF>^WAKEUPCFG: (list of supported <n>s),(list of supported <channel>s),(list of supported <source>s)<CR><LF><CR><LF>OK<CR><LF>

11.3.2 Interface Description

This command enables and disables the module's Remote Wake-up feature, and sets 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.

11.3.3 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.

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

- 0x01 PIN Wake-up
- 0x02 USB Remote Wakeup
- 0x03 PIN + USB Wake-up
- 0x04–0x80 Reserved

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[4]	Bit[3]	Bit[2]	Bit[1]	Bit[0]
Undefined	GPS	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).

11.3.4 Property Description

Saving upon Power-off	PIN
Y	N

11.3.5 Example

- The set command if only support USB Remote Wakeup:

Run: AT^WAKEUPCFG=1,2,7

Response: OK

- Read command:

Run: AT^WAKEUPCFG?

Response: ^WAKEUPCFG: 1,2,7

OK

- Test command:

Run: AT^WAKEUPCFG=?

Response: ^WAKEUPCFG: (0-1), (0-3), (0-31)

OK

11.4 AT^ICCID-Query the ICCID

11.4.1 Command Syntax

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

AT^ICCID=?

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

11.4.2 Interface Description

This command queries the ICCID of a SIM card no matter the PIN is entered or not.

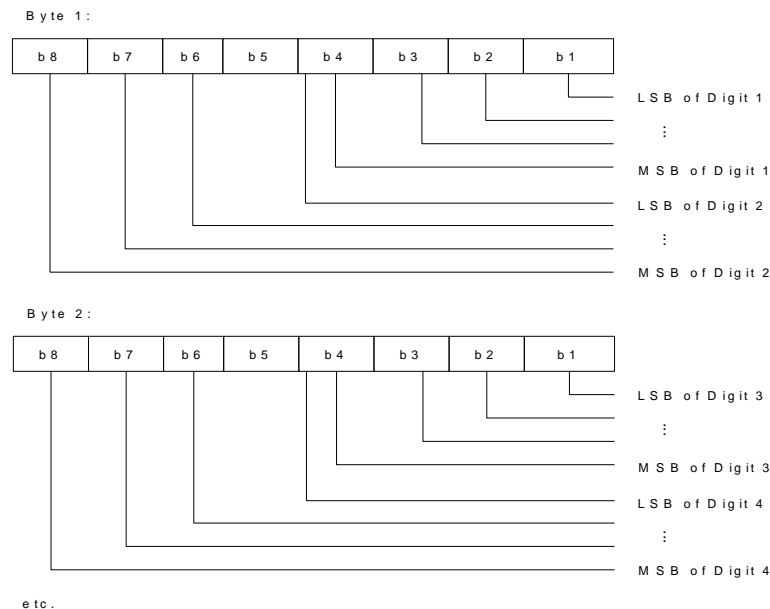
11.4.3 Parameter Description

<iccid>: a string value type that indicates ICCID, containing up to 20 characters.



NOTE

The ICCID uniquely identifies an IC card. The ICCID is saved in the EF_{ICCID} file and consists of 10 bytes. The following figure shows the relationship between the ICCID and information in the EF_{ICCID} file (for details, see the GSM 11.11 protocol).



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

11.4.4 Property Description

Saving upon Power-off	PIN
NA	N

11.4.5 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

11.5 AT^CPIN-Manage PIN

11.5.1 Command Syntax

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

AT^CPIN?
Possible Response(s)
<CR><LF>^CPIN: <code>[,<times>],<puk_times>,<pin_times>,<puk2_times>,<pin2_times><CR><LF><CR> ><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^CPIN=?
Possible Response(s)
<CR><LF>OK<CR><LF>

11.5.2 Interface Description

The set command verifies and unblocks PIN and PIN2.

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

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



NOTE

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

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

11.5.3 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 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.

11.5.4 Property Description

Saving upon Power-off	PIN
N	N

11.5.5 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,,10,3,10,3    Indicate a password is not
                                                required.
                                                OK
Run:          AT^CPIN=?
Response:    OK
```

11.6 AT^CARDMODE-Query SIM/USIM Card Type

11.6.1 Command Syntax

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

11.6.2 Interface Description

This command queries the type of the currently installed SIM/USIM card. If the SIM/USIM card does not exist, or an error occurs during the query, +CME ERROR: <err> is returned. For details about the CME errors, see 27.2 General CME Error List.

11.6.3 Parameter Description

<sim_type>: indicates SIM/USIM card type.

0 No card found



- 1 SIM card
- 2 USIM card
- 3 CSIM card (only for dual-mode data cards)
- 4 UIM card (only for dual-mode data cards)

11.6.4 Property Description

Saving upon Power-off	PIN
NA	N

11.6.5 Example

```
Run:          AT^CARDMODE
Response:    ^CARDMODE: 3
             OK
```

11.7 ^SIMRESET-Unsolicitedly Report SIM Reset Event

11.7.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SIMRESET: <type><CR><LF>

11.7.2 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.

11.7.3 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 TS 31.111). 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 TS 31.111). If the PIN code is enabled, re-entering the PIN is requested.
Other values	Reserved

11.7.4 Property Description

Saving upon Power-off	PIN
NA	N

11.7.5 Example

Response: ^SIMRESET: 2

11.8 AT^MSO-Shutdown Command

11.8.1 Command Syntax

AT^MSO[=<value>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^MSO=?
Possible Response(s)
<CR><LF>^MSO: (list of supported <value>s)<CR><LF><CR><LF>OK<CR><LF>

11.8.2 Interface Description

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

11.8.3 Parameter Description

<value>: an integer indicates the time in seconds which the MT will wait. When <value> is 65535 and the MT is waiting, it will cancel the AT^MSO actions.

11.8.4 Property Description

Saving upon Power-off	PIN
NA	N

11.8.5 Example

```

Run:          AT^MSO
Response:    OK

Run:          AT^MSO=15
Response:    OK

Run:          AT^MSO=?
Response:    ^MSO: (0-60, 65535)

              OK
    
```

11.9 AT^CPBR-Read the Phonebook

11.9.1 Command Syntax

AT^CPBR=<index1>[,<index2>]
Possible Response(s)
[<CR><LF>^CPBR: <index1>,<number>,<type>,<text>,<coding>[[...]<CR><LF>^CPBR: <index2>,<number>,<type>,<text>,<coding>]<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>

AT^CPBR=?
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

11.9.2 Interface Description

This command returns the phonebook entries between index1 and index2 in the currently selected phonebook memory. If no phonebook entry is available in all positions between index1 and index2, +CME ERROR: not found is returned.

If only <index1> is specified, only the phonebook records of index1 are returned.

The position range of the currently selected phonebook memory and the maximum lengths of <number> and <text> are returned when the test command is executed.

11.9.3 Parameter Description

<index1>, <index2>, <index>: integer type values that specify the position in the phonebook.

<number>: a string with double quotation marks that specifies a phone number.

<type>: specifies the number type. The value ranges from 128 to 255. 145 indicates an international number, and 129 indicates a national number. For details, refer 3GPP TS 24.008 subclause 10.5.4.7. When the first character in the read phone number is '+', <type> is set to 145 automatically.

<text>: a string with double quotation marks that specifies a name. When <coding> is set to 1, which indicates that <text> is the hex text of original data.

<coding>: specifies the encoding format, indicating the character code of the <text> field, and the language.

- 1 RAW mode (<text> is uploaded in the original data format.)
- 2 ASCII (<text> is uploaded in the original keyboard value.)

<nlength>: an integer type value that specifies the maximum length of a phone number. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 40.

<llength>: an integer type value that specifies the maximum length of a name. When the memory is "SM", the maximum value depends on the UICC. When the memory is "ME", the maximum value is 90.

11.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.9.5 Example

```
Run:          AT^CPBR=1

Response:    ^CPBR: 1,"13902934081",129,"82038363800031",1

              OK
```



NOTE

In the above command, the parameter values mean the following:

- 1 (position of the record in the memory)
- "13902934081" (phone number)
- 129 (number type)
- "82038363800031" (菜@1)
- 1 (name encoding format UCS2)

11.10 AT^IOCTRL-Control the GPIO

11.10.1 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>

11.10.2 Interface Description

This command controls the GPIO's actions.

The set command sets the GPIO to high voltage or low voltage.

The read command queries the GPIO current state.

The test command returns supported values as a compound value.

This command controls n GPIO pins and the corresponding relationship between the GPIO and LGA pin (from right to left) are as follows.

GPIO PIN: n ... 5 4 3 2 1
LGA PIN: xx ... xx xx xx xx xx



NOTE

n and xx are defined according to the module's features.

11.10.3 Parameter Description

<sel>: enables GPIOs.

0000000	Disable any GPIO.
0000001	Enable GPIO1.
0000010	Enable GPIO2.
0101101	Enable or disable some GPIO.
1111111	Enable all GPIO.

<options>: sets the GPIO's mode.

0000000	All GPIOs are in input mode. (default value)
0000001	GPIO1 is in output mode; others are in input mode.
0000010	GPIO2 is in output mode; others are in input mode.
0101100	Set some GPIO's mode.
1111111	All GPIOs are in output mode.



NOTE

Only when the GPIO is enabled, setting the GPIO's mode can take effect.

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

0000000	Set all GPIOs to LOW. (default value)
0000001	Set GPIO1 to HIGH, others to LOW.
0000010	Set GPIO2 to HIGH, others to LOW.
0101010	Set some GPIO's value.
1111111	Set all GPIOs to HIGH.

11.10.4 Property Description

Saving upon Power-off	PIN
N	N

11.10.5 Example

- Query the GPIO state:

```
Run:          AT^IOCTRL?
Response:     ^IOCTRL: 0000000,0000000

                OK
```

- Set the GPIO state:

```
Run:          AT^IOCTRL=1111111,1111000,0011000
Response:     OK
```

11.11 AT^ADCREADEX-Query the ADC Value

11.11.1 Command Syntax

AT^ADCREADEX=<id>
Possible Response(s)
<CR><LF>^ADCREADEX: <adc_value><CR><LF><CR><LF>OK<CR><LF>

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

11.11.2 Interface Description

This command queries the ADC value of the ADC pin. The obtained value is the raw data without unit conversion. The number of ADC pins varies with products.

11.11.3 Parameter Description

<id>: the query ID.

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

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

11.11.4 Property Description

Saving upon Power-off	PIN
N	N

11.11.5 Example

- Query the ADC value of the input voltage:

Run: AT^ADCREADEX=1

Response: ^ADCREADEX: 460

OK

- The test command:

Run: AT^ADCREADEX=?

Response: ^ADCREADEX: (1-2)

OK

11.12 AT^CARDLOCK-Card Lock Administration

11.12.1 Command Syntax

AT^CARDLOCK?
Possible Response(s)
<CR><LF>^CARDLOCK: <status>,<times>,<operator><CR><LF><CR><LF>OK<CR><LF>

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

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

AT^CARDLOCK=?
Possible Response(s)
<CR><LF>OK<CR><LF>

11.12.2 Interface Description

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

The set command unlocks the MT's SIM lock.

- If the correct unlock code is entered, the MT's SIM lock will be removed permanently. The MT can work with any SIM card and the unlock code will never be requested. After the MT's SIM lock is removed permanently or the MT's SIM lock is disabled, if a unlock code is entered, +CME ERROR: 3 will be returned.
- If the number of consecutive incorrect unlock code entry attempts exceeds 10 (the number of consecutive incorrect unlock code entry can be specified. Generally, it is 10), the MT's SIM lock will be locked permanently. The MT can only work with valid SIM card. After the MT's SIM lock is locked permanently, if a unlock code is entered again, +CME ERROR: 3 will be returned.

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

- When the MT's SIM lock is locked permanently, no matter that the MT's SIM card is locked or not, 3 is returned for <status>.
- When the MT's SIM lock is removed permanently or the MT's SIM lock is disabled, no matter that the MT's SIM card is locked or not, 2 is returned for <status>.

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



NOTE

An MT without IMEI will not be locked.

11.12.3 Parameter Description

<status>: an integer type value that indicates the lock status of the module currently.

- | | |
|---|--|
| 1 | Unlocked code need to be provided. |
| 2 | Unlocked code need not to be provided. |
| 3 | The module is locked forever. |

<times>: an integer type value that indicates remain times of the attempt of unlock the module. The value ranges is 0 to 10. When this parameter value is 0, it means this module is locked forever. After the module is unlocked, this parameter has no use.

<operator>: an integer type value that indicates which operator locks this module. In fact it is the operator's PLMN ID.

- | | |
|-------|--|
| 24202 | Netcom Norway locks this module. (not supported currently) |
| 46000 | Mobile China locks this module. (not supported currently) |
| 0 | No any operators lock this module. |

<unlock_code>: a string type value that specifies the unlock code for the MT. Each MT has a unique unlock code.

11.12.4 Property Description

Saving upon Power-off	PIN
NA	N

11.12.5 Example

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

```
Run : AT^CARDLOCK?
Response: ^CARDLOCK: 2,10,0
OK
```

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



```

Run:          AT^CARDLOCK?
Response:    ^CARDLOCK: 1,10,0

              OK

Run:          AT^CARDLOCK="11111111"
Response:    OK                               The MT is unlocked and the SIM
                                                lock is removed permanently.

Run:          AT^CARDLOCK?
Response:    ^CARDLOCK: 2,10,0

              OK
    
```

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

```

Run:          AT^CARDLOCK?
Response:    ^CARDLOCK: 3,0,0

              OK
    
```

11.13 AT^LEDCTRL-Control LED GPIO PIN

11.13.1 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_duration2>,<OFF_duration2>]][...]<CR><LF><CR><LF>OK<CR><LF>

AT^LEDCTRL=?

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>

11.13.2 Interface Description

The set command controls the blinking mode for modules:

- When the <mode> is set to 0, the blinking function of modules is disabled;
- when the <mode> is set to 1, Huawei's default blinking mode is used;
- Users can set the blinking mode for modules in different service states using this command.

The read command queries the blinking mode of the current module.

The test command returns the supported parameters.

11.13.3 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

Parameter Value	Service Status
00000200	Data transmission in WCDMA mode
00000400	Radio bearer establishment success in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00000800	Data transmission in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00001000	Registration success in LTE mode
00002000	Dial-up success in LTE mode
00004000	Data transmission in LTE mode
3FFFFFFF	All service states

<index>: indicates GPIO pin of the LED indicator. The length is 8 bits and the valid value ranges from 1 to 7.

The least significant 3 bits (Bit [2-0]) indicate the GPIO pin configuration of the LED indicator.

- 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.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	Reserved	Pin 3	Pin 2	Pin 1

<ON_duration1>: an integer value type that indicates the duration for first pulling up the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<OFF_duration1>: an integer value type that indicates the duration for first pulling down the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<ON_duration2>: an integer value type that indicates the duration for second pulling up the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value ranges from 1 to 100 (unit: 100 ms).

<OFF_duration2>: an integer value type that indicates the duration for second pulling down the GPIO pin of the LED indicator specified by the <index> during a blinking period. The value 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.

11.13.4 Property Description

Saving upon Power-off	PIN
Y	N

11.13.5 Example

- Configure the blinking mode in airplane state. Set the indicator to be on for 100 ms and then off for 1900 ms and activate the GPIO pin 1 of the LED indicator.

Run: AT^LEDCTRL=2,00000001,1,1,19

Response: OK

- Query the current blinking mode. The indicator is steady off in airplane, power-on and initiation, no service, and network disconnection states, and on for 100 ms and then off for 1900 ms in a service period in other states.

Run: AT^LEDCTRL?

Response: ^LEDCTRL: 2,00000001,1,1,19

OK

- Query the parameter range supported by the AT^LEDCTRL command.

Run: AT^LEDCTRL=?

Response: ^LEDCTRL:
(0-2),00007FFF,(0-1),(1-100),(1-100),(1-100),(1-100)

OK

NOTE

If the user sets the blinking mode in a service state to be steady off, the returned index value is 1 by default when querying the blinking configuration in the service state.

11.14 AT^SLEEPCFG-Configure Module's Sleep Function by Host

11.14.1 Command Syntax

AT^SLEEPCFG=<para>,<value>
Possible Response(s)

AT^SLEEP_CFG=<para>,<value>
<CR><LF>OK<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^SLEEP_CFG=?
Possible Response(s)
<CR><LF>^SLEEP_CFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

11.14.2 Interface Description

This command adjusts some module sleep-related parameters to cooperate with the host in harmony.

The set command sets the sleep configuration parameters.

The read command queries the settings of the sleep configuration parameters.

The test command returns all supported sleep configuration parameters.

11.14.3 Parameter Description

<para>: specifies the sleep configuration parameter to set.

- 0 Delay time of SMS report when the module wakes up the host by PIN channel.
- 1 Delay settings to allow UART to sleep when UART has no data.

<value>: specifies the value for the sleep configuration parameter to set.

- If <para> is set to 0, the available values for <value> are an integer ranging from 0 to 10000. The unit of the <value> is millisecond, and the default value is 2000.
- If <para> is set to 1, the available values for <value> are an integer ranging from 1 to 3600. The unit of the <value> is second and the default value is 10.

It takes effect immediately after the parameter is set. The setting value of the parameter can not be changed if the module is powered off or restarted, but will be changed if the module's firmware is upgraded.

11.14.4 Property Description

Saving upon Power-off	PIN
Y	N

11.14.5 Example

- Configure the delay time of SMS report to 3000 ms:

Run: AT^SLEEPCFG=0,3000

Response: OK

- Configure the time to allow UART to sleep when UART has no data

Run: AT^SLEEPCFG=1,6

Response: OK

- Run the read command:

Run: AT^SLEEPCFG?

Response: ^SLEEPCFG: 0,3000
^SLEEPCFG: 1,6

OK

- Run the test command:

Run: AT^SLEEPCFG=?

Response: ^SLEEPCFG: (0-1)

OK

11.15 ^CPBREADY-Unsolicitedly Report CPB Ready

11.15.1 Command Syntax

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



11.15.2 Interface Description

This command sends an unsolicited report to TE when phonebook is ready.

11.15.3 Parameter Description

<status>: indicates whether phonebook is ready.

0 Indicates that the phonebook is not ready.

1 Indicates that the phonebook is ready.

11.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

11.15.5 Example

Response: ^CPBREADY: 1

11.16 AT^SIMSWITCH-Switch the SIM Card

11.16.1 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>



11.16.2 Interface Description

The set command specifies which SIM card to switch.

The read command queries the current SIM card selection.

The test command returns the supported parameter values.

11.16.3 Parameter Description

<n>: an integer type value.

- 0 Use SIM CARD2
- 1 Use SIM CARD1 (default value)

11.16.4 Property Description

Saving upon Power-off	PIN
NA	N

11.16.5 Example

```
Run:          AT^SIMSWITCH=0
Response:     OK

Run:          AT^SIMSWITCH?
Response:     ^SIMSWITCH: 0

                OK

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

                OK
```

11.17 AT^SIMSWITCHCFG-Change the SIMSWITCH Mode

11.17.1 Command Syntax

AT^SIMSWITCHCFG=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^SIMSWITCHCFG?
Possible Response(s)
<CR><LF>^SIMSWITCHCFG: <n><CR><LF><CR><LF>OK<CR><LF>

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

11.17.2 Interface Description

The set command sets SIMSWITCH mode.

The read command returns the current SIMSWITCH mode.

The test command returns the supported parameter values.

11.17.3 Parameter Description

<n>: integer type

- 0 Use M2M SIMSWITCH mode (solution A/B/C).
- 1 Use vehicle-mounted SIMSWITCH mode (solution D).

Setting the parameter to other values will return an ERROR response.

11.17.4 Property Description

Saving upon Power-off	PIN
Y	N



11.17.5 Example

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

11.18 ^EXSIMST-External SIM Card Status Indication

11.18.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^EXSIMST: <sim_state><CR><LF>

11.18.2 Interface Description

This command reports the external SIM card status when an external SIM card is inserted into the card slot and properly identified or is completely removed from the card slot.

11.18.3 Parameter Description

<n>: integer type

- 0 The external SIM card has been removed.
- 1 An external SIM card has been inserted.

Setting the parameter to other values will return an ERROR response.

11.18.4 Property Description

Saving upon Power-off	PIN
------------------------------	------------



Saving upon Power-off	PIN
NA	N

11.18.5 Example

None

11.19 AT^RESET-Reset the Module

11.19.1 Command Syntax

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

11.19.2 Interface Description

This command is used to reset the module.

11.19.3 Parameter Description

None

11.19.4 Property Description

Saving upon Power-off	PIN
N	N

11.19.5 Example

Run: AT^RESET

Response: OK

11.20 AT^TDSPLMNCFG-Set the TDS Feature

11.20.1 Command Syntax

AT^TDSPLMNCFG=<num>,<plmn>,...<plmn>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^TDSPLMNCFG?
Possible Response(s)
<CR><LF>^TDSPLMNCFG: <num>,<plmn>,...<plmn><CR><LF><CR><LF>OK<CR><LF>

AT^TDSPLMNCFG=?
Possible Response(s)
<CR><LF>OK<CR><LF>

11.20.2 Interface Description

The set command sets a maximum of six IMSI PLMNs for the TDS feature. The settings take effect after the module is restarted.

The test command returns "OK".

The read command returns the current IMSI PLMN.



NOTE

If UTRAN mode on the module is not set to AUTO, running this command will return an ERROR response.

11.20.3 Parameter Description

<num>: an integer type that specifies the number of IMSI PLMNs to be set. The value range is 1 to 6.

<plmn>: character string that contains only digits and specifies the IMSI PLMN.

11.20.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----



Saving upon Power-off	PIN
Y	N

11.20.5 Example

```

Run:          AT^TDSPLMNCFG=3,46000,46004,46007
Response:     OK
Run:          AT^TDSPLMNCFG?
Response:     ^TDSPLMNCFG: 3,46000,46004,46007

                OK
Run:          AT^TDSPLMNCFG=?
Response:     OK

```

11.21 AT^GLASTERR-Query the Latest Error Code for a Specific Function

11.21.1 Command Syntax

AT^GLASTERR=<type>
Possible Response(s)
<CR><LF>^GLASTERR: <type>,<code><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

AT^GLASTERR=?
Possible Response(s)
<CR><LF>^GLASTERR: (list of supported <type>s)<CR><LF><CR><LF>OK<CR><LF>

11.21.2 Interface Description

This command queries the latest error code for a function. Currently, only the error codes for the dial-up function can be queried.

11.21.3 Parameter Description

<type>: function for which the latest error code you want to query.

0	Reserved
1	CS registration (default value)
2	PS registration
3	CS and PS joint registration
4	PDP context activation
5	Dial-up (only supported on the Balong platform)
6-255	Reserved

<code>: error code. The value range is 0 to 65535.



NOTE

When <type> is set to 1, the value and definition of <code> are the same as those of <err_code> in 20.2 ^NDISSTAT-Unsolicitedly Report of Connection Status

11.21.4 Property Description

Saving upon Power-off	PIN
N	Y

11.21.5 Example

```
Run:          AT^GLASTER=?
Response:     ^GLASTER: (0-255)

              OK
```

11.22 AT^WAKEUPBYPIN-Enable and Disable the Judgment of the USB Status in Remote Pin Wake-up

11.22.1 Command Syntax

AT^WAKEUPBYPIN=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^WAKEUPBYPIN?
Possible Response(s)
<CR><LF>^WAKEUPBYPIN: <n><CR><LF><CR><LF>OK<CR><LF>

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

11.22.2 Interface Description

This command enables and disables the judgment of the USB status in the module's remote pin wake-up feature.

11.22.3 Parameter Description

<n>: indicates whether PIN-based wake on LAN (WOL) is controlled by USB port status.

0	Yes
1	No

11.22.4 Property Description

Saving upon Power-off	PIN
Y	N

11.22.5 Example

```

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

          OK

Run:      AT^WAKEUPBYPIN?
Response: WAKEUPBYPIN: 0

          OK

Run:      AT^WAKEUPBYPIN=1
Response: OK

```

11.23 AT^SETETHNUM - Configure the ECM ports

11.23.1 Command Syntax

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

AT^SETETHNUM?
Possible Response(s)
<CR><LF>^SETETHNUM: <num><CR><LF><CR><LF>OK<CR><LF>

AT^SETETHNUM=?
Possible Response(s)
<CR><LF>^SETETHNUM: (list of supported <num>s)<CR><LF><CR><LF>OK<CR><LF>

11.23.2 Interface Description

This command is used to Configure ECM ports upon USB port reports ECM port numbers.

11.23.3 Parameter Description

<num>: indicates ECM port numbers.

- 1 MT report one ECM port (default).
- 2 MT report double ECM ports.
- 3 MT report three ECM ports.

 **NOTE**

When the software version with multiple ECM ports recovers from an earlier version, this command must be reset.

11.23.4 Property Description

Saving upon Power-off	PIN
Y	N

11.23.5 Example

```
Run: AT^SETETHNUM=?
Response: ^SETETHNUM: (1,2,3)

