

HUAWEI ME906s LTE M.2 Module
V100R001

AT Command Interface Specification

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1 Introduction

1.1 Scope

This document describes AT command interface specifications that is supported by Huawei Mobile Broadband product ME906s module.

Please read the Release Notes released with the firmware before using ME906s module and this document.

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

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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

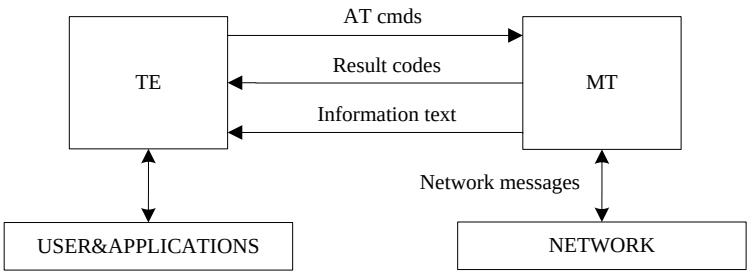
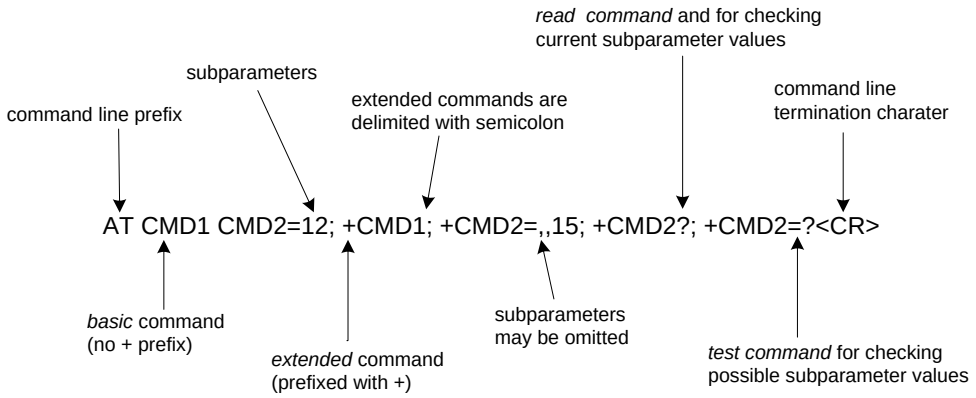


Figure 1-2 shows the basic organization format of the AT command line.

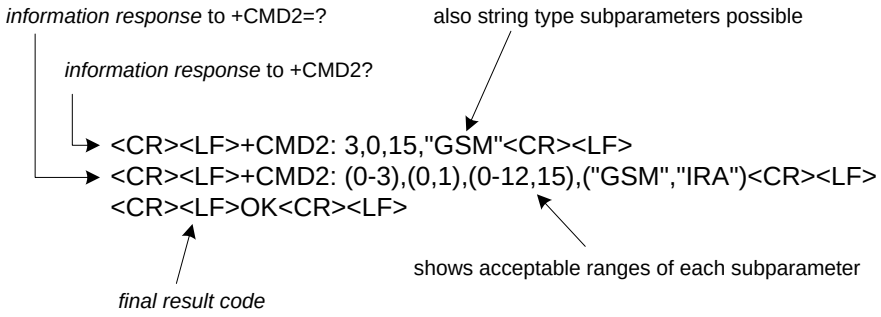
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Figure 1-2 Basic organization format of the AT command line



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

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AT command type	Sub-type	Syntax	Function
General command	Set command	• Contains one parameter: AT<name>[=<value>] • Contains multiple parameters: AT<name>=[<compound_value>]	A set command is executed to set parameters.
	Execution command	• Contains no parameter: AT<name> • Contains one parameter: AT<name>[=<value>] • Contains multiple parameters: AT<name>[=<compound_value>]	An execution command performs a specific action in addition to interacting with the local parameters of the MS.
	Read command	AT<name>?	A read command is executed to read the current value of 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>]	In the command format, <command> indicates a single letter (A-Z) or the & symbol plus a single letter. In the command format, <number> indicates a decimal number with one digit or multiple digits. The digit 0 at the start of <number> can be ignored.
S register command	Read command	ATS<parameter number>?	Returns the ASCII code of characters currently saved in the S register. The ASCII code is expressed by a 3-digit decimal number. The digit 0 is added in the front of the number in case of insufficient digits.
	Set command	ATS<parameter number>=<value>	Replaces the characters saved in the S register with the characters related to the value of <value>.

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1.4.3 AT Command Parameter

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

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

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

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

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

1.5 Abort Attributes of AT Commands

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

The following commands can be aborted.

AT+CLCK

AT+COPS=?

1.6 Rules for Running AT Commands

- Each interface should be functionally convergent.

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- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.

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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

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2.1.5 Example

```
Run:        ATE0
Response:   OK
```

2.2 ATV-Set the Response Format

2.2.1 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>

2.2.2 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>

2.2.3 Parameter Description

<value>:

0	The MT sends an abbreviated header and tail and adopts the result code in the digit format.

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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.

2.2.4 Property Description

Saving upon Power-off	PIN
N	N

2.2.5 Example

```
Run:        ATV1
Response:   OK
```

2.3 ATI-Request Identification

2.3.1 Command Syntax

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

2.3.2 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)

2.3.3 Parameter Description

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

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

2.3.4 Property Description

Saving upon Power-off	PIN
N	N

2.3.5 Example

```
Run:        ATI
Response:   Manufacturer: Huawei Technologies Co., Ltd.
            Model: ME906s-158
            Revision: 11.670.01.00.00
            IMEI: 356112010004540
            +GCAP: +CGSM,+DS,+ES

            OK
```

2.4 AT+GCAP-Request Transmission Capacity Domain Identification

2.4.1 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>

2.4.2 Interface Description

This command lists transmission capacity domains currently supported by an MS.

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2.4.3 Parameter Description

None

2.4.4 Property Description

Saving upon Power-off	PIN
NA	N

2.4.5 Example

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

              OK
```

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

2.5.1 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>

2.5.2 Interface Description

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

2.5.3 Parameter Description

<manufacturer>: a string type value without double quotation marks that indicates the manufacturer information.

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

2.5.4 Property Description

Saving upon Power-off	PIN
NA	N

2.5.5 Example

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

              OK
```

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

2.6.1 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>

2.6.2 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.

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2.6.3 Parameter Description

<production_name>: a string type value without double quotation marks that indicates product name.

2.6.4 Property Description

Saving upon Power-off	PIN
NA	N

2.6.5 Example

```
Run:            AT+CGMM
Response:       ME906s-158

                OK
```

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

2.7.1 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>

2.7.2 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.

2.7.3 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.

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2.7.4 Property Description

Saving upon Power-off	PIN
NA	N

2.7.5 Example

```
Run:        AT+CGMR
Response:   11.670.01.00.00

            OK
```

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

2.8.1 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>

2.8.2 Interface Description

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

- 3GPP

This command queries the MT's IMEI.

2.8.3 Parameter Description

- 3GPP

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<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

2.8.4 Property Description

Saving upon Power-off	PIN
NA	N

2.8.5 Example

```
Run:          AT+CGSN
Response:     356112010004540

              OK
```

2.9 AT+CSCS-Select TE Character Set

2.9.1 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=?

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

2.9.2 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.

2.9.3 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).

2.9.4 Property Description

Saving upon Power-off	PIN
N	N

2.9.5 Example

```
Run:            AT+CSCS="IRA"
Response:       OK
Run:            AT+CSCS?
Response:       +CSCS: "IRA"

                OK
Run:            AT+CSCS=?
```


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

               OK
```

2.10 AT+CIMI-Request IMSI

2.10.1 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>

2.10.2 Interface Description

- 3GPP

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

2.10.3 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	-
MCC	MNC	MSIN

2.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

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2.10.5 Example

```
Run:        AT+CIMI
Response:   123451234567890

            OK
```

2.11 ATZ-Restore Factory Settings

2.11.1 Command Syntax

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

2.11.2 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, and the command ATE and ATV can be set to factory configuration.

2.11.3 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.

2.11.4 Property Description

Saving upon Power-off	PIN
NA	N

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2.11.5 Example

```
Run:        ATZ0
Response:   OK
```

2.12 AT+CMEE-Report Mobile Termination Error

2.12.1 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>

2.12.2 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.

2.12.3 Parameter Description

<n>: an integer type value that 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.

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<err>: see 22.2 General CME Error List.

2.12.4 Property Description

Saving upon Power-off	PIN
N	N

2.12.5 Example

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

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

                OK
```


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3 Network Service Related Commands

3.1 AT+COPS-Select Operator

3.1.1 Command Syntax

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

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

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

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3.1.2 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.

3.1.3 Parameter Description

<mode>:

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

<format>:

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

<oper>: string type.

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

<stat>:

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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

3.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

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

3.1.5 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
```


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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+COPS?
Response:       +COPS: 1

                OK
```

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

NOTE

- We cannot manually search the UTRAN network when current setting is GSM ONLY mode 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+COPS?
Response:       +COPS: 1,2,"46000",2

                OK
```

3.2 AT+CREG-Register Network

3.2.1 Command Syntax

AT+CREG=[<n>]
Possible Response(s)
<CR><LF>OK<CR><LF>

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

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

3.2.2 Interface Description

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

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

3.2.3 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.

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<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 the idle state.

3.2.4 Property Description

Saving upon Power-off	PIN
N	Y

3.2.5 Example

- Enable the initiative report when network registration status change:

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

- Query the 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=?
```


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```
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
```

3.3 AT+CLCK-Facility Lock

3.3.1 Command Syntax

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

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

3.3.2 Interface Description

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

The test command returns the facilities supported.

3.3.3 Parameter Description

<fac>: specifies the target of this command.

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"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

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<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 (not supported currently)
2	Data
4	Fax (not supported currently)
8	Short message

3.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

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

3.3.5 Example

- Query the lock status of SIM:

```
Run:            AT+CLCK="SC",2
Response:       +CLCK: 0

                OK
```

- Set the lock status of SIM:

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

- Query the list of supported <fac>s:

```
Run:            AT+CLCK=?
Response:       +CLCK:
                ("SC","AO","OI","OX","AI","IR","AB","AG","AC","FD")

                OK
```


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3.4 AT+CPWD-Change Password

3.4.1 Command Syntax

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

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

3.4.2 Interface Description

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

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

3.4.3 Parameter Description

<fac>: specifies the target of this command.

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

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"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.

3.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

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

3.4.5 Example

- Modify PIN2 of SIM:

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

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

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

            OK
```


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3.5 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.

3.5.1 Command Syntax

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

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

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

3.5.2 Interface Description

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

<n> 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:

```
+CUSD: <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 +CUSD result code.

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

The test command returns all the supported n values.

3.5.3 Parameter Description

<n>:

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

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.

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3.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.5.5 Example

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

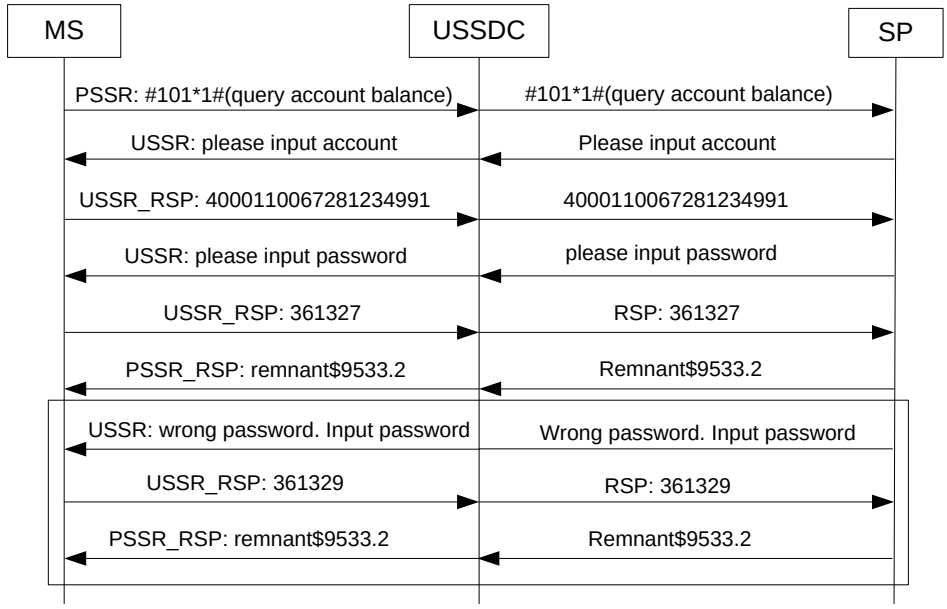
- Use USSD to query the phone number (given that the query code is "*99#"):

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

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

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

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



NOTE

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

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

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3.6 +CUSD-Unsolicitedly Report USSD of Network

3.6.1 Command Syntax

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

3.6.2 Interface Description

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

3.6.3 Parameter Description

For the definition of its parameters, see 3.5 AT+CUSD-USSD Command.

3.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.6.5 Example

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

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

3.7 AT+CNUM-Subscriber Number

3.7.1 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>

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

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

3.7.2 Interface Description

The execution command returns the MSISDNs related to the subscriber (this information can be stored in the EF_{MSISDN} folder on the SIM/USIM).

- For a SIM card, the information is stored in the EF_{MSISDN} under $DF_{Telecom}$.
- For a USIM card, the information is stored in the EF_{MSISDN} under ADF_{USIM}.
- If the subscriber has different MSISDNs for different services, each MSISDN is returned in a separate line.

3.7.3 Parameter Description

<alpha*x*>: indicates optional alphanumeric string associated with <number*x*>; used character set should be the one selected with command 2.9 AT+CSCS-Select TE Character Set.

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

<type*x*>: indicates type of the phone number; address octet in integer format.

- When <number*x*> contains the plus sign ('+'), the value of <type*x*> is 145, indicating that the phone number is an international number.
- When <number*x*> does not contain the plus sign ('+'), the value of <type*x*> is 129, indicating that the phone number is a national number.

<speed>: 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

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

0	3.1 kHz
1	UDI

3.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.7.5 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
```


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3.8 AT+CGEQREQ-Set QoS Parrameters

3.8.1 Command Syntax

AT+CGEQREQ=[<cid>[,<Traffic class>[,<Maximum biterate 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>

3.8.2 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.

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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.

3.8.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 5.1 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.

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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 5.1 AT+CGDCONT-Define PDP Context.

3.8.4 Property Description

Saving upon Power-off	PIN
N	Y

3.8.5 Example

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


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```
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=?
```


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```
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
```

3.9 AT+CGEQNEG-3G Negotiated QoS Profile

3.9.1 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>

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3.9.2 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.

3.9.3 Parameter Description

<cid>: an index that specifies a particular PDP context definition (see 5.1 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 kbits/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 kbits/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 kbits/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 kbits/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.

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<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.

3.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

3.9.5 Example

```
Run:        AT+CGEQNEG=1          This command should be sent after
                                  successful dial-up.
Response:   +CGEQNEG: 1,2,5760,8640,0,0,0,1060,"1E4","1E5",2,100,2

            OK
Run:        AT+CGEQNEG=?          This command should be used after
                                  successful dial-up, otherwise the
                                  bracket is empty.
Response:   +CGEQNEG: (1)

            OK
```


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3.10 AT+CGEQMIN-3G Quality of Service Profile (Minimum Acceptable)

3.10.1 Command Syntax

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

AT+CGEQMIN?
Possible Response(s)
<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>

AT+CGEQMIN=?
Possible Response(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),(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>

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3.10.2 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 5.1 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.