OK

Run: AT^SETETHNUM=1
Response: OK

Run: AT^SETETHNUM?
Response: ^SETETHNUM: 1

OK
```

11.24 AT^NDISALIVE-NDIS Dial-up in Linux

11.24.1 Command Syntax

AT^NDISALIVE=<state>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^NDISALIVE=<state>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^NDISALIVE?
Possible Response(s)
<CR><LF>^NDISALIVE: <state><CR><LF> <CR><LF>OK<CR><LF>

AT^NDISALIVE=?
Possible Response(s)
<CR><LF>^NDISALIVE: (0-1)<CR><LF> <CR><LF>OK<CR><LF>

11.24.2 Interface Description

This command is used to enable or disable NDISALIVE. When NDISALIVE is enabled, the module is not powered off in Linux. NDIS dial-up is not interrupted in case of USB reset.

NOTE

This command works only in Linux.

As the module cannot determine whether the USB RESET is triggered by the user, or by other scenarios (electrical exception of the USB's bus, normal USB power failure, and more), the host needs to issue a command to enable this feature, so that other scenarios will not be affected, and disable this feature when the device is woken up.

11.24.3 Parameter Description

<state>: an integer type.

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

11.24.4 Property Description

Saving upon Power-off	PIN
NA	N



11.24.5 Example

Run: AT^NDISALIVE=1

Response: OK

Run: AT^NDISALIVE?

Response: ^NDISALIVE: 1

OK

Run: AT^NDISALIVE=?

Response: ^NDISALIVE: (0,1)

OK

12 Huawei Proprietary Interface: Voice Call Interface

12.1 ^ORIG-Indicate the Origination of a Call

12.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ORIG: <call_x>,<call_type><CR><LF>

12.1.2 Interface Description

This command indicates that the MT is originating a call.

12.1.3 Parameter Description

<call_x>: an integer with a product-specific value that specifies the call ID, uniquely identifying the call.

<call_type>: specifies the call type.

- | | |
|---|--|
| 0 | Voice call |
| 1 | CS domain data call (GW) (not supported currently) |
| 2 | PS domain data call (GW) |
| 3 | CDMA SMS call (not supported currently) |
| 7 | OTA call (standard OTASP numbers) (not supported currently) |
| 8 | OTA call (non-standard OTASP numbers)(not supported currently) |
| 9 | Emergency call |

12.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.1.5 Example

Dial a normal number:

Response: ^ORIG: 1,0

12.2 ^CSCHANNELINFO-Report the Voice Narrowband and Broadband Information Unsolicitedly

12.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^CSCHANNELINFO: <status>,<voice_domain><CR><LF>

12.2.2 Interface Description

This command unsolicitedly reports the voice channel status during calls.

- If the network side sends the ALERTING message, network-based playback is unavailable. (Requirement for network-based playback: A progress indicator IE indicates user attachment if it specifies a progress description in the set {1, 2, 3} or in the set {6, 7, 8, ..., 20}.) In this case, the AP side will play the ringtone locally.
- If there is an air interface message that carries the progress indicator where the value of progress description is {1, 2, 3} or {6, 7, 8, ..., 20}, the network side sends a message to indicate that network-based playback is available. In this case, the AP side will stop the local ringtone playback and start the network-based playback.

12.2.3 Parameter Description

< status >:

- 0 Ringing without inband signal information
- 1 Inband signal available, narrowband audio
- 2 Inband signal available, broadband audio (not supported currently)

<voice_domain>: an integer type that specifies the call domain for voice calls.

- 0 CS domain
- 1 IMS domain

12.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.2.5 Example

- The call domain of voice calls is CS and the audio channel status is ringing without inband signal information:

Response: ^CSCHANNELINFO: 0,0

- The call domain of voice calls is CS and the audio channel status switches from broadband audio to narrowband audio:

Response: ^CSCHANNELINFO: 1,0

- The call domain of voice calls is IMS and the audio channel is in broadband audio state: (not supported currently)

Response: ^CSCHANNELINFO: 2,0

12.3 ^CONF-Ringback Tone Indication

12.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^CONF: <call_x><CR><LF>

12.3.2 Interface Description

If an MT receives a ringback tone after initiating a call, the MT presents this indication to the TE.

12.3.3 Parameter Description

<call_x>: an integer type with a product-specific value that specifies the call ID.

12.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.3.5 Example

Dial a normal number:

Response: ^CONF: 1

12.4 ^CONN-Call Connection Indication

12.4.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^CONN: <call_x>,<call_type><CR><LF>

12.4.2 Interface Description

When a call is connected, the MT presents this indication to the TE, indicating that a call starts.

12.4.3 Parameter Description

<call_x>: an integer type with a product-specific value that specifies the call ID, uniquely identifying the call.

<call_type>: specifies the call type.

- 0 Voice call
- 1 CS domain data call (GW) (not supported currently)

- 2 PS domain data call (GW)
- 3 CDMA SMS call (not supported currently)
- 7 OTA call (standard OTASP numbers) (not supported currently)
- 8 OTA call (non-standard OTASP numbers)(not supported currently)
- 9 Emergency call

12.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.4.5 Example

Answer a normal number:

Response: ^CONN: 1,0

12.5 ^CEND-Call End Indication

12.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^CEND: <call_x>,<duration>,<end_status>[,<cc_cause>]<CR><LF>

12.5.2 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.

12.5.3 Parameter Description

<call_x>: an integer type with a product-specific value that specifies the call ID.

<duration>: specifies call duration in the unit of second.

<end_status>: specifies call end cause.

<end_status>	Comments
0	The board is in offline mode.
21	The board is out of service.
22	The call is ended abnormally.
23	The call is interrupted by the BS.
24	A BS record is received during the call.
25	The BS releases the call.
26	The BS rejects the current SO service.
27	A call from the BS is received.
28	A ringing stop signaling is received during the call.
29	The call is ended normally at the client.
30	The activation is ended during the OTASP call.
31	The MC stops initiating the call or stops the call.
34	The RUIM does not exist.
99	The NDSS fails.
100	The call is released from the bottom layer, and <cc_cause> must be queried.
101	The network fails to respond.
102	The MT rejects an incoming call.
103	The call is rejected during setup.
104	The call is released from the network, and <cc_cause> must be queried.
105	The fund runs out.
106	The MT is out of service.

<cc_cause>: specifies call control information.

- 0 Success, no cause
- 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
260	IMSI unknown in VLR
262	Illegal ME
273	Network failure
278	Congestion



281	Not authorized for this CSG
288	Service option not supported
289	Requested service option not subscribed
290	Service option temporarily out of order
515	Illegal UE
518	Illegal ME
519	EPS services not allowed
521	UE identity cannot be derived by the network
522	Implicitly detached
523	PLMN not allowed
524	Tracking area not allowed
525	Roaming not allowed in this tracking area
527	No suitable cells in tracking area
530	CS domain not available
534	Congestion
537	Not authorized for this CSG
547	Requested service option not authorized in this PLMN
551	CS service temporarily not available
552	No EPS bearer context activated
1537	rr conn fail congestion
1538	rr conn fail unspecified
1539	rr conn fail access bar
1540	rr conn fail est conn fail
1541	rr conn fail immediate assign reject
1542	rr conn fail random access reject
1543	rr conn fail t3122 running
1544	rr conn fail no rf
1545	rr conn fail low level searching network
1546	rr conn fail random access send fail
1547	rr conn fail no valid info
1548	rr conn fail ue not allow
1549	rr conn fail time out
1550	rr conn fail no random access resource



1551	rr conn fail invalid immediate assigned msg
1552	rr conn fail active physical channel fail
1553	rr conn fail air msg decode error
1554	rr conn fail current protocol not support
1555	rr conn fail invalid ue state
1556	rr conn fail cell barred
1557	rr conn fail fast return to lte
1558	rr conn fail ra fail no valid info
1559	rr conn fail rj inter rat
1792	auth reject
1793	rr rel normal event
1794	rr rel normal unspecified
1795	rr rel preemptive release
1796	rr rel congestion
1797	rr rel reest rej
1798	rr rel directed signal conn reest
1799	rr rel user inactive
1800	rr rel utran release
1801	rr rel rrc error
1802	rr rel rl failure
1803	rr rel other reason
1804	rr rel no rf
1805	rr rel rlc error
1806	rr rel cell up date fail
1807	rr rel nas rel req
1808	rr rel conn fail
1809	rr rel nas data absent
1810	rr rel t314 expired
1811	rr rel w rl fail
2048	lmm local fail
2049	auth reject
2050	T3417 time out
2051	app detach service



2052	cn detach service
2053	others
2054	emm state
2055	sms only
2056	ps only
2057	tau collision abnormal
2304	forbidden LA
2305	Forbidden others
2306	cs access bar
2307	cs detach
2308	cs sim invalid
2309	cs service congestion
2310	T3230 timer out
2311	searching network
2312	inter rat system change
2313	not support cs call s1 mode only
2314	out of coverage
2315	attempting to update
2316	CSFB already exists
2317	resume to gu fail
2318	Ti invalid
2319	wait est cnf time out
2320	cc conn req exist
2321	UE invalid state
2322	wait cc reest time out
2323	back to LTE
2324	resume to EHRPD
2325	Send sapi3 fail
2326	est sapi3 fail
2327	ecall inactive
2328	reest fail
2329	cc rel req
2330	LTE limited service



2561	Invalid parameter
2562	Sim not exit
2563	Sim pin need
2564	No call ID
2565	Call Not allow
2566	State error
2568	FDN check failure
2569	Call control beyond capability
2570	Call control timeout
2571	Call control not allow
2573	Call control invalid parameter
2574	Dtmf buffer full
2575	Dtmf repeat stop
2576	Dtmf rej
2577	Call on hold
2578	Call release
2579	Power off
2580	Not in speech call
2581	Sim invalid
2582	Domain selection failure
2583	Domain selection timer expired
2586	Ecall mode not allowed
2587	Ecall cache msg fail
2588	Lower power power on fail
2589	Call number not exist
2590	No RF
2591	T303 time out
2592	T335 timer out
2593	Wait rab time out
2594	No TCH
2815	Unknown
3329	Hifi already started
3330	port cfg fail



3331	set device fail
3332	set start fail
3333	set volume fail
3334	sample rate fail
3335	Ti start expired
18732	IMS Multiple Choices
18733	IMS Moved Permanently
18734	IMS Moved Temporarily
18737	IMS Use Proxy
18812	IMS Alternative Service
18832	IMS Bad Request
18833	IMS Unauthorized
18834	IMS Payment Required
18835	IMS Forbidden
18836	IMS Not Found
18837	IMS Method Not Allowed
18838	IMS Not Acceptable
18839	IMS Proxy Authentication Required
18840	IMS Request Timeout
18841	IMS Conflict Deprecated
18842	IMS Gone
18844	IMS Conditional request failed
18845	IMS Request Entity Too Large
18846	IMS Request-URI Too Long
18847	IMS Unsupported Media Type
18848	IMS Unsupported URI Scheme
18849	IMS Unknown Resource-Priority
18852	IMS Bad Extension
18853	IMS Extension Required
18854	IMS Session Interval too small
18855	IMS Interval Too Brief
18856	IMS Bad Location Information
18860	IMS Use Identity Header



18861	IMS Provide referrer identity
18862	IMS Flow Failed
18865	IMS Anonymity Disallowed
18868	IMS Bad Identity-Info
18869	IMS Unsupported Certificate
18870	IMS Invalid Identity Header
18871	IMS First Hop Lacks Outbound Support
18872	IMS Max-Breadth Exceeded
18901	IMS Bad Info Package
18902	IMS Consent needed
18912	IMS Temporarily Unavailable
18913	IMS Call/Transaction Does Not Exist
18914	IMS Loop Detected
18915	IMS Too Many Hops
18916	IMS Address Incomplete
18917	IMS Ambiguous
18918	IMS Busy Here
18919	IMS Request Terminated
18920	IMS Not Acceptable Here
18921	IMS Bad event
18923	IMS Request Pending
18925	IMS Undecipherable
18926	IMS Security agreement required
18932	IMS Server Internal Error
18933	IMS Not Implemented
18934	IMS Bad Gateway
18935	IMS Service Unavailable
18936	IMS Server Time-out
18937	IMS Version Not Supported
18945	IMS Message Too Large
19012	IMS Precondition Failure
19032	IMS Busy Everywhere
19035	IMS Decline

19036	IMS Does Not Exist Anywhere
19038	IMS Not Acceptable
19457	IMSA ERROR
19458	IMSA NOT SUPPORTED CMD
19459	IMSA ALLOC ENTITY FAIL
19460	IMSA RETRY VIA CS
19461	IMSA TIMEOUT
19462	IMSA NOT SUPPORTED CALL TYPE
19463	IMSA SERVICE NOT AVAILABLE
19464	SRVCC buffer msg fail
19465	SRVCC success
19466	SRVCC abnormal
19467	SRVCC abnormal Dereg



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.
- ^CEND replaces response codes such as "BUSY", "NO CARRIER", "NO ANSWER" in voice call feature.

12.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

12.5.5 Example

The user disconnects the voice call normally:

Response: ^CEND: 1,2,29,16 The voice call is normally cleared.

12.6 AT^CALLSRV-Set the CS Voice Function

12.6.1 Command Syntax

AT^CALLSRV=<n>

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

AT^CALLSRV?
Possible Response(s)
<CR><LF>^CALLSRV: <n><CR><LF><CR><LF>OK<CR><LF>

12.6.2 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.

12.6.3 Parameter Description

<n>: indicates whether to enable the CS voice function.

0 Disable

1 Enable

12.6.4 Property Description

Saving upon Power-off	PIN
Y	N

12.6.5 Example

Run : AT^CALLSRV=1



```
Response:      OK

Run:           AT^CALLSRV?

Response:      ^CALLSRV: 1

                OK

Run:           AT^CALLSRV=?

Response:      ^CALLSRV: (0,1)

                OK
```

13 Huawei Proprietary Interface: Audio Commands

13.1 AT^CPCM-Configure PCM Audio

13.1.1 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>

13.1.2 Interface Description

This command configures the PCM audio before a voice call. Module updating will reset the value to default value.

The read command queries the current parameter values.

The test command returns the supported parameter ranges.

13.1.3 Parameter Description

<mode>: indicates 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>: indicates data format.

- 0 Linear (default value)
- 1 U-law (not supported currently)
- 2 A-law (not supported currently)

<clock>: indicates 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)
- 4 4.096 MHz (not supported currently)

<frame>: indicates the SYN frame format setting.

- 0 Short frame (default value)
- 1 Long frame (not supported currently)

<offset>: indicates 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)

13.1.4 Property Description

Saving upon Power-off	PIN
Y	N

13.1.5 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

13.2 AT^STN-Switch Sidetone Status

13.2.1 Command Syntax

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

AT^STN?
Possible Response(s)
<CR><LF>^STN: <vol><CR><LF><CR><LF>OK<CR><LF>

AT^STN=?
Possible Response(s)
<CR><LF>^STN: (list of supported <vol>s)<CR><LF><CR><LF>OK<CR><LF>

13.2.2 Interface Description

This command enables or disables the sidetone before a voice call. Resetting the module will not affect the value. Module updating will reset the value to default value.

The test command returns supported values as a compound value.

13.2.3 Parameter Description

<vol>:

- 0 Sidetone off
- 1 Sidetone on (default value)

13.2.4 Property Description

Saving upon Power-off	PIN
Y	N

13.2.5 Example

Set sidetone to off:

Run : AT^STN=0

Response : OK

13.3 AT^SMUT-Mute Speaker

13.3.1 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>

13.3.2 Interface Description

This command enables or disables the speaker mute function during a voice call.

The read command queries the current value of the speaker mute status.

The test command returns the supported values of the speaker mute setting.

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

13.3.3 Parameter Description

<n>: specifies mute switch.

- | | |
|---|--------------------------|
| 0 | Mute off (default value) |
| 1 | Mute on |

13.3.4 Property Description

Saving upon Power-off	PIN
N	N

13.3.5 Example

Set the speaker mute to off:

Run: AT^SMUT=0

Response: OK

13.4 AT^MODEMLOOP-Set the Voice Loop Mode

13.4.1 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>

13.4.2 Interface Description

This command sets the voice loop mode.

13.4.3 Parameter Description

<mode>: an integer type value that indicates the voice loop mode.

- 0 Exit the voice loop mode. (default value)
- 1 Enter into the voice loop mode.

13.4.4 Property Description

Saving upon Power-off	PIN
N	N

13.4.5 Example

Set the module into the voice loop mode:

```
Run:          AT^MODEMLOOP=1
Response:     OK
```

13.5 AT^ECCLIST-Query Emergency Numbers

13.5.1 Command Syntax

AT^ECCLIST?
Possible Response(s)
<CR><LF>^ECCLIST: <list of supported eccs><CR><LF><CR><LF>OK<CR><LF>

13.5.2 Interface Description

This command is used to obtain emergency numbers.

The read command queries the real-time data.

13.5.3 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.

13.5.4 Property Description

Saving upon Power-off	PIN
NA	N

13.5.5 Example

None

13.6 ^ECCLIST-Unsolicitedly Report Emergency Numbers

13.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECCLIST: <list of supported eccs><CR><LF>

13.6.2 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 NV emergency numbers, the module unsolicitedly reports its supported emergency numbers. Unsolicited reports are used to inform users of the emergency numbers currently supported by the module.

13.6.3 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.

13.6.4 Property Description

Saving upon Power-off	PIN
NA	N

13.6.5 Example

None

13.7 AT^NSSWITCH-Control Noise Suppression

13.7.1 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>

13.7.2 Interface Description

This command enables or disables the noise suppression function. Resetting the module will not affect the value. Running the set command during a voice call will return an ERROR.

13.7.3 Parameter Description

<nsmode>: an integer type value that indicates the noise suppression status.

- 0 Disable the noise suppression function.
- 1 Enable the noise suppression function.

13.7.4 Property Description

Saving upon Power-off	PIN
Y	N

13.7.5 Example

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

13.8 AT^VMSET-Set the Voice Device Mode

13.8.1 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>

13.8.2 Interface Description

The set command sets the current voice device mode.

The read command queries the current voice device mode.

The test command returns 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.

13.8.3 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

13.8.4 Property Description

Saving upon Power-off	PIN
N	N

13.8.5 Example

```
Run: AT^VMSET=4
Response: OK
Run: AT^VMSET?
Response: ^VMSET: 4
OK
Run: AT^VMSET=?
Response: ^VMSET: (0-4)
OK
```

13.9 AT^ECHOEX-Set Echo Suppression Parameters

13.9.1 Command Syntax

AT^ECHOEX=<EchoEnable>,<EchoTime>,<EchoSingleLen>,<EchoSingleDecStr>,<EchoDoubleDecStr>

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>,<EchoDoubleDecStr> ><CR><LF><CR><LF>OK<CR><LF>

AT^ECHOEX=?
Possible Response(s)
<CR><LF>^ECHOEX: <EchoEnable>,<EchoTime>,<EchoSingleLen>,<EchoSingleDecStr>,<EchoDoubleDecStr> ><CR><LF><CR><LF>OK<CR><LF>

13.9.2 Interface Description

The set command enables or disables echo suppression and sets the echo suppression parameters for the current voice device mode.

The read command queries the parameters of the current voice device mode.

The test command returns 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.

13.9.3 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 range of 0–960.

<EchoSingleLen>: an integer type value indicating the end sound elimination length for a single speaker, which has a value range of 0–35.

<EchoSingleDecStr>: an integer type value indicating the end sound elimination strength for a single speaker, which has a value range of 50-300.

<EchoDoubleDecStr>: an integer type value indicating the residual voice suppression strength for double speakers, which has a value 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.

13.9.4 Property Description

Saving upon Power-off	PIN
Y	N

13.9.5 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

```

13.10 AT^PCMFR-Change the PCM Frequency Response

13.10.1 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>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^PCMFR=?
Possible Response(s)
<CR><LF>^PCMFR: <length><CR><LF><CR><LF>OK<CR><LF>

13.10.2 Interface Description

When a voice test is performed for the module, the voice frequency response curve varies by the speaker and microphone, resulting in different voice qualities. To facilitate the frequency response curve test, AT^PCMFR is used to modify the NV of the curve and ensure the voice quality.

This command is used to set and query the NV value of the frequency response curve.

The set command sets NV values.

The read command queries the current NV value.

The test command returns the string length of the frequency response.

13.10.3 Parameter Description

<string>: a character string indicating the NV value of the frequency response curve. Each character can be '0'-'9', 'a'-'f', or 'A'-'F'.

<length>: an integer type value indicating the number of characters in one character string. The number of characters is 232.

13.10.4 Property Description

Saving upon Power-off	PIN
Y	N

13.10.5 Example

- Set the frequency response curve value:



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

13.11.2 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.

13.11.3 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.

13.11.4 Property Description

Saving upon Power-off	PIN
Y	N

13.11.5 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

```

13.12 AT^AUDIOCFG- Set Tone Volume Level

13.12.1 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>

13.12.2 Interface Description

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

The test command returns supported values as compound value.

13.12.3 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.

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

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

13.12.4 Property Description

Saving upon Power-off	PIN
Y	N

13.12.5 Example

Run: AT^AUDIOCFG=0,1

Response: OK

Run: AT^AUDIOCFG?

Response: ^AUDIOCFG: 0,1

OK

Run: AT^AUDIOCFG=?

Response: ^AUDIOCFG: (0)

OK

13.13 AT^ECHOSWITCH- Switch the Acoustical Echo Canceller 3A Alogrithm

13.13.1 Command Syntax

AT^ ECHOSWITCH =<n>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^ ECHOSWITCH?
Possible Response(s)
<CR><LF>^ECHOSWITCH: <n><CR><LF><CR><LF>OK<CR><LF>

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

13.13.2 Interface Description

The set command enable or disable the acoustical echo canceller 3A algorithm.

The read command queries the parameters of the current canceller 3A algorithm status.

The test command returns the supported parameters.

13.13.3 Parameter Description

<n>: Echo cancellation switch status. The value is an integer, and the default value is 1.

0 Disable 3A algorithm, and all audio data is not processed by the algorithm.

1 Enable 3A algorithm, and all audio data will be processed by the algorithm.

13.13.4 Property Description

Saving upon Power-off	PIN
N	N

13.13.5 Example

```

Run:      AT^ECHOSWITCH=1
Response: OK

Run:      AT^ECHOSWITCH?
Response: ^ECHOSWITCH: 1

          OK

Run:      AT^ECHOSWITCH=?

```



Response: ^ECHOSWITCH: (0,1)

OK

14 Huawei Proprietary Interface: SMS Service Interface

14.1 ^SMMEMFULL-Message Memory Full

14.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SMMEMFULL: <mem_type><CR><LF>

14.1.2 Interface Description

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

14.1.3 Parameter Description

<mem_type>: a string type value that indicates the type of the storage that is full.

"SM"	(U)SIM card
"ME"	NV memory

14.1.4 Property Description

Saving upon Power-off	PIN
NA	NA



14.1.5 Example

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

Response: ^SMMEMFULL: "SM"

15 Huawei Proprietary Interface: Network Service Interfaces

15.1 AT^SYSINFOEX-Query Extended System Information

15.1.1 Command Syntax

AT^SYSINFOEX
Possible Response(s)
<CR><LF>^SYSINFOEX: <srv_status>,<srv_domain>,<roam_status>,<sim_state>,<lock_state>,<sysmode>,<sysmode_name>,<submode>,<submode_name><CR><LF><CR><LF>OK<CR><LF>

15.1.2 Interface Description

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

15.1.3 Parameter Description

<srv_status>: indicates the system service status.

- | | |
|---|---------------------------------|
| 0 | No services |
| 1 | Restricted services |
| 2 | Valid services |
| 3 | Restricted regional services |
| 4 | Power saving or hibernate state |

<srv_domain>: indicates the system service domain.



- 0 No services
- 1 CS service only
- 2 PS service only
- 3 PS+CS services
- 4 Not registered to CS or PS; searching now
- 255 CDMA (not supported currently)

<roam_status>: indicates the roaming status.

- 0 Not roaming
- 1 Roaming

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

- 0 Invalid SIM card
- 1 Valid SIM card
- 2 Invalid SIM card in CS
- 3 Invalid SIM card in PS
- 4 Invalid SIM card in PS and CS
- 240 ROMSIM version
- 255 No SIM card is found

<lock_state>: indicates whether the SIM card is locked by the CardLock feature. (not supported 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.

- 0 NO SERVICE
- 1 GSM
- 2 CDMA (not supported currently)
- 3 WCDMA
- 4 TD-SCDMA
- 5 WiMAX (not supported currently)

6 LTE



NOTE

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

<sysmode_name>: a string type value that 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
4-20	(No defined)
21	IS95A
22	IS95B
23	CDMA2000 1X
24	EVDO Rel0
25	EVDO RelA
26	EVDO RelB
27	Hybrid (CDMA2000 1X)
28	Hybrid (EVDO Rel0)
29	Hybrid (EVDO RelA)
30	Hybrid (EVDO RelB)
31	eHRPD Rel0
32	eHRPD RelA
33	eHRPD RelB
34	Hybrid (eHRPD Rel0)
35	Hybrid (eHRPD RelA)
36	Hybrid (eHRPD RelB)
37-39	Reserved
41	WCDMA
42	HSDPA
43	HSUPA
44	HSPA



45	HSPA+
46	DC-HSPA+
47-60	Reserved
61	TD-SCDMA
62	HSDPA
63	HSUPA
64	HSPA
65	HSPA+
66-80	Reserved
81	802.16e
82-100	Reserved
101	LTE
Other value	Reserved

<submode_name>: indicates system sub-mode. (Its 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+.

15.1.4 Property Description

Saving upon Power-off	PIN
NA	N

15.1.5 Example

```
Run: AT^SYSINFOEX
Response: ^SYSINFOEX: 2,3,0,1,,3,"WCDMA",41,"WCDMA"
          OK
```

Indicates that the UE is operating over a WCDMA network in WCDMA mode.

15.2 AT^SYSCFGEX-Configure Extended System

15.2.1 Command Syntax

AT^SYSCFGEX=<acqorder>,<band>,<roam>,<srvdomain>,<lteband>,<reserve1>,<reserve2>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^SYSCFGEX?
Possible Response(s)
<CR><LF>^SYSCFGEX: <acqorder>,<band>,<roam>,<srvdomain>,<lteband><CR><LF><CR><LF>OK<CR><LF> >

AT^SYSCFGEX=?
Possible Response(s)
<CR><LF>^SYSCFGEX: (list of supported <acqorder>s),(list of supported (<band>,<band_name>)s),(list of supported <roam>s),(list of supported <srvdomain>s),(list of supported (<lteband>,<lteband_name>)s)<CR><LF><CR><LF>OK<CR><LF>

15.2.2 Interface Description

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

15.2.3 Parameter Description

<acqorder>: a string type value that specifies the network access order. Its value can be "00", "99" or a combination of the following values:

"00"	Automatic
"01"	GSM
"02"	UMTS
"03"	LTE
"04"	CDMA 1X (not supported currently)

- "06" WiMAX (not supported currently)
- "07" CDMA EVDO (not supported currently)
- "99" Not change

For example, the "03" value indicates LTE only.

- The "030201" value indicates the order of LTE->WCDMA->GSM.
- The "0302" value indicates the order of LTE->WCDMA, without GSM.
- The "030402" value indicates the order of LTE->CDMA->WCDMA.
- In specialty, the "99" value is not combined with other values, indicating no change of the network access order.
- The "00" value is not combined with other values, indicating automatic network access order that is determined by the module.

**NOTE**

UMTS contains TD-SCDMA and WCDMA.

- If the module supports WCDMA and does not support TD-SCDMA, and then "02" means WCDMA only.
- If the module supports TD-SCDMA and does not support WCDMA, and then "02" means TD-SCDMA only.
- If the module supports both TD-SCDMA and WCDMA, and then "02" means TD-SCDMA and WCDMA, and TD-SCDMA is prior to WCDMA.
- The AT^SYSCFGEX command does not support setting and querying the TD-SCDMA bands.

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

<band>: a hexadecimal value that specifies the frequency band, which is related to the system mode and dependent on the module performance. The possible values of <band> are 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 2100
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)	All bands
40000000 (CM_BAND_PREF_NO_CHANGE)	Band not changed

0004000000000000 (CM_BAND_PREF_WCDMA_IX_1700)	WCDMA_IX_1700
0002000000000000 (CM_BAND_PREF_WCDMA_VIII_900)	WCDMA_VIII_900
1000000000000000 (CM_BAND_PREF_WCDMA_XIX_850)	WCDMA_XIX_850
2000000 (CM_BAND_PREF_WCDMA_IX_1700)	AWS
00680380	Automatic

<band_name>: a string type value that indicates the frequency band name.

- For WCDMA, it is named in WCDMA BCx format, in which, x indicates the actual Band Class (refer to 3GPP TS 25.101 Table 5.1). If multiple bands are simultaneously supported, it is separated by / (for example, WCDMA BC I/WCDMA BC II).
- For GSM, it is named in GSM850/GSM1800.... format.

<roam>: indicates whether roaming is supported.

0	Not supported
1	Supported
2	No change

 **NOTE**

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

<srvidomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY
2	CS_PS
3	ANY
4	No change

<lteband>: a hexadecimal value that specifies the LTE frequency band. The value of <lteband> can be one of the following values and their combinations (excluding 0x7FFFFFFFFFFFFFFF):

7FFFFFFFFFFFFFFF	(CM_BAND_PREF_ANY)	All bands
1	(CM_BAND_PREF_LTE_EUTRAN_BAND1)	LTE BC1
2	(CM_BAND_PREF_LTE_EUTRAN_BAND2)	LTE BC2
4	(CM_BAND_PREF_LTE_EUTRAN_BAND3)	LTE BC3
8	(CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE BC4



10	(CM_BAND_PREF_LTE_EUTRAN_BAND5)	LTE BC5
20	(CM_BAND_PREF_LTE_EUTRAN_BAND6)	LTE BC6
40	(CM_BAND_PREF_LTE_EUTRAN_BAND7)	LTE BC7
80	(CM_BAND_PREF_LTE_EUTRAN_BAND8)	LTE BC8
100	(CM_BAND_PREF_LTE_EUTRAN_BAND9)	LTE BC9
200	(CM_BAND_PREF_LTE_EUTRAN_BAND10)	LTE BC10
400	(CM_BAND_PREF_LTE_EUTRAN_BAND11)	LTE BC11
800	(CM_BAND_PREF_LTE_EUTRAN_BAND12)	LTE BC12
1000	(CM_BAND_PREF_LTE_EUTRAN_BAND13)	LTE BC13
2000	(CM_BAND_PREF_LTE_EUTRAN_BAND14)	LTE BC14
10000	(CM_BAND_PREF_LTE_EUTRAN_BAND17)	LTE BC17
20000	(CM_BAND_PREF_LTE_EUTRAN_BAND18)	LTE BC18
40000	(CM_BAND_PREF_LTE_EUTRAN_BAND19)	LTE BC19
80000	(CM_BAND_PREF_LTE_EUTRAN_BAND20)	LTE BC20
100000	(CM_BAND_PREF_LTE_EUTRAN_BAND21)	LTE BC21
1000000	(CM_BAND_PREF_LTE_EUTRAN_BAND25)	LTE BC25
2000000	(CM_BAND_PREF_LTE_EUTRAN_BAND26)	LTE BC26
8000000	(CM_BAND_PREF_LTE_EUTRAN_BAND28)	LTE BC28
100000000	(CM_BAND_PREF_LTE_EUTRAN_BAND33)	LTE BC33
200000000	(CM_BAND_PREF_LTE_EUTRAN_BAND34)	LTE BC34
400000000	(CM_BAND_PREF_LTE_EUTRAN_BAND35)	LTE BC35
800000000	(CM_BAND_PREF_LTE_EUTRAN_BAND36)	LTE BC36
1000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND37)	LTE BC37
2000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND38)	LTE BC38
4000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND39)	LTE BC39
8000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND40)	LTE BC40
10000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND41)	LTE BC41
20000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND42)	LTE BC42
40000000000	(CM_BAND_PREF_LTE_EUTRAN_BAND43)	LTE BC43
40000000	(CM_BAND_PREF_NO_CHANGE)	No band change



NOTE

LTE bands supported by the module are LTE band 1/2/3/4/5/7/8/20/28/38/39/40/41.



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

That is, in the response to AT^SYSCFGEX=?, <lteband> and <lteband_name> are left out.

```
^SYSCFGEX: (list of supported <acqorder>s), (list of supported
<band>, <band_name>)s), (list of supported <roam>s), (list of supported
<srvdomain>s),
```

OK

In the response to AT^SYSCFGEX?, <lteband> is left out.

```
^SYSCFGEX: <acqorder>, <band>, <roam>, <srvdomain>,
```

OK

When the set command is executed, <lteband> is null or unchanged.

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

<lteband_name>: a string type value that indicates the LTE frequency band name. It is displayed in LTE BCx format, in which, x indicates the actual Band Class. If multiple bands are simultaneously supported, it is separated by / (for example, LTE BC1/LTE BC2).

<reserve1>: reserved field 1.

<reserve2>: reserved field 2.

15.2.4 Property Description

Saving upon Power-off	PIN
Y	N

15.2.5 Example

Run: AT^SYSCFGEX=?

```
Response: ^SYSCFGEX:
("00", "03", "02", "01", "99"), ((6000000400380, "GSM900/GSM1800
/WCDMA BCVIII/WCDMA BCIX/WCDMA BCI"), (4000000, "WCDMA
BCV"), (3fffffff, "All
bands")), (0-2), (0-4), ((1e000000085, "LTE BC1/LTE BC3/LTE
BC8/LTE BC38/LTE BC39/LTE BC40/LTE
BC41"), (7fffffffffffffff, "All bands"))
```

OK

Run: AT^SYSCFGEX?

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

OK



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

15.3 AT^USSDMODE-Select USSD Mode

15.3.1 Command Syntax

AT^USSDMODE=[<mode>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^USSDMODE?
Possible Response(s)
<CR><LF>^USSDMODE: <mode><CR><LF><CR><LF>OK<CR><LF>

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

15.3.2 Interface Description

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

The read command queries the current USSD mode.

The test command returns the list of supported USSD modes.

15.3.3 Parameter Description

<mode>:

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

15.3.4 Property Description

Saving upon Power-off	PIN
N	N

15.3.5 Example

- Query the current USSD mode:


```
Run:          AT^USSDMODE?
Response:     ^USSDMODE: 1

              OK
```
- Set USSD to non-transparent mode:


```
Run:          AT^USSDMODE=0
Response:     OK
```
- Query the list of supported <mode>s:


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

              OK
```

15.4 AT^EONS-Query the Service Provider Name and the EFSPN Information of the SIM Card

15.4.1 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>

AT^EONS=<type>[,<plmn_id>[,<plmn_name_len>]]
If there is a MS-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>

URC
Possible Response(s)
When the service provider's short and long names is released from the network side in GMM/MM/EMM information, report unsolicitedly: <CR><LF>^EONS: 0<CR><LF>

15.4.2 Interface Description

This command queries the service provider name and the information contained in the EF_{SPN} file of the SIM card.

If the service provider's short and long names is released from the network side in GMM/MM/EMM information, the MT must run the ^EONS: 0 command for unsolicited reporting to the TE.

<type> specifies the query type. Its value can be 1, 2, 3, 4, or 5 in 3GPP mode and only 1 in 3GPP2 mode.

- 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 EF_{SPN} file that is not empty, the content of the EF_{SPN} 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 UCS2 hexadecimal character string is converted using the big-endian encoding scheme. For example, character 'A' is represented by 0041.

15.4.3 Parameter Description

<type>: specifies operation type.

- 1 Automatic mode.
 - For 3GPP mode, the priority for <plmn_name1> and <plmn_name2> is as follows:
 - Information saved in the EF_{PNN} file corresponding to the USIM EF_{OPL}
 - 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 EF_{PNN} file corresponding to the USIM EF_{OPL}.
- 4 Query the information saved in the internal network name list.
- 5 Automatic length limit mode.

Processing logic for <plmn_name1>:

- 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

- 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

- 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:

1. Information saved in the EF_{PNN} file corresponding to the EF_{OPL}
2. Information released from the network side (MM/GMM/EMM information)
3. Information saved in the internal network name list

If the long and short names obtained from a preferred location are invalid, specifically, the name does not exist or its length exceeds the limit, the next preferred location is turned to.

<plmn_id>: specifies PLMN ID of the network, without double quotation marks. For detailed format, see the description of the numeric <oper> field in the AT+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 that ranges 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.

15.4.4 Property Description

Saving upon Power-off	PIN
N	Y

15.4.5 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,"0048005500410057004500490020005400450053005400200
05700300039","00480054005700300039",3,"0048005500410057004
50049"

OK

Run: AT^EONS=2

Response: ^EONS:
2,46009,"0048005500410057004500490020005400450053005400200
057003000390020004E004500540057004F0052004B","004800540057
00300039004E00450054",3,"004800550041005700450049"

OK

Run: AT^EONS=2,46010

Response: ^EONS: 2,46010,"","",3,"004800550041005700450049"

OK

Run: AT^EONS=5

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

OK

^EONS: 5,46009,"0048005500410057004500490020
00540045005300540020005700300039","" When network 46009
is not in an HPLMN,
EHPLMN, or EF_{SPDI}.

OK



NOTE

- "HUAWEI TEST W09" (UCS2 hexadecimal character string):
004800550041005700450049002000540045005300540020005700300039
- "HTW09" UCS2 (UCS2 hexadecimal character string): 00480054005700300039
- "HUAWEI" UCS2 (UCS2 hexadecimal character string): 004800550041005700450049
- "HUAWEI TEST W09 NETWORK" (UCS2 hexadecimal character string):
0048005500410057004500490020005400450053005400200057003000390020004E004500540057
004F0052004B
- "HTW09NET" UCS2 (UCS2 hexadecimal character string): 00480054005700300039004E0045005

15.5 AT^HCSQ-Query and Report Signal Strength

15.5.1 Command Syntax

AT^HCSQ?

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>

15.5.2 Interface Description

This command queries and reports 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, and MT will not unsolicitedly report "NOSERVICE".

The read command queries the current network signal strength detected by the MT.

The test command returns the list of service modes supported by the MT.

The URC command allows the MT to unsolicitedly report the current signal strength when the strength changes.

15.5.3 Parameter Description

<sysmode>: a string type value that 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
"TD-SCDMA"	TD-SCDMA mode



"LTE"	LTE mode
"CDMA"	CDMA mode (not supported currently)
"EVDO"	EV-DO/eHRPD mode (not supported currently)
"CDMA-EVDO"	CDMA/EV-DO (eHRPD) mode (not supported currently)

<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	-	-
"TD-SCDMA"	tdscdma_rssi	tdscdma_rscp	tdscdma_ecio		
"LTE"	lte_rssi	lte_rsrp	lte_sinr	lte_rsrq	-

<gsm_rssi>, <wcdma_rssi>, <tdscdma_rssi>, <lte_rssi>: integer type values that indicate the received signal strength. These parameters are available for GSM, WCDMA, TD-SCDMA, LTE mode respectively.

0	rssi < -120 dBm
1	-120 dBm ≤ rssi < -119 dBm
2	-119 dBm ≤ rssi < -118 dBm
...	
94	-27 dBm ≤ rssi < -26 dBm
95	-26 dBm ≤ rssi < -25 dBm
96	-25 dBm ≤ rssi
255	unknown or undetectable

<wcdma_rscp>, <tdscdma_rscp>: an integer type value that indicates the received signal code power. This parameter is available for WCDMA and TD-SCDMA mode.

0	rscp < -120 dBm
1	-120 dBm ≤ rscp < -119 dBm
2	-119 dBm ≤ rscp < -118 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>, <tdscdma_ecio>: integer type values that indicate the downlink carrier-to-interference ratio. These parameters are available for WCDMA, TD-SCDMA mode respectively.

0	$\text{Ec/Io} < -32 \text{ dB}$
1	$-32 \text{ dB} \leq \text{Ec/Io} < -31.5 \text{ dB}$
2	$-31.5 \text{ dB} \leq \text{Ec/Io} < -31 \text{ dB}$
...	
63	$-1 \text{ dB} \leq \text{Ec/Io} < -0.5 \text{ dB}$
64	$-0.5 \text{ dB} \leq \text{Ec/Io} < 0 \text{ dB}$
65	$0 \text{ dB} \leq \text{Ec/Io}$
255	unknown or undetectable

<lte_rsrp>: an integer type value that indicates the reference signal received power. This parameter is available for LTE mode.

0	$\text{rsrp} < -140 \text{ dBm}$
1	$-140 \text{ dBm} \leq \text{rsrp} < -139 \text{ dBm}$
2	$-139 \text{ dBm} \leq \text{rsrp} < -138 \text{ dBm}$
...	
95	$-46 \text{ dBm} \leq \text{rsrp} < -45 \text{ dBm}$
96	$-45 \text{ dBm} \leq \text{rsrp} < -44 \text{ dBm}$
97	$-44 \text{ dBm} \leq \text{rsrp}$
255	unknown or undetectable

<lte_sinr>: an integer type value that indicates the signal to interference plus noise ratio. This parameter is available for LTE mode.

0	$\text{sinr} < -20 \text{ dB}$
1	$-20 \text{ dB} \leq \text{sinr} < -19.8 \text{ dB}$
2	$-19.8 \text{ dB} \leq \text{sinr} < -19.6 \text{ dB}$

```

...
249      29.6 dB ≤ sinr < 29.8 dB
250      29.8 dB ≤ sinr < 30 dB
251      30 dB ≤ sinr
255      unknown or undetectable

```

<lte_rsrq>: an integer type value that indicates the reference signal received quality in dB.

```

0        rsrq < -19.5 dB
1        -19.5 dB ≤ rsrq < -19 dB
2        -19 dB ≤ rsrq < -18.5 dB
...
32       -4 dB ≤ rsrq < -3.5 dB
33       -3.5 dB ≤ rsrq < -3 dB
34       -3 dB ≤ rsrq
255     unknown or undetectable

```

15.5.4 Property Description

Saving upon Power-off	PIN
NA	N

15.5.5 Example

```

Run:      AT^HCSQ=?
Response: ^HCSQ: "NOSERVICE", "GSM", "WCDMA", "TD-SCDMA", "LTE"

          OK

Run:      AT^HCSQ?
Response: ^HCSQ: "WCDMA", 30, 30, 58

          OK

```

15.6 ^SRVST-Service State Change Indication

15.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SRVST: <srv_status><CR><LF>

15.6.2 Interface Description

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

15.6.3 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

15.6.4 Property Description

Saving upon Power-off	PIN
NA	N

15.6.5 Example

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

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



```
Response:  ^SRVST: 0
           ^MODE: 0,0
           ^MODE: 3,3
           ^SRVST: 1
           ^HCSQ: "GSM",36,255
           ^SRVST: 2
           ^HCSQ: "GSM",37,0
           OK
```

15.7 ^SIMST-SIM Card State Change Indication

15.7.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SIMST: <sim_state><CR><LF>

15.7.2 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.

15.7.3 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. |
| 240 | ROMSIM version. |
| 255 | No SIM card is found. This value may be returned if the SIM card is not inserted or it is locked by the CardLock feature. |

15.7.4 Property Description

Saving upon Power-off	PIN
NA	N

15.7.5 Example

```
Run:          AT+CPIN=1234
Response:    OK
              ^SIMST: 1
```

15.8 AT^NWTIME-Query Presentation of Network System Time

15.8.1 Command Syntax

AT^NWTIME?
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF>

15.8.2 Interface Description

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

15.8.3 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 module 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

15.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

15.8.5 Example

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

```
Run:          AT^NWTIME?
Response:     ^NWTIME: 11/12/20,12:33:18+32,0
              OK
```

15.9 ^NWTIME-Unsolicitedly Report Network System Time

15.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF>

15.9.2 Interface Description

This command unsolicitedly reports network system time, time zone, and daylight saving time.

15.9.3 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 module 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

15.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.9.5 Example

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

Response: ^NWTIME: 11/12/20,12:31:34+32,0

15.10 AT^LTECAT-Query LTE Category

15.10.1 Command Syntax

AT^LTECAT?
Possible Response(s)
<CR><LF>^LTECAT: <ltecat><CR><LF> <CR><LF>OK<CR><LF>

15.10.2 Interface Description

This command queries LTE category.

15.10.3 Parameter Description

<ltecat>: indicates LTE UE category. For more details, please refer to 3GPP TS 36.306.



15.10.4 Property Description

Saving upon Power-off	PIN
NA	N

15.10.5 Example

```
Run:          AT^LTECAT?
Response:     ^LTECAT: 3
              OK
```

15.11 AT^MONSC-Query Serving Cell Information Through Network Monitor

15.11.1 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>

15.11.2 Interface Description

This command is used to query the parameter values of the current serving cell.

If the module is using a WCDMA network, in non-DCH state, the command returns the parameters of the resident cell, and in DCH state, the command returns the parameters of the cell whose signal is the strongest among the active set. In DCH state, if you want to enable or disable the frequency lock, it is recommended to run AT^MONSC command firstly, and then run AT^FREQLock command.

15.11.3 Parameter Description

<RAT>: a string indicating 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.

- TD-SCDMA Reside on a TD-SCDMA cell. <cell_paras> will be returned.
- LTE Reside on a LTE cell. <cell_paras> will 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:
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 identify in the SIB3 message, 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 -130 to -10.
- <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 -130 to -20.
<RXLEV>	Receiving Signal Strength in dBm, which is a decimal number. The value range is -101 to -20.
<EC/N0>	Ratio of energy per modulating bit to the noise spectral density, which is a decimal number. The value range is -25 to 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.

- TD-SCDMA

<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 9400-9600, 10050-10125, 11500-12000.
<SYNC_ID>	Downlink pilot code, which is a decimal number. The value range is 0–31.
<SC>	Scrambling code, which is a decimal number. The value range is 0–127.
<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 -116 to 0.
<DRX>	Discontinuous Reception Cycle Length, which is a decimal number, The value range is 6–9.
<RAC>	Route area code, which is a hexadecimal number. The value range is 0–FFFF.

- LTE
 - <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 0–39649.
 - <Cell_ID> Cell identity in the SIB1 message, which is a hexadecimal and includes the RNC ID and cell ID. The value range is 0–FFFFFFF.
 - <PCI> Physical cell ID, which is a decimal number, The value range is 0–503.
 - <TAC> Tracking Area Code, which is a hexadecimal number. The value range is 0–FFFF.
 - <RSRP> Reference Signal Received Power in dBm, which is a decimal number. The value range is -144 to -44 .
 - <RSRQ> Reference Signal Received Quality in dB, which is a decimal number, The value range is -30 to -3.
 - <RXLEV> Receiving Signal strength in dBm, which is a decimal number, The value range is -110 to -20.



NOTE

When the module is residing on an LTE cell for the first time, a valid value for <RXLEV> may fail to be obtained temporarily, and therefore <RXLEV> may be left empty.

15.11.4 Property Description

Saving upon Power-off	PIN
N	N

15.11.5 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
```

15.12 AT^MONNC-Query Neighboring Cell Information Through Network Monitor

15.12.1 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>

15.12.2 Interface Description

This command is used to query the parameter values of the current neighboring cells.

If the module is using a WCDMA network, the command returns the following information depending on the state:

- In non-DCH state, the command returns the parameters of neighboring WCDMA cells.
- In DCH state, the command returns the parameters of all the cells, including the cells in the active set, cells in the monitored set, and neighboring cells.

15.12.3 Parameter Description

<RAT>: a string indicating the access technology.

GSM	The neighboring cells are GSM cells.
WCDMA	The neighboring cells are WCDMA cells.
TD-SCDMA	The neighboring cells are TD-SCDMA cells.
LTE	The neighboring cells are LTE 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)

<BAND>	Frequency Band, which is a decimal number. The value range is 0–3:
	0: GSM 850
	1: GSM 900
	2: GSM 1800
	3: GSM 1900

<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 number. The value range is 0–FFFF.
<LAC>	Location Area Code, which is a hexadecimal. The value range is 0–FFFF.
<RXLEV>	Receiving Signal Strength Indication in dBm, which is a decimal number. The value range is -130 to -10.

 **NOTE**

- When the network condition is unstable, valid values for <BSIC>, <Cell_ID>, and <LAC> may fail to be obtained temporarily.
- <LAC>, <Cell_ID>: When the serving cell is a TD-SCDMA/WCDMA/LTE cell, a valid value cannot be obtained and therefore this parameter is left empty.
- WCDMA (a maximum of sixteen WCDMA neighboring cells are supported)
 - <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.
 - <RSCP> Received Signal Code Power in dBm, which is a decimal number. The value range is -130 to -20.
 - <EC/N0> Ratio of energy per modulating bit to the noise spectral density, which is a decimal number. The value range is -25 to 0.
- TD-SCDMA (a maximum of sixteen TD-SCDMA neighboring cells are supported)
 - <ARFCN> Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 9400–9600, 10050–10125, 11500–12000.
 - <SYNC_ID> Downlink pilot code, which is a decimal number. The value range is 0–31.
 - <SC> Scrambling code, which is a decimal number. The value range is 0-127.
 - <RSCP> Received Signal Code Power in dBm, which is a decimal number. The value range is -116 to 0.
- LTE (a maximum of sixteen LTE neighboring cells are supported)
 - <ARFCN> Absolute Radio Frequency Channel Number of the BCCH carrier, which is a decimal number. The value range is 0–39649.
 - <PCI> Physical cell ID, which is a decimal number. The value range is 0–503.
 - <RSRP> Reference Signal Received Power in dBm, which is a decimal number. The value range is -144 to -44.

- <RSRQ> Reference Signal Received Quality in dBm, which is a decimal number. The value range is -30 to -3.
- <RXLEV> Receiving Signal strength in dbm, which is a decimal number. The value range is -110 to -20.

15.12.4 Property Description

Saving upon Power-off	PIN
N	N

15.12.5 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
             ^MONNC: WCDMA,10738,301,-78,-2

OK
```

15.13 AT^NETSCAN-Network Scan

15.13.1 Command Syntax

AT^NETSCAN=<n>,<pow>[[<mode>[,<band>]]]
Possible Response(s)
[<CR><LF>^NETSCAN: <arfcn>,<c1>,<c2>,<lac>,<mcc>,<mnc>,<bsic>,<rxlvel>[,<cid>[,<band>[,<psc>[,<pid>]]]]][<CR><LF>^NETSCAN: <arfcn>,<c1>,<c2>,<lac>,<mcc>,<mnc>,<bsic>,<rxlvel>[,<cid>[,<band>[,<psc>[,<pci>]]]]][...][<CR><LF>]<CR><LF>OK<CR><LF>

AT^NETSCAN=<n>,<pow>[[<mode>,<band>]]]
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>

15.13.2 Interface Description

This command obtains the list of cells in the specified network mode and at the specified frequency. In the list, cells are displayed by signal strength in a descending order.