3.10.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 5.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT).

The following parameters are defined in 3GPP TS 23.107:

<PDP_type>: see 5.1 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 kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bit rate of 32kbit/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 kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bit rate of 32kbit/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 kbits/s delivered to UMTS (up-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/s would be specified as '32' (e.g. AT+CGEQMIN=...,32,...) (refer 3GPP TS 24.008 subclause 10.5.6.5).

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<Guaranteed bitrate DL>: a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bit rate of 32kbit/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.

3.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

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3.10.5 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
```


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4 Mobile Termination Control and Status Commands

4.1 AT+CFUN-Set Operation Mode

4.1.1 Command Syntax

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

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

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

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4.1.2 Interface Description

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

The read command queries the current mode.

The test command returns the supported parameter values.

4.1.3 Parameter Description

<fun>:

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

4.1.4 Property Description

Saving upon Power-off	PIN
NA	N

4.1.5 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
```


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```
Response:    OK
```

- Query which mode MT supports:

```
Run:         AT+CFUN=?
Response:    +CFUN: (0,1,4,5,6,7),(0,1)

             OK
```

4.2 AT+CPIN-Enter PIN

4.2.1 Command Syntax

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

AT+CPIN?
Possible Response(s)
<CR><LF>+CPIN: <code><CR><LF><CR><LF>OK<CR><LF>

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

4.2.2 Interface Description

The 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.

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- 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.

4.2.3 Parameter Description

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

<code>: 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.

4.2.4 Property Description

Saving upon Power-off	PIN
NA	N

4.2.5 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
```


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- Try the read command again:

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

              OK
```

- Run the test command:

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

4.3 AT+CSQ-Signal Quality

4.3.1 Command Syntax

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

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

4.3.2 Interface Description

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

The test command returns supported RSSI and BER values.

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4.3.3 Parameter Description

<rssi>: indicates received signal strength indication.

<rssi>	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)

4.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.3.5 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
```


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4.4 AT+CPBS-Select Phonebook Memory Storage

4.4.1 Command Syntax

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

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

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

4.4.2 Interface Description

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

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

The test command returns supported phonebook storages.

4.4.3 Parameter Description

<storage>: indicates phonebook storage type.

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

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"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.

4.4.4 Property Description

Saving upon Power-off	PIN
N	Y

4.4.5 Example

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

```
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
```


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4.5 AT+CPBR-Read Phonebook Entries

4.5.1 Command Syntax

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

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

4.5.2 Interface Description

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

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

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

4.5.3 Parameter Description

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

<number>: string type field of maximum length <nlength>, 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 2.9 AT+CSCS-Select TE Character Set.

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<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.

4.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.5.5 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.

4.6 AT+CPBW-Write Phonebook Entry

4.6.1 Command Syntax

AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>

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AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]
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>

4.6.2 Interface Description

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

- If 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:

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

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

4.6.3 Parameter Description

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

<number>: string type field of maximum length <nlength>, 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 is145 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 2.9 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.

4.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

4.6.5 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
```


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- Test command:

```
Run:          AT+CPBW=?
Response:     +CPBW: (1-250),24,(128-255),16

              OK
```

4.7 AT+CRSM-Restricted SIM Access

4.7.1 Command Syntax

AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]
Possible Response(s)
<CR><LF>+CRSM: <sw1>,<sw2>[,<response>]<CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

4.7.2 Interface Description

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

The set command accesses the SIM card through restricted permissions.

4.7.3 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

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<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.

4.7.4 Property Description

Saving upon Power-off	PIN
NA	N

4.7.5 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
```


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4.8 AT+CCLK-Return Current Time of the Module

4.8.1 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>

4.8.2 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.

4.8.3 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.

4.8.4 Property Description

Saving upon Power-off	**PIN**

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Saving upon Power-off	PIN
NA	N

4.8.5 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
```


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5 UMTS Packet Domain Commands

5.1 AT+CGDCONT-Define PDP Context

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

5.1.1 Command Syntax

AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<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)

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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>

5.1.2 Interface Description

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

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

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

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.

5.1.3 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.

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<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)

0	NAS mode
1	DHCP mode

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<emergency indication>: a numeric parameter that specifies whether PDP can be used for emergency bearer services. (not supported currently)

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.

5.1.4 Property Description

Saving upon Power-off	PIN
Y	N

5.1.5 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?
```


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```
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.

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5.2 AT+CGACT-Activate or Deactivate PDP Context

5.2.1 Command Syntax

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

5.2.2 Interface Description

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

The read command queries the defined PDP Activation state.

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

5.2.3 Parameter Description

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

0 Deactivated

1 Activated

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<cid>: the index of a PDP context, specifies a particular PDP context definition, see 5.1 AT+CGDCONT-Define PDP Context.

5.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.2.5 Example

- Query the value range of PDP Activation state:

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

              OK
```

- Query the current PDP Activation state:

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


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5.3 AT+CGATT-Attach or Detach PS Domain

5.3.1 Command Syntax

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

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

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

5.3.2 Interface Description

The set command attaches the MT to, or detaches the MT from the 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.

5.3.3 Parameter Description

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

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0 Detached

1 Attached

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

5.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.3.5 Example

- Query the value range of PS domain service states:

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

            OK
```

- Query the current GPRS service state:

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

            OK
```

- Attach or Detach PS Domain:

```
Run:        AT+CGATT=1
Response:   OK
Run:        AT+CGATT=0
Response:   OK
```

5.4 AT+CGREG-PS Domain Registration Status

5.4.1 Command Syntax

AT+CGREG[=<n>]
Possible Response(s)

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AT+CGREG[=<n>]
<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>

5.4.2 Interface Description

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

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

The read command 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.

5.4.3 Parameter Description

<n>:

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

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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)

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5.4.4 Property Description

Saving upon Power-off	PIN
N	Y

5.4.5 Example

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

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

              OK
```

5.5 AT+CGSMS-SMS Bearer Domain

5.5.1 Command Syntax

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

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

AT+CGSMS=?
Possible Response(s)

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AT+CGSMS=?
<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>

5.5.2 Interface Description

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

The read command queries the current SMS bearer domain.

The test command returns the supported parameter values.

5.5.3 Parameter Description

<service>:

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

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

5.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.5.5 Example

- Query the value range of SMS bearer domain:

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

              OK
```

- Query the current domain type which SMS used:

```
Run:          AT+CGSMS?
```


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```
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
```

5.6 AT+CGPADDR-Show PDP Address

5.6.1 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>

5.6.2 Interface Description

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

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

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5.6.3 Parameter Description

<cid>: a numeric parameter that specifies a particular PDP context definition (see 5.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT (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 5.1 AT+CGDCONT-Define PDP Context and AT+CGDSCONT 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.

5.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

5.6.5 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
```


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6 Normal Commands for SMS

6.1 AT+CPMS-Preferred Message Storage

6.1.1 Command Syntax

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

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

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

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6.1.2 Interface Description

The set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. The set command also 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.

6.1.3 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.

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6.1.4 Property Description

Saving upon Power-off	PIN
N	Y

6.1.5 Example

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

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

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

            OK
```

6.2 AT+CMGF-Message Format

6.2.1 Command Syntax

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

AT+CMGF?
Possible Response(s)

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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>

6.2.2 Interface Description

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

The read command queries the currently selected mode.

The test command returns available values of <mode>.

6.2.3 Parameter Description

<mode>:

0	PDU mode (default value)
1	Text mode

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

6.2.4 Property Description

Saving upon Power-off	PIN
N	N

6.2.5 Example

Set the message format to PDU format:

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

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

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6.3 AT+CNMI-New Message Indications to TE

6.3.1 Command Syntax

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

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

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

6.3.2 Interface Description

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

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.

6.3.3 Parameter Description

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

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

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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

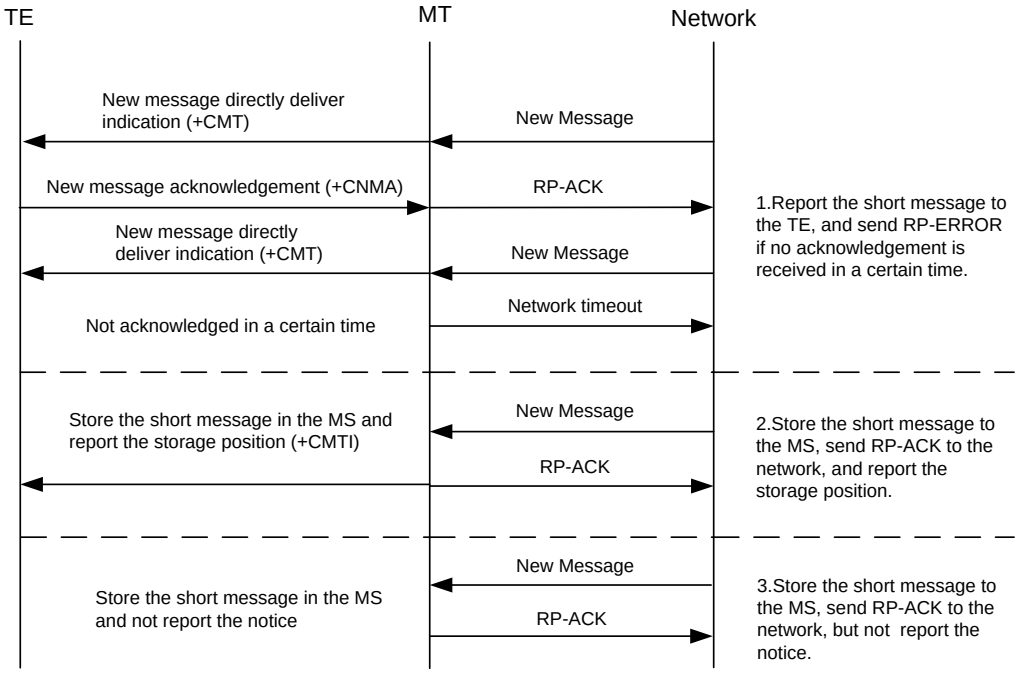
SMS-DELIVER indications are buffered in the MT's volatile memory. If the MT is powered off before the indications are sent, messages may be lost. Therefore, when <mode> is set to 0 or 2, messages are not recommended to be directly sent to the TE (that is, <mt> is not supported to be set to 2 or 3).

<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>
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.

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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 7.8 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)

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

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

Table 6-1 <bm> parameter

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

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

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

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

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

  +CDS: <length><CR><LF><pdu>

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 to2 is entered (OK response shall be given before flushing the codes). (default value)

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1	TA buffer of unsolicited result codes defined within this command is cleared when <mode>=0-2 is entered.

6.3.4 Property Description

Saving upon Power-off	PIN
N	N

6.3.5 Example

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

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

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

6.4.1 Command Syntax

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

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

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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>

6.4.2 Interface Description

The execution command acknowledges the reception of a new message that is routed directly to the TE. This acknowledgement command shall be used when AT+CSMS parameter <service> equals 1. For the use of this command, see 6.3 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 7.8 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.

6.4.3 Parameter Description

<n>:

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

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<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)

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0	1	SMS-SUBMIT (in the direction MT to SC)
0	1	SMS-SUBMIT-REPORT (in the direction SC to MT)
1	1	Reserved

<TP-UDHI>: indicates that the TP-UD has one header; bit 6 of the first byte.

0	The TP-UD field contains SMS message only.
1	There is a header at the beginning of the TP-UD field.

<TP-PI>: indicates the optional parameters. Setting the bit to 1 indicates that the corresponding parameter exits.

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

<TP-PID>: 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'	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.

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

<TP-UDL>: 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.

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

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

Figure 6-1 User data encoded using the default 7-bit encoding scheme

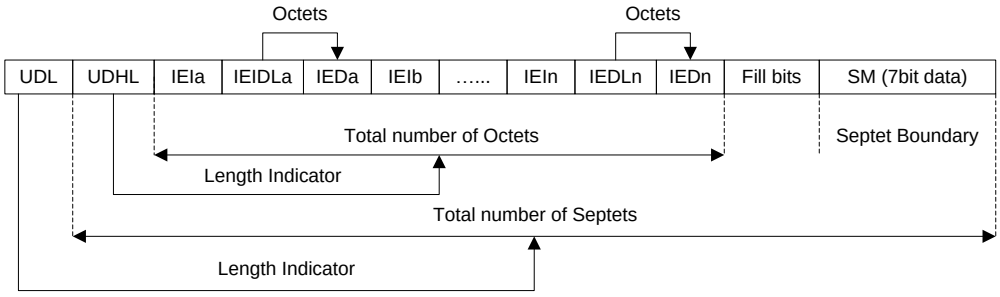
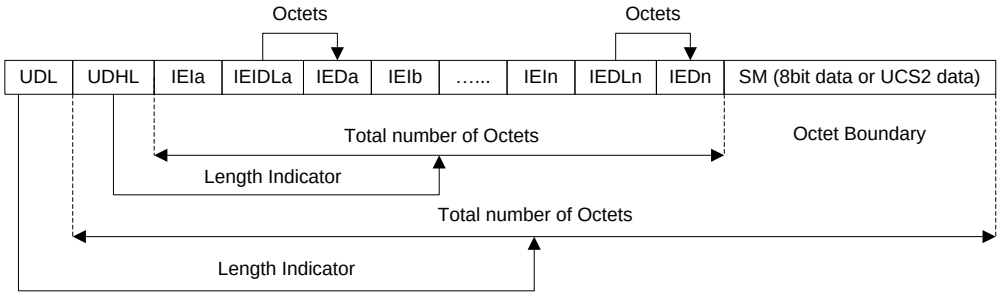


Figure 6-2 User data encoded using the 8-bit or UCS2 encoding scheme



In Figure 6-1 and Figure 6-2, IEI is short for Information Element Identifier.

6.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.4.5 Example

- Firstly, set AT commands orderly as follows:

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


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```
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
                089168310860880 5F9240D91683109731147F40000313050124360000
                4F4F29C0E
Run:            AT+CNMA
Response:       OK
```

6.5 +CMTI-New SMS-DELIVER Indication

6.5.1 Command Syntax

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

6.5.2 Interface Description

This command indicates that a new message is received.

6.5.3 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.

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6.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

6.5.5 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.
```

6.6 +CDSI-New SMS Status Report Indication

6.6.1 Command Syntax

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

6.6.2 Interface Description

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

6.6.3 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.

6.6.4 Property Description

Saving upon Power-off	PIN

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Saving upon Power-off	PIN
NA	NA

6.6.5 Example

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

```
Response:    +CDSI: "SM",17
```

6.7 AT+CMGD-Delete Message

6.7.1 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>

6.7.2 Interface Description

The execution command deletes the message at location <index> in the storage <mem1>. For details about <mem1>, see 6.1 AT+CPMS-Preferred Message Storage.

- If <delflag> is set to a value other than 0, the MT ignores <index> and executes the command as specified by <delflag>.
- If the deletion fails, +CMS ERROR: <err> is returned.

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

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6.7.3 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.