The test command returns the supported number of cells, thresholds, and network modes.

During the process of obtaining frequency information, you can enter an interrupt character string to interrupt the process. If interrupted, the module will output the information of found frequencies and "OK" (not affected by the settings of NV en_NV_Item_AT_ABORT_CMD_PARA). The interrupt character string can be set using NV en_NV_Item_AT_ABORT_CMD_PARA. If it is set to any ASCII code, the process can be interrupted by any character string.

Execution of this command will be interrupted by voice calls, frequency lock, TCP/UDP, location area updates, and route area updates.

This command cannot be executed if the frequency lock is enabled, regardless of the network mode. The cell lock will not affect execution of this command.

The maximum execution time of this command is 2 minutes.

Limitations:

1. When the module does not reside in a TD-SCDMA cell but performs the NETSCAN operation to scan TD-SCDMA frequencies, the module will be disconnected from the network. When the NETSCAN operation is complete, the module will reconnect to the network. This limitation also applies to the LTE cell.
2. When the NETSCAN operation is complete, the module may not be able to reside in the cell that it resided before the NETSCAN operation.
3. When the NETSCAN operation is complete, the module may report the service status again and may not be able to restore to the pre-NETSCAN operation service state.
4. When the module resides in a GSM cell and performs the NETSCAN operation to scan WCDMA frequencies, the network connection and service status does not change. If the frequency settings specified for scanning conflict with the frequency settings specified by AT^SYSCFGEX, an error response will be returned for AT^NETSCAN. This limitation also applies to the case where the module resides in a WCDMA cell and scans for GSM frequencies.

15.13.3 Parameter Description

<n>: the number of cells whose power level is greater than the <pow>, which is a decimal number. The value range is 1–20.

<pow>: minimum power value in dBm to scan, which is a decimal number. The value range is –110 to –47.

<mode>: network mode, which is a decimal number.

- | | |
|---|---------------------|
| 0 | GSM (default value) |
| 1 | WCDMA |
| 2 | TD-SCDMA |
| 3 | LTE |

<band>: please refer to the parameter description about <band> or <lteband> in 15.2 AT^SYSCFGEX-Configure Extended System.

<arfcn>: frequency, which is a decimal number.

Network Mode	Value Range of <arfcn>
GSM	0–1023
WCDMA	0–16383
TD-SCDMA	9400–9600, 10050–10125, 11500–12000
LTE	0–39649

<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. The value range is 0–FFFF. In LTE, <lac> indicates TAC (Tracking Area Code), ranging from 0 to FFFF.

<mcc>: PLMN country code, which is a 3-digit decimal number.

<mnc>: PLMN network code, which is a 2-digit or 3-digit decimal number.

<bsic>: GSM base station identification code, which is a decimal number. The value range is 0–63. In WCDMA, TD-SCDMA and LTE, the parameter returns 0.

<rxlvel>: receive signal level in dBm, which is a decimal number.

- For GSM: indicates RSSI. Received signal level of the BCCH carrier. The value range is –120 to –37. This is in accordance with a formula specified in 3GPP TS 45.008.
- For WCDMA: indicates RSCP. Parameter determines the received signal code power level of the cell that was scanned. The value range is –120 to –25.
- For TD-SCDMA: indicates RSCP. The value range is –116 to 0.
- For LTE: indicates RSRP. The value range is –140 to –44.

<cid>: cell identity in the SIB3 message, which is a hexadecimal number.

Network Mode	Value Range of <cid>
GSM	0–FFFF
WCDMA	0–FFFFFFF
TD-SCDMA	0–FFFFFFF
LTE	0–FFFFFFF

<psc>:

- When the network mode is WCDMA, this parameter specifies the primary scrambling code, which is a decimal number ranging from 0 to 511.
- When the network mode is TD-SCDMA, this parameter specifies the Midamble ID, which is a decimal number ranging from 0 to 127. Formula for obtaining the Midamble ID: Midamble ID = 4 x syncID + basicMidamble.

<pci>: physical cell ID used in the LTE network. The value range is 0–503.



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.

15.13.4 Property Description

Saving upon Power-off	PIN
N	N

15.13.5 Example

- Obtain the cell list without specifying the network mode and frequency:

```
Run:          AT^NETSCAN=2,-110
Response:     ^NETSCAN: 15,,,4,460,09,5,-64,2,80
              ^NETSCAN: 15,,,4,460,09,5,-64,2,80
              OK
```

- Obtain the cell list by specifying the network mode but not the frequency:

```
Run:          AT^NETSCAN=2,-110,0
```

Response: ^NETSCAN: 15,,,4,460,09,5,-64,2,80
 ^NETSCAN: 31,,,6,460,09,2,-100,2,80

 OK

- Obtain the cell list by specifying the network mode and frequency:

Run: AT^NETSCAN=2,-110,0,300

Response: ^NETSCAN: 15,,,4,460,09,-64,2,300
 ^NETSCAN: 31,,,6,460,09,-100,2,100300

 OK

- Query the supported number of cells, thresholds, and network modes:

Run: AT^NETSCAN=?

Response: ^NETSCAN: (1-20),(-110--47),(0-3)

 OK

- Interrupt the process of obtaining frequency information:

Run: AT^NETSCAN=2,-110,0,300

Response: ABCD (the interrupt character string is set to any ASCII
 codes)
 ^NETSCAN: 15,,,4,460,09,5,-64,2,300
 ^NETSCAN: 31,,,6,460,09,2,-100,2,300

 OK

15.14 AT^FREQLOCK-Frequency Lock

15.14.1 Command Syntax

AT^FREQLOCK=<n>[,<mode>,<freq>,[<band>],[<psc>],[<pci>]]
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)
<pre><CR><LF>^FREQLOCK: <n>,<mode>,<freq>,<band>,<psc>,<pci>]]<CR><LF>^FREQLOCK:<n>,<mode>,<freq>,<band >,<psc>,<pci>]][...]<CR><LF><CR><LF>OK<CR><LF></pre>

15.14.2 Interface Description

This command is used to query, enable, or disable the frequency lock.

The set command enables or disables the frequency lock.

The read command queries the current status information of the frequency lock.

15.14.3 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
- "03" TD-SCDMA
- "04" LTE

<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 indicating the primary scrambling code in WCDMA mode and scrambling parameter in TD-SCDMA mode.

 **NOTE**

- When $\langle n \rangle = 0$, the frequency lock is disabled, and the values of $\langle mode \rangle$, $\langle freq \rangle$, $\langle band \rangle$ and $\langle psc \rangle$ are meaningless.
- When the `AT^FREQLOCK?` command is run, if $\langle n \rangle$ is 0, the other parameters are not returned.
- $\langle psc \rangle$ is optional. If it is not set, only the frequency lock is enabled. If it is set, the frequency lock is enabled and the scrambling code is specified.
- Running `AT^FREQLOCK=0` disables the frequency lock for all network modes.

$\langle pci \rangle$: an integer type indicating the physical cell ID, which ranges from 0 to 503 and is valid only in LTE mode.

15.14.4 Property Description

Saving upon Power-off	PIN
N	N

15.14.5 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

- Lock the frequency 500 of the LTE, and the physical cell ID is 2.

Run: `AT^FREQLOCK=1,"04",500,,2`

Response: OK

- Disable the frequency lock.

Run: `AT^FREQLOCK=0`

Response: OK

- Query the current status of the frequency lock. In the following response, the cell is locked to frequency 54 at 900 MHz in GSM mode, frequency 10738 in WCDMA mode, and frequency 500 with the physical cell ID of 2 in LTE mode:

Run: `AT^FREQLOCK?`

```
Response: ^FREQLOCK: 1,"01",54,"01",,
          ^FREQLOCK: 1,"02",10738,,,
          ^FREQLOCK: 0,"03"
          ^FREQLOCK: 1,"04",500,,,2
```

OK

15.15 AT^DDTMFCFG-Configure the DTMF Decoder

15.15.1 Command Syntax

AT^DDTMFCFG=<para>,<value>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^DDTMFCFG?
Possible Response(s)
<CR><LF>^DDTMFCFG: <para>,<value><CR><LF><CR><LF>OK<CR><LF>

AT^DDTMFCFG=?
Possible Response(s)
<CR><LF>^DDTMFCFG: (list of supported <para>s)<CR><LF><CR><LF>OK<CR><LF>

15.15.2 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 specifies the DTMF decoder parameters.

The read command queries the values of DTMF decoder parameters.

The test command returns all configurable DTMF decoder parameters.



NOTE

At present, only the DTMF characters decoded from the received inband-voice data flow is supported, and that decoded from the received signal is not supported.

15.15.3 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.

15.15.4 Property Description

Saving upon Power-off	PIN
Y	N

15.15.5 Example

```

Run:          AT^DDTMFCFG=0,1
Response:    OK

Run:          AT^DDTMFCFG?
Response:    ^DDTMFCFG: 0,1

                OK

Run:          AT^DDTMFCFG=?
Response:    ^DDTMFCFG: (0)

                OK

```

15.16 ^DDTMF-Unsolicitedly Report the DTMF Character Sent from the Communication Peer

15.16.1 Command Syntax

URC

URC
Possible Response(s)
<CR><LF>^DDTMF: <key><CR><LF>

15.16.2 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.



NOTE

At present, only the DTMF characters decoded from the received inband-voice data flow is supported, and that decoded from the received signal is not supported.

15.16.3 Parameter Description

<key>: character type value ('0' to '9', 'A' to 'D', '*', or '#').

15.16.4 Property Description

Saving upon Power-off	PIN
NA	NA

15.16.5 Example

Response: ^DDTMF: 1

15.17 AT^CELLLOCK-Control the Cell Lock

15.17.1 Command Syntax

AT^CELLLOCK=<n>[,<mode>,<paras>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^CELLLOCK?
Possible Response(s)

AT^CELLLOCK?
<pre><CR><LF>^CELLLOCK: <n>[,<mode>,<paras>][<CR><LF>^CELLLOCK:<n>,<mode>,<paras>][...]]<CR><LF> <CR><LF>OK<CR><LF></pre>

AT^CELLLOCK=?
Possible Response(s)
<pre><CR><LF>^CELLLOCK: (list of supported <n>s),(list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF></pre>

15.17.2 Interface Description

The set command enables or disables the cell lock function and sets the cell location and information.

The read command queries the information of the currently locked locations and cells.

The test command returns the parameter ranges of the currently locked cells.

15.17.3 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.

- 01 GSM
- 02 WCDMA
- 03 TD-SCDMA
- 04 LTE

<paras>: cell lock parameter, which varies by network mode.

- GSM/WCDMA/TD-SCDMA

<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.

<ci1>...<ci3>: eight-character cell ID, similar to <lac>. When the cell lock function is required, this parameter is optional.

- LTE

<tac>: four-character tracking area code in hexadecimal format.

<ci1>...<ci3>: eight-character cell ID. This parameter is optional when the cell lock is enabled. A maximum of three values can be set.

 **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.

15.17.4 Property Description

Saving upon Power-off	PIN
N	N

15.17.5 Example

- Enable the device to work only in the location 00C3, cell 00000001 in GSM mode.

Run: AT^CELLLOCK=1,"01","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,"01","00C3","00000001"
^CELLLOCK: 1,"02","00B3","00000001"

OK

- Query the parameter ranges.

Run: AT^CELLLOCK=?

Response: ^CELLLOCK: (0-1),("01"- "04")

OK

15.18 AT^HFREQINFO frequency of serving cell report command

15.18.1 Command syntax

AT^HFREQINFO=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^HFREQINFO?
Possible Response(s)
<CR><LF>^HFREQINFO: <n>,<sysmode>,<band_class>,<dl_fcn1>,<dl_freq1><dl_bw1>,<ul_fcn1>,<ul_freq 1><ul_bw1><CR><LF><CR><LF>OK<CR><LF>

AT^HFREQINFO=?
Possible Response(s)
<CR><LF>^HFREQINFO (list of supported<n>,<sysmode>s)<CR><LF><CR><LF>OK<CR><LF>

URC
Possible Response(s)
When the serving cell's frequency changed, the unsolicited report: <CR><LF>^HFREQINFO: <n>,<sysmode>,<band_class>,<dl_fcn1>,<dl_freq1><dl_bw1>,<ul_fcn1>,<ul_freq 1><ul_bw1><CR><LF>

15.18.2 Interface Description

HFREQINFO: Huawei Frequency Information.

This command is used to query the parameters of the uplink and downlink frequency, center frequency, bandwidth, and frequency band of the serving cell. When the serving cell frequency changes, it is reported automatically.



Supports enable the unsolicited report by AT^HFREQINFO=<n>.

If the current service is out of service and the service mode is not known, ERROR is returned.
The current system mode and all parameters only support LTE mode.

15.18.3 Parameter description

<n> integer type

0 disable ^HFREQINFO unsolicited report(default)

1 enable ^HFREQINFO unsolicited report

<sysmode>: integer type, the current system mode

1 GSM

2 CDMA

3 WCDMA

4 TDSCDMA

6 LTE

Only support LTE.

< band_class >: integer type. the band of the current serving cell.

When <sysmode>is 6(LTE):

1 LTE band1

2 LTE band2

... ...

41 LTE band41

42 LTE band42

43 LTE band43

More information, please refer 3GPP 36.101 V10.0.0 Section 5.7.3

<dl_fcn1>: integer type, the downlink EARFCN

<dl_freq1>: integer type, the downlink carrier frequency (100kHz)

<dl_bw1>: integer type, the bandwidth of downlink (kHz)

When <sysmode>is 6(LTE):

1400

3000

5000

10000

15000

20000

More information please refer to 3GPP 36.101 V9.6.0 Section 5.6.

<ul_fcn1>: integer type, the uplink EARFCN

<ul_freq1>: integer type, the uplink carrier frequency (100kHz)

<ul_bw1>: integer type, the bandwidth of uplink (kHz)

When <sysmode>is 6(LTE):

1400

3000

5000

10000

15000

20000

More information, please refer 3GPP 36.101 V9.6.0 Section 5.6.

15.18.4 Property Description

Saving upon Power-off	PIN
N	Y

15.18.5 Example

```
AT^HFREQINFO?
```

```
^HFREQINFO: 0,6,18,5925,8675,20000,23925,8225,20000
```

OK

For the LTE mode:

the band is LTE band 18,

downlink EARFCN is 5925,

carrier frequency of the downlink is 867.5MHz,

bandwidth of downlink is 20MHz,

uplink EARFCN is 23925,

carrier frequency of the uplink is 822.5MHz,

bandwidth of uplink is 20MHz.

15.19 ^REJINFO cause value unsolicited report command

15.19.1 Command syntax

URC
Possible Response(s)
^REJINFO: <PLMN ID>, <Service Domain>, <Reject Cause>, <Rat Type>, <Reject Type>

15.19.2 Interface Description

This command is used to report the cause value of the bellow procedure

- 1) register reject
- 2) service request reject
- 3) detach request from network
- 4) the authentication procedure failure cause by the USIM

The host uses AT^CUSTFEATURE=16,1 command to turn on the feature of activating report the network reject information.

15.19.3 Parameter Description

<PLMN ID>: PLMN

< Service Domain >

0: CS only;

1: PS only;

2: CS+PS;

<Reject Cause>:

Cause value defined by 3GPP except bellow value. The actual AT return value does not contain #.

#256: Authentication Failure;

#258: other cause (except #2、#16、#17、#22) of the combined attach procedure failure for the CS services;

#301: no response of the register procedure for CS PS service;

#302: RRC procedure failure for the CS service;

#303: RRC procedure failure for the PS service;

#65537: (include #65537、65538、65539、65540、65541) USIM authentication failure;

< Rat Type>

0: GERAN;



- 1: UTRAN;
 - 2: E-UTRAN;
 - 3: other;
- <Reject Type>
- 0: register reject;
 - 1: authentication failure;
 - 2: service request reject;
 - 3: detach request form the network;

15.19.4 Example

^REJINFO:46001,2,12,1,0

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=?

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 configures basic parameters for dialing and establishes 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>: a string type value with quotation marks that indicates the access point name, with a maximum of 99 characters, as shown in the example. (If only comma is specified or no character is specified, it indicates that APN is null)

<user_name>: a string type value with quotation marks, with a maximum of 31 characters, which can be left out.

<password>: a string type value with quotation marks, with a maximum of 31 characters, which can be left out.

<ip_addr>: a string type value 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.

- | | |
|---|-------------------------------------|
| 0 | No authentication |
| 1 | PAP authentication |
| 2 | CHAP authentication (default value) |

<state>: indicates 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>: a string type value with quotation marks that indicates the IP address of the preferred DNS server.



<sec_dns_address>: a string type value with quotation marks that indicates 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","172.16.44.200","172.16.44.201"

             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)

AT^IPOPEN?
<p>If link has been open:</p> <pre><CR><LF>^IPOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[<CR><LF>^IPOPEN: <link_id>,<type>,<local_port>,<remote_ip>,<remote_port>,<SIO_port>,<MSS>[...]]<CR> ><LF><CR><LF>OK<CR><LF></pre>
<p>If link hasn't been open:</p> <pre><CR><LF>OK<CR><LF></pre>

AT^IPOPEN=?
Possible Response(s)
<pre><CR><LF>^IPOPEN: (list of supported <link_id>s),(list of supported <local_port>s),(list of supported <remote_port>s)<CR><LF><CR><LF>OK<CR><LF></pre>

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 an FTP link
"FTPS"	Establishing an FTPS link
"HTTP"	Establishing an HTTP link
"HTTPS"	Establishing an HTTPS link
"SMTP"	Establishing an SMTP link
"SMTPS"	Establishing an SMTPS link



Currently, FTPS, HTTPS, SMTP, and SMTPS connections cannot be established using IPv6 addresses.

<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. IPv6 address should be enclosed in "[]", 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, make sure the protocol, local IP address, local IP port, remote IP address, and remote IP port used for a service cannot be all the same as those used for another service. Otherwise, the customer shall be liable for the service conflicts.

<username>: string type, indicating the user name 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 '@'.

<password>: 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

- Establish consecutively three links:

Run: AT^IPOPEN=1, "TCP", "192.168.18.8", 10000, 9000

Response: OK

Run: AT^IPOPEN=2, "TCP", "[2013::15]:80", 10000, 8000



```
Response:      OK
Run:           AT^IPOPEN=3,"UDP","192.168.18.8",7000,6000
Response:      OK
Run:           AT^IPOPEN?
Response:      ^IPOPEN: 1,"TCP",9000,"192.168.18.8",10000,1,1460
               ^IPOPEN: 2,"TCP",8000,"[2013::15]",80,1,1460
               ^IPOPEN: 3,"UDP",6000,"192.168.18.8",7000,1,0
Response:      OK
```

- Establish one link using the URL mode (here take www.example.com as an example, which is not a real domain name):

```
Run:           AT^IPOPEN=1,"TCP","www.example.com",80,3081
Response:      OK
Run:           AT^IPOPEN?
Response:      ^IPOPEN: 1,"TCP",3081,"192.168.111.147",80,1,1440
Response:      OK
Run:           AT^IPOPEN=1,"SMTP","192.168.63.41",25,, "m2m", "m2m"
Response:      OK
               ^IPSRVST: 1,13,235
Run:           AT^IPOPEN=1,"SMTPS","192.168.63.41",465,, "m2m", "m2m"
Response:      OK
               ^IPSRVST: 1,13,235
Run:           AT^IPOPEN=2,"FTP","192.168.63.41",21,, "m2m", "m2m"
Response:      OK
               ^IPSRVST: 2,10,230
Run:           AT^IPOPEN=2,"FTP","[2013::15]",21,, "admin", "admin"
Response:      OK
               ^IPSRVST: 2,10,230
Run:           AT^IPOPEN=2,"FTPS","192.168.63.41",990,, "m2m", "m2m"
Response:      OK
               ^IPSRVST: 2,10,230
```

```

Run:          AT^IPOPEN=4, "HTTP", "[2013::15]", 9001
Response:     OK

Run:          AT^IPOPEN=4, "HTTP", "192.168.63.41", 9001
Response:     OK

Run:          AT^IPOPEN=4, "HTTPS", "192.168.63.41", 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 enables listening function. At most 5 clients are supported.

16.3.3 Parameter Description

<type>: a string type value with quotation marks that indicates the type of the link.

"TCP" Establish a TCP link.
"UDP" Establish a UDP link.



NOTE

If the listening function is not enabled, <type> in the read command response is a null string.

<listen_port>: an integer type value that indicates the local listening port. The value ranges from 1 to 65535.



NOTE

If the listening function is not enabled, <listen_port> in the read command response is 0.

<idle_num>: an integer type value that indicates the number of current idle links. The value ranges from 0 to 5.

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

AT^IPSEND=<link_id>,<data>
Possible Response(s)
<CR><LF>^IPSEND: <link_id><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^IPSEND=?
Possible Response(s)
<CR><LF>OK<CR><LF>

16.4.2 Interface Description

This command sends 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>: indicates the ID of established links. The value ranges 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 content of 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 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 automatically reports data when the data arrives.

16.5.3 Parameter Description

<link_id>: indicates the number of established links. The value ranges from 1 to 5.

<data_len>: an integer type value that indicates the length of data. The value ranges from 1 to 1500.

<data>: a character string value indicates newly received data information, and contains any characters without quotation marks.

16.5.4 Property Description

Saving upon Power-off	PIN
N	Y

16.5.5 Example

Response: ^IPDATA:
 1, 71, 123456781234561234567234567234567234678234782347823456
 78234678903489034

16.6 AT^IPCLOSE-Close TCP/UDP Link

16.6.1 Command Syntax

AT^IPCLOSE=<link_id>

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>,<link5_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 closes links, disables the server's listening function, or closes 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 link ID. The value ranges 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?

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 transfers 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 AT^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>: indicates 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

<p>If <mode>=0 or <mode>=1: AT^IPSENDEX=<link_id>,<mode>,<data></p> <p>If <mode>=2: AT^IPSENDEX=<link_id>,<mode>,<len>[,<eof>]<CR>entered data</p>
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 sends the user data based on established links. Among three data sending modes available, mode 2 is recommended.

- Mode 0 is compatible with the AT[^]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 AT[^]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>: indicates the ID of established links. The value ranges from 1 to 5.

<mode>:

- | | |
|---|--|
| 0 | Compatible with AT [^] IPSEND |
| 1 | Mandatory data conversion mode |
| 2 | Length-limited full-character mode |

<data>: indicates user data with quotation marks. The maximum length of the user data is 1500 characters in both mode 0 and mode 1.

<len>: indicates the maximum length of the data requested by a user to be sent, which cannot exceed 1500 characters.

<eof>: indicates the end of the user data during FTP put.

- | | |
|---|---------------------|
| 0 | Data is pending. |
| 1 | End of 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
-----------------------	-----



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

Run: AT^IPSENDEX=1,2,1500,0

Response: OK

Input: input user data

Response: ^IPSENDEX: 1

OK

Run: AT^IPSENDEX=1,2,500,1

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>

AT^IPFLOWQ[=<link_id>]
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^IPFLOWQ?
Possible Response(s)
<CR><LF>^IPFLOWQ: <link1>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_SOCKET>,<RX_TO_USER>[<CR><LF>^IPFLOWQ: <link2>,<TX_FROM_USER>,<TX_TO_SOCKET>,<TX_ACK_SUM>,<RX_FROM_SOCKET>,<RX_TO_USER>[...]]<CR><LF><CR><LF>OK<CR><LF>

AT^IPFLOWQ=?
Possible Response(s)
<CR><LF>^IPFLOWQ: (list of supported <link_id>s)<CR><LF><CR><LF>OK<CR><LF>

16.9.2 Interface Description

When data is sent over a TCP link, the peer end, if it receives the data, sends ACK to the sending end. After the ME receives the ACK from the peer end, the ME confirms that the data is successfully sent.

No ACK is required when data is received or sent over a UDP link. Only the sums of the data packets sent to and received from the peer end are recorded.

The set command clears 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 queries the data packet statistics of all current TCP/UDP links.

The test command returns the sequence number of the supported TCP/UDP link.

16.9.3 Parameter Description

<link_id>: an integer type value that indicates the TCP/UDP sequence number.

- | | |
|-----|---|
| 0 | Indicate clearing the statistics of all TCP links. |
| 1-5 | Indicate 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>: indicates TCP/UDP link ID.

- 0 An illegal ID
- 1-5 ID of established links



- 6 Local server
- 7 IPv4 network connection
- 8 IPv6 network connection

<state>: indicates link state.

- 0 The link is closed.
- 1 The link is established.
- 2-255: Reserved

<errcode>: indicates error message.

- 0 The peer end closes the link.
- 1 The server receives a new link.
- 2 A network error occurs.
- 3 The supported link reaches the threshold.
- 4 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

When the connection or listening is disconnected due to the IPv6 dial-up disconnection, the module initiatively send status reports.

Response: ^IPSTATE: 8,0,2

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 configures 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 sets one parameter at a time. The user needs to enter parameter ID and the corresponding value.

The read command queries 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>	Range of <value> (Unit)	Description
5	1-100 (0.1s) (10 by default)	Specifies the value of the timer for the transparent transmission.

<parameter_id>	Range of <value> (Unit)	Description
10	1-1472 (byte) (1024 by default)	Specifies the length of the TCP/UDP data packet for packet sending.
12	0-1 (0 by default)	For selecting the transparent transmission mode, see the description of AT^IPENTRANS.
13	0-1 (0 by default)	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 adds the 0x7E end character and forwards to the user. (not supported currently)
14	0-2 (0 by default)	0: The transparent transmission mode 1: The command transmission mode 2: The get buffer transmission mode

16.11.4 Property Description

Saving upon Power-off	PIN
N	Y

16.11.5 Example

Set the time of the assembled data packet timer to 0.2s during the transparent transmission.

Run: AT^IPCFL=5,2

Response: OK

16.12 AT^FTPCMD-Create File Transfer Service

16.12.1 Command Syntax

AT^FTPCMD=<link_id>,<ftp_cmd>[,<filename>][,<data_offset>]
Possible Response(s)

AT^FTPCMD=<link_id>,<ftp_cmd>[,<filename>][,<data_offset>]
<p>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></p>
<p>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></p>
<p>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></p>

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>

16.12.2 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.

16.12.3 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 downloading 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	Establish data connection in PASV mode (default value)

- PORT Establish data connection in PORT mode
- FILESIZE Get 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.
- The module do not check whether the character string of <filename> contains following characters (|, :, *, <, >, ", ?) or not. But if you use these characters in <filename>, the server may return error.

16.12.4 Property Description

Saving upon Power-off	PIN
N	Y

16.12.5 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
```

- Get the file size.

```
Run:           AT^FTPCMD=1,FILESIZE,"test.txt"

Response:      ^FTPCMD: "FILESIZE",4500

               OK
```

- Download 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 AT^FTPCMD.

```
Run:          AT^FTPCMD=?
Response:     ^FTPCMD: (1-5), ("GET", "PUT", "PORT", "PASV")

                OK
```

16.13 AT^HTTPCMD-Command for HTTP Data Service

16.13.1 Command Syntax

AT^HTTPCMD=<http_linkID>,<http_cmd>,<http_data_path>[,<http_data_length>[,<http_data_type>]]
Possible Response(s)
If in the transparent transmission mode: <CR><LF>CONNECT<CR><LF><http data content><CR><LF>OK<CR><LF>
If 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>

16.13.2 Interface Description

After HTTP service is established, this command is used for data services using HTTP protocol.