6.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

6.7.5 Example

- Delete the message stored in index 1using 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
```


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7 SMS Service Interface (3GPP)

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

7.1.1 Command Syntax

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

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

7.1.2 Interface Description

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

7.1.3 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 7.8 AT+CMGS-Send Message (PDU Mode).

7.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

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7.1.5 Example

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

```
Response:   +CMT: ,24                                  Presents an
            089168310860880 5F9240D91683109731128      indication, without
            F5000041106151833300046 2B1580C            solicitation, when the
                                                       message storage is
                                                       full.
```

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

7.2.1 Command Syntax

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

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

7.2.2 Interface Description

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

7.2.3 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 7.8 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

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Abbr.	Reference	P1)	R2)
TP-UDHI	TP-User-Data-Header-Indication	O	b
TP-MMS	TP-More-Messages-to-Send	M	b
TP-SRQ	TP-Status-Report-Qualifier	M	b
TP-MR	TP-Message-Reference	M	I
TP-RA	TP-Recipient-Address	M	2-12o
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o
TP-DT	TP-Discharge-Time	M	7o
TP-ST	TP-Status	M	o
TP-PI	TP-Parameter-Indicator	O	o
TP-PID	TP-Protocol-Identifier	O	o
TP-DCS	TP-Data-Coding-Scheme	O	o
TP-UDL	TP-User-Data-Length	O	o
TP-UD	TP-User-Data	O	

NOTE

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

7.2.4 Property Description

Saving upon Power-off	PIN
NA	NA

7.2.5 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
```


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7.3 AT+CSCA-Service Center Address

7.3.1 Command Syntax

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

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

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

7.3.2 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 7.8 AT+CMGS-Send Message (PDU Mode)).

7.3.3 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 7.8 AT+CMGS-Send Message (PDU Mode).

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

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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.

7.3.4 Property Description

Saving upon Power-off	PIN
Y	Y

7.3.5 Example

Sets the service center number using the test command:

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

7.4 AT+CSMS-Select Messaging Service

7.4.1 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>

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7.4.2 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.

7.4.3 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)

7.4.4 Property Description

Saving upon Power-off	PIN
N	N

7.4.5 Example

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

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

            OK
```


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7.5 AT+CMGL-List Messages (PDU Mode)

7.5.1 Command Syntax

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

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

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

7.5.2 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.

7.5.3 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

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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 7.8 AT+CMGS-Send Message (PDU Mode).

For the TPDU format of messages to be sent, see 7.8 AT+CMGS-Send Message (PDU Mode). The TPDU format for received messages is described in the following table.

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

<MTI>: see the definition in 7.8 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 7.8 AT+CMGS-Send Message (PDU Mode).

<RP>: see the definition in 7.8 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 7.8 AT+CMGS-Send Message (PDU Mode).

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<DCS>: indicates use data coding scheme. See the definition in 7.8 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 7.8 AT+CMGS-Send Message (PDU Mode).

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

7.5.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.5.5 Example

List all the received unread messages using the execution command:

```
Run:        AT+CMGL=0
Response:   +CMGL: 1,0,,25
            089168310860880 5F9040D91683109730147F20000215071617235000 5
            F4F29C4E03

            OK
```

7.6 AT+CMGR-Read Message (PDU Mode)

7.6.1 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=?

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AT+CMGR=?
Possible Response(s)
<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 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.

7.6.3 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 7.8 AT+CMGS-Send Message (PDU Mode).

7.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.6.5 Example

Read the message stored in index 1:

```
Run:          AT+CMGR=1
```


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```
Response:    +CMGR: 1,,25
             089168310860880 5F9040D91683109730147F20000215071617235000 5
             F4F29C4E03

             OK
```

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

7.7.1 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>

7.7.2 Interface Description

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

7.7.3 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

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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 7.8 AT+CMGS-Send Message (PDU Mode).

7.7.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.7.5 Example

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

                OK
```

7.8 AT+CMGS-Send Message (PDU Mode)

7.8.1 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>

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

7.8.2 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).

7.8.3 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".

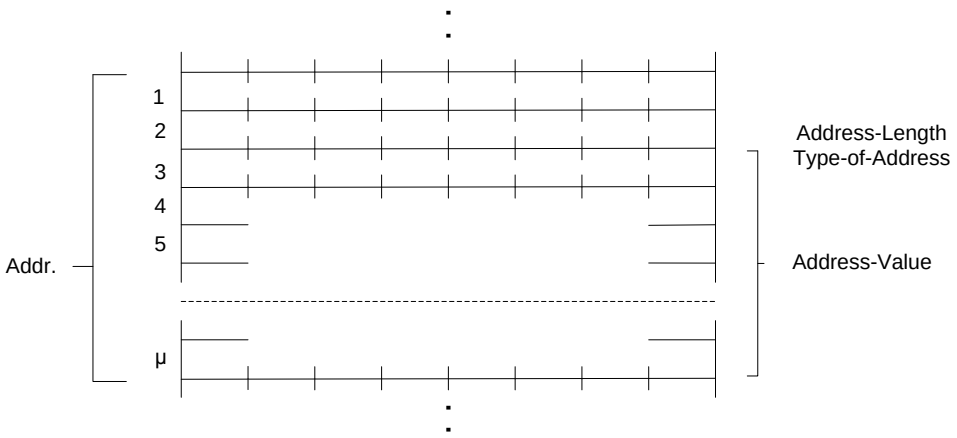
<ESC>: cancels the sending of the message. The characters are "0x1B".

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

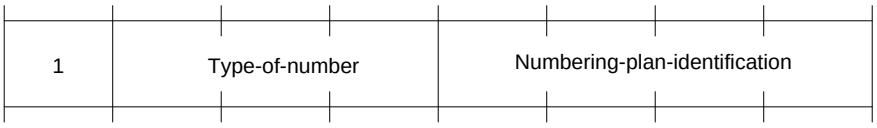
<SCA>: indicates SCA. Its structure is illustrated in the following figure.

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<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:

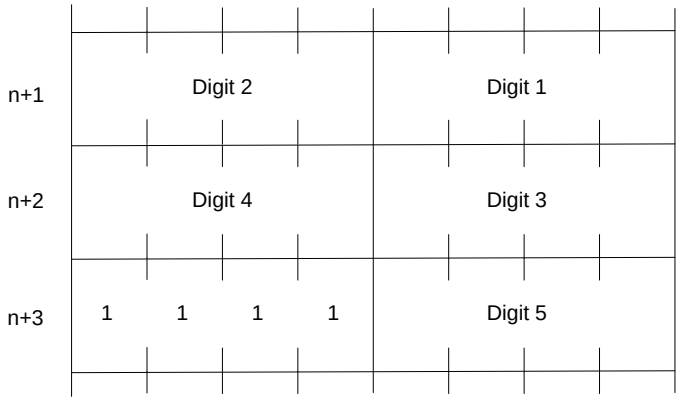
NOTE
bits 3-0 are valid only when bits 6-4 are 000, 001, or 010.

0 0 0 0	The number is determined by the numbering plan at the network.

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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-12 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0-140 Oct

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1 Octet								1 Oct	2 Oct-12 Oct	1 Oct	1 Oct	1 Oct	1 Oct	0-140 Oct
RP	UDHI	SRR	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	-	-	-	-	-	-	-

<MTI>: 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

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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-CSME 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.

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<table>
<tr><th colspan="3">Bits 7...4</th><th>Bits 3...0</th></tr>
<tr><td rowspan="4">00xx</td><td rowspan="2">Bit 5</td><td>0: Message is not compressed.</td><td rowspan="4">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</td></tr>
<tr><td>1: Message is compressed. This is not supported currently.</td></tr>
<tr><td rowspan="2">Bit 4</td><td>0: indicates that bit 1 and bit 0 are reserved.</td></tr>
<tr><td>1: indicates that bit 1 and bit 0 serve as the message type indication.</td></tr>
<tr><td>0100
...
1011</td><td colspan="2">reserved</td><td>-</td></tr>
<tr><td>1100</td><td colspan="2">The message content is discarded. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.</td><td>The settings of bits 3...0 are the same as those when bits 7...4=1101.</td></tr>
<tr><td>1101</td><td colspan="2">The message is stored. The message waiting indication is presented, and the user data is encoded using the GSM 7-bit encoding scheme.</td><td>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</td></tr>
<tr><td>1110</td><td colspan="2">The message is stored. The message waiting indication appears, and the user data is encoded using uncompressed UCS2 encoding scheme.</td><td>The settings of bits 3...0 are the same as those when bits 7...4=1101.</td></tr>
</table>

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Bits 7...4		Bits 3...0
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 <tooa>.

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<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.

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

<tosca>: an integer type value that specifies the address type. If the value of <tosca> is 145, the address is an international phone number. For details about the values of <tosca>, see the value definitions of <type_addr> in 7.8 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.

7.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.8.5 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>.

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- 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

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

7.9.1 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>

7.9.2 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

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<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.

7.9.3 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 7.8 AT+CMGS-Send Message (PDU Mode).

7.9.4 Property Description

Saving upon Power-off	PIN
NA	Y

7.9.5 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
```


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8 Standard STK Interface Commands

8.1 +CUSATP-Unsolicitedly Report a UICC Proactive Command

8.1.1 Command Syntax

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

8.1.2 Interface Description

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

8.1.3 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.

8.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.1.5 Example

Unsolicitedly report a proactive command "GET INPUT".

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```
Response:   +CUSATP:
            "D01A810301230082028182 8D0B043C54494D452D4F55543E9102000A"
```

8.2 AT+CUSATE-Send USAT Envelope

8.2.1 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>

8.2.2 Interface Description

This command sends a USAT envelope command to UICC.

8.2.3 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.

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

8.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.2.5 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
```

8.3 AT+CUSATT-Send USAT Terminal Response

8.3.1 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>

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8.3.2 Interface Description

This command sends a USAT terminal response to UICC.

8.3.3 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.

8.3.4 Property Description

Saving upon Power-off	PIN
NA	Y

8.3.5 Example

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

```
Response:     +CUSATP: "D015810301210082028102 8D0404434154"
Run:          AT+CUSATT="8103012180820282818301 00"
Response:     OK
```

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

8.4.1 Command Syntax

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

8.4.2 Interface Description

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

8.4.3 Parameter Description

None

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8.4.4 Property Description

Saving upon Power-off	PIN
NA	NA

8.4.5 Example

- As the following, the proactive command is reported:

```
Response:   +CUSATP:
            "D04B810301250082028182050D53494D20536572766963657 3FF8F0D87
            50686F6E65206E756D6265728F0B8553656C662053657276658F1080537
            0656369616C204E756D626572731803212421"
```

- Then user sends the terminal response:

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

- Then the CUSATEND will be reported as following:

```
Response:   +CUSATEND
```


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9 Huawei Proprietary Interface: BodySAR Interface Description

9.1 AT^BODYSARON-Disable or Enable BodySAR

9.1.1 Command Syntax

AT^BODYSARON=<on>
Possible Response(s)
<CR><LF>OK<CR><LF>

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

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

9.1.2 Interface Description

The set command enables or disables the BodySAR function.

The read command queries the current BodySAR function status.

The test command returns the supported parameter ranges.

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9.1.3 Parameter Description

<on>: indicates the state of BodySAR function.

0	Disable BodySAR. (default value)
1	Enable BodySAR.

9.1.4 Property Description

Saving upon Power-off	PIN
N	N

9.1.5 Example

```
Run:          AT^BODYSARON=1
Response:     OK
Run:          AT^BODYSARON?
Response:     ^BODYSARON: 1

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

              OK
```

9.2 AT^BODYSARWCDMA-Set the Maximum Tx Power Limit of WCDMA

9.2.1 Command Syntax

AT^BODYSARWCDMA=<power>[,<band>[,<power>,<band>]...]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^BODYSARWCDMA?
Possible Response(s)

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AT^BODYSARWCDMA?
<CR><LF>^BODYSARWCDMA: list of (<power>,<band>)s<CR><LF><CR><LF>OK<CR><LF>

AT^BODYSARWCDMA=?
Possible Response(s)
<CR><LF>^BODYSARWCDMA: (0-24),<band><CR><LF><CR><LF>OK<CR><LF>

9.2.2 Interface Description

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

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

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

9.2.3 Parameter Description

<power>: an integer type value that indicates the maximum Tx power limit. The value range is 0-24, and the unit is dBm.

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

Parameters	Band
00000001	WCDMA_I_IMT_2100
00000002	WCDMA_II_PCS_1900
00000004	WCDMA_III_1700
00000008	WCDMA_IV_1700
00000010	WCDMA_V_850
00000020	WCDMA_VI_800
00000040	WCDMA_VII_2600
00000080	WCDMA_VIII_900
00000100	WCDMA_IX_1700
00000200	WCDMA_XIX_850

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Parameters	Band
3FFFFFFF	All supported bands

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

9.2.4 Property Description

Saving upon Power-off	PIN
Y	N

9.2.5 Example

```
Run:        AT^BODYSARWCDMA=?
Response:   ^BODYSARWCDMA:                  Indicate that the firmware
            (0-24),00000093                 supports WCDMA Band I, Band II,
                                            Band IV, Band V and Band VIII;
            OK                              the power range is 0-24.
Run:        AT^BODYSARWCDMA=20,00000001,1   Set the maximum WCDMA I Tx
            8,00000003                      power limit to 20 and the
                                            maximum WCDMA II and WCDMA II
                                            Tx power limit to 18.
Response:   OK
Run:        AT^BODYSARWCDMA?
Response:   ^BODYSARWCDMA:                  Indicate that the current
            (20,00000001),(18,00000003)     maximum WCDMA I Tx power limit
                                            is set to 20 and the maximum
            OK                              WCDMA I and WCDMA II Tx power
                                            limit is set to 18.
```

9.3 AT^BODYSARGSM-Set the Maximum Tx Power Limit of GSM

9.3.1 Command Syntax

AT^BODYSARGSM=<power>[,<band>[,<power>,<band>]...]
Possible Response(s)

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AT^BODYSARGSM=<power>[,<band>[,<power>,<band>]...]
<CR><LF>OK<CR><LF>

AT^BODYSARGSM?
Possible Response(s)
<CR><LF>^BODYSARGSM: list of (<power>,<band>)s<CR><LF><CR><LF>OK<CR><LF>

AT^BODYSARGSM=?
Possible Response(s)
<CR><LF>^BODYSARGSM: (0-33),<band><CR><LF><CR><LF>OK<CR><LF>

9.3.2 Interface Description

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

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

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

NOTE

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

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

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Number of timeslots in uplink assignment	Reduction of maximum Tx power (dB)
8	9

9.3.3 Parameter Description

<power>: an integer type value that indicates the maximum Tx power limit. The value range is 0-33, and the unit is dBm.

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

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

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

9.3.4 Property Description

Saving upon Power-off	PIN
Y	N

9.3.5 Example

```
Run:        AT^BODYSARGSM=?
Response:   ^BODYSARGSM:            Indicate that the firmware supports
            (0-33),000F000F         GPRS850, GPRS900, GPRS1800 and GPRS1900,
                                    EGPRS850, EGPRS900, EGPRS1800 and
            OK                      EGPRS1900; the power range is 0-33.
Run:        AT^BODYSARGSM=20        Set the maximum Tx power limit for the
                                    band supported by firmware to 20.
Response:   OK
Run:        AT^BODYSARGSM?
```


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

9.4 AT^BODYSARLTE-Set the Maximum Tx Power Limit of LTE

9.4.1 Command Syntax

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

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

AT^BODYSARLTE=?
Possible Response(s)
<CR><LF>^BODYSARLTE: (0-24),<band><CR><LF><CR><LF>OK<CR><LF>

9.4.2 Interface Description

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

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

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

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9.4.3 Parameter Description

<power>: an integer type value that indicates the maximum Tx power limit. The value range is 0-24, and the unit is dBm.