16.13.3 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 that indicates HTTP service types.

GET HTTP GET request

POST HTTP POST request

<http_data_path>: a character string. The parameter consists of a URL, whose format is as follows: <protocol>://<host>:<port>/<path>.

 **NOTE**

If the host is a IPv6 address, the address should be enclosed in "[]".

<http_data_length>: indicates the length of HTTP POST data.

<http_data_type>: indicate the type of HTTP POST data. 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.

16.13.4 Property Description

Saving upon Power-off	PIN
NA	Y

16.13.5 Example

Here take www.example.com as an example, which is not a real domain name.

- Query the range of the parameters supported by AT^HTTPCMD.

```
Run:          AT^HTTPCMD=?
Response:    ^HTTPCMD: (1-5), ("GET", "POST")
OK
```

- HTTP GET

```
Run:          AT^IOPEN=1, "HTTP", "www.example.com", 80
Response:    OK

Run:          AT^HTTPCMD=1, GET, "http://www.example.com:80/example.html"
Response:    CONNECT
              <file Content>
              OK

              ^IPSRVST: 1,12,200

Run:          AT^IOPEN=1, "HTTP", "[2013::15]", 80
Response:    OK
```



```
Run:          AT^HTTPCMD=1,GET,"http://[2013::15]:80/example.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","www.example.com",80

Response:     OK

Run:          AT^HTTPCMD=1,GET,"http://www.example.com:80/example.html"

Response:     OK

              ^IPDATA: 1,1500,ABC..

              ^IPDATA: 1,1500,ABC..

              ^IPSRVST: 1,12,200
```

- HTTP POST

```
Run:          AT^IPOPEN=1,"HTTP","www.example.com",80

Response:     OK

Run:          AT^HTTPCMD=1,POST,"http://www.example.com:80/example.html"
              ,3500,"text/plain"

Response:     CONNECT
              <User enter 3500 characters>
              <Server Response>
              OK

              ^IPSRVST: 1,12,200

Run:          AT^IPOPEN=1,"HTTP","[2013::15]",80

Response:     OK

Run:          AT^HTTPCMD=1,POST,"http://[2013::15]:80/example.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.example.com:80/example.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","www.example.com",443

Response: OK

Run: AT^HTTPCMD=1,GET,"https://www.example.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,"agddhmwdgwcfcjgwdgjsjsjsjsdfg"
OK

16.14 ^IPSRVST-Unsolicitedly Report the Socket Service State

16.14.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPSRVST: <link_id>,<state_type>,<state_code><CR><LF>

16.14.2 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.

16.14.3 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.
	110	Restart the marker reply.

<state_type>	<state_code>	Meaning
	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	Fail to open the data connection.
	426	Close the connection and terminate the transmission.
	450	The requested file operation is not executed.
	451	Terminate the requested operation: a local error occurs.
	452	The requested operation is not executed: insufficient system storage space.



<state_type>	<state_code>	Meaning
	500	The command 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 is failed.
	1	Data transmission is completed.
12	200	The requested operation succeeds.
	301	Moved permanently
	302	Moved temporarily
	400	The requested operation is not understood by the server.
	401	User name and password are required for the requested page.
	403	Forbidden
	404	Resource not found
	405	Method not allowed on resource
	406	Requested representation not accepted
	408	Request timedout
	410	Requested source is no longer available server
	500	Internal server error
	501	Requested HTTP operation not supported



<state_type>	<state_code>	Meaning
	505	HTTP version not supported
13	421	Service not available
	450	Requested mail command failed
	451	Command has been aborted due to server error.
	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 <CR><LF>.<CR><LF>
	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

16.14.4 Property Description

Saving upon Power-off	PIN
NA	NA

16.14.5 Example

- An FTP user is successfully logged in to an FTP.

```
Run:          AT^IPOPEN=1,"FTP","192.168.44.4",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.

16.15 AT^DVCFG-Set Priority of Voice Call and Data Service

16.15.1 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=?

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

16.15.2 Interface Description

The set command sets the priority of voice call and data service.

The read command queries the current priority of voice call and data service.

16.15.3 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, you can use AT^DVCFG=0 command, or AT^IPCLOSE=7 to close IPSTACK, which can return back to answer the voice call when it coming.

16.15.4 Property Description

Saving upon Power-off	PIN
N	Y

16.15.5 Example

Run: AT^DVCFG=0

Response: OK

16.16 AT^EMSEND-Send Emails

16.16.1 Command Syntax

<code>AT^EMSEND=<link_id>,<ds_addr>[,<subj>][,<charset>][,<attachment>][,<file_name>]]]<CR></code>
Possible Response(s)
<code><CR><LF>>email text to be entered here followed by<CTRL-Z>/<Esc><CR><LF>OK<CR><LF></code>
In case of an MT-related error: <code><CR><LF>+CME ERROR: <err><CR><LF></code>

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 value)
- 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 AT^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@test.example.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@test.example.com","testwithattachment
              ","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.

16.17 AT^IPRCV-Read Network Service Data

16.17.1 Command Syntax

AT^IPRCV=<link_id>,<reqReceiveLength>
Possible Response(s)
<ul style="list-style-type: none"> 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>

16.17.2 Interface Description

This command reads data out from the service buffer.

16.17.3 Parameter Description

<link_id>: link number.

1–5 The expression has established link number.

<reqReceiveLength>: an integer type that 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

16.17.4 Property Description

Saving upon Power-off	PIN
N	Y

16.17.5 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
```

16.18 ^IPRCVST-Unsolicitedly Report Data Arrival in Data Receive Buffer

16.18.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^IPRCVST: <link_id>,<urcCauseid><CR><LF>

16.18.2 Interface Description

This command notifies unsolicited reports to the user by indicating the data arrival in data receive buffer.

16.18.3 Parameter Description

<link_id>: link number, the value ranges from 1 to 5.

<urcCauseid>: indicates whether there is data to be read.

- 1 Indicate that data is available and can be read by sending AT^IPRCV command.

16.18.4 Property Description

Saving upon Power-off	PIN
N	Y

16.18.5 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

16.19 AT^SSLEN-Initialize Secure Service

16.19.1 Command Syntax

AT^SSLEN=<SSL_id>,<Enable>[,<encode_ok>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^SSLEN?
Possible Response(s)
<CR><LF>^SSLEN: <SSL_id>,<Enable>,<encode_ok>,<Target_IP_addr><CR><LF><CR><LF>OK<CR><LF>

AT^SSLEN=?
Possible Response(s)
<CR><LF>^SSLEN: (list of supported <SSL_id>s),(list of supported <Enable>s),(list of supported <encode_ok>s)<CR><LF><CR><LF>OK<CR><LF>

16.19.2 Interface Description

This command is used to enable/disable secure or normal socket.

The read command queries the current values of parameters and the target IP address.

The test command returns the SSL enable command capabilities.

16.19.3 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^SSLEN 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 SSLEN 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.

16.19.4 Property Description

Saving upon Power-off	PIN
N	Y

16.19.5 Example

Preconditions:

- The network connection and wireless network connection are supported by the targets.

```
Run:          AT^SSLEN=1,1,1
Response:     OK
Run:          AT^SSLEN?
Response:     ^SSLEN: 1,1,1,"192.168.70.59"
              OK
Run:          AT^SSLEN=?
Response:     ^SSLEN: (0-1),(0-1),(0-1)
              OK
```

- The SSL is not enabled.

```
Run:          AT^SSLEN?
Response:     ^SSLEN: 1,0,1,"0.0.0.0"
              OK
```

Examples for abnormal cases:

- Without enabling a socket, if the socket is disabled:

```
Run:          AT^SSLEN=1,0
Response:     +CME ERROR: Socket not enabled
```

- The socket is enabled again (without disabling the previously enabled socket):

```
Run:          AT^SSLEN=1,1
Response:     +CME ERROR: Socket already enabled
```

- A secure socket is enabled by AT^SSLEN=1,1, and the normal socket is disabled:

```
Run:          AT^SSLEN=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^SSLEN=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

16.20 AT^SSLCFG-Configure SSL

16.20.1 Command Syntax

AT^SSLCFG=<SSL_id>,<Timeout>[,<cipher_suite>,<scurl_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>,<scurl_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 <scurl_level>s)<CR><LF><CR><LF>OK<CR><LF>

16.20.2 Interface Description

This command is used to configure the properties of secure socket.

The read command queries the current values of the parameters.

The test command returns AT^SSLCFG command capabilities.

16.20.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- 1 Secure socket connection
- 2 FOTA secure socket connection

<Timeout>: an integer indicates the maximum blocking timeout for Rx and Tx operations (unit: seconds).

<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 10.

The table below is the supported cipher suite list (currently supported 10 cipher suites).

<ciphers_suit>	Cipher suites
0	All supported ciphers (default value)
1	TLS_RSA_WITH_NULL_SHA
2	TLS_RSA_WITH_NULL_SHA256
3	TLS_RSA_WITH_AES_256_CBC_SHA
4	TLS_RSA_WITH_AES_128_CBC_SHA
5	TLS_RSA_WITH_AES_128_CBC_SHA256
6	TLS_RSA_WITH_AES_256_CBC_SHA256
7	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
8	TLS_DHE_RSA_WITH_AES_128_CBC_SHA
9	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
10	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256



NOTE

TLS_RSA_WITH_NULL_SHA and TLS_RSA_WITH_NULL_SHA256 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^SLEN=1,0, the module will restore the parameter values of AT^SSLCFG to their default values.
- FOTA SSL socket connection (<SSL_id>=2) settings will not be controlled (reset) by SSL enabled or disabled.

16.20.4 Property Description

Saving upon Power-off	PIN
N	Y

16.20.5 Example

Preconditions: the secure socket is enabled by using AT^SLEN 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: (1-2), (1-60), (0-10), (0-2)

                OK
```

Examples for abnormal cases

- Without that secure socket is enabled (AT^SLEN), if AT^SSLCFG command is run:

```
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 0.

```
Run:          AT^SSLCFG=0,60,1,0
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
```

16.21 AT^SSLMNG-Manage Certificate or Key

16.21.1 Command Syntax

AT^SSLMNG=<SSL_id>,<data_type>,<action>,<file_name>[,<package_id>,<total_no_of_packages>,<cert_info>][,<password>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^SSLMNG?
Possible Response(s)
<CR><LF>^SSLMNG: [<SSL_id>,<data_type>,<file_name>[...]<CR><LF>][<SSL_id>,<data_type>,<action>,<file_name>[,<package_id>,<total_no_if_packages>]<CR><LF>]<CR><LF>OK<CR><LF>
If no certificate is present: ^SSLMNG: <CR><LF>OK<CR><LF>

AT^SSLMNG=?
Possible Response(s)
<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>

16.21.2 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 up to 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,"S0tLUVORCBSU0EgUFJJVkfURSBLRVktLS0tLQ
o="
OK
AT^SSLMNG=1,1,0,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ211cyBJbmRpYSBQc
m12YXRlbG1taXRlZC4s"
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 queries 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 returns 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

16.21.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- | | |
|---|--------------------------------|
| 1 | Secure socket connection |
| 2 | FOTA 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 (the 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 255.

<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 contain the correct password.
- For FOTA SSL, it is required to give the password in every package, but the last package must contain 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.
- If more than one client and key 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 (reading data) to succeed the hand shake during the open socket.
- 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 for <action>=2 (reading data) can load a maximum of 10 certificates from the buffer/file system during a particular session 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.
- Certificate store/delete operations will not be controlled by SSL enabled or disabled.
- On FOTA SSL connection, RAM storing is not supported. Users have to store the certificate first and then use LOAD operation to load the certificate.
- FOTA SSL socket connection (<SSL_id>=2) store/delete/load operations will not be controlled by SSL enabled or disabled.

16.21.4 Property Description

Saving upon Power-off	PIN
N	Y

16.21.5 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,"SHVhd2VpIFRlY2hub2xvZ2
1lcyBJbmRpYSBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVvKf
URSBLRVktLS0tLQo="

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,"SHVhd2VpIFRlY2hub2xvZ2
1lcyBJbmRpYSBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG=1,1,1,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVvKf
URSBLRVktLS0tLQo="

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^SSLEN command before load operation is performed.

- 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,"S0tLUVORCBSU0EgUFJJVkJFURSBLRVktLS0tLQo="

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","m2m"

Response: OK

Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",2,2,"S0tLUVORCBSU0EgUFJJVkJFURSBLRVktLS0tLQo=","m2m"

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:
          1,1,ca-cert.pem
          1,0,client-cert.pem
          1,2,client-key.pem

          OK
```

- The SSLMNG operation is performed before.

```
Run: AT^SSLMNG=1,1,2,"ca_cert2.pem",1,2,"SHVhd2VpIFRlY2hub2xvZ2
      1lcYBJbmRpYSBQcm12YXRlbGltaxRlZC4s"

Response: OK

Run: AT^SSLMNG?

Response: ^SSLMNG: 1,1,ca-cert.pem
          1,0,client-cert.pem
          1,2,client-key.pem
          2,1,ca-cert.pem
          2,0,client-cert.pem
          2,2,client-key.pem
          1,1,2,"ca_cert2.pem",1,2

          OK

Run: AT^SSLMNG=?

Response: ^SSLMNG: (1-2),(0-2),(0-2),,(1-10),(1-10),,

          OK
```

Examples for abnormal cases

- Without the secure socket is enabled (AT^SSLEN), run AT^SSLMNG command to perform load operation:

```
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 0.

```
Run: AT^SSLMNG=0,1,2,"ca_cert2.pem"

Response: +CME ERROR: Invalid arguments
```


16.22 AT^SSLO-Open Secure or Normal Socket

16.22.1 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>^SSLO: 1,"0.0.0.0",443,0,90<CR><LF><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>

16.22.2 Interface Description

This command is used to create and open a secure/normal socket.

The read command queries the current values of parameters.

The test command returns the socket open command capability.

16.22.3 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 the remote port of the server (usually 443). The value ranges from 1 to 65535.

<mode>: an integer indicates the async mode.

- 0 Sync Mode (default value)
- 1 Async Mode

- For in Sync mode, the data will be received in the synchronous mode. If AT^SSLRX command is run, the module will receive the data from the server.
- For in 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.

16.22.4 Property Description

Saving upon Power-off	PIN
N	Y

16.22.5 Example

Here take www.example.com as an example, which is not a real domain name.

Preconditions: the secure socket is enabled by using AT^SLEN command.

```

Run:          AT^SSLO=1, "192.168.63.155", 443, 1, 60
Response:    OK

Run:          AT^SSLO=1, "www.example.com", 443, 1, 90
Response:    OK

Run:          AT^SSLO=1, "192.168.63.41:448", 448, 1, 60
Response:    OK

Run:          AT^SSLO?
Response:    ^SSLO: 1, "192.168.63.155", 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^SSLEN), run AT^SSLO command.

Run: AT^SSLO=1, "192.168.63.155", 443, 1, 60
Response: +CME ERROR: Socket not enabled

- The server is down.

Run: AT^SSLO=1, "192.168.63.155", 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, "192.168.63.155", 443, 1, 60
Response: +CME ERROR: Invalid arguments

- The IP or host name value is given without quotes.

Run: AT^SSLO=1, 192.168.63.155, 443, 1, 60
Response: +CME ERROR: Invalid arguments
Run: AT^SSLO=1, www.example.com, 443, 1, 60
Response: +CME ERROR: Invalid arguments

- After the socket is enabled with <SSL_id>=1 (AT^SSLEN=1,1), open the connection with <SSL_id>=0:

Run: AT^SSLO=0, "192.168.63.155", 475, 1, 60
Response: +CME ERROR: Invalid Operation

16.23 AT^SSLC-Close Socket

16.23.1 Command Syntax

AT^SSLC=<SSL_id>

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>

16.23.2 Interface Description

This command is used to turn off a secure socket. It can also turn off the normal socket.

The test command returns the SSL close command capability.

16.23.3 Parameter Description

<SSL_id>: an integer indicates the SSL socket ID.

- 0 Normal socket connection
- 1 Secure socket connection

16.23.4 Property Description

Saving upon Power-off	PIN
N	Y

16.23.5 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: The link has not been established yet

- Without the socket is opened (AT^SSLO), run AT^SSLC command.

Run: AT^SSLC=1

Response: +CME ERROR: The link has not been established yet

- 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: The link has not been established yet

- 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

16.24 AT^SSLSTAT-Query SSL Status

16.24.1 Command Syntax

AT^SSLSTAT=<SSL_id>
Possible Response(s)
<CR><LF>^SSLSTAT: <conn_state><CR><LF><CR><LF>OK<CR><LF>

AT^SSLSTAT=<SSL_id>
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>

16.24.2 Interface Description

This command is used to query the status of the secure or normal socket.

The test command returns the current support SSL query capabilities.

16.24.3 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

16.24.4 Property Description

Saving upon Power-off	PIN
N	Y

16.24.5 Example

Preconditions: the socket is enabled by using AT^SLEN 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

16.25 AT^SSLRX-Receive Data

16.25.1 Command Syntax

AT^SSLRX=<SSL_id>,<Maxlength>[,<TimeOut>]
Possible Response(s)
<CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF><CR><LF>OK<CR><LF>
If no data received: <CR><LF>^SSLRX: 0<CR><LF>TIMEOUT<CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^SSLRX=?
Possible Response(s)
<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>

16.25.2 Interface Description

This command is used to receive the data through the secure or normal socket.

The test command returns the SSL received command capabilities.

- For the Sync mode (if the socket is opened with <mode>=0), AT^SSLRX will work in the synchronous mode. If AT^SSLRX command is run, the module will receive the data from the server.
- For the ASync mode (if the socket is opened with <mode>=1), 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 exceeds the maximum length, AT^SSLRX can be 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.

16.25.3 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 to be read from the socket. The value ranges from 1 to 1024.

<TimeOut>: the maximum blocking timeout in seconds. It is optional and 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^SSELEN 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.

16.25.4 Property Description

Saving upon Power-off	PIN
N	Y

16.25.5 Example

Preconditions: the connection is opened by using AT^SSLO command.

- The <encode_ok> is set to 1 in AT^SSELEN command.

Run: AT^SSLRX=1, 5, 60

Response: ^SSLRX: 5
SGVsbG8=

OK

- The <encode_ok> is set to 0 in AT^SSELEN 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^SSLEN), run AT^SSLRX command.

Run: AT^SSLRX=1,10,60

Response: +CME ERROR: The link has not been established yet

- Without the socket is opened (AT^SSLO), run AT^SSLRX command.

Run: AT^SSLRX=1,10,60

Response: +CME ERROR: The link has not been established yet

- 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: The link has not been established yet

- 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

16.26 ^SSLRX-Notify SSL Arrival Data

16.26.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SSLRX: <LengthOfRec><CR><LF><Received_data><CR><LF>

16.26.2 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.

16.26.3 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.

16.26.4 Property Description

Saving upon Power-off	PIN
N	Y

16.26.5 Example

```
Response:  ^SSLRX: 5
           Hello
           ^SSLRX: 5
           SGVsbG8=
```

16.27 AT^SSLTX-Send Data

16.27.1 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>

16.27.2 Interface Description

This command is used to send data through the secure or normal socket.

The test command returns the SSL transmit data command capability.

16.27.3 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.

16.27.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----

Saving upon Power-off	PIN
N	Y

16.27.5 Example

Preconditions: a connection is opened using AT^SSLO command.

- The <encode_ok> is set to 1 in AT^SSELEN command

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: OK

- The <encode_ok> is set to 0 in AT^SSELEN 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^SSELEN), run AT^SSLTX command.

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: +CME ERROR: The link has not been established yet

- Without that socket is opened (AT^SSLO), run AT^SSLTX command.

Run: AT^SSLTX=1, "SGVsbG8=", 60

Response: +CME ERROR: The link has not been established yet

- After the secure socket is opened (<SSL_id> is 1), send the data from the normal socket.

Run: AT^SSLTX=0, "SGVsbG8=", 60

Response: +CME ERROR: The link has not been established yet

- 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

16.28 AT^HBEACTEX-Control Heartbeat Function

16.28.1 Command Syntax

AT^HBEACTEX=<state>[,<ACK data>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^HBEACTEX?
Possible Response(s)
<CR><LF>^HBEACTEX: <state>[,<ACK data>]<CR><LF><CR><LF>OK<CR><LF>

AT^HBEACTEX=?
Possible Response(s)
<CR><LF>^HBEACTEX: (0-2)<CR><LF><CR><LF>OK<CR><LF>

16.28.2 Interface Description

This command is used to enable or disable the heartbeat function.

16.28.3 Parameter Description

<state>: indicates whether the heartbeat function is enabled or disabled.

- 0 Disable the heartbeat function.(default value)
- 1 Enable the heartbeat function.

- 2 Enable the heartbeat function and ACK packet filtering.

<ACK data>: indicates the heartbeat ACK packet. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 1400 bytes. This parameter is valid and mandatory when <state> is set to 2.

16.28.4 Property Description

Saving upon Power-off	PIN
N	Y

16.28.5 Example

```

Run:      AT^HBEACTEX=0                Disable the heartbeat function.
Response: OK

Run:      AT^HBEACTEX=1                Enable the heartbeat function.
Response: OK

Run:      AT^HBEACTEX=2, "3132333435363738 3968626561636b64617461"  Enable the heartbeat function and
                                                ACK packet filtering.
Response: OK

Run:      AT^HBEACTEX?                Read the heartbeat function states
Response: ^HBEACTEX:
          2, "3132333435363738396862656163
          6b64617461"

          OK

Run:      AT^HBEACTEX=?                Test command
Response: ^HBEACTEX: (0-2)

          OK

```

NOTE

If you want the module to discard the server-sent packet which content is "123"(0x313233) and do not report it, you can set the <ACK data> as either "123" or "3132333". But when you set the <ACK data> as "313233", the wake-up packet that server sent should avoid being set as "313233"(0x333133323333) because both the strings "313233" and "123" will be discard.

16.29 AT^HBECONTDATA-Set the Heartbeat Packet Data

16.29.1 Command Syntax

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

AT^HBECONTDATA?
Possible Response(s)
<CR><LF>^HBECONTDATA: <data><CR><LF><CR><LF>OK<CR><LF>

AT^HBECONTDATA=?
Possible Response(s)
<CR><LF>OK<CR><LF>

16.29.2 Interface Description

This command is used to set the heartbeat packet data in the heartbeat mechanism.

16.29.3 Parameter Description

<data>: indicates the heartbeat packet data. The value is a hexadecimal string with double quotation marks ("). The maximum length is 1400 bytes, which is 700 ASCII codes. The ones place must be an even number.

16.29.4 Property Description

Saving upon Power-off	PIN
N	Y

16.29.5 Example

Run: AT^HBECONTDATA="1234567890ABCDEF"
Response: OK


```

Run:          AT^HBECONTDATA?
Response:    ^HBEACTDATA: "1234567890ABCDEF"

                OK

Run:          AT^HBECONTDATA=?
Response:    OK
    
```

16.30 AT^HBECONTEX-Set Heartbeat Parameters

16.30.1 Command Syntax

AT^HBECONTEX=<type>,<server_ip>,<port>,<time>,<retrytime>,<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^HBECONTEX?
Possible Response(s)
<CR><LF>^HBECONTEX: <type>,<server_ip>,<port>,<time>,<retrytime>,<socket_id>,<apn>,[<username>],[<password>]]<CR><LF><CR><LF>OK<CR><LF>

AT^HBECONTEX=?
Possible Response(s)
<CR><LF>^HBECONTEX: (list of supported <port>), (list of supported <time>), (list of supported <retrytime>), (list of supported <socket_id>)<CR><LF><CR><LF>OK<CR><LF>

16.30.2 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, time for re-connecting timer, link ID of the transmit channel, APN, username, and password.



16.30.3 Parameter Description

<type>: indicates the link type. The value is a string that shall be enclosed in quotation marks

"TCP" Build TCP link.

"UDP" Build UDP link.

<server_IP>: indicates the remote server IP address. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 40 bytes. The invoker shall ensure the IP address correctness.

<port>: indicates the remote server port number. The value is an integer ranging from 1 to 65535. The invoker shall ensure the port number correctness.

<time>: indicates the sending interval in seconds. The value is an integer ranging from 3 to 3600.

<retrytime>: indicates the reconnect timer time in seconds. The value is an integer ranging from 0 to 3600.

- If the value is 0, the timer is disabled. In this case, the heartbeat will continue until manually stopped.
- To disable the heartbeat once the heartbeat fails, set this parameter to a value smaller than that of <time>.
- To enable multiple heartbeat attempts, set this parameter to a value that is greater than multiples of the value of <time>.

<socket_id>: indicates the link ID. 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 99 characters.

<user_name>: indicates the username. The value is a string that shall be enclosed in quotation marks and can contain a maximum of 31 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 31 characters. This parameter can be omitted.

16.30.4 Property Description

Saving upon Power-off	PIN
N	Y

16.30.5 Example

Run: AT^HBECONTEX="UDP", "211.1.1.11", 8000, 5, 20, 1, "ipv4", "name", "password"

Response: OK

Run: AT^HBECONTEX?