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

Parameters	Band
0000000000000001	Band 1
0000000000000002	Band 2
0000000000000004	Band 3
0000000000000008	Band 4
0000000000000010	Band 5
0000000000000020	Band 6
0000000000000040	Band 7
0000000000000080	Band 8
0000000000000100	Band 9
0000000000000200	Band 10
0000000000000400	Band 11
0000000000000800	Band 12
0000000000001000	Band 13
0000000000002000	Band 14
0000000000004000	Band 15
0000000000008000	Band 16
0000000000010000	Band 17
0000000000020000	Band 18
0000000000040000	Band 19
0000000000080000	Band 20
0000000000100000	Band 21
0000000000200000	Band 22
0000000000400000	Band 23
0000000000800000	Band 24
0000000001000000	Band 25
0000000002000000	Band 26

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Parameters	Band
0000000004000000	Band 27
0000000008000000	Band 28
0000000010000000	Band 29
0000000020000000	Band 30
0000000040000000	Band 31
0000000080000000	Band 32
0000000100000000	Band 33
0000000200000000	Band 34
0000000400000000	Band 35
0000000800000000	Band 36
0000001000000000	Band 37
0000002000000000	Band 38
0000004000000000	Band 39
0000008000000000	Band 40
0000010000000000	Band 41
0000020000000000	Band 42
0000040000000000	Band 43
0000080000000000	Band 44
0000100000000000	Band 45
0000200000000000	Band 46
0000400000000000	Band 47
0000800000000000	Band 48
0001000000000000	Band 49
0002000000000000	Band 50
0004000000000000	Band 51
0008000000000000	Band 52
0010000000000000	Band 53
0020000000000000	Band 54
0040000000000000	Band 55
0080000000000000	Band 56
0100000000000000	Band 57

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Parameters	Band
0200000000000000	Band 58
0400000000000000	Band 59
0800000000000000	Band 60
1000000000000000	Band 61
2000000000000000	Band 62
4000000000000000	Band 63
8000000000000000	Band 64
FFFFFFFFFFFFFFFF	All supported bands

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

9.4.4 Property Description

Saving upon Power-off	PIN
Y	N

9.4.5 Example

```
Run:        AT^BODYSARLTE=?
Response:   ^BODYSARLTE:                    Indicate that the firmware
            (0-24),00000000080800D7         supports LTE Band 1, Band 2 and
                                            Band 3; the power range is 0-24.
            OK
Run:        AT^BODYSARLTE=20,FFFFFFFFFF     Set the maximum Tx power limit
            FFFFFF                          of bands supported by firmware
                                            to 20.
Response:   OK
Run:        AT^BODYSARLTE?
Response:   ^BODYSARLTE:                    Indicate that the maximum Tx
            (20,FFFFFFFFFFFFFFFF)           power limit of bands supported
                                            by firmware is set to 20.
            OK
```


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10 Huawei Proprietary Interface: Mobile Termination Control and Status Interface

10.1 AT^CURC-Set Presentation of Unsolicited Results

10.1.1 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>

10.1.2 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.

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10.1.3 Parameter Description

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

0	The presentation of the unsolicited indications in Table 10-1 is disabled.
1	Enable the presentation of the unsolicited indications. (default value)

Table 10-1 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

10.1.4 Property Description

Saving upon Power-off	PIN
N	N

10.1.5 Example

- Set <mode> to 0:

```
Run:        AT^CURC=0
Response:   OK
```


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- Set <mode> to 1:

```
Run:        AT^CURC=1
Response:   OK
```

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

10.2.1 Command Syntax

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

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

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

10.2.2 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.

10.2.3 Parameter Description

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

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

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

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

0 Disable the channel controlled by the bit.

1 Enable the channel controlled by the bit.

The default value of <channel> is 0x03 (Wake up PIN + USB).

<source>: sets Remote Wake-up sources. The length of this parameter is 2 bytes (16 bits). This parameter is entered in decimal format. Each bit of this parameter controls one source, where:

0 Disable the source controlled by the bit.

1 Enable the source controlled by the bit.

Bit[5-15]	Bit[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).

10.2.4 Property Description

Saving upon Power-off	PIN
Y	N

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10.2.5 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
```

10.3 AT^ICCID-Query the ICCID

10.3.1 Command Syntax

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

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

10.3.2 Interface Description

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

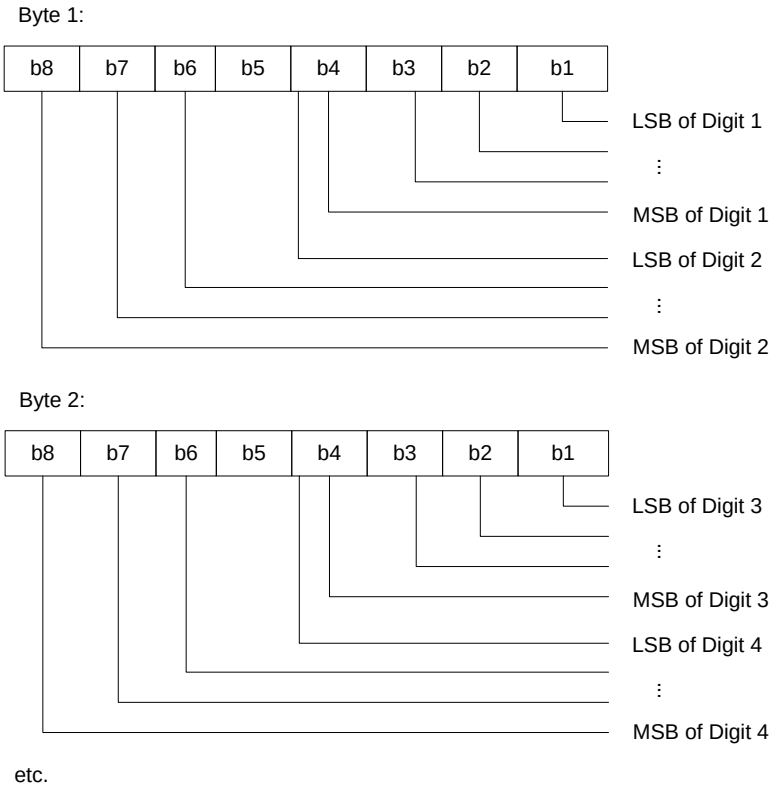
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10.3.3 Parameter Description

<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.

10.3.4 Property Description

Saving upon Power-off	PIN
NA	N

10.3.5 Example

Query the ICCID of the SIM card of which the EF_{ICCID} file contains the character string 98684006905725201069:

```
Run:        AT^ICCID?
```


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```
Response:   ^ICCID: 89860460097552020196

            OK
```

10.4 AT^CPIN-Manage PIN

10.4.1 Command Syntax

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

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

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

10.4.2 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.

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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.

10.4.3 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.

10.4.4 Property Description

Saving upon Power-off	PIN
N	N

10.4.5 Example

```
Run:        AT^CPIN?
```


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```
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
```

10.5 AT^CARDMODE-Query SIM/USIM Card Type

10.5.1 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>

10.5.2 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 22.2 General CME Error List.

10.5.3 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)

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4 UIM card (only for dual-mode data cards)

10.5.4 Property Description

Saving upon Power-off	PIN
NA	N

10.5.5 Example

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

            OK
```

10.6 ^SIMRESET-Unsolicitedly Report SIM Reset Event

10.6.1 Command Syntax

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

10.6.2 Interface Description

As long as the SIM reset event happens, the MS will report the event to the TE. The SIM reset can be generated by STK refresh command if the refresh command's type is 4 or 5.

10.6.3 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

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10.6.4 Property Description

Saving upon Power-off	PIN
NA	N

10.6.5 Example

```
Response:    ^SIMRESET: 2
```

10.7 AT^RFSWITCH-Set the Flight Mode

10.7.1 Command Syntax

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

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

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

10.7.2 Interface Description

This command switches the RF and saves the corresponding value.

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The read command queries the state of RF switch, including W_DISABLE# pin (for the detail, please refer the module's hardware guide) status which indicates the state of the hardware switch.

AT^RFSWITCH feature is equivalent to AT+CFUN function (the two values are 0 and 1), besides saving the corresponding value.

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

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

10.7.3 Parameter Description

<SW state>: indicates state of RF software switch.

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

<HW state>: indicates state of RF hardware switch.

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

10.7.4 Property Description

Saving upon Power-off	PIN
Y	N

10.7.5 Example

Query the current state of RF switch:

```
Run:        AT^RFSWITCH?
Response:   ^RFSWITCH: 0,1      Indicate the current state of the hardware
                                switch is on, and the software switch is
            OK                  off.
```


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10.8 ^RFSWITCH-Unsolicitedly Report the RFSWITCH State

10.8.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^RFSWITCH: <SW state>,<HW state><CR><LF>

10.8.2 Interface Description

This command unsolicitedly reports the status of the W_DISABLE# pin (for the detail, please refer the module's hardware guide) and RF software switch. Once the W_DISABLE# pin or RF software switch changes, this command is reported.

10.8.3 Parameter Description

<SW state>: indicates state of RF software switch.

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

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

<HW state>: indicates state of RF hardware switch.

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

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

10.8.4 Property Description

Saving upon Power-off	PIN
NA	NA

10.8.5 Example

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

```
Response:    ^RFSWITCH: 0,1
```


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

```
Response:    ^RFSWITCH: 1,0
```

10.9 AT^MSO-Shutdown Command

10.9.1 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>

10.9.2 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.

10.9.3 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.

10.9.4 Property Description

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

10.9.5 Example

```
Run:         AT^MSO
Response:    OK
Run:         AT^MSO=15
```


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

             OK
```

10.10 AT^CPBR-Read the Phonebook

10.10.1 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>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

10.10.2 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.

10.10.3 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.

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<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.

<tlength>: 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.

10.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.10.5 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" (荣@1)
- 1 (name encoding format UCS2)

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10.11 AT^CARDLOCK-Card Lock Administration

10.11.1 Command Syntax

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

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

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

10.11.2 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

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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.

10.11.3 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.

10.11.4 Property Description

Saving upon Power-off	PIN
NA	N

10.11.5 Example

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

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```
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
```

10.12 AT^CUSTNVCLR-Clear Customer Nonvolatile Value

10.12.1 Command Syntax

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

10.12.2 Interface Description

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

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

AT command	Function	Field
AT^ANTENCFG	Tunable antenna	Platform
AT^BODYSARWCDMA	BodySAR-WCDMA	Platform
AT^BODYSARGSM	BodySAR-GSM	Platform
AT^BODYSARLTE	BodySAR-LTE	Platform
AT^WAKEUPCFG	Power management	Platform
AT^PWRCFGON	Switch for Max. Tx. power	Platform
AT^PWRCFG	Configuration for Max. Tx. power	Platform
AT^MTCAUTOSEL	Multi carrier	Platform
AT^SETPORT	USB Port	Platform
AT^WPDOM	GPS	Protocol
AT^WPDGL	GPS	Protocol

10.12.3 Parameter Description

None

10.12.4 Property Description

Saving upon Power-off	PIN
N	N

10.12.5 Example

Restore the customer nonvolatile value to the factory default value:

```
Run:        AT^CUSTNVCLR
Response:   OK
```


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10.13 AT^LEDCTRL-Control LED GPIO PIN

10.13.1 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=?
Possible Response(s)
<CR><LF>^LEDCTRL: (list of supported <mode>s),(list of supported <stat>s),(list of supported <index>s),(list of supported <ON_duration1>s),(list of supported <OFF_duration1>s),(list of supported <ON_duration2>s),(list of supported <OFF_duration2>s)<CR><LF><CR><LF>OK<CR><LF>

10.13.2 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.

10.13.3 Parameter Description

<mode>: indicates blinking mode.

0	Do not blink. (default value)

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1 Use Huawei's default blinking mode.

2 Use the customized blinking mode.

<stat>: indicates service status. It is a 32-bit hexadecimal number. One binary digit corresponds to a service state. The values are listed in the following table.

Parameter Value	Service Status
00000001	Airplane mode
00000002	Power-on and initiation
00000004	Registration failure and no service
00000008	Network disconnection during connecting
00000010	Registration success in GSM mode
00000020	Radio bearer establishment success in GSM/GPRS/EDGE mode
00000040	Data transmission in GSM/GPRS/EDGE mode
00000080	Registration success in WCDMA mode
00000100	Radio bearer establishment success in WCDMA mode
00000200	Data transmission in WCDMA mode
00000400	Radio bearer establishment success in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
00000800	Data transmission in HSDPA/HSUPA/HSPA+/DC-HSPA+ mode
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.

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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.

10.13.4 Property Description

Saving upon Power-off	PIN
Y	N

10.13.5 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=?
```


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```
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.

10.14 AT^SLEEPCFG-Configure Module's Sleep Function by Host

10.14.1 Command Syntax

AT^SLEEPCFG=<para>,<value>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^SLEEPCFG?
Possible Response(s)
<CR><LF>^SLEEPCFG: <para>,<value>[<CR><LF>^SLEEPCFG: <para1>,<value1>[<CR><LF>^SLEEPCFG: <para2>,<value2>...]]<CR><LF><CR><LF>OK<CR><LF>

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

10.14.2 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.

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10.14.3 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. (But for the module, it does not work if you set <para> to 1.)

<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 5000. 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.

10.14.4 Property Description

Saving upon Power-off	PIN
Y	N

10.14.5 Example

- Configure the delay time of SMS report to 3000 ms:

```
Run:        AT^SLEEPCFG=0,3000
Response:   OK
```

- Run the read command:

```
Run:        AT^SLEEPCFG?
Response:   ^SLEEPCFG: 0,3000
            ^SLEEPCFG: 1,10

            OK
```

- Run the test command:

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

            OK
```


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10.15 ^CPBREADY-Unsolicitedly Report CPB Ready

10.15.1 Command Syntax

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

10.15.2 Interface Description

This command sends an unsolicited report to TE when phonebook is ready.

10.15.3 Parameter Description

<status>: indicates whether phonebook is ready.

0 Indicates that the phonebook is not ready.

1 Indicates that the phonebook is ready.

10.15.4 Property Description

Saving upon Power-off	PIN
NA	Y

10.15.5 Example

```
Response:    ^CPBREADY: 1
```

10.16 AT^RESET-Reset the Module

10.16.1 Command Syntax

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

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10.16.2 Interface Description

This command is used to reset the module.

10.16.3 Parameter Description

None

10.16.4 Property Description

Saving upon Power-off	PIN
N	N

10.16.5 Example

```
Run:        AT^RESET
Response:   OK
```

10.17 AT^HFDOR-Control the Fast DORmancy Mode

10.17.1 Command Syntax

AT^HFDOR=<mode>[,<FD-Delay-Timer>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^HFDOR?
Possible Response(s)
<CR><LF>^HFDOR: <mode>,<FD-Delay-Timer><CR><LF><CR><LF>OK<CR><LF>

AT^HFDOR=?
Possible Response(s)

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AT^HFDOR=?
<CR><LF>^HFDOR: (list of supported <mode>s),(list of supported <FD-Delay-Timer>s)<CR><LF><CR><LF>OK<CR><LF>

10.17.2 Interface Description

This command controls how the terminal device triggers fast dormancy: once (immediately send the SCRI), auto (auto-send the SCRI), or stop triggering (disable fast dormancy).

The read command obtains the current Fast Dormancy settings.

The test command queries the supported parameter range.

NOTE

1. When the network side supports Fast Dormancy, the SCRI sent by the terminal device contains the cause "UE Requested PS Data session end." Otherwise, the SCRI cannot contain the cause.
2. The terminal device can determine whether the network side supports Fast Dormancy by checking whether the system broadcast SIB1 contains T323.

10.17.3 Parameter Description

<mode>: integer type

1	Trigger Fast Dormancy once. In this mode, the settings of <FD-Delay-Timer> will not take effect.
2	Auto-trigger Fast Dormancy. In this mode, <FD-Delay-Timer> must be set.
3	Stop triggering Fast Dormancy. In this mode, the settings of <FD-Delay-Timer> will not take effect.
Others	Reserved.

<FD-Delay-Timer>: integer type. The value range is 1 to 60. The unit is s. The settings of this parameter take effect only when <mode> is set to 2. The terminal device triggers Fast Dormancy when it detects that its wireless interface has been idle for the time specified by <FD-Delay-Timer>.

10.17.4 Property Description

Saving upon Power-off	PIN
N	Y

10.17.5 Example

- Query the Fast Dormancy parameter range supported by the terminal device:

```
Run:        AT^HFDOR=?
```


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```
Response:    ^HFDOR: (1~3),(1~60)

             OK
```

- Query the current Fast Dormancy settings:

```
Run:         AT^HFDOR?
Response:    ^HFDPR: 2,30

             OK
```

- Configure the terminal device to auto-trigger Fast Dormancy when its wireless interface is idle for 10s:

```
Run:         AT^HFDOR=2,10
Response:    OK
```

10.18 AT^GLASTERR-Query the Latest Error Code for a Specific Function

10.18.1 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>

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10.18.2 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.

10.18.3 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 18.2 ^NDISSTAT-Unsolicitedly Report of Connection Status.

10.18.4 Property Description

Saving upon Power-off	PIN
N	Y

10.18.5 Example

```
Run:        AT^GLASTERR=?
Response:   ^GLASTERR: (0-255)

            OK
```


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11 Huawei Proprietary Interface: SMS Service Interface

11.1 ^SMMEMFULL-Message Memory Full

11.1.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SMMEMFULL: <mem_type><CR><LF>

11.1.2 Interface Description

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

11.1.3 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

11.1.4 Property Description

Saving upon Power-off	PIN
NA	NA

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11.1.5 Example

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

```
Response:     ^SMMEMFULL: "SM"
```


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12 Huawei Proprietary Interface: Network Service Interfaces

12.1 AT^SYSINFOEX-Query Extended System Information

12.1.1 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>

12.1.2 Interface Description

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

12.1.3 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.

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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 (not supported currently)
5	WiMAX (not supported currently)

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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

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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+.

12.1.4 Property Description

Saving upon Power-off	PIN
NA	N

12.1.5 Example

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


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12.2 AT^SYSCFGEX-Configure Extended System

12.2.1 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>

12.2.2 Interface Description

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

12.2.3 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)

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"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 board.

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-SCMDA 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.
- AT^SYSCFGEX does not support setting and querying TD-SCDMA bands.

In case that <acqorder> is a combination list with muti-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 board 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

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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.

<srvdomain>: indicates the domain setting.

0	CS_ONLY
1	PS_ONLY
2	CS_PS
3	ANY
4	No change

<lteband>: a hexadecimal value that specifies the LTE frequency band. The value of <lteband> can be one of the following values and their combinations (excluding 0x7FFFFFFFFFFFFFFF):

7FFFFFFFFFFFFFFF	(CM_BAND_PREF_ANY)	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

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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_PRE_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 1/2/3/5/7/8/20/28.

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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.

12.2.4 Property Description

Saving upon Power-off	PIN
Y	N

12.2.5 Example

```
Run:        AT^SYSCFGEX=?
Response:   ^SYSCFGEX:
            ("00","03","02","01","99")((2000000400380,"GSM900/GSM1800/
            WCDMA BCVIII/WCDMA BCI"),(4a80000,"GSM850/GSM1900/WCDMA
            BCV/WCDMA BCII"),(3fffffff,"All
            bands")),(0-2),(0-4),((80800d7,"LTE BC1/LTE BC2/LTE BC3/LTE
            BC5/LTE BC7/LTE BC8/LTE BC20/LTE
            BC28"),(7fffffffffffffff,"All bands"))

            OK
Run:        AT^SYSCFGEX?
```


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

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

12.3 AT^USSDMODE-Select USSD Mode

12.3.1 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>

12.3.2 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.

12.3.3 Parameter Description

<mode>:

0 Select USSD non-transparent mode.

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1 Select USSD transparent mode. (default value)

12.3.4 Property Description

Saving upon Power-off	PIN
N	N

12.3.5 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
```

12.4 AT^EONS-Query the Service Provider Name and the EFSPN Information of the SIM Card

12.4.1 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>

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

12.4.2 Interface Description

This command queries the service provider name and the information contained in the EF_{SPN} file of the SIM card.

<type> specifies the query type. Its value can be 1, 2, 3, 4, or 5 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.

12.4.3 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

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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:

- Information saved in the EF_{PNN} file corresponding to the EF_{OPL}
- Information released from the network side (MM/GMM/EMM information)
- Information saved in the internal network name list

If the long and short names obtained from a preferred location are invalid, specifically, the name does not exist or its length exceeds the limit, the next preferred location is turned to.

<plmn_id>: 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.

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<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.

12.4.4 Property Description

Saving upon Power-off	PIN
N	Y

12.4.5 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,"00480055004100570045004900200054004500530054002000
            5700300039","004800540057003000390","004800550041005700450049"

            OK
Run:        AT^EONS=2
Response:   ^EONS:
            2,46009,"00480055004100570045004900200054004500530054002000
            57003000390020004E004500540057004F0052004B","004800540057
            00300039004E00450054",3,"004800550041005700450049"

            OK
Run:        AT^EONS=2,46010
```


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Response:	^EONS: 2,46010,"","",3,"00480055004100570045004900200054004500530054002000570030003900200 04E004500540057004F0052004B"	
	OK	
Run:	AT^EONS=5	
Response:	^EONS: 5,46009,"00480055004100570045004900200054004500530054002000570030003900200 04E004500540057004F0052004B","" OK ^EONS: 5,46009,"00480055004100570045004900200054004500530054002000570030003900200 04E004500540057004F0052004B0020005400450053005400200057003000390039","" OK	When network 46009 is an HPLMN or belongs to an EHPLMN, or in EF_{SPDI}. When network 46009 is not in an HPLMN, EHPLMN, or EF_{SPDI}.

NOTE

- "HUAWEI TEST W09" (UCS2 hexadecimal character string): 00480055004100570045004900200054004500530054002000570030003900 39
- "HTW09" UCS2 (UCS2 hexadecimal character string): 00480054005700300039
- "HUAWEI" UCS2 (UCS2 hexadecimal character string): 0048005500410057004500490
- "HUAWEI TEST W09 NETWORK" (UCS2 hexadecimal character string): 00480055004100570045004900200054004500530054002000570030003900200 04E004500540057004F0052004B
- "HTW09NET" UCS2 (UCS2 hexadecimal character string): 00480054005700300039004E0045005

12.5 AT^HCSQ-Query and Report Signal Strength

12.5.1 Command Syntax

AT^HCSQ?
Possible Response(s)
<CR><LF>^HCSQ: <sysmode>[,<value1>[,<value2>[,<value3>[,<value4>[,<value5>]]]]]<CR><LF><CR><LF>OK<CR><LF>

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

URC

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URC
Possible Response(s)
<CR><LF>^HCSQ: <sysmode>[,<value1>[,<value2>[,<value3>[,<value4>[,<value5>]]]]]<CR><LF>

12.5.2 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.

12.5.3 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
"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	-	-	-	-

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<sysmode>	<value1>	<value2>	<value3>	<value4>	<value5>
"WCDMA"	wcdma_rssi	wcdma _rscp	wcdma_ecio	-	-
"LTE"	lte_rssi	lte_rsrp	lte_sinr	lte_rsrq	-

<gsm_rssi>, <wcdma_rssi>, <lte_rssi>: integer type values that indicate the received signal strength. These parameters are available for GSM, WCDMA, LTE mode respectively.

0	rssi < -120 dBm
1	-120 dBm ≤ rssi < -119 dBm
2	-119 dBm ≤ rssi < -118 dBm
...	
94	-27 dBm ≤ rssi < -26 dBm
95	-26 dBm ≤ rssi < -25 dBm
96	-25 dBm ≤ rssi
255	unknown or undetectable

<wcdma_rscp>: an integer type value that indicates the received signal code power. This parameter is available for WCDMA mode.

0	rscp < -120 dBm
1	-120 dBm ≤ rscp < -119 dBm
2	-119 dBm ≤ rscp < -118 dBm
...	
94	-27 dBm ≤ rscp < -26 dBm
95	-26 dBm ≤ rscp < -25 dBm
96	-25 dBm ≤ rscp
255	unknown or undetectable

<wcdma_ecio>: integer type values that indicate the downlink carrier-to-interference ratio. These parameters are available for WCDMA mode respectively.

0	Ec/Io < -32 dB
1	-32 dB ≤ Ec/Io < -31.5 dB
2	-31.5 dB ≤ Ec/Io < -31 dB
...	

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63	-1 dB ≤ Ec/Io < -0.5 dB
64	-0.5 dB ≤ Ec/Io < 0 dB
65	0 dB ≤ Ec/Io
255	unknown or undetectable

<lte_rsrp>: an integer type value that indicates the reference signal received power. This parameter is available for LTE mode.

0	rsrp < -140 dBm
1	-140 dBm ≤ rsrp < - 139 dBm
2	-139 dBm ≤ rsrp < -138 dBm
...	
95	-46 dBm ≤ rsrp < -45 dBm
96	-45 dBm ≤ rsrp < -44 dBm
97	-44 dBm ≤ rsrp
255	unknown or undetectable

<lte_sinr>: an integer type value that indicates the signal to interference plus noise ratio. This parameter is available for LTE mode.

0	sinr < -20 dB
1	-20 dB ≤ sinr < -19.8 dB
2	-19.8 dB ≤ sinr < -19.6 dB
...	
249	29.6 dB ≤ sinr < 29.8 dB
250	29.8 dB ≤ sinr < 30 dB
251	30 dB ≤ sinr
255	unknown or undetectable

<lte_rsrq>: an integer 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

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33	-3.5 dB ≤ rsrq < -3 dB
34	-3 dB ≤ rsrq
255	unknown or undetectable

12.5.4 Property Description

Saving upon Power-off	PIN
NA	N

12.5.5 Example

```
Run:          AT^HCSQ=?
Response:     ^HCSQ: "NOSERVICE","GSM","WCDMA","LTE"

              OK
Run:          AT^HCSQ?
Response:     ^HCSQ: "WCDMA",30,30,58

              OK
```

12.6 ^SRVST-Service State Change Indication

12.6.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^SRVST: <srv_status><CR><LF>

12.6.2 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.

12.6.3 Parameter Description

<srv_status>: indicates the system service status.

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0	No services
1	Restricted services
2	Valid services
3	Restricted regional services
4	Power saving or hibernate state

12.6.4 Property Description

Saving upon Power-off	PIN
NA	N

12.6.5 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
```

12.7 ^SIMST-SIM Card State Change Indication

12.7.1 Command Syntax

URC

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URC
Possible Response(s)
<CR><LF>^SIMST: <sim_state><CR><LF>

12.7.2 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.

12.7.3 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.

12.7.4 Property Description

Saving upon Power-off	PIN
NA	N

12.7.5 Example

```
Run:        AT+CPIN=1234
Response:   OK

            ^SIMST: 1
```


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12.8 AT^NWTIME-Query Presentation of Network System Time

12.8.1 Command Syntax

AT^NWTIME?
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF><CR><LF>OK<CR><LF>

12.8.2 Interface Description

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

12.8.3 Parameter Description

<date>: specifies date in the format of yy/MM/dd.

<time>: specifies the time and time zone in the format of hh:mm:ss+tz. The value of <time> consists of time and time zone, for example, 05:56:13+32. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, +8 hours.

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

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

12.8.4 Property Description

Saving upon Power-off	PIN
NA	Y

12.8.5 Example

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

```
Run:          AT^NWTIME?
```


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```
Response:    ^NWTIME: 11/12/20,12:33:18+32,0

             OK
```

12.9 ^NWTIME-Unsolicitedly Report Network System Time

12.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NWTIME: <date>,<time>,<dt><CR><LF>

12.9.2 Interface Description

This command unsolicitedly reports network system time, time zone, and daylight saving time.

12.9.3 Parameter Description

<date>: specifies date in the format of yy/MM/dd.

<time>: specifies the time and time zone in the format of hh:mm:ss+tz. The value of <time> consists of time and time zone, for example, 05:56:13+32. The unit of time zones is 15 minutes. The +32 value indicates 32 times of 15 minutes, that is, +8 hours.

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

0 No adjustment for Daylight Saving Time

1 +1 hours adjustment for Daylight Saving Time

2 +2 hours adjustment for Daylight Saving Time

3 Reserved

12.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

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12.9.5 Example

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

```
Response:    ^NWTIME: 11/12/20,12:31:34+32,0
```

12.10 ^PDPSTATUS-Unsolicitedly Report Deactivation Reason

12.10.1 Command Syntax

URC
<CR><LF>^PDPSTATUS: <stat><CR><LF>

12.10.2 Interface Description

This command sends an unsolicited report to the host when PDP is deactivated.

12.10.3 Parameter Description

<stat>: an integer value type that indicates PDP context deactivation reasons.

0 PDP context deactivated by the network

1 PS domain deactivated by the network

2 PDP context deactivated by the module

12.10.4 Property Description

Saving upon Power-off	PIN
NA	Y

12.10.5 Example

```
Response:    ^PDPSTATUS: 0
```


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12.11 ^NWNAME-Unsolicitedly Report NITZ Operator Name

12.11.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NWNAME: <Long Name>,<Short Name>,<Num Name><CR><LF>

12.11.2 Interface Dscription

This command reports the operator name when the network takes NITZ information.

12.11.3 Paramerter Description

<Long Name>: long alphanumeric operator name. If the NITZ information does not take long name, the default value is null.

<Short Name>: short alphanumeric operator name. If the NITZ information does not take short name, the default value is null.

<Num Name>: numeric operator name.

NOTE

If the network does not take long name and short name, this command will not be reported.

It supports UCS2 and BIT7 formats from the network and supports the characters with green colour in the following table.

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				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	_	!	1	A	Q	a	q
0	0	1	0	2	$	Φ	"	2	B	R	b	r
0	0	1	1	3	¥	Γ	#	3	C	S	c	s
0	1	0	0	4	è	Λ	¤	4	D	T	d	t
0	1	0	1	5	é	Ω	%	5	E	U	e	u
0	1	1	0	6	ù	Π	&	6	F	V	f	v
0	1	1	1	7	ì	Ψ	'	7	G	W	g	w
1	0	0	0	8	ò	Σ	(	8	H	X	h	x
1	0	0	1	9	Ç	Θ	)	9	I	Y	i	y
1	0	1	0	10	LF	Ξ	*	:	J	Z	j	z
1	0	1	1	11	Ø	1)	+	;	K	Ä	k	ä
1	1	0	0	12	ø	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	-	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ü	n	ü
1	1	1	1	15	å	É	/	?	O	§	o	à

12.11.4 Property Description

Saving upon Power-off	PIN
NA	N

12.11.5 Example

None

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13 Huawei Proprietary Interface: GPS Service Interfaces

13.1 AT^WPDOM-Set Positioning Operation Mode

13.1.1 Command Syntax

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

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

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

13.1.2 Interface Description

This command is used to set operation mode in the positioning process.

The set command is available before or after the session is positioned. Parameters cannot be modified during the positioning process. Otherwise, an error message is returned.

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13.1.3 Parameter Description

<mode>: indicates the operation mode.

0	Standalone only. In this mode, no network assistance is required, and an MS can be in or not in the network coverage area. This mode can be used to position the session without SIM cards.
1	MSA. The MS-assisted positioning mode used here is one of AGPS. The MS needs to communicate with PDE or PDM upon each positioning, and the PDE or PDM calculates position information. In this operation mode, the PDE or PDM needs to be accessed, and network coverage is required. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning.
5	MSB. The network needs to provide positioning assistance information, and the MS calculates the position information. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning.

13.1.4 Property Description

Saving upon Power-off	PIN
Y	N

13.1.5 Example

- Query the value range of operation modes:

```
Run:          AT^WPDOM=?
Response:     ^WPDOM: (0,1,5)

              OK
```

- Query the current operation mode:

```
Run:          AT^WPDOM?
Response:     ^WPDOM: 5

              OK
```

- Set the operation mode:

```
Run:          AT^WPDOM=0
Response:     OK
Run:          AT^WPDOM=1
Response:     OK
```


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```
Run:            AT^WPDOM=5
Response:       OK
```

13.2 AT^WPDST-Set Session Type

13.2.1 Command Syntax

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

AT^WPDST?
Possible Response(s)
<CR><LF>^WPDST: <type><CR><LF><CR><LF>OK<CR><LF>

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

13.2.2 Interface Description

This command is used to set the session type of the positioning operation.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

13.2.3 Parameter Description

<type>: indicates the session type.