```

Response:  ^HBECONTEX:
           "UDP", "211.1.1.11", 8000, 5, 20, 1, "ipv4", "name", "password"

           OK

Run:       AT^HBECONTEX=?

Response:  ^HBECONTEX: (1-65535), (3-3600), (0-3600), (1-5)

           OK
    
```

16.31 AT^IPINITEX-Initialize Embedded TCP/IP Service

16.31.1 Command Syntax

AT^IPINITEX=<channel_id>,<PDP_type>,<APN>[,<user_name>[,<password>[,<ip_addr_v4>[,<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^IPINITEX?
Possible Response(s)
If initialized:<CR><LF>^IPINITEX: <channel_id>,<state>,<PDP_type>,<APN>,<ip_addr_v4>,<pri_dns_address_v4>,<sec_dns_address_v4>,<ip_addr_v6>,<pri_dns_address_v6>,<sec_dns_address_v6> <CR><LF><CR><LF>OK<CR><LF>
If not initialized: <CR><LF>^IPINITEX: 0<CR><LF><CR><LF>OK<CR><LF>

AT^IPINITEX=?
Possible Response(s)
<CR><LF>^IPINITEX: (list of supported <channel_id>s),(list of supported <PDP_type>s) ,(list of supported <state>s) <CR><LF><CR><LF>OK<CR><LF>

16.31.2 Interface Description

This command has the same dialing function as a modem.

This command configures basic parameters for dialing and establishes connections with networks. A local IP is obtained after the command is run. Only after network connections are established by running the AT^IPINITEX command, you can perform further operations such as opening the TCP links and transmitting UDP data.



NOTE

Aborting AT^IPINITEX will not abort the PDP activation operation. It will only abort the AT^IPINITEX 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.

When using AT^IPINITEX to dial both IPv4 and IPv6, the return value of OK does not mean that both ipv4 and ipv6 have been dialed. Before issuing AT^IPOPEN to open a link, you should ensure that your device has obtained the address you want to use.

16.31.3 Parameter Description

<channel_id>: channel ID. Currently, the channel ID can only be set to "1".

<PDP_type>: Character string type, which specifies the dialing type.

"IP"	IPv4 single stack
"IPV6"	IPv6 single stack
"IPV4V6"	IPv4v6 dual stack

<APN>: Character string with double quotation marks, which indicates the access node name. The current interface supports a maximum of 99 characters. Due to platform restrictions, the actual maximum valid length is 63 characters.

<user_name>: Character string with double quotation marks not exceeding 31 characters and can be omitted.

<password>: Character string with double quotation marks not exceeding 31 characters and can be omitted.

<auth_type>: This parameter indicates the authentication mode, which can be omitted. If this parameter is omitted, the default value is used.

0	No authentication
1	PAP authentication
2	CHAP authentication (default value)

<state>: This parameter indicates the initialization completion.

0	Network initialized
1	IPv4 network initialized
2	IPv6 network initialized
3	IPv4 and IPv6 network initialized

<ip_addr_v4>: Character string with double quotation marks not exceeding 40 characters. This indicates the requested static IPv4 address, but the module may obtain the actual IPv4 address.

<pri_dns_address_v4>: Character string with double quotation marks, which indicates the IP address of the preferred IPv4 DNS server.

<sec_dns_address_v4>: Character string with double quotation marks, which indicates the IP address of the standby IPv4 DNS server.

<ip_addr_v6>: 9 Character string with double quotation marks not exceeding 136 characters.

<pri_dns_address_v6>: Character string with double quotation marks, which indicates the preferred IPv6 DNS server address.

<sec_dns_address_v6>: Character string with double quotation marks, which indicates the standby IPv6 DNS server address.

16.31.4 Property Description

Saving upon Power-off	PIN
N	Y

16.31.5 Example

IPv4 single-stack dial-up:

Run: AT^IPINITEX=1,"IP","ipv4"

Response: OK

Run: AT^IPINITEX?

Response: ^IPINITEX:
1,1,"IP","ipv4","192.168.70.59","172.22.44.200","172.22.44.201","","",""

OK

IPv6 single-stack dial-up:

Run: AT^IPINITEX=1,"IPV6","ipv6"

Response: OK

Run: AT^IPINITEX?

Response: ^IPINITEX: 1,2,"IPV6","ipv6","","","","2013::15","2013::5","2013::7"

OK

v4v6 dual-stack dial-up:

Run: AT^IPINITEX=1,"IPV4V6","v4v6"

Response: OK

Run: AT^IPINITEX?

```

Response:      ^IPINITEX:
                1,3,"IPV4V6","v4v6","192.168.90.85","172.22.47.400","172.22.47.401","CDCD:
                910A:2222:5498:8475:1111:3900:2020","2001:da8:8000:1:202:120:2:100","200
                1:da8:8000:1:202:120:2:101"

                OK

Run:           AT^IPINITEX=?

Response:      ^IPINITEX: (1) ,(“IP”,“IPV6”,“IPV4V6”),(0-3)

                OK
    
```

16.32 AT^IPLISTENEX-Listen On TCP/UDP Server

16.32.1 Command Syntax

AT^IPLISTENEX=<channel_id>,<ip_type>,<protocol_type>,<listen_port>
Possible Response(s)
<CR><LF>OK<CR><LF>
Error related to MT: <CR><LF>+CME ERROR: <err><CR><LF>

AT^IPLISTENEX?
Possible Response(s)
<CR><LF>^IPLISTENEX: <channel_id>,<ip_type>,<protocol_type>,<listen_port>,<idle_num><CR><LF><CR><LF> >OK<CR><LF>

AT^IPLISTENEX=?
Possible Response(s)
<CR><LF>^IPLISTENEX: (list of supported <channel_id>s),(list of supported <ip_type>s),(list of supported <protocol_type>s),(list of supported <listen_port>s),(list of supported <idle_num>s)<CR><LF><CR><LF>OK<CR><LF>

16.32.2 Interface Description

AT^IPLISTENEX command is used to enable listening function on the server. Only one type of listening can be set up for the module. After the listening function is enabled, a maximum of five clients can be connected.

16.32.3 Parameter Description

<channel_id>: Channel ID. Currently, the value can only be set to "1".

<ip_type>: Character string type, which indicates local listening IP type.

"IPV4" Establish IPv4 address for listening

"IPV6" Establish IPv6 address for listening

<protocol_type>: Character string with double quotation marks, which indicates the link type.

"TCP" Establish TCP link

"UDP" Establish UDP link



NOTE

If the listening function is not enabled, the value of <type> is empty when you run the query command.

<listen_port>: The value is an integer that indicates the local listening port. The value range is 1–65535.



NOTE

If the listening function is not enabled, the value of <listen_port> is 0 when you run the query command.

<idle_num>: The value is an integer that indicates the number of idle links. The value range is 0–5.

16.32.4 Property Description

Saving upon Power-off	PIN
N	Y

16.32.5 Example

Run: AT^IPLISTENEX=1,"IPV4","TCP",12000

Response: OK

Run: AT^IPLISTENEX?

Response: ^IPLISTENEX: 1,"IPV4","TCP",12000,2

OK

```
Run:          AT^IPLISTENEX=?
Response:     ^IPLISTENEX: (1),("IPV4","IPV6"),("TCP","UDP"),(1-65535),(0-5)

OK
```

16.33 AT^IPDNSCFG-Configure DNS Resolution Priority

16.33.1 Command Syntax

AT^IPDNSCFG=<DNS_type>
Possible Response(s)
<CR><LF>OK<CR><LF>
Error related to MT: <CR><LF>+CME ERROR: <err><CR><LF>

AT^IPDNSCFG?
Possible Response(s)
<CR><LF>^IPDNSCFG: <DNS_type><CR><LF><CR><LF>OK<CR><LF>

AT^IPDNSCFG=?
Possible Response(s)
<CR><LF>^IPDNSCFG: (list of supported <DNS_type>s)<CR><LF><CR><LF>OK<CR><LF>

16.33.2 Interface Description

The AT^IPDNSCFG command takes effect after a dual-stack dial-up connection is set up. The command is used to configure the DNS resolution priority, that is, the DNS server with the IPv4 or IPv6 address is preferentially used to resolve the domain name. The <remote_addr> address type of the <DNS_type> and that of AT^IPOPEN must be the same. Otherwise, the connection times out.

16.33.3 Parameter Description

<DNS_type>: Character string type, which indicates which DNS type is preferentially used.

- 0 IPv6 DNS resolution prioritized (default)
- 1 IPv4 DNS resolution prioritized



16.33.4 Property Description

Saving upon Power-off	PIN
N	Y

16.33.5 Example

Run: AT^IPDNSCFG=1

Response: OK

Run: AT^IPDNSCFG?

Response: ^IPDNSCFG: 1

OK

Run: AT^IPDNSCFG=?

Response: ^IPDNSCFG: (0-1)

OK

17 Huawei Proprietary Interface: STK Interface

17.1 AT^STSF-Configure 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 configures STK, including:

- Activate and deactivate the function of STK

- Set the mode of STK

The read command queries the current value of <Mode> and <RawMode>(if <RawMode> is supported).

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

17.1.3 Parameter Description

<Mode>:

- | | |
|---|-----------------|
| 0 | Deactivate STK. |
| 1 | Activate STK. |

<RawMode>:

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

 **NOTE**

- Parameter values of <Mode> are saved when MT is powered off. Parameter values of <RawMode> are not saved when MT is powered off
- <RawMode> is an 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

- Deactivate STK:

Run: AT^STSF=0

Response: OK

- Parameter setting error:

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

- Activate 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 queries 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 "SETUP MENU" to MT, <setup_menu> is empty when TE queries 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:

```
"D0818A81030125008202818285118051687403901A00550053004900  
4D53618F0D01444953504C415920544558548F0A0247455420494E4B4  
5598F0A0347455420494E5055548F0A044D4F52452054494D458F0A05  
504C415920544F4E458F0E06504F4C4C20494E54455256414C8F08075  
24546524553488F130853454E442053484F5254204D455353414745"
```

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

<code>AT^ANTMODE=<ant_mode>[,<nw_mode>]</code>
Possible Response(s)
<code><CR><LF>OK<CR><LF></code>

<code>AT^ANTMODE?</code>
Possible Response(s)
<code><CR><LF>^ANTMODE: <ant_mode>,<nw_mode><CR><LF>[^ANTMODE: <ant_mode>,<nw_mode><CR><LF>][...]<CR><LF>OK<CR><LF></code>

<code>AT^ANTMODE=?</code>
Possible Response(s)
<code><CR><LF>^ANTMODE: (list of supported <ant_mode>s),(list of supported <nw_mode>s)<CR><LF><CR><LF>OK<CR><LF></code>

18.1.2 Interface Description

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

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

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.

<nw_mode>: indicates the network.

- 0 All networks (default value)
- 1 Reserved
- 2 WCDMA
- 3 LTE
- 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
^ANTMODE: 2,3

OK

The response indicates that the main and AUX antennas are all enabled on the WCDMA network, and the AUX antenna is enabled on the LTE network.



- Query the list of operation modes of main and AUX antennas supported by the module:

Run: AT^ANTMODE=?

Response: ^ANTMODE: (0,1,2), (0,2,3)

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 FOTA Operation Mode

19.1.1 Command Syntax

AT^FOTAMODE=<detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^FOTAMODE?
Possible Response(s)
<CR><LF>^FOTAMODE: <detect_mode>,<download_mode>,<update_mode>,<en_resume>[,<period>]<CR><LF> <CR><LF>OK<CR><LF>

AT^FOTAMODE=?
Possible Response(s)
<CR><LF>^FOTAMODE: (list of supported <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>

19.1.2 Interface Description

The set command sets 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 queries the modes of version detection, download, and update, status of resumable data transfer, and interval between version detections.

The test command returns 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 | Disable resumable data transfer. |
| 1 | Enable resumable data transfer. (default value) |

<period>: an integer type value that specifies the interval between version detections. Value unit: day. The value ranges 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.

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>

AT^FOTACFG=<APN>,<username>,<password>,<auth_type>
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 sets the 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 31 bytes. This parameter can be omitted, but only when <password> is also omitted.

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

<auth_type>: indicates the authentication mode. The 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 detects a new version available for the module.



NOTE

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

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:

Run: AT^FOTADET

Response: OK

- If the module detects a new version:

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:

Response: ^FOTASTATE: 14

- If the command fails to be executed because the module is processing other service or the FOTA status is incorrect:

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:

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 starts or stops a version download.

The test command returns the control mode available for version downloads.

19.4.3 Parameter Description

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

- 0 Cancel a download, delete the downloaded file, and restore the FOTA status to idle state.
- 1 Start a download or resumes data transfer.
- 2 Run this command to manually download pause.

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 starts a FOTA update.

19.5.3 Parameter Description

None

19.5.4 Property Description

Saving upon Power-off	PIN
NA	N

19.5.5 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: 80,155

19.6 AT^FOTASTATE-Unsolicitedly 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 unsolicitedly reports the current update state after AT^FOTASTATE is executed.

19.6.3 Parameter Description

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

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.
- 32 Download Pending for FOTA 3.0 feature. This value indicates that the module has a download task that is not yet complete after the module restarts. If resumable data transfer has been enabled, the module resumes the download.
- 40 Download Complete.
- 50 Ready to update.
- 60 Update Progressing.
- 80 Update failed.
- 90 Update successful.

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

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

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

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

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

<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

<error_code>	Description
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
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

<error_code>	Description
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

This command queries 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>: indicates the file type. Its value is a string with double quotation marks.

"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", 255638, 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>

19.8.2 Interface Description

This command specifies the upgrade type, transmits the upgrade file into the module using 1K-Xmodem, and starts the upgrade. The following table lists the ports supported by the full and increment upgrades.

Upgrade type	UART port	MODEM port	PCUI port
Full upgrade	√	√	√
Increment 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 set command. When you do so, refer to the following baud rates supported by the full/differential upgrades.

NOTE

During a local update, if the 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 specifies the upgrade type.

- 0 Full upgrade
- 1 Increment upgrade

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

19.8.4 Property Description

Saving upon Power-off	PIN
NA	N

19.8.5 Example

Local increment upgrade

```
Run:          AT^FWLOAD=1
Response:     >
              C
```

The module restarts, and the upgrade starts.

```
Response:     ^FWLSTATE: 90
```

Local full upgrade

```
Run:          AT^FWLOAD=0
Response:     >
              C
```

The module restarts, and the upgrade starts.

```
Response:     ^FWLSTATE: 90
```



NOTE

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

19.9 ^FWLSTATE-Unsolicitedly 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 module unsolicitedly reports the current update status after ^FWLSTATE is executed.

19.9.3 Parameter Description

<state>: an integer type value that specifies the current upgrade status.

50	Ready to update
80	Update failed
90	Update succeeded

<error_code>: an integer type value that specifies the cause of the upgrade failure. See the error list in 19.6 AT^FOTASTATE-Unsolicitedly Report the FOTA Status.

19.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.9.5 Example

- Local increment upgrade:

Run: AT^FWLOAD=1

Response: >
C

- The module restarts, and the upgrade starts.

Response: ^FWLSTATE: 90

19.10 ^FOTASMS-Notify Users to Decide on FOTA Upgrade

19.10.1 Command Syntax

URC
Possible Response(s)



URC
<CR><LF>^FOTASMS<CR><LF>

19.10.2 Interface Description

Once parsing of FOTA SMS is done, it will notify users every 4 seconds for 3 times for the confirmation of FOTA upgrade.

If users do not give any confirmation, it will go for force upgrade.

19.10.3 Parameter Description

None

19.10.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.10.5 Example

None

19.11 AT^FOTAP-Confirm FOTA Upgrade

19.11.1 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>

AT^FOTAP=?
Possible Response(s)
<CR><LF>^FOTAP: (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>

19.11.2 Interface Description

Once FOTA SMS notification comes, users can confirm the FOTA upgrade using this command. If users do not give any confirmation by default, it will go for force upgrade.

19.11.3 Parameter Description

<n>:

- 0 Do not do FOTA upgrade.
- 1 Go for FOTA upgrade.

19.11.4 Property Description

Saving upon Power-off	PIN
N	Y

19.11.5 Example

```

Response:      ^FOTASMS

Run:           AT^FOTAP=1

Response:      OK
               ^FOTASTATE: 11

Run:           AT^FOTAP?

Response:      ^FOTAP: 1

               OK
  
```

19.12 AT^FOTASMSCFG-Set FOTA SMS Auto-Download

19.12.1 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>

19.12.2 Interface Description

This command enables and disables the FOTA SMS auto-download 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 downloads the update file only if it receives AT^FOTAP after ^FOTASMS is reported.



NOTE

Update file downloads may incur data usage fees charged by the operator.

19.12.3 Parameter Description

<operation>: an integer indicating whether the FOTA SMS auto-download function is enabled.

- 0 Disable
- 1 Enable (default value)



19.12.4 Property Description

Saving upon Power-off	PIN
Y	N

19.12.5 Example

```

Run:      AT^FOTASMSCFG=1

Response: OK

Run:      AT^FOTASMSCFG?

Response: ^FOTASMSCFG: 1

          OK

Run:      AT^FOTASMSCFG=?

Response: ^FOTASMSCFG: (0-1)

          OK
    
```

19.13 AT^FOTAOEMDL-Download a New Version By The Specifying URL

19.13.1 Command Syntax

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

AT^FOTAOEMDL?
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^FOTAOEMDL=?

AT^FOTAOEMDL=?
Possible Response(s)
<CR><LF>OK<CR><LF>

19.13.2 Interface Description

This command downloads a new version by specifying the url.

19.13.3 Parameter Description

<URL>: the new version package URL address stored on the upgrade server.

- For the definition of the form http: http://<host>:<port>/<path>;
For the definition of the form ftp: ftp://<user>:<password>@<host>:<port>/<url-path>;
More detailed rules refer to the standard protocol RFC1738.
- Supports FTP, FTPS, HTTP, HTTPS protocols type;
- Specifies the path where the upgrade package, not an upgrade file name, that <URL> in '/' at the end;
- The maximum length is 255 bytes.

19.13.4 Property Description

Saving upon Power-off	PIN
N	Y

19.13.5 Example

```

Run:      AT^FOTAOEMDL="ftp://card:card@172.16.44.33:21/OnlineUpdate/
          files/"

Response:  OK

Run:      AT^FOTAOEMDL="http://10.14.10.153:80/OnlineUpdate/files/"

Response:  OK

Run:      AT^FOTAOEMDL="ftps://card:card@172.16.44.33:990/OnlineUpdat
          e/files/"

Response:  OK

Run:      AT^FOTAOEMDL="https://10.14.10.153:443/OnlineUpdate/files/"

Response:  OK

```

20 Huawei Proprietary Interface: ECM Interfaces

20.1 AT^NDISDUP-NDIS-Based Dialing

20.1.1 Command Syntax

<code>AT^NDISDUP=<cid>,<connect>[,<APN>[,<username>[,<passwd>[,<auth_type>]]]]</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^NDISDUP?</code>
Possible Response(s)
<code><CR><LF>OK<CR><LF></code>

<code>AT^NDISDUP=?</code>
Possible Response(s)
<code><CR><LF>^NDISDUP: (list of supported <cid>s),(list of supported <connect>s)<CR><LF><CR><LF>OK<CR><LF></code>

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 access point name in the format of character strings (0 to 99 bytes).

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

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

<auth_type>: indicates 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. Otherwise, it will use the parameter of this command to connect. For example, AT^NDISDUP=1,1 command will use profile 1 which is defined by AT+CGDCONT to connect.

20.2 ^NDISSTAT-Unsolicitedly 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 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 | User disconnect/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 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" IPV4 Protocol
- "IPV6" IPV6 Protocol

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=<cid>
Possible Response(s)

AT^NDISSTATQRY=<cid>
<CR><LF>^NDISSTATQRY: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]][,<stat>,<err_code>,<wx_state>,<PDP_type>]<CR><LF><CR><LF>OK<CR><LF>

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

AT^NDISSTATQRY=?
Possible Response(s)
<CR><LF>^NDISSTATQRY: (list of supported< cid >s) <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.

The specific command varies by the number of NDIS links:

- A single NDIS link: at^ NDISSTATQRY?
- Multiple NDIS links:
 - AT^NDISSTATQRY=<cid> for querying the connection status of a specific NDIS link
 - AT^NDISSTATQRY? or AT^NDISSTATQRY=1 for querying the connection status of the first NDIS link

For details, see section 20.3.5 Example.

20.3.3 Parameter Description

<cid>: indicates the index of the PDP context corresponding to the NDIS link for which you want to query the connection status. The value ranges from 1 to 11.

<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>:

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" IPV4 Protocol
"IPV6" IPV6 Protocol

20.3.4 Property Description

Saving upon Power-off	PIN
NA	N

20.3.5 Example

Report one or two groups of connection status based on the IPv6 capability of the MT.

- Query the connection status of the NDIS link whose CID is 1 and PDP type is IPv6, which is in the connected state:

Run: AT^NDISSTATQRY?

Response: ^NDISSTATQRY: 1,,, "IPV6"

OK

Or

Run: AT^NDISSTATQRY=1

Response: ^NDISSTATQRY: 1,,, "IPV6"

OK

- Query the connection status of the NDIS link whose CID is 2 and PDP type is IPv4, which is in the disconnected state:

Run: AT^NDISSTATQRY=2

Response: ^NDISSTATQRY: 0,,, "IPV4"

OK

- Query the connection status of the NDIS link whose CID is 2 and PDP type is IPv4 and IPv6, which is in the connected state for IPv4 and disconnected state for IPv6:

Run: AT^NDISSTATQRY=2

Response: ^NDISSTATQRY: 1,,, "IPV4",0,,, "IPV6"

OK

20.4 AT^DHCPV6-Query DHCPV6 Information

20.4.1 Command Syntax

AT^DHCPV6?
Possible Response(s)
<CR><LF>^DHCPV6: <clip_v6>,<netmask_v6>,<gate_v6>,<dhcp_v6>,<pDNS_v6>,<sDNS_v6>,<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^DHCPV6=?
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

20.4.2 Interface Description

This command queries related IPv6 DHCPv6 value, including the host IPv6 address, default gateway, subnet mask, and DHCPv6 servers.

After IPv6 dial-up connection is established, the command issued by the PC obtains the appropriate IPv6 address. If you do not dial or dial-up fails, checking DHCPv6 will return ERROR.

20.4.3 Parameter Description

The following IPv6 address format uses RFC5952 specification formats, such as 2001:db8::1. When the address does not exist, all zeros to fill the field.

<clip_v6>: indicates host IPv6 addresses.

<netmask_v6>: indicates IPv6 subnet mask.

<gate_v6>: indicates IPv6 address of the default gateway.

<dhcp_v6>: indicates DHCPv6 server's IPv6 address.

<pDNS_v6>: indicates IPv6 addresses of IPv6 DNS first.

<sDNS_v6>: indicates IPv6 addresses of IPv6 DNS next.

<max_rx_data>: indicates the maximum receive rate (bps), the value is the same in IPv4v6 dual stack dialing.

<max_tx_data>: indicates the maximum transmission rate (bps), the value is the same in IPv4v6 dual stack dialing.

20.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

20.4.5 Example

Run : AT^DHCPV6?