0 Provide a single positioning operation.

1 Provide tracing positioning. The positioning value is obtained using the designated frequency. The positioning frequency is set by AT^WPDFR. (default value)

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2 Provide the last positioning information, but do not execute the satellite searching operation.

Present type: after run AT^WPDGP:

- If the module is positioned, the latest GGA sentences which are successfully positioned are reported on the NMEA port.
- If the module fails to be positioned, or does not be positioned, a null GPGGA sentence is reported.

13.2.4 Property Description

Saving upon Power-off	PIN
N	N

13.2.5 Example

- Query the value range of session type:

```
Run:        AT^WPDST=?
Response:   ^WPDST: (0-2)

            OK
```

- Query the current session type:

```
Run:        AT^WPDST?
Response:   ^WPDST: 1

            OK
```

- Set the session type:

```
Run:        AT^WPDST=0
Response:   OK
```

13.3 AT^WPDFR-Set Positioning Frequency

13.3.1 Command Syntax

AT^WPDFR=<num>[,<time>]
Possible Response(s)

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AT^WPDFR=<num>[,<time>]
<CR><LF>OK<CR><LF>
In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^WPDFR?
Possible Response(s)
<CR><LF>^WPDFR: <num>[,<time>]<CR><LF><CR><LF>OK<CR><LF>

AT^WPDFR=?
Possible Response(s)
<CR><LF>^WPDFR: (list of supported <num>s),(list of supported <time>s)<CR><LF><CR><LF>OK<CR><LF>

13.3.2 Interface Description

This command is used to set the positioning frequency in the tracing positioning session.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

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

13.3.3 Parameter Description

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

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

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

13.3.4 Property Description

Saving upon Power-off	PIN
N	N

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13.3.5 Example

- Query the value range of positioning frequency:

```
Run:        AT^WPDFR=?
Response:   ^WPDFR: (0-65535),(1-1800)

            OK
```

- Query the current positioning frequency:

```
Run:        AT^WPDFR?
Response:   ^WPDFR: 0,1

            OK
```

- Setting the positioning frequency fails:

```
Run:        AT^WPDST=0
Response:   OK
Run:        AT^WPDFR=20,2
Response:   +CME ERROR: operation not supported
```

- Setting the positioning frequency successes:

```
Run:        AT^WPDST=1
Response:   OK
Run:        AT^WPDFR=20,2
Response:   OK
```

13.4 AT^WPDGL-Set GPS Session Lock

13.4.1 Command Syntax

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

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AT^WPDGL?
Possible Response(s)
<CR><LF>^WPDGL: <option><CR><LF> <CR><LF>OK<CR><LF>

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

13.4.2 Interface Description

This command is used to set a GPS session lock.

The set command sets whether to disable the mobile initiated session and the mobile terminated session or not. The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

13.4.3 Parameter Description

<option>: GPS session lock type.

0	Enable MI and MT
1	Disable MI and enable MT
2	Enable MI and disable MT
3	Disable MI and MT

13.4.4 Property Description

Saving upon Power-off	PIN
Y	N

13.4.5 Example

- Query the value range of the session lock type:

```
Run:        AT^WPDGL=?
```


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```
Response:   ^WPDGL: (0-3)

            OK
```

- Query the current GPS session lock type:

```
Run:        AT^WPDGL?
Response:   ^WPDGL: 0

            OK
```

- Set the GPS session lock type:

```
Run:        AT^WPDGL=1
Response:   OK
```

13.5 AT^WPURL-Set AGPS Server Address and Port on the 3GPP Network

13.5.1 Command Syntax

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

AT^WPURL?
Possible Response(s)
<CR><LF>^WPURL: <url><CR><LF><CR><LF>OK<CR><LF>

13.5.2 Interface Description

The set command sets the address of the AGPS server on the 3GPP network. The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

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13.5.3 Parameter Description

<url>: a string type value without quotation marks indicates the address of the AGPS server in the 3GPP server. It is a DNS address or an IP address.

13.5.4 Property Description

Saving upon Power-off	PIN
Y	N

13.5.5 Example

Set the address of the AGPS server:

```
Run:        AT^WPURL=SUPL.EXAMPLE.COM:7276
Response:   OK
```

13.6 AT^WPDIM-Delete Auxiliary Data

13.6.1 Command Syntax

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

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

13.6.2 Interface Description

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

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13.6.3 Parameter Description

<mode>: deletion type.

0	Cold start, this option clears all data that is currently stored in the internal memory of the GPS receiver including position, almanac, ephemeris, and time.
1	Warm start, this option clears the ephemeris. The almanac is retained.
2	Hot start, this option does not clear anything. The almanac and ephemeris are retained. (default value)
3	This option clears the LTO data.

13.6.4 Property Description

Saving upon Power-off	PIN
NA	N

13.6.5 Example

- Query the value range of deleting auxiliary data mode:

```
Run:        AT^WPDIM=?
Response:   ^WPDIM: (0-3)

            OK
```

- Set the deletion mode:

```
Run:        AT^WPDIM=1
Response:   OK
```

13.7 AT^WPDGP-Start Positioning Session

13.7.1 Command Syntax

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

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13.7.2 Interface Description

This command is used to enable the GPS function. Only one positioning operation is allowed within the same period. When the GPS function is enabled, an error message is returned if this command is set again.

13.7.3 Parameter Description

None

13.7.4 Property Description

Saving upon Power-off	PIN
NA	N

13.7.5 Example

- Setting PD session fails:

```
Run:        AT^WPDGL=1
Response:   OK
Run:        AT^WPDGP
Response:   +CME ERROR: GPS locked
```

- Setting PD session successes:

```
Run:        AT^WPDGL=0
Response:   OK
Run:        AT^WPDGP
Response:   OK
```

13.8 AT^WPEND-Terminate Positioning Process

13.8.1 Command Syntax

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

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13.8.2 Interface Description

This command is used to end the GPS session. When no positioning session is available or the positioning session is in off status, an error message is returned.

13.8.3 Parameter Description

None

13.8.4 Property Description

Saving upon Power-off	PIN
NA	N

13.8.5 Example

- Terminate the PD session successfully:

```
Run:        AT^WPEND
Response:   OK
```

- PD Session is not on going, Terminate Failure:

```
Run:        AT^WPEND
Response:   +CME ERROR: PD session is in off status
```

13.9 ^WNINV-Unsolicitedly Notify NI Positioning

13.9.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^WNINV: <req_type>[,<transport_mode>[,<encoding_type>[,<requestor_id>[,<requestor_id_type>[,<client_name>[,<client_name_type>[,<loc_type>[,<client_id>[,<codeword>[,<service_type_id>[,<session_id>]]]]]]]]]]<CR><LF>

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13.9.2 Interface Description

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

13.9.3 Parameter Description

<req_type>: NI request type.

0	Notify and Verify. Allowed on no answer. In this type, the module notifies the user of the NI request and the user accepts or rejects the NI positioning. If the user does not respond within 6s, the system accepts the NI positioning based on the network policy.
1	Notify Only. In this type, the module notifies the user of the NI request, and the user accepts the NI positioning by default.
2	No Notify and no Verify. In this type, the module does not notify the user of the NI request. The user does not accept or reject the NI positioning either.
3	Notify and Verify. Denied on no answer. In this type, the module notifies the user of the NI request and the user accepts or rejects the NI positioning. If the user does not respond within 6s, the system rejects the NI positioning based on the network policy.
4	Privacy override (It is used for preventing notification and verification without leaving any traces of a performed position fix or position fix attempt in terms of log files etc. on the simple end-point terminal).

NOTE

For <req_type>=2, NI request is not reported to the upper layer application, and the module will take the NI request.

<transport_mode>: AGPS transport mode.

1	User plane

<encoding_type>: AGPS transport mode.

0	UCS2 format
1	GSM Default format
2	UTF-8 format

<client_name>: the name of the location application. (not supported currently)

<requestor_id>: identity of the requestor.

<requestor_id_type> and <client_name_type>: the type of the requestor id and client name. They can be one of the following values. (not supported currently)

1	Logical name

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2	MSISDN (3GPP TS 23.003)
3	E-mail address (RFC 2396)
4	URL (RFC 2396)
5	SIP URL (RFC 3261)
6	IMS public identity (3GPP TS 23.228)
7	MIN
8	MDN

<loc_type>: (not supported currently)

0	Current location
1	Current or Last location known
2	Initial location

<client_id>: client identifier. It only is used by CP. (not supported currently)

<codeword>: this parameter contains the codeword associated to current positioning request as described in 3GPP TS 23.271. It only is used by CP. (not supported currently)

<service_type_id>: this parameter defines the LCS service type of the current positioning request. The possible values are defined in 3GPP TS 22.071. (not supported currently)

<session_id>: session index value. It is used to distinguish between multiple simultaneous sessions.

13.9.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.9.5 Example

- Notify and verify NI positioning (allowed on no answer):

```
Response:   ^WNINV: 0,1,1,,,,,,,,1
```

- Only notify NI positioning:

```
Response:    ^WNINV: 1,1,1,,,,,,,,1
```


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13.10 AT^WNICT-Set NI Response

13.10.1 Command Syntax

AT^WNICT=<choice>[,<session_id>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^WNICT=?
Possible Response(s)
<CR><LF>^WNICT: (list of supported <choice>s)[,(list of supported <session_id>s)]<CR><LF><CR><LF>OK<CR><LF>

13.10.2 Interface Description

The set command is used by the user to notify the module of the response to the NI positioning request so that the module can perform relevant operations when the NI positioning type is Notify and Verify. The user can accept or reject the NI positioning only when the NI positioning type is Notify and Verify, and when the user receives the NI positioning report or ^WNINV. Otherwise, an error message is returned.

13.10.3 Parameter Description

<choice>: indicates whether the user accepts the NI request.

0 No

1 Yes

<session_id>: session index value, which is corresponding to the value of <session_id> reported by ^WNINV. It is used to distinguish between multiple simultaneous sessions.

13.10.4 Property Description

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

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13.10.5 Example

- Query the range of supported values:

Run: `AT^WNICT=?`

Response:
```
^WNICT: (0-1),(0-65535)

OK
```

- Set NI response:

Run: `AT^WNICT=0,0`

Response: `OK`

Run: `AT^WNICT=1,1`

Response: `OK`

13.11 AT^WPCAP-Disable or Enable GNSS System

13.11.1 Command Syntax

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

AT^WPCAP?
Possible Response(s)
<CR><LF>^WPCAP: <system><CR><LF><CR><LF>OK<CR><LF>

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

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13.11.2 Interface Description

This command is used to enable or disable a GNSS.

The set command sets the GNSS system type. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned. The settings take effect immediately and will be saved upon power-off.

The read command queries the current positioning system type.

The test command returns the value range of the positioning system type.

13.11.3 Parameter Description

<system>: GNSS system type. The value is a decimal integer, represented by one byte.

- When the corresponding bit is 0, the related GNSS system is disabled.
- When the corresponding bit is 1, the related GNSS system is enabled.

Bit0	GPS
Bit1	GLONASS
Bit2	COMPASS, namely BeiDou (not supported currently)
Bit3	GALILEO (not supported currently)

13.11.4 Property Description

Saving upon Power-off	PIN
Y	N

13.11.5 Example

- Disable all the GNSS systems in a module:

```
Run:        AT^WPCAP=0
Response:   OK
```

- Query the current GNSS system type:

```
Run:        AT^WPCAP?
Response:   ^WPCAP: 3

            OK
```

- Query the supported GNSS system types:

```
Run:        AT^WPCAP=?
```


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```
Response:    ^WPCAP: (0,3)

             OK
```

13.12 AT^AGNSSCFG-Set an AGNSS System's Capabilities

13.12.1 Command Syntax

AT^AGNSSCFG=<asystem>,<value1>[,<value2>,<value3>]
Possible Response(s)
<CR><LF>OK<CR><LF> In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^AGNSSCFG?
Possible Response(s)
<CR><LF>^AGNSSCFG: <asystem>,<value1>,<value2>,<value3>[<CR><LF>^AGNSSCFG: <asystem>,<value1>,<value2>,<value3>[...]]<CR><LF><CR><LF>OK<CR><LF>

AT^AGNSSCFG=?
Possible Response(s)
<CR><LF>^AGNSSCFG: <asystem>,(list of supported <value1>s),(list of supported <value2>s),(list of supported <value3>s)[<CR><LF>^AGNSSCFG: <asystem>,(list of supported <value1>s),(list of supported <value2>s),(list of supported <value3>s)[...]]<CR><LF><CR><LF>OK<CR><LF>

13.12.2 Interface Description

This command is used to set an AGNSS capabilities. It cannot be used to configure the AGNSS system type.

The set command sets an AGNSS system's capabilities. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command queries the parameter settings of all the supported AGNSS systems. If a parameter is not supported, no value is returned for it.

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13.12.3 Parameter Description

<asystem>: type of the AGNSS system.

1 AGPS

<value1>,<value2>,<value3>: an AGNSS system's capabilities. The capabilities you can set vary according to AGNSS system types. Currently, only the capabilities of the AGPS can be set. The following table provides more details.

<asystem>	<value1>	<value2>	<value3>
AGPS	transport_mode	supl_ver	sec_mode

If set <transport_mode> to 1, <supl_ver>, <sec_mode> parameters must be filled in, otherwise error will be returned.

<transport_mode>: transport mode of the AGPS system.

1 User plane (default value)

<supl_ver>: SUPL version.

1 SUPL 1.0

2 SUPL 2.0 (default value)

<sec_mode>: whether to enable security mode.