```

Response:      ^DHCIPv6: ::,::,::,::,::,fe80::e1ec:e44a:a28f:aeb1,::,7200000,
                384000

                OK

Run:          AT^DHCIPv6=?

Response:     OK
    
```

20.5 AT^AUTHDATA-Set Username and Password

20.5.1 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: <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>

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

20.5.2 Interface Description

Locally save a group of usernames and passwords, etc. indexed by <cid>, and each one contains a set of saved settings environmental parameters associated with the handshake agreement.

The set command stores a set of parameters of the handshake protocol to a group of data storages indexed by <cid>. Each data storage is initially undefined, after a set of parameters stored into by the set command, the data storage then becomes a defined state. And the number of defined data storages can be saved is determined by the value range of <cid>.

A special set command AT^AUTHDATA=<cid>, will clear stored parameters indexed by <cid>. Then this data storage returns to an undefined state.

The read command queries all defined parameter values, and each group of handshake agreement data displays in a line.

The test command returns all supported values.

20.5.3 Parameter Description

<cid>:

0-11 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

3 Authentication fallback, the first to use CHAP, if you do not support CHAP, fall back to PAP; if you do not support the PAP, fall back No authentication. (not supported currently)

<PLMN>: a string type value indicates provider ID (operator PLMN).

<passwd>: a string type value that 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.

20.5.4 Property Description

Saving upon Power-off	PIN
Y	N

20.5.5 Example

```
Run:          AT^AUTHDATA=?
Response:     ^AUTHDATA: (0-11), (0-2), , ,
              OK

Run:          AT^AUTHDATA=2, 0, "46009", "", ""
Response:     OK

Run:          AT^AUTHDATA?
Response:     ^AUTHDATA: 1, 3, "", "", ""
              OK

Run:          AT^AUTHDATA
Response:     OK
```

20.6 AT^DHCP-Query DHCP/IP

20.6.1 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=?
<CR><LF>OK<CR><LF>

20.6.2 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.

This command does not currently support IPv6 address lookup, follow-up will extend the command.

The command querying the IP address must be run 5s later after dialing command is issued. If not, you should run the command each second again. If the total time is over 15s, it can be considered that the query fails.

20.6.3 Parameter Description

IP addresses as described below in hexadecimal code are counted from the back to the front. Eg: 192.168.50.32 is expressed as 0x2032A8C0, in which 32 is represented as 0x20, 50 is represented as 0x32, 168 is represented as 0xA8, and 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).

20.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

20.6.5 Example

Run: AT^DHCP=?

Response: OK

20.7 AT^IPV6CAP-Query IPv6 Capability

20.7.1 Command Syntax

AT^IPV6CAP?
Possible Response(s)
<CR><LF>^IPV6CAP: <cfg_value><CR><LF><CR><LF>OK<CR><LF>

AT^IPV6CAP=?
Possible Response(s)
<CR><LF>^IPV6CAP: (list of supported <cfg_value>s)<CR><LF><CR><LF>OK<CR><LF>

20.7.2 Interface Description

The command queries the current IPv6 capabilities of MT.

20.7.3 Parameter Description

<cfg_value>: an integer type value that indicates IPv6 capability to configure.

- 1 IPv4 only
- 2 IPv6 only
- 7 IPv4 only, IPv6 only and IPv4v6

20.7.4 Property Description

Saving upon Power-off	PIN
N	N

20.7.5 Example

```
Run:          AT^IPV6CAP?
Response:     ^IPV6CAP: 7
              OK

Run:          AT^IPV6CAP=?
Response:     ^IPV6CAP: (1,2,7)
              OK
```

20.8 AT^PORTCTRL-Control Custom Data Transmission Channel

20.8.1 Command Syntax

AT^PORTCTRL=<ctrl>[,<ctrl_param>[,<type>]]
Possible Response(s)
<CR><LF>^PORTCTRL: <ctrl>,<status>,<next_packet_len>,<type><CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF> In case of other errors: <CR><LF>ERROR<CR><LF>

AT^PORTCTRL?
Possible Response(s)
<CR><LF>^PORTCTRL: <state>,<clock_rate>,<next_packet_len>,<type> <CR><LF>OK<CR><LF>

AT^PORTCTRL=?
Possible Response(s)
<CR><LF>^PORTCTRL: (range of supported <ctrl>S),(range of supported <datalen>s),(range of supported <clock_rate>s),(range of supported <type>s)<CR><LF> <CR><LF>OK<CR><LF>

20.8.2 Interface Description

The AT^PORTCTRL command opens or closes the specified custom data transmission channel, a way to transmit data through SPI.

- The Set command controls the specified data transmission channel, such as enabling, disabling, receiving and sending data.
- The Query command queries the status of the data transmission channel.
- The Test command returns the supported parameter range.

To use this command, the hardware must be connected to SPI and the SPI for external connection must be set to SLAVE mode.

20.8.3 Parameter Description

<ctrl>: The value is an integer type that indicates the control command type.

- 0 Close the data transmission channel.
- 1 Initialize and open the data transmission channel.
- 2 Receive downlink data through the data transmission channel.
- 3 Send uplink data through the data transmission channel.
- 4 Stop data transmission and reinitialize the data transmission channel.

<ctrl_param>: See Table 20-1 for the integer type that indicates the control command. The parameter must be set as follows when <ctrl> is 1, 2, or 3.

<type>: The value is an integer type that indicates the channel type. Currently, Only Value 0 is supported, indicating SPI.

Values of the set command parameters are described in the following table.

Table 20-1 Values of the set command parameters

ctrl	<ctrl_param>	type
0	Set this parameter to 0.	0
1	The clock rate of the data transmission channel: SPI supports clocks of 3MHz, 6MHz, 12MHz and 24MHz.	0
2	The maximum length of downlink data to be received is 1,600 bytes. However, depending on the network, the valid length of the data package should not be longer than the actual size of the MTU. The received data must be in the form of an integral IP package with driver level-packaged header and trailer.	0
3	The maximum length of uplink data to be sent is 1,600 bytes. However, depending on the network, the valid length of the data package should not be longer than the actual size of the MTU. The data to be sent must be in the form of an integral IP package with driver level-packaged header and trailer. The maximum length is 1,600 bytes.	0
4	Set this parameter to 0.	0

<status>: An integer type that indicates the command execution results.

- 0 Command is executed.
- 1 Command fails to be executed because the data transmission channel is not activated.
- 2 Command fails to be executed because the data transmission channel failed to be activated.



- 3 Command fails to be executed due to mismatched data length.
- 4 Command fails to be executed due to insufficient memory.
- 5 Command fails to be executed because data is being transmitted through the channel.
- 6 The command fails to be executed due to data transmission or reception error.
- 7 The command fails to be executed due to errors in verifying the received data.
- 8 The command fails to be executed because uplink data cannot be sent.

<next_packet_len>: An integer type value that indicates the length of the next packet to be received, including packet header and trailer.

<state>: An integer type value that indicates the current state of the channel.

- 0 Closed. Data transmission is disabled.
- 1 In initialization.
- 2 Busy receiving or sending data.
- 3 In idle state, which indicates that the channel is open, and the no data is being transmitted now.

<clock_rate>: An integer type value that indicates the current clock rate.

<type>: An integer type value that indicates the type of the data channel. SPI is the only channel supported at present. Reserved for future extension.

- 0 SPI channel, default value

20.8.4 Property Description

Saving upon Power-off	PIN
N	N

20.8.5 Example

1. Initialize and the open the SPI data transmission channel (set to 6MHz clock).

Run: AT^PORTCTRL=1,6,0

Response: ^PORTCTRL: 1,0,0,0

OK

2. Close the SPI data transmission channel.

Run: AT^PORTCTRL=0,0,0
Response: ^PORTCTRL: 0,1,0,0
OK

3. Query the current SPI channel state (in idle state now, 6MHz clock, and no downlink data waiting to be received by MCU).

Run: AT^PORTCTRL?
Response: ^PORTCTRL: 3,6,0,0
OK

4. Query the parameters supported by the AT command.

Run: AT^PORTCTRL=?
Response: ^PORTCTRL: (0-4), (1-1600), (3,6,12,24), (0)
OK

5. TE requests 1000-byte data to be read (1200 bytes downlink data waiting to be received by TE after the data reading).

Run: AT^PORTCTRL=2,1000,0
Response: ^PORTCTRL: 2,0,1200,0
OK

6. Examples of parameter errors.

Run: AT^PORTCTRL=1,36,0 (clock rate not supported)

Response: +CME ERROR: 50

Run: AT^PORTCTRL=1,12,1 (channel type not supported)

Response: +CME ERROR: 50

Run: AT^PORTCTRL=1,12,1 (control type not supported)

Response: +CME ERROR: 50

Run: AT^PORTCTRL=2,2000,0 (data length = 2000, exceeding the range)

Response: +CME ERROR: 50

20.9 ^PORTSTAT-Report Downlink Data in the Custom Data Transmission Channel

20.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^PORTSTAT: <report_type>,<clock_rate>,<next_packet_len>,<type><CR><LF>

20.9.2 Interface Description

When the custom data transmission channel (that now supports SPI only) is open, MT will report the ^PORTSTAT command to TE if the custom channel has downlink data waiting to be received.

20.9.3 Parameter Description

<report_type>: An integer type value that indicates the report type.

0 Downlink data report

<clock_rate>: An integer type value that indicates the current clock rate.

<next_packet_len>:An integer type value that indicates the length of the next packet to be received, including header and trailer.

<type>: An integer type value that indicates the type of channel for data transmission. SPI is the only channel supported at present. Reserved for future extension.

0 SPI channel (default value)

20.9.4 Property Description

Saving upon Power-off	PIN
N	N

20.9.5 Example

MT will send a downlink data notification to TE, clock rate at 12M, data length to be received at 1200 bytes.

Output: ^PORTSTAT:3,12,1200,0

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 and crystal 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 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 in the unit of 0.1 °C. The value range is -400 to 1200.

<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:          Indicate the
              65535,65535,65535,65535,65535,300      current temperature
              OK                                       on hardware spots.

Run:          AT^CHIPTEMP=?
Response:    ^CHIPTEMP:          Indicate the
              (65535-65535), (65535-65535), (65535-65535), (65535-65535), (-400-1100)
              temperature ranges
              on hardware spots.

              OK

```

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 enables or disables 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 that 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
N	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 sends an unsolicited report to the host when thermal protection active/inactive according to temperature.

21.3.3 Parameter Description

<ACTION>: indicates whether thermal protection takes effect.

- 0 The thermal protection is inactive.
- 1 The thermal protection is active.
- 2 The module changes from the normal state to the alarm state.
- 3 The module changes from the alarm state to the normal state.

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 sets parameters for the TTS function.

The read command queries the current TTS function settings.

The test command queries 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 disable 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 (Unit)	Description
0	0-1 (0 by default)	<on_off>: 0: Disable TTS function (default value) 1: Enable 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: Disable second-line volume
5	1-2 (1 by default)	TTS play language 1: Chinese (default value) 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)

AT^TTS=<op>[,<text>]
<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 enables or disables the 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 play 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 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
------------------------------	------------



Saving upon Power-off	PIN
NA	N

22.2.5 Example

- Query the supported languages:

```
Run:          AT^TTSCFG?
Response:     ^TTSCFG: 0,0      Indicate that the supported language is
              ^TTSCFG: 1,2      Chinese.
              ^TTSCFG: 2,2
              ^TTSCFG: 3,2
              ^TTSCFG: 4,1
              ^TTSCFG: 5,1

              OK
```

- 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: eCall

23.1 AT^ECLSTART-Start an eCall Session

23.1.1 Command Syntax

AT^ECLSTART=<activation_type>,<type_of_call>[,<dial_num>][,<opr_mode>]
Possible Response(s)
<CR><LF>OK<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_mode>s)<CR><LF><CR><LF>OK<CR><LF>

23.1.2 Interface Description

The set command starts an eCall session.

The test command returns the supported eCall capability.

23.1.3 Parameter Description

<activation_type>: an integer type value that indicates the triggered conditions to start an eCall session.

- 0 Customers 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_{FDN}'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_{SDN}'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, the value of <dial_num> will be used to initiate a RECONFIG call.



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



NOTE

- If <opr_mode> is not specified, it is equivalent to set <opr_mode> to 1.
- Before start an eCall session, you should get MSD information by using AT^EECLMSD. Note that MSD information contains the triggered conditions to start an eCall session and eCall session type, which should be consistent with the parameter values of AT^EECLSTART. Otherwise, MSD information will not be consistent with the real eCall situation.

23.1.4 Property Description

Saving upon Power-off	PIN
N	N

23.1.5 Example

- Set <opr_mode> to PULL mode after an eCall is started:



```
Run:          AT^ECLSTART=0,0,"13987654321",0
Response:    OK

              ^ORIG: 1,0

              ^CONF: 1

              ^CONN: 1,0           Enter a voice call.
```

- If <opr_mode> is not specified, enter PUSH mode by default after an eCall is started:

```
Run:          AT^ECLSTART=0,0,"13987654321"
Response:    OK

              ^ORIG: 1,0

              ^CONF: 1

              ^CONN: 1,0

              ^ECLSTAT: 0           IVS starts to send MSD.
                                   MSD is transferred
                                   successfully.

              ^ECLSTAT: 1
```

23.2 AT^ECLSTOP-Stop an eCall Session

23.2.1 Command Syntax

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

23.2.2 Interface Description

This command stops an eCall session.

23.2.3 Parameter Description

None

23.2.4 Property Description

Saving upon Power-off	PIN
-----------------------	-----

Saving upon Power-off	PIN
NA	N

23.2.5 Example

```
Run:          AT^ECLSTOP
Response:    OK
```

23.3 ^ECLSTAT-Unsolicitedly Present eCall Session Status

23.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECLSTAT: <eCall_state>[,<description>]<CR><LF>

23.3.2 Interface Description

The MT uses the unsolicited result code ^ECLSTAT: <eCall_state>[,<description>] to present the current eCall session status.

23.3.3 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).

23.3.4 Property Description

Saving upon Power-off	PIN
NA	N

23.3.5 Example

```

Run:          AT^ECLSTART=0,0,"13987654321"
Response:    OK
              ^ORIG: 1,0
              ^CONF: 1
              ^CONN: 1,0
              ^ECLSTAT: 0
              ^ECLSTAT: 1
              Start to transmit MSD
              data.
              MSD data transmission is
              successful.

```

23.4 AT^ECLCFG-Configure eCall

23.4.1 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>

23.4.2 Interface Description

The set command configures the mode that MT gets MSD data, enables or disables the mute for IVS side speaker in MSD transmission and the automatic redial function.

The read command queries the current settings information.

The test command returns the available value range of each parameter.

23.4.3 Parameter Description

<mode>: an integer type value indicates the mode that MT gets MSD data.

- 0 Transparent transmission mode

<voc_config>: an integer type value indicates whether to 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.
- If you have set <redial_config> to 0 before the eCall is started, then you set <redial_config> to 1 when the eCall is abnormally hung up. In this condition, the module cannot redial, but can redial when the next exception happens.

23.4.4 Property Description

Saving upon Power-off	PIN
------------------------------	------------



Saving upon Power-off	PIN
N	N

23.4.5 Example

- Disable the automatic redial function before the eCall is started:

```
Run:          AT^ECLCFG=0,1,0
Response:     OK

Run:          AT^ECLSTART=0,0,"13987654321",1
Response:     OK

                ^ORIG: 1,0

Run:          AT+CHUP                               The eCall is abnormally hung up when
                                                    it is started, but the module does not
                                                    redial and the time outs.

Response:     ^CEND: 1,0,29,16

                OK
```

- After the eCall is started, disable the automatic redial function when the eCall is abnormally hung up:

```
Run:          AT^ECLSTART=0,0,"13987654321",1
Response:     OK

                ^ORIG: 1,0

                ^CONF: 1

                ^CONN: 1,0

                ^ECLSTAT: 0

Run:          AT^ECLCFG=0,1,0                       Disable the automatic redial
                                                    function.

Response:     OK

Run:          AT+CHUP                               The eCall is abnormally hung up, but
                                                    the module does not redial and the time
                                                    outs.

Response:     ^CEND: 1,1,29,16

                OK
```

- When the eCall is abnormally hung up, disable the automatic redial function during the time waiting for the redial:

Run: AT^ECLSTART=0,0,"13987654321",1

Response: OK

^ORIG: 1,0

^CEND: 1,0,104,27

Run: AT^ECLCFG=0,1,0 Disable the automatic redial function.
The module does not redial and the time
outs.

Response: OK

23.5 ^ECLREC-Unsolicitedly Report AL_ACK and Timestamp Information

23.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECLREC: <timestamp>,<AL_ACK><CR><LF>

23.5.2 Interface Description

Upon receiving an AL_ACK message, the IVS reports the received message and timestamp.

23.5.3 Parameter Description

<timestamp>: see descriptions for 23.8 AT^ECLLIST-Query AL_ACK and Timestamp Information.

<AL_ACK>: see descriptions for 23.8 AT^ECLLIST-Query AL_ACK and Timestamp Information.

23.5.4 Property Description

Saving upon Power-off	PIN
N	N

23.5.5 Example

To enable auto-reporting of AL_ACK message:

```
Run:          AT^ECLSTART=0,0,"13903711846"
Response:    ^ORIG: 1,0
              ^CONF: 1
              ^CONN: 1,0
              ^ECLSTAT: 0
              ^ECLREC: "2014/04/17,02:03:27",0
              ^ECLREC: "2014/04/17,02:03:27",0
              ^ECLSTAT: 1
              ^ECLREC: "2014/04/17,02:03:28",0
              ^ECLREC: "2014/04/17,02:03:28",0
              ^ECLREC: "2014/04/17,02:03:28",0
```

23.6 AT^ECLMSD-Set MSD Data Transparent Transmission

23.6.1 Command Syntax

AT^ECLMSD=<eCall_msd>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^ECLMSD?
Possible Response(s)
<CR><LF>^ECLMSD: <eCall_msd><CR><LF><CR><LF>OK<CR><LF>

23.6.2 Interface Description

The set command gets MSD information which is required by the current eCall session.

23.7.4 Property Description

Saving upon Power-off	PIN
NA	N

23.7.5 Example

- Start an eCall in PUSH mode:

Run: AT^ECLSTART=0,0,"13987654321",1

Response: OK

^ORIG: 1,0

^CONF: 1

^CONN: 1,0

Enter a voice call.

- Enable IVS to issue the request for MSD transmission:

Run: AT^ECLPUSH

Response: OK

^ECLSTAT: 0

IVS starts to transfer MSD to PSAP.

23.8 AT^ECLLIST-Query AL_ACK and Timestamp Information

23.8.1 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>

23.8.2 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.

23.8.3 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 module. 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.

23.8.4 Property Description

Saving upon Power-off	PIN
N	N

23.8.5 Example

- When no AL_ACK has been reported:

Run: AT^ECLLIST?

Response: OK

- Query information after an AL_ACK has been reported:

```
Run:          AT^ECLLIST?

Response:     ^ECLLIST: "2014/04/17,02:03:27",0
              ^ECLLIST: "2014/04/17,02:03:27",0
              ^ECLLIST: "2014/04/17,02:03:28",0
              ^ECLLIST: "2014/04/17,02:03:28",0
              ^ECLLIST: "2014/04/17,02:03:28",0

              OK
```

23.9 ^ECLREDIAL-Unsolicitedly Report eCall Redialing

23.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^ECLREDIAL: <redialresult><CR><LF>

23.9.2 Interface Description

This command reports eCall redialing unsolicitedly.

23.9.3 Parameter Description

<redialresult>:

- 0 eCall redialing is initiated.
- 1 eCall redialing is failed.

23.9.4 Property Description

Saving upon Power-off	PIN
N	N

23.9.5 Example

```
Run:          AT^ECLSTART=0,0
```



Response: ERROR

 ^ECLREDIAL: 0

 ^ECLREDIAL: 1

24 Huawei Proprietary Interface: Record Interface

24.1 AT^AUDREC-Record Audio

24.1.1 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>

24.1.2 Interface Description

The command is used to record and play recording files.

The set command records or plays audio.

The read command queries the information of recordings.

The test command queries the supported audio recording parameters.

24.1.3 Parameter Description

<op>: an integer type indicating recording and playback.

0	Stop recording
1	Start recording
2	Play recordings
3	Stop playing recordings

<file_name>: a string type indicating 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 can not 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.

24.1.4 Property Description

Saving upon Power-off	PIN
NA	N

24.1.5 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
```

24.2 ^AUDEND-Unsolicitedly Report the End of Audio Playback

24.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^AUDEND: <end_type>,<end_cause>[,<len>]<CR><LF>

24.2.2 Interface Description

The command is used to report the end of audio playback to users.

24.2.3 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.

24.2.4 Property Description

Saving upon Power-off	PIN
NA	N

24.2.5 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
```

24.3 AT^RECCFG-Change the Recording Settings

24.3.1 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?

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>

24.3.2 Interface Description

The set command changes the recording settings.

The read command queries the current recording settings.

The test command returns the supported recording settings.

24.3.3 Parameter Description

<op>: an integer indicating 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)

24.3.4 Property Description

Saving upon Power-off	PIN
N	N

24.3.5 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

```

24.4 AT^FILEIO-Operate File

24.4.1 Command Syntax

AT^FILEIO=<mode>,<file_name>[,<mem>,[<file_type>],<para1>,<para2>,<pkg_data>]
--

AT^FILEIO=<mode>,<file_name>[,<mem>,[<file_type>],<para1>,<para2>,<pkg_data>]
Possible Response(s)
When <mode>=1: <CR><LF>^FILEIO: <rcv_len>,<file_size><CR><LF><file content><CR><LF><CR><LF>OK<CR><LF> Or <CR><LF>^FILEIO: <file_name>,<file_size><CR><LF><CR><LF>OK<CR><LF>
When <mode>=2: <CR><LF>^FILEIO: <para1>,<rcv_len><CR><LF><CR><LF>OK<CR><LF>
When <mode>=3: <CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^FILEIO=?
Possible Response(s)
<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>

24.4.2 Interface Description

This command is used by the host to deliver files to modules.

The set command operates files.

The test command returns 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).

24.4.3 Parameter Description

<mode>: an integer indicating 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 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 indicating 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 indicating 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 indicating the length of the received data in bytes.

<file_size>: an integer indicating the total length of the data in bytes.

<file content>: 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.

24.4.4 Property Description

Saving upon Power-off	PIN
NA	N

24.4.5 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, "AD2A3AB12BAD2A3AB12BAD2A3AB12B"

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 are 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 Bytes, 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 response +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

25 Huawei Proprietary Interface: Codec Control Commands

25.1 AT^CODECPOW-Initialize Codec Settings After Power-on

25.1.1 Command Syntax

AT^CODECPOW=<codec_type>
Possible Response(s)
<CR><LF>OK<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>

25.1.2 Interface Description

The set command sets the type of codec whose settings will be initialized after power-on.

The read command queries the current codec type.

The test command returns the supported types of codecs.



You can choose one codec type from the supported types to initialize its settings after power-on.

25.1.3 Parameter Description

<codec_type>: an integer type value that indicates the codec type.

- 0 None (default value)
- 1 NAU8814

25.1.4 Property Description

Saving upon Power-off	PIN
N	N

25.1.5 Example

```
Run:          AT^CODECPOW=1
Response:     OK
Run:          AT^CODECPOW?
Response:     ^CODECPOW: 1
              OK
Run:          AT^CODECPOW=?
Response:     ^CODECPOW: (0-1)
              OK
```

25.2 AT^SETCODECREG-Configure the Codec Register

25.2.1 Command Syntax

AT^SETCODECREG=<register_addr>,<data>
Possible Response(s)
<CR><LF>OK<CR><LF>

25.2.2 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.

25.2.3 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.

25.2.4 Property Description

Saving upon Power-off	PIN
N	N

25.2.5 Example

Run: AT^SETCODECREG=01,001D

Response: OK

25.3 AT^GETCODECREG-Query the Codec Register

25.3.1 Command Syntax

AT^GETCODECREG=<register_addr>
Possible Response(s)
<CR><LF>^GETCODECREG: <register_addr>,<data><CR><LF><CR><LF>OK<CR><LF>



25.3.2 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.

25.3.3 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.

25.3.4 Property Description

Saving upon Power-off	PIN
N	N

25.3.5 Example

```
Run:          AT^GETCODECREG=01
Response:     ^GETCODECREG: 01,001D
              OK
```

26 Huawei Proprietary Interface: SMS and Call Whitelist and Blacklist

26.1 AT^TNUMCTL-Control the SMS and Call Whitelist and Blacklist

26.1.1 Command Syntax

AT^TNUMCTL=<TNUMCTL>,<TCNUMCTL>,<TBNUMCTL>
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^TNUMCTL?
Possible Response(s)
<CR><LF>^TNUMCTL: <TNUMCTL>,<TCNUMCTL>,<TBNUMCTL><CR><LF><CR><LF>OK<CR><LF>

AT^TNUMCTL=?
Possible Response(s)
<CR><LF>^TNUMCTL: (list of supported <TNUMCTL>s),(list of supported <TCNUMCTL>s),(list of supported <TBNUMCTL>s)<CR><LF><CR><LF>OK<CR><LF>

26.1.2 Interface Description

The set command is used to enable or disable the SMS whitelist, call whitelist, SMS blacklist, and call blacklist.

The read command is used to query whether the SMS whitelist, call whitelist, SMS blacklist, and call blacklist are enabled.

26.1.3 Parameter Description

<TSNUMCTL>: an integer value that indicates whether to enable the SMS whitelist.

0	Disable
1	Enable

<TCNUMCTL>: an integer value that indicates whether to enable the call whitelist.

0	Disable
1	Enable

<TBNUMCTL>: an integer value that indicates whether to enable the SMS and call blacklist.

0	Disable
1	Enable



NOTE

If the SMS and call whitelist and blacklist are both enabled, the module will prioritize the blacklist.

26.1.4 Property Description

Saving upon Power-off	PIN
Y	NA

26.1.5 Example

- Enable the SMS whitelist, call whitelist, SMS blacklist, and call blacklist:

Run: AT^TNUMCTL=1,1,1

Response: OK

- Query whether the SMS whitelist, call whitelist, SMS blacklist, and call blacklist are enabled:

Run: AT^TNUMCTL?
Response: ^TNUMCTL: 1,1,1
OK

- Query the parameter range supported by the command:

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

26.2 AT^TRUSTNUM-Contorl the SMS Whitelist

26.2.1 Command Syntax

AT^TRUSTNUM=<index>[,<number>]>
Possible Response(s)
In case of writing or deleting: <CR><LF>OK<CR><LF> In case of reading: [<CR><LF>^TRUSTNUM: <index>,<number><CR><LF>]<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^TRUSTNUM?
Possible Response(s)
[<CR><LF>^TRUSTNUM: <index>, <number>[<CR><LF>^TRUSTNUM: <index>,<number>[...]]<CR><LF>]<CR><LF>OK<CR><LF>

AT^TRUSTNUM=?
Possible Response(s)
<CR><LF>^TRUSTNUM: (list of supported <index>s)<CR><LF><CR><LF>OK<CR><LR>

26.2.2 Interface Description

This command is used to control the SMS whitelist.

- If both the <index> and <number> fields are not empty (the value of <number> must be added quotation marks), this command is used to write SMS whitelist into NV specified by <index>.
- If there are two parameters, and the <number> is left empty with only quotation marks, this command is used to delete the SMS whitelist specified by <index>.
- If there is one parameter, only <index> field is not empty, this command is used to read the SMS whitelist specified by <index>.



NOTE

- Only when the USB bus is in suspend state, the SMS whitelist is valid.
- If the SMS whitelist is not set, it will be empty, and all the SMS numbers can wake up the host (If SMS is allowed to wake up the host by AT^WAKEUPCFG).

26.2.3 Parameter Description

<index>: an integer value that indicates the position in NV memory. The value ranges from 0 to 19.

<number>: a string type that indicates a SMS number with ASCII character. Valid characters are '0'-'9', '*', '#', and '+'. If '+' exists, it should be at the beginning, and the maximum length is 25 bytes; or else the maximum length is 24 bytes. The SMS number must include the country code.

26.2.4 Property Description

Saving upon Power-off	PIN
Y	NA

26.2.5 Example

- Add the number "111111111" with <index> of 0 to the SMS whitelist:

```
Run: AT^TRUSTNUM=0, "111111111"
```

```
Response: OK
```

- Read the number whose <index> is 0 in the SMS whitelist:

```
Run: AT^TRUSTNUM=0
```

```
Response: ^TRUSTNUM: 0, "111111111"
```

```
OK
```

- Delete the number whose <index> is 0 from the SMS whitelist:

Run: AT^TRUSTNUM=0, ""
Response: OK

- Read all the numbers in the SMS whitelist:

Run: AT^TRUSTNUM?
Response: ^TRUSTNUM: 1, "1111111111"
^TRUSTNUM: 2, "2222222222"
^TRUSTNUM: 3, "3333333333"

OK

- Query the list of supported <index>:

Run: AT^TRUSTNUM=?
Response: ^TRUSTNUM: (0-19)

OK

26.3 AT^TRUSTCNUM-Control the Call Whitelist

26.3.1 Command Syntax

AT^TRUSTCNUM=<index>[,<number>]>
Possible Response(s)
In case of writing or deleting: <CR><LF>OK<CR><LF> In case of reading: [<CR><LF>^TRUSTCNUM: <index>,<number><CR><LF>]<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^TRUSTCNUM?
Possible Response(s)
[<CR><LF>^TRUSTCNUM: <index>, <number>[<CR><LF>^TRUSTCNUM: <index>,<number>[...]]<CR><LF>]<CR><LF>OK<CR><LF>

AT^TRUSTCNUM=?
Possible Response(s)
<CR><LF>^TRUSTCNUM: (list of supported <index>s)<CR><LF><CR><LF>OK<CR><LR>

26.3.2 Interface Description

This command is used to control the call whitelist.

- If both the <index> and <number> fields are not empty (the value of <number> must be added quotation marks), this command is used to write call whitelist specified by <index>.
- If there are two parameters, and the <number> is left empty with only quotation marks, this command is used to delete the call whitelist specified by <index>.
- If there is one parameter, only <index> field is not empty, this command is used to read the call whitelist specified by <index>.



NOTE

If the call whitelist is not set, it will be empty, and all the caller numbers will be rejected.

26.3.3 Parameter Description

<index>: an integer value. The value ranges from 0 to 19.

<number>: a string type that indicates a caller number with ASCII character. Valid characters are '0'-'9', '*', '# and '+'. If '+' exists, it should be at the beginning of number, and the maximum length is 25 bytes; or else the maximum length is 24 bytes.

26.3.4 Property Description

Saving upon Power-off	PIN
Y	NA

26.3.5 Example

- Add the number "111111111" with <index> of 0 to the call whitelist:

Run: AT^TRUSTCNUM=0, "111111111"

Response: OK

- Read the number whose <index> is 0 in the call whitelist:

Run: AT^TRUSTCNUM=0

Response: ^TRUSTNUM: 0, "111111111"

OK

- Delete the number whose <index> is 0 from the call whitelist:

Run: AT^TRUSTCNUM=0, ""

Response: OK

- Read all the numbers in the call whitelist:

Run: AT^TRUSTCNUM?

Response: ^TRUSTCNUM: 1, "1111111111"
^TRUSTCNUM: 2, "2222222222"
^TRUSTCNUM: 3, "3333333333"

OK

- Query the list of supported <index>:

Run: AT^TRUSTCNUM=?

Response: ^TRUSTCNUM: (0-19)

OK

26.4 AT^TRUSTBNUM-Control the SMS and Call Blacklist

26.4.1 Command Syntax

AT^TRUSTBNUM=<index>[,<number>]
Possible Response(s)
In case of writing or deleting: <CR><LF>OK<CR><LF>
In case of reading: [<CR><LF>^TRUSTBNUM: <index>,<number><CR><LF>]<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^TRUSTBNUM?
Possible Response(s)

AT^TRUSTBNUM?
[<CR><LF>^TRUSTBNUM: <index>, <number>[<CR><LF>^TRUSTBNUM: <index>, <number>[...]]<CR><LF>]<CR><LF>OK<CR><LF>

AT^TRUSTBNUM=?
Possible Response(s)
<CR><LF>^TRUSTBNUM: (list of supported <index>s)<CR><LF><CR><LF>OK<CR><LF>

26.4.2 Interface Description

This command is used to control the SMS and call blacklist.

- If both the <index> and <number> fields are not empty (the value of <number> must have quotation marks added), this command is used to add a number with the specified <index> to the SMS and call blacklist.
- If there are two parameters, and the <number> is left empty with only quotation marks, this command is used to delete the number specified by <index> from the SMS and call blacklist.
- If only <index> is specified, this command is used to read the number specified by <index> in the SMS and call blacklist.



NOTE

If the SMS and call blacklist is not set, it will be empty, and all the numbers will be allowed.

26.4.3 Parameter Description

<index>: an integer value. The value ranges from 0 to 19.

<number>: a string type that indicates a number with ASCII character. Valid characters are '0'-'9', '*', '#', and '+'. If '+' exists, it should be at the beginning of number, and the maximum length is 25 bytes; or else the maximum length is 24 bytes.

26.4.4 Property Description

Saving upon Power-off	PIN
Y	NA

26.4.5 Example

- Add the number "111111111" with the <index> of 0 to the SMS and call blacklist:

Run: AT^TRUSTBNUM=0, "111111111"

Response: OK



- Read the number whose <index> is 0 in the SMS and call blacklist:

```
Run:          AT^TRUSTBNUM=0
Response:     ^TRUSTBNUM: 0, "1111111111"
              OK
```

- Delete the number whose <index> is 0 from the SMS and call blacklist:

```
Run:          AT^TRUSTBNUM=0, ""
Response:     OK
```

- Read all numbers in the SMS and call blacklist:

```
Run:          AT^TRUSTBNUM?
Response:     ^TRUSTBNUM: 1, "1111111111"
              ^TRUSTBNUM: 2, "2222222222"
              ^TRUSTBNUM: 3, "3333333333"
              OK
```

- Query the list of supported <index>:

```
Run:          AT^TRUSTBNUM=?
Response:     ^TRUSTBNUM: (0-19)
              OK
```

27 Appendix

27.1 List of URC Commands



NOTE

URC commands listed in the following table are provided only for your reference. Some URC commands may be not supported by the module.

URC	Function
+CBM	New CBM directly deliver indication
+CBMI	New CBM indication
+CCWA	Call waiting notifications
+CDS	SMS status report indication directly displayed
+CDSI	New SMS status report indication
+CEREG	Notify the current LTE registration status
+CGREG	Notify PS Domain Registration Status
+CLIP	CLIP notifications
+CMT	New message directly deliver indication
+CMTI	New SMS-DELIVER indication
+CREG	Notify the current registration status
+CRING	Indicate incoming call
+CSSI	Supplementary service notifications
+CSSU	Supplementary service notifications
+CTZV	Notify the time zone is changed
+CUSATEND	Unsolicitedly report of terminating a UICC proactive command session
+CUSATP	Unsolicitedly report a UICC proactive command
+CUSD	Unsolicitedly report USSD of network



URC	Function
+XADPCLKFREQ INFO	Unsolicitedly Present of Adaptive Clock Frequency Info
+XTS	Unsolicitedly Present of the Threshold Reached
RING	Call Indication
^ACTIVEBAND	(Only for the HUAWEI specified client)
^ANLEVEL	(Only for the HUAWEI specified client)
^AUDEND	Unsolicitedly Report the End of Audio Playback
^BOOT	(Only for the HUAWEI specified client)
^CEND	Call end indication
^CONF	Ringback tone indication
^CONN	Call connection indication
^CPBREADY	Unsolicitedly Report CPB Ready
^CRSSI	RSSI or System Mode Change Indication (be replaced by the URC "HCSQ")
^CSNR	(Only for the HUAWEI specified client)
^DATASETTRULT	Notify XTRA data injection
^DATAVALIDITY	(Only for the HUAWEI specified client)
^DDTMF	Report DTMF Reserved Event
^DSDORMANT	Dormant State Indication
^DSFLOWRPT	(Only for the HUAWEI specified client)
^EARST	(Only for the HUAWEI specified client)
^ECCLIST	(Only for the HUAWEI specified client)
^ECLREC	Unsolicitedly Report AL_ACK and Timestamp Information
^ECLREDIAL	Unsolicitedly Report eCall Redialing
^ECLSTAT	Unsolicitedly Present eCall Session Status(Only for the HUAWEI specified client)
^EFSSTATE	Unsolicitedly Report EFS Backup or Resume
^ERRRPT	Specified error code indication (Only for the HUAWEI specified client)
^FOTASMS	Notify Users to Decide on FOTA Upgrade
^FOTASTATE	Report the FOTA Status
^FWLSTATE	Report the Upgrade Status

URC	Function
^HCDS	Report a New Status Report Short Message
^HCMGS	Unsolicited Present of Successfully Sending a Short Message (PDU mode)
^HCMGSF	Report Short Message Sending Failure
^HCMGSS	Report Successful Short Message Sending (Text Mode)
^HCMT	Report a New Short Message
^HCSQ	Report system mode and Signal Strength
^HDRSSI	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")
^HWNAT	Indicate Network Mode Change
^IPDATA	Notificate Arrival Data
^IPRCVST	Unsolicited Report Data Arrival in Data Receive Buffer
^IPSRVST	Unsolicited Report the Socket Service State
^IPSTATE	Indicate TCP/UDP data link state
^JDET	Jammer Report
^LOCCHD	Unsolicited Report of Connection Status (Only for the HUAWEI specified client)
^MODE	RSSI or System Mode Change Indication (be replaced by the URC "HCSQ")
^NDISEND	(Only for the HUAWEI specified client)
^NDISSTAT	Unsolicited Report of Connection Status
^NISMSFWD	Unsolicited Report Short Messages with Specified Destination Port Numbers
^NWNNAME	Unsolicited Report NITZ Operator Name
^NWTIME	Unsolicited report network system time
^ORIG	Indicate the origination of a call
^OTACMSG	(Only for the HUAWEI specified client)
^PDPSTATUS	Unsolicited Report Deactivation Reason
^POSEND	Report positioning end information
^POSITION	Notify positioning result
^RFSWITCH	Report the RFSWITCH State

URC	Function
^RSSI	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")
^SIMFILEREFR H	(Only for the HUAWEI specified client)
^SIMRESET	Unsolicitedly Report SIM Reset Event
^SIMST	SIM Card State Change Indication
^SMMEMFULL	Message memory full
^SRVST	Service State Change Indication
^SSLRX	Notify SSL Arrival Data
^STIN	(Only for the HUAWEI specified client)
^SUPLCONN	Report a Successful Connection to the SUPL Server
^SYSSTART	Unsolicitedly report module startup
^THERM	Thermal Protection Activated Unsolicited Report
^THERMEX	Unsolicitedly Report Thermal Protection State Change
^TIMESETRULT	Notify XTRA time injection
^WAKEUPIN	WAKEUP_IN PIN Input Change Indication
^WNINV	Notify NI positioning
^WPDCP	(Only for the HUAWEI specified client)
^WPDDL	(Only for the HUAWEI specified client)
^WPDOP	(Only for the HUAWEI specified client)
^XDSTATUS	Notify XTRA data status
^EONS	Notify when the service provider's name is released from the network side
^PORTSTAT	Notify when the custom channel has downlink data waiting to be received

27.2 General CME Error List

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

Table 27-1 General CME ERROR Codes

Numeric mode	Verbose mode
0	phone failure
1	no connection to phone
2	phone adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted (not supported currently. If no SIM is inserted, return SIM failure)
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required



Numeric mode	Verbose mode
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)
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

Numeric mode	Verbose mode
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
323	Parameters error

Table 27-2 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 27-3 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

Numeric mode	Verbose mode
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
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 27-4 SSL related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
---------------------	---------------------

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 27-5 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

Numeric mode	Verbose mode
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

Table 27-6 RSAP related "CME ERROR" Codes (Huawei proprietary)

Numeric mode	Verbose mode
324	CS call is ongoing
325	PS call is ongoing
326	SAP connecting busy

Numeric mode	Verbose mode
327	SAP role unchanged

27.3 CMS Error List

The following lists the <err> value of CMS ERROR that may be returned by all AT commands of short messages.

<err> values used by common messaging commands:

Numeric mode	Verbose mode
0-127	3GPP TS 24.011 clause E.2 values
128-255	3GPP TS 23.040 clause 9.2.3.22 values.
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service

Numeric mode	Verbose mode
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
...511	other values in range 256...511 are reserved
512...	manufacturer specific

27.4 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.

27.5 References

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



- [1] 3GPP TS 22.067
- [2] 3GPP TS 22.071
- [3] 3GPP TS 22.082
- [4] 3GPP TS 22.101
- [5] 3GPP TS 22.173
- [6] 3GPP TS 23.003
- [7] 3GPP TS 23.038
- [8] 3GPP TS 23.040
- [9] 3GPP TS 23.041
- [10] 3GPP TS 23.107
- [11] 3GPP TS 23.228
- [12] 3GPP TS 23.271
- [13] 3GPP TS 24.008
- [14] 3GPP TS 24.011
- [15] 3GPP TS 24.229
- [15] 3GPP TS 25.101
- [16] 3GPP TS 25.331
- [17] 3GPP TS 27.005
- [18] 3GPP TS 27.007
- [19] 3GPP TS 27.060
- [20] 3GPP TS 29.061
- [21] 3GPP TS 31.102
- [22] 3GPP TS 31.111
- [23] 3GPP TS 36.101
- [24] 3GPP TS 36.306
- [25] 3GPP TS 44.060
- [26] 3GPP TS 45.008
- [27] ETSI TS 102.221
- [28] ETSI TS 102.223
- [29] GSM 07.05
- [30] GSM 11.11
- [31] GSM MoU SE.13
- [32] ITU-T E.212 Annex A

- [33] ITU-T Recommendation V.250
- [34] ITU-T Recommendation V.42
- [35] ITU-T T.50: International Reference Alphabet (IRA)
- [36] ITU-T V.25 ter
- [37] HUAWEI Terminal AT Command Interface Specifications

27.6 Acronyms and Abbreviations

Acronym Or Abbreviation	Full Spelling
3GPP	Third Generation Partnership Project
ACK	Acknowledgement
ADB	Android Debug Bridge
ADC	Analog To Digital Converter
AGNSS	Assisted Global Navigation Satellite System
AGPS	Assisted Global Positioning Systems
AP	Access Point
APN	Access Point Name
ASCII	American Standard Code For Information Interchange
AT	Attention
AUX	Auxiliary
BCD	Binary Coded Decimal
BER	Bit Error Rate
BS	Base Station
CBM	Cell Broadcast Message
CDMA	Code Division Multiple Access
CHAP	Challenge Handshake Authentication Protocol
CLI	Calling Line Identification
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CP	Content Provider
CPT	Cellular Paging Teleservice
CS	Circuit Switched



Acronym Or Abbreviation	Full Spelling
CUG	Closed User Group
DCD	Data Carrier Detection
DCE	Data Circuit-Terminating Equipment
DC-HSPA+	Dual Carrier High Speed Packet Access Plus
DCS	Digital Cellular System
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multiple Frequency
DTR	DTE Ready
ECM	Ethernet Networking Control Model
EDGE	Enhanced Data Rates For GSM Evolution
EFS	Encrypting File System
EGPRS	Enhanced General Packet Radio Service
EHRPD	Evolved High Rate Packet Data
EMM	EPS Mobility Management
EPS	Evolved Packet System
ERMES	European Radio Messaging System
ESN	Equipment Serial Number
ETSI	European Telecommunication Standards Institute
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
EVDO	Evolution-Data Only
EVVPF	Enhanced Validity Period Format
FDN	Fixed Dialing Number
FOTA	Firmware Over-The-Air
FTM	Factory Test Mode
FTP	File Transfer Protocol
GBK	Chinese Internal Code Specification
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node



Acronym Or Abbreviation	Full Spelling
GLONASS	Global Navigation Satellite System
GMM	GPRS Mobility Management
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
GPGGA	Global Positioning System Fix Data
GPGSA	GPS DOP And Active Satellites
GPGSV	GPS Satellites In View
GPIO	General-Purpose Input/Output
GPRMC	Recommended Minimum Specific GPS
GPRS	General Packet Radio Service
GPS	Global Position System
GPVTG	GPS Trackmade Good And Ground Speed
GSM	Global System For Mobile Communications
HDR	High Data Rate
HSDPA	High Speed Downlink Packet Access
HSPA	High Speed Packet Access
HSPA+	High Speed Packet Access Plus
HSUPA	High Speed Uplink Packet Access
HTTP	Hypertext Transfer Protocol
IC	Integrated Circuit
ICCID	Integrated Circuit Card Identity
IMEI	International Mobile Equipment Identity
IMEISV	International Mobile Station Equipment Identity And Software Version
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IMT	International Mobile Telecommunications
IP	Internet Protocol
IRA	International Reference Alphabet
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector



Acronym Or Abbreviation	Full Spelling
IVS	In Vehicle System
IWF	Interworking Function
LCS	Location Service
LED	Light Emitting Diode
LGA	Land Grid Array
LPP	LTE Positioning Protocol
LTE	Long Term Evolution
MBIM	Mobile Broadband Interface Model
MCC	Mobile Country Code
MDM	Mobile Device Management
MDN	Mobile Directory Number
ME	Mobile Equipment
MEID	Mobile Equipment Identifier
MIN	Mobile Identification Number
MM	Mobility Management
MNC	Mobile Network Code
MS	Mobile Station
MSC	Mobile Switching Center
MSD	Minimum Set Of Data
MSIN	Mobile Station Identification Number
MSISDN	Mobile Station International ISDN Number
MT	Mobile Terminal
NCM	Network Control Model
NDIS	Network Driver Interface Specification
NDSS	Network Directed System Selection
NI	Network Indicator
NMEA	National Marine Electronics Association
NV	Non-Volatile
OTA	Over The Air
OTASP	Over-The-Air Service Provisioning
PA	Power Amplifier



Acronym Or Abbreviation	Full Spelling
PAP	Password Authentication Protocol
PC	Personal Computer
PCCA	Portable Computer And Communications Association
PCM	Pulse-Coded Modulation
PCS	Personal Communications System
PD	Position Determination
PDCP	Packet Data Convergence Protocol
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PH-FSIM	Phone To The Very First Inserted SIM
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PPP	Point-To-Point Protocol
PS	Packet Switched
PSAP	Public Safety Answering Point
PUK	PIN Unlocking Key
QoS	Quality Of Service
RF	Radio Frequency
RFC	Requirement For Comments
RI	Ring Indicator
RLP	Radio Link Protocol
RNDIS	Remote Network Driver Interface Specification
ROM	Read Only Memory
RPLMN	Registered Public Land Mobile Network
RRC	Radio Resource Control
RSCP	Received Signal Code Power
RSRP	Reference Signal Received Power
RSRQ	Reference Signal Received Quality
RSSI	Receive Signal Strength Indicator
RUIM	Removable User Identity Module
SAP	Service Access Point



Acronym Or Abbreviation	Full Spelling
SAR	Specific Absorption Rate
SC	Service Center
SCA	Service Center Address
SDN	Service Dialing Number
SDU	Service Data Unit
SID	Service Identifier
SIM	Subscriber Identity Module
SINR	Signal To Interference Plus Noise Ratio
SIP	Session Initiation Protocol
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
SNDCP	Subnetwork Dependent Convergence Protocol
SNR	Serial Number
SNTP	Simple Network Time Protocol
SPN	Service Principal Name
SS	Selective Suspend
SSL	Secure Sockets Layer
STK	SIM Toolkit
SUPL	Secure User Plane Location
SVN	Software Version Number
TA	Terminal Adapter
TAC	Type Approval Code
TCP	Transmission Control Protocol
TD-SCDMA	Time Division Synchronous Code Division Multiple Access
TE	Terminal Equipment
TLS	Transport Layer Security
TPDU	Transfer Protocol Data Unit
TS	Technical Specification
TTS	Text To Speech



Acronym Or Abbreviation	Full Spelling
UART	Universal Asynchronous Receiver/Transmitter
UCS	Universal Character Set
UDP	User Datagram Protocol
UDUB	User Determined User Busy
UE	User Equipment
UICC	Universal Integrated Circuit Card
UIM	User Identity Module
UMTS	Universal Mobile Telecommunications System
URC	Unsolicited Result Code
URL	Uniform Resource Locator
USAT	USIM Application Toolkit
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module
USSD	Unstructured Supplementary Service Data
UTC	Coordinated Universal Time
UTRAN	Universal Terrestrial Radio Access Network
VP	Validity Period
WCDMA	Wideband Code Division Multiple Access
WiMAX	Worldwide Interoperability For Microwave Access
WWAN	Wireless Wide Area Network
XTRA	Extended Receiver Assistance