0 Disable security mode. No certificate is required. (default value)

1 Enable security mode. A certificate is required.

13.12.4 Property Description

Saving upon Power-off	PIN
Y	N

13.12.5 Example

- Set the AGPS system's capabilities:

```
Run:        AT^AGNSSCFG=1,1,1,0
Response:   OK
```


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- Query the supported AGNSS system's parameter settings:

```
Run:        AT^AGNSSCFG?
Response:   ^AGNSSCFG: 1,1,1,0

            OK
```

- Query the types of the supported AGNSS system's capabilities:

```
Run:        AT^AGNSSCFG=?
Response:   ^AGNSSCFG: 1,1,(1,2),(0,1)

            OK
```

13.13 ^POSEND-Unsolicitedly Report Positioning End Information

13.13.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^POSEND: <reason>,<leftfixnum><CR><LF>

13.13.2 Interface Description

This command is used to report the ending reason and the left positioning times when the positioning ends and the positioning session is over.

13.13.3 Parameter Description

<reason>: positioning end reason.

-1	Normal end
9	User end
12	Timeout
15	Error in fix
22	Unknown error

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<leftfixnum>: left positioning times. When the positioning time set by AT^WPDFR is 0, the left positioning times returned by ^POSEND is 65535 all the time.

13.13.4 Property Description

Saving upon Power-off	PIN
NA	NA

13.13.5 Example

If users end the PD session, the following response will be presented:

```
Response:    ^POSEND: 9,0
```

13.14 AT^WPTLS-Set TLS Certificate

13.14.1 Command Syntax

AT^WPTLS=<length>[,<index>,<tls>]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

AT^WPTLS?
Possible Response(s)
<CR><LF>^WPTLS: <length>[,<index>,<tls>][<CR><LF>^WPTLS: <length>,<index>,<tls>[...]]<CR><LF><CR><LF>OK<CR><LF>
In case of an error: <CR><LF>+CME ERROR: <err><CR><LF>

13.14.2 Interface Description

The set command injects or deletes the TLS certificate data. When the value of <length> is more than 0, the <tls> will be injected. If the TLS certificate length is greater than 300 characters, the entire text has to be split into 300 character segments and each segment is sent by using one separate AT^WPTLS command. The <index> shall indicate the segment number

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of the TLS certificate being set. When <length>=0, the TLS certificate data will be deleted. In this case, <index> and <tls> does not need to be set.

The set command is available before or after the session is positioned. Parameters cannot be modified in the positioning process. Otherwise, an error message is returned.

The read command queries the TLS certificate data.

13.14.3 Parameter Description

<length>: the total length of the TLS certificate.

<index>: current packet index, counting from 1.

<tls>: content of the TLS certificate file (with quotation marks).

13.14.4 Property Description

Saving upon Power-off	PIN
Y	N

13.14.5 Example

- Inject the TLS certificate of the AGPS server:

```
Run:        AT^WPTLS=304,1,"30820242308201ec020900d9f63efc3f85582c300d0
            6092a864886f70d01010505003081a7311f301d060355040a1316537069
            72656e7420436f6d6d756e69636174696f6e73310e300c060355040b130
            550412d57503125302306092a864886f70d010901161673757070 6f7274
            4073706972656e74636f6d2e636f6d311230100603550407130945617 46
            f6e746f776e310b300906"
Response:   OK
Run:        AT^WPTLS=304,2,"f025"
Response:   OK
```

- Read the TLS certificate of the AGPS server:

```
Run:        AT^WPTLS?
Response:   ^WPTLS:
            304,1,"30820242308201ec020900d9f63efc3f85582c300d06092a864
            886f70d01010505003081a7311f301d060355040a131653706972656e7
            420436f6d6d756e69636174696f6e73310e300c060355040b130550412
            d57503125302306092a864886f70d010901161673757070 6f727440737
            06972656e74636f6d2e636f6d311230100603550407130945617 46f6e7
            46f776e310b300906"
            ^WPTLS: 304,2,"f025"

            OK
```


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- Delete the TLS certificate of the AGPS server:

```
Run:        AT^WPTLS=0
Response:   OK
```

13.15 AT^WPINFO-Get GNSS Engine Status

13.15.1 Command Syntax

AT^WPINFO?
Possible Response(s)
<CR><LF>^WPINFO: <System><CR><LF><CR><LF>OK<CR><LF>

13.15.2 Interface Description

This read command queries the current GNSS engine.

13.15.3 Parameter Description

<System>: GNSS system type. The value is a decimal integer, represented by one byte.

- When the corresponding bit is 1, the related GNSS system is in the positioning state.
- When the corresponding bit is 0, the related GNSS system is not in the positioning state.

For parameter values, see 13.11 AT^WPCAP-Disable or Enable GNSS System.

13.15.4 Property Description

Saving upon Power-off	PIN
NA	N

13.15.5 Example

Query the current GPS engine state:

```
Run:        AT^WPINFO?
Response:   ^WPINFO:3          The GPS and GLONASS systems cooperate to
                               implement positioning.

            OK
```


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13.16 AT^NISMSFWD-Control the Report of SUPL NI Short Messages

13.16.1 Command Syntax

AT^NISMSFWD=<mode>[,<port>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^NISMSFWD?
Possible Response(s)
<CR><LF>^NISMSFWD: <mode>,<port><CR><LF><CR><LF>OK<CR><LF>

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

13.16.2 Interface Description

This command is used to enable or disable the short message report function on specified ports and specify the ports that need to report short messages. When the short message report function is enabled in a module and the destination port number in the packet header of a short message received by the module is the same as the port number specified by this command, the short message is directly reported to the TE using a PDU packet.

13.16.3 Parameter Description

<mode>: whether to enable the short message report function.

0	Disable the short message report function.
1	Enable the short message report function. (default value)

NOTE

When <mode> is set to 0, none of the short messages received by a module will be reported using the ^NISMSFWD command, no matter what the destination port numbers in the packet headers of the short messages are.

<port>: port number for reporting short messages, specifically, the destination port number in the packet header of a short message to be reported. The value is an integer ranging from 0 to

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65535. By default, the previous setting is used for this parameter. If this parameter has not been set, the default value is 7275, which is the destination port number in the packet header in a GPS short message.

13.16.4 Property Description

Saving upon Power-off	PIN
NA	N

13.16.5 Example

Enable the short message report function and specify the destination port number:

```
Run:        AT^NISMSFWD=1,7275
Response:   OK
```

13.17 ^NISMSFWD-Unsolicitedly Report Short Messages with Specified Destination Port Numbers

13.17.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NISMSFWD: <pdu><CR><LF>

13.17.2 Interface Description

This command is used to unsolicitedly report a short message that has the destination port number specified. When the short message report function is enabled in a module and the destination port number in the packet header of a short message received by the module is the same as the port number specified by the AT^NISMSFWD command, this command directly reports the PDU packet of the short message to the TE.

13.17.3 Parameter Description

<pdu>: protocol data unit. (refer to 3GPP TS 23.040)

13.17.4 Property Description

Saving upon Power-off	PIN
NA	NA

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13.17.5 Example

If the short message report function is enabled in a module and the destination port number in the packet header of a short message received by the module is the same as the port number specified by this command, the following response is displayed:

```
Response:   ^NISMSFWD:
            07804180551512F2440B804180551512F27DF53090211203756B18060504
            EA061C6B00110100004000000046054001182090040011010000400000000
            4605400118209004
```

13.18 AT^LTOLOCK-Enable/Disable the LTO Feature

13.18.1 Command Syntax

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

AT^LTOLOCK?
Possible Response(s)
<CR><LF>^LTOLOCK: <lockstate><CR><LF><CR><LF>OK<CR><LF>

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

13.18.2 Interface Description

The set command enables or disables the LTO feature.

The read command queries the status (enabled or disabled) of the LTO feature.

The test command returns the present value range.

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The set command can be used only before or after a positioning session. Do not modify the parameters in the set command during the positioning. After the LTO feature is enabled and AT^WPDOM=0 is run, LTO data is checked. If the LTO data is valid, it is used to accelerate the positioning. After the LTO feature is disabled, the standard standalone positioning is used.

The LTO feature is enabled by default. To disable the LTO feature on a client, deliver the AT^LTOLOCK=1 command before enabling the GPS positioning function. To enable the LTO feature on a client, deliver the AT^LTOLOCK=0 command before enabling the GPS positioning function.

13.18.3 Parameter Description

<lockstate>: positioning system type. The settings take effect at power-off.

0	Enable the LTO feature. (default value)
1	Disable the LTO feature.

13.18.4 Property Description

Saving upon Power-off	PIN
Y	N

13.18.5 Example

Disable the LTO feature:

```
Run:        AT^LTOLOCK=1
Response:   OK
```

13.19 AT^HWCUST-Enable Custom Hardware Function

13.19.1 Command Syntax

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

AT^HWCUST?

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AT^HWCUST?
Possible Response(s)
<CR><LF>^HWCUST: list of (<func>,<action>)s<CR><LF><CR><LF>OK<CR><LF>

AT^HWCUST=?
Possible Response(s)
<CR><LF>^HWCUST: list of supported (<func>,(list of supported <action>s))s<CR><LF><CR><LF>OK<CR><LF>

13.19.2 Interface Description

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

13.19.3 Parameter Description

<func>: hardware function.

0	GNSS reference clock
1-255	Reserved

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

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

13.19.4 Property Description

Saving upon Power-off	PIN
N	N

13.19.5 Example

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

- Enable the output of the GNSS reference clock function:

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```
Run:        AT^HWCUST=0,1
Response:   OK
```

- Query the status of a specified hardware function:

```
Run:        AT^HWCUST?
Response:   ^HWCUST: 0,1

            OK
```

- Query the present value range:

```
Run:        AT^HWCUST=?
Response:   ^HWCUST: 0,(0,1)

            OK
```

13.20 AT+XCELLINFO-Provide Cell Information

13.20.1 Command Syntax

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

AT+XCELLINFO?
Possible Response(s)

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AT+XCELLINFO?
When <type>=0 or <type>=1: <CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<LAC>,<CI>,<RxLev>[,<t_advance>,<Arfcn>,<Bsic>][<CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<LAC>,<CI>,<RxLev>[,<t_advance>][...]]<CR><LF><CR><LF>OK<CR><LF> When <type>=2 or <type>=3 or <type>=4: <CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<LAC>,<CI>,<scrambling_code>,<dl_frequency>,<rscp>,<ecn0>[,<pathloss>][<CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<LAC>,<CI>,<scrambling_code>,<dl_frequency>,<rscp>,<ecn0>,<pathloss>[...]]<CR><LF><CR><LF>OK<CR><LF> When <type>=5: <CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<CI>,<PhyCellID>,<TrackingAreaCode>,<RSRPResult>,<RSRQResult>,<TA>[<CR><LF>+XCELLINFO: <mode>,<type>,<MCC>,<MNC>,<CI>,<PhyCellID>,<TrackingAreaCode>,<RSRPResult>,<RSRQResult>,<TA>[...]]<CR><LF><CR><LF>OK<CR><LF> When <type>=6: <CR><LF>+XCELLINFO: <mode>,<type>,[[<Earfcn>,[<PhyCellID>,[<RSRPResult>,[<RSRQResult>]]]]][<CR><LF>+XCELLINFO: <mode>,<type>,[[<Earfcn>,[<PhyCellID>,[<RSRPResult>,[<RSRQResult>]]]]][...]]<CR><LF><CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

13.20.2 Interface Description

This command provides a periodic reporting of the serving cell and the neighbour cells for GSM, UMTS cells and LTE.

NOTE

The read command will return +CME ERROR when the network is not registered.

13.20.3 Parameter Description

<mode>:

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0	Disable the periodic reporting (default value)
1	Enable the periodic reporting
2	Currently not used (backward compatibility)

<type>:

0	GSM serving cell
1	GSM neighbour cell (not supported currently)
2	UMTS serving cell
3	UMTS neighbour cell (not supported currently)
4	UMTS detected cell (not supported currently)
5	LTE serving cell
6	LTE neighbour cell (not supported currently)

<MCC>: integer type; Mobile Country Code. The value is 65535 when this parameter is invalid.

<MNC>: integer type; Mobile Network Code. The value is 65535 when this parameter is invalid.

<LAC>: integer type; Location area code in hexadecimal format. The value is FFFF when this parameter is invalid.

<CI>: integer type; GERAN/UTRAN/E-UTRAN cell ID in hexadecimal format. The value is FFFFFFFF when this parameter is invalid.

<Arfcn>: Absolute Radio Frequency Channel Number of the cell.

<Bsic>: base station identification code, which is a 2-digit decimal number.

<scrambling_code>: integer type; Scrambling Code. (not supported currently)

<rscp>: integer type; Received Signal Code Power. (not supported currently)

<ecn0>: integer type; Energy per chip/noise. (not supported currently)

<dl_frequency>: integer type; Downlink frequency. (not supported currently)

<pathloss>: integer type; Path loss. The value is 255 when this parameter is invalid.. (not supported currently)

<RxLev>: integer type; Signal strength. The value ranges from 0 to 63.

<t_advance>: integer type; Timing Advance. Only valid for the serving cell. (not supported currently)

<PhysCellId>: integer type, Physical Cell ID. (Ref: 3GPP TS 36.331, 6.3.4, PhysCellId IE) (not supported currently)

<TrackingAreaCode>: integer type; Tracking Area Code in hexadecimal format. (Ref: 3GPP TS 36.331, 6.3.4, TrackingAreaCode IE) (not supported currently)

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<RSRPResult>: integer type; Reference Signal Received Power. The value ranges from 0 to 97. (Ref: 3GPP TS 36.331, 6.3.5, RSRP-Range IE) (not supported currently)

<RSRQPResult>: integer type; Reference Signal Received Quality. The value ranges from 0 to 34. (Ref: 3GPP TS 36.331, 6.3.5, RSRQ-Range IE) (not supported currently)

<TA>: integer type; Timing Advance. The value ranges from 0 to 1282. (Ref: 3GPP TS 36.321). (not supported currently)

<Earfcn>: integer type; The carrier frequency of the neighbor cell designated by the EUTRA Absolute Radio Frequency Channel Number (EARFCN), The value ranges from 0 to 0xFFFF. (Ref: 3GPP TS 36.101, 5.7.3) (not supported currently)

<PhyCellID>: integer type; The physical cell ID of the neighbor cell. The value ranges from 0 to 503. (Ref: 3GPP TS 36.331, 6.3.4, PhysCellId IE) (not supported currently)

<RSRPResult>: integer type; Average RSRP of the neighbor cell. The value ranges from 1 to 97. (Ref: 3GPP TS 36.331, 6.3.5, RSRP-Range IE) (not supported currently)

<RSRQResult>: integer type; Average RSRQ of the neighbor cell. The value ranges from 0 to 34. (Ref: 3GPP TS 36.331, 6.3.5, RSRQ-Range IE) (not supported currently)

13.20.4 Property Description

Saving upon Power-off	PIN
NA	N

13.20.5 Example

- Query the cells information after GSM network is registered:

```
Run:        AT+XCELLINFO?
Response:   +XCELLINFO: 0,0,460,09,2,1,53,,550,0

            OK
```

- Query the cells information after WCDMA network is registered:

```
Run:        AT+XCELLINFO?
Response:   +XCELLINFO: 0,2,234,15,,100005,,,,,

            OK
```

- Query the cells information after LTE network is registered:

```
Run:        AT+XCELLINFO?
Response:   +XCELLINFO: 0,5,460,09,E15,,,,,

            OK
```


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13.21 +XCELLINFO-Automatically Report Cell Information

13.21.1 Command Syntax

URC
Possible Response(s)
When <type>=0 or <type>=1: <CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<LAC>,<CI>,<RxLev>[,<t_advance>,<Arfcn>,<Bsic>][<CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<LAC>,<CI>,<RxLev>[,<t_advance>][...]]<CR><LF> When <type>=2 or <type>=3 or <type>=4: <CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<LAC>,<CI>,<scrambling_code>,<dl_frequency>,<rscp>,<ecn0>[,<pathloss>][<CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<LAC>,<CI>,<scrambling_code>,<dl_frequency>,<rscp>,<ecn0>[,<pathloss>][...]]<CR><LF> When <type>=5: <CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<CI>,<PhyCellID>,<TrackingAreaCode>,<RSRPResult>,<RSRQResult>,<TA>[<CR><LF>+XCELLINFO: <type>,<MCC>,<MNC>,<CI>,<PhyCellID>,<TrackingAreaCode>,<RSRPResult>,<RSRQResult>,<TA>[...]]<CR><LF> When <type>=6: <CR><LF>+XCELLINFO: <type>,[[<Earfcn>,[<PhyCellID>,[<RSRPResult>,[<RSRQResult>]]]]][<CR><LF>+XCELLINFO: <type>,[[<Earfcn>,[<PhyCellID>,[<RSRPResult>,[<RSRQResult>]]]][...]]<CR><LF>

13.21.2 Interface Description

If the module has registered with a network and the function to report cell information is enabled, cell information will be reported at an interval of 1 second.

13.21.3 Parameter Description

For details, see 13.20.3 Parameter Description for the AT+XCELLINFO command.

13.21.4 Property Description

Saving upon Power-off	PIN

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Saving upon Power-off	PIN
NA	NA

13.21.5 Example

If the module has registered with the GSM network and the function to report cell information is enabled, the following response is displayed:

```
Response:   +XCELLINFO: 0,460,09,2,0,63,,550,0
```

If the module has registered with the UMTS network and the function to report cell information is enabled, the following response is displayed:

```
Response:   +XCELLINFO: 2,234,15,,100005,,,,,
```

If the module has registered with the LTE network and the function to report cell information is enabled, the following response is displayed:

```
Response:   +XCELLINFO: 5,460,09,12C,,,,,
```


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14 Huawei Proprietary Interface: STK Interface

14.1 AT^STSF-Configure STK

14.1.1 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>

14.1.2 Interface Description

The set command configures STK, including:

- Activate and deactivate the function of STK

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- 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).

14.1.3 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.

14.1.4 Property Description

Saving upon Power-off	PIN
Y	N

14.1.5 Example

- Deactivate STK:

```
Run:        AT^STSF=0
Response:   OK
```

- Parameter setting error:

```
Run:        AT^STSF=3,0
```


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```
Response:    ERROR
```

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

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

14.2 AT^CUSATM-Query the Main Menu

14.2.1 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>

14.2.2 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".

14.2.3 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.

14.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

14.2.5 Example

Query the main menu:

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```
Run:        AT^CUSATM?
Response:   ^CUSATM:
            "D0818A810301250082028182851180516874039 01A00550053004900
            4D53618F0D01444953504C415920544558548F0A0247455420494E4B4
            5598F0A0347455420494E5055548F0A044D4F52452054494D458F0A05
            504C415920544F4E458F0E06504F4C4C20494E54455256414C8F08075
            24546524553488F130853454E442053484F5254204D455353414745"

            OK
```


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15 Huawei Proprietary Interface: Tunable Antenna Interface

15.1 AT^ANTENCFG-Set Tunable Antenna

15.1.1 Command Syntax

AT^ANTENCFG=<mode>,<pattern>[,<band>[,<pattern>,<band>[...]]]
Possible Response(s)
<CR><LF>OK<CR><LF>

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

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

15.1.2 Interface Description

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

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

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

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15.1.3 Parameter Description

<mode>: indicates the mode of network.

0	GSM
1	WCDMA
2	CDMA (not supported currently)
3	LTE

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

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

0	Low Level
1	High Level

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

Table 15-1 The value of <band> when <mode>=0

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

Table 15-2 The value of <band> when <mode>=1

Parameters	Band
0000000000000001	WCDMA_I_IMT_2100
0000000000000002	WCDMA_II_PCS_1900
0000000000000004	WCDMA_III_1700

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Parameters	Band
0000000000000008	WCDMA_IV_1700
0000000000000010	WCDMA_V_850
0000000000000020	WCDMA_VI_800
0000000000000040	WCDMA_VII_2600
0000000000000080	WCDMA_VIII_900
0000000000000100	WCDMA_IX_1700
0000000000000200	WCDMA_X
0000000000000400	WCDMA_XI
0000000000000800	WCDMA_XII
0000000000001000	WCDMA_XIII
0000000000002000	WCDMA_XIV
0000000000004000	WCDMA_XV
0000000000008000	WCDMA_XVI
0000000000010000	WCDMA_XVII
0000000000020000	WCDMA_XVIII
0000000000040000	WCDMA_XIX
...	...
FFFFFFFFFFFFFFFF	All supported bands

Table 15-3 The value of <band> when <mode>=2

Parameters	Band
0000000000000001	BC0 A
0000000000000002	BC0 B
0000000000000004	BC1
0000000000000008	BC2
0000000000000010	BC3
0000000000000020	BC4
0000000000000040	BC5
0000000000000080	BC6
...	...

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Parameters	Band
FFFFFFFFFFFFFFFF	All supported bands

Table 15-4 The value of <band> when <mode>=3

Parameters	Band
0000000000000001	Band 1
0000000000000002	Band 2
0000000000000004	Band 3
0000000000000008	Band 4
0000000000000010	Band 5
0000000000000020	Band 6
0000000000000040	Band 7
0000000000000080	Band 8
0000000000000100	Band 9
0000000000000200	Band 10
0000000000000400	Band 11
0000000000000800	Band 12
0000000000001000	Band 13
0000000000002000	Band 14
0000000000004000	Band 15
0000000000008000	Band 16
0000000000010000	Band 17
0000000000020000	Band 18
0000000000040000	Band 19
0000000000080000	Band 20
...	...
FFFFFFFFFFFFFFFF	All supported bands

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

NOTE

The parameter can set several groups (less or equal to seven groups) of pattern at one time.

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15.1.4 Property Description

Saving upon Power-off	PIN
Y	N

15.1.5 Example

```
Run:        AT^ANTENCFG=?
Response:   ^ANTENCFG:                      Indicate that the module
            (0,1,3),(0-15),(00000000000     supports GSM, WCDMA and LTE. The
            0000F,0000000000000093,0000     pattern is from 0 to 15. The
            0000080800D7)                   module supports GSM 4 bands,
                                            WCDMA BC1, BC2, BC5, BC8, and
            OK                              LTE B1, B2, B3, B5, B7, B8, B20,
                                            B28.
Run:        AT^ANTENCFG=0,1,2               Set the antenna tuner
                                            configuration of GSM900 to be 1.
Response:   OK
Run:        AT^ANTENCFG?
Response:   ^ANTENCFG:                      Indicate that the current
            0:                              configuration of GSM900 is 1,
            0,000000000000000D,1,000000     other bands are 0.
            0000000002
            1: 0,FFFFFFFFFFFFFFFF
            3: 0,FFFFFFFFFFFFFFFF

            OK
```


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16 Huawei Proprietary Interface: Main And AUX Switch Interface

16.1 AT^ANTMODE-Set Operation Mode of Main and AUX Antennas

16.1.1 Command Syntax

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

AT^ANTMODE?
Possible Response(s)
<CR><LF>^ANTMODE: <ant_mode>,<nw_mode><CR><LF>[^ANTMODE: <ant_mode>,<nw_mode><CR><LF>][...]<CR><LF>OK<CR><LF>

AT^ANTMODE=?
Possible Response(s)
<CR><LF>^ANTMODE: (list of supported <ant_mode>s),(list of supported <nw_mode>s)<CR><LF><CR><LF>OK<CR><LF>

16.1.2 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.

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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.

16.1.3 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.

16.1.4 Property Description

Saving upon Power-off	PIN
Y	N

16.1.5 Example

- Query the current operation mode of the main and AUX antennas:

```
Run:        AT^ANTMODE?
Response:   ^ANTMODE: 0,2       The response indicates that the main and
            ^ANTMODE: 2,3       AUX antennas are all enabled on the WCDMA
                                network, and the AUX antenna is enabled
            OK                  on the LTE network.
```


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- 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
```


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17 Huawei Proprietary Interface: M.2 Interface

17.1 AT+XTSM-Set Thermal Sensor with the Threshold

17.1.1 Command Syntax

AT+XTSM=<temp_sensor_id>[,<AlarmID>[,[<TripPointTemp>,<Hysteresis>][,<sampling_period>]]]
Possible Response(s)
<CR><LF>OK<CR><LF>

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

17.1.2 Interface Description

This command configures thermal sensors with the threshold break points.

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

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

17.1.3 Parameter Description

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

0 RF sensor

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<AlarmID>: indicates alarm ID value. The value ranges from 1 to 10.

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

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

<sampling_period>: indicates polling interval in millisecond. The minimum value is 1000, and the maximum value is 131071000.

17.1.4 Property Description

Saving upon Power-off	PIN
NA	N

17.1.5 Example

- Set the alarm ID, tripPointTemp value, hysteresis value, and sampling period:

```
Run:        AT+XTSM=0,1,50000,3000,2000
Response:   OK
```

- Query the available value ranges of these parameters:

```
Run:        AT+XTSM=?
Response:   +XTSM: 0,(1-10),(0-119000),(100-99000),(1000-131071000)

            OK
```

- Set the alarm ID, tripPointTemp value, and hysteresis value:

```
Run:        AT+XTSM=0,3,76000,5000
Response:   OK
```

- Set the sampling period:

```
Run:        AT+XTSM=0,10,,30000
Response:   OK
```

- Delete one alarm:

```
Run:        AT+XTSM=0,10
Response:   OK
```


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- Delete all alarms:

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

17.2 +XTS-Unsolicitedly Present of the Threshold Reached

17.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+XTS: <temp_sensor_id>,<AlarmId>,<OnOff>,<Temp><CR><LF>

17.2.2 Interface Description

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

17.2.3 Parameter Description

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

0 RF sensor

<AlarmID>: indicates alarm ID value. The value ranges from 1 to 10.

<OnOff>:

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

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

<Temp>: indicates current temperature value in MiliDegC.

17.2.4 Property Description

Saving upon Power-off	PIN
NA	N

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17.2.5 Example

Set the alarm ID, tripPointTemp value, hysteresis value, and sampling period:

```
Run:        AT+XTSM=0,1,50000,3000,2000
Response:   OK
Response:   +XTS: 0,1,1,31000       MT will unsolicitedly report when
                                    the temperature rises to 31°C from
                                    the temperature that is lower than
                                    30°C.
Response:   +XTS: 0,1,0,26500       MT will unsolicitedly report when
                                    the temperature drops to 26.5°C from
                                    the temperature that is higher than
                                    30°C.
```

17.3 AT+XTAMR-Query the Current Temperature of a Thermal Sensor

17.3.1 Command Syntax

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

17.3.2 Interface Description

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

17.3.3 Parameter Description

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

0 RF sensor

<temp>: indicates current temperature value in MiliDegC.

17.3.4 Property Description

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

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17.3.5 Example

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

17.4 AT+XADPCLKFREQINFO-Query Adaptive Clock Frequency Info

17.4.1 Command Syntax

AT+XADPCLKFREQINFO=<n>
Possible Response(s)
<CR><LF>OK<CR><LF>

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

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

17.4.2 Interface Description

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

The set command enables or disables the +XADPCLKFREQINFO URC.

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

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

NOTE

When RF is disabled or the module deregisters from the network, the module does not need to report frequency 0 unsolicitedly.

17.4.3 Parameter Description

<n>:

0	Disable the +XADPCLKFREQINFO URC. (default value)
1	Enable the +XADPCLKFREQINFO URC.

<centFreq>: indicates the center frequency of the channel number in Hz. This is the host receiver channel frequency. (frequency 0 is not reported when RF is disabled)

<freqSpread>: indicates the frequency spread of the channel number in Hz. This is the host receiver channel frequency spread. (frequency 0 is not reported when RF is disabled)

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

17.4.4 Property Description

Saving upon Power-off	PIN
N	N

17.4.5 Example

- Read the status of enabling or disabling the +XADPCLKFREQINFO URC:

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

            OK
```

- Enable the +XADPCLKFREQINFO URC:

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

- Query the list of frequency information available: centFreq, freqSpread, and noisePower.

```
Run:        AT+XADPCLKFREQINFO=?
```


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```
Response:    +XADPCLKFREQINFO: 21476000,5000000,0

             OK
```

17.5 +XADPCLKFREQINFO-Unsolicitedly Present of Adaptive Clock Frequency Info

17.5.1 Command Syntax

URC
Possible Response(s)
<CR><LF>+XADPCLKFREQINFO: <centFreq>,<freqSpread>,<noisePower>[[;<centFreq>,<freqSpread>,<noisePower>][...]]<CR><LF>

17.5.2 Interface Description

The URC displays the adaptive clock frequency information.

17.5.3 Parameter Description

<centFreq>: indicates the center frequency of the channel number in Hz. This is the host receiver channel frequency. (frequency 0 is not reported when RF is disabled)

<freqSpread>: indicates the frequency spread of the channel number in Hz. This is the host receiver channel frequency spread. (frequency 0 is not reported when RF is disabled)

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

17.5.4 Property Description

Saving upon Power-off	PIN
NA	NA

17.5.5 Example

Unsolicitedly report the frequency information: centFreq, freqSpread, and noisePower.

```
Response:    +XADPCLKFREQINFO: 21476000,5000000,0
```


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18 Huawei Proprietary Interface: ECM Interfaces

18.1 AT^NDISDUP-NDIS-Based Dialing

18.1.1 Command Syntax

AT^NDISDUP=<cid>,<connect>[,<APN>[,<username>[,<passwd>[,<auth_type>]]]]
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

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

AT^NDISDUP=?
Possible Response(s)
<CR><LF>^NDISDUP: (list of supported <cid>s),(list of supported <connect>s)<CR><LF><CR><LF>OK<CR><LF>

18.1.2 Interface Description

This command implements NDIS-based dialing.

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- 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.

18.1.3 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

18.1.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.1.5 Example

```
Run:          AT^NDISDUP=1,1,"1234"
Response:     OK
Run:          AT^NDISDUP?
Response:     OK
Run:          AT^NDISDUP=?
```


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```
Response:       ^NDISDUP: (0-11),(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.

18.2 ^NDISSTAT-Unsolicitedly Report of Connection Status

18.2.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^NDISSTAT: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]]<CR><LF>

18.2.2 Interface Description

When the device connection status changes, the MT proactively indicates this to the TE.

18.2.3 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)

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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

18.2.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.2.5 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"
```

18.3 AT^NDISSTATQRY-Query the Connection Status

18.3.1 Command Syntax

AT^NDISSTATQRY?
Possible Response(s)

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AT^NDISSTATQRY?
<CR><LF>^NDISSTATQRY: <stat>[,<err_code>[,<wx_state>[,<PDP_type>]]][,<stat>,<err_code>,<wx_state>,<PDP_type>]<CR><LF><CR><LF>OK<CR><LF>

18.3.2 Interface Description

The TE delivers this command to query the ECM (NDIS/WWAN) connection status of the MT.

18.3.3 Parameter Description

<stat>: indicates connection status.

0	Disconnected
1	Connected
2	In connection (reported only when the device is automatically connected)
3	Disconnected (reported only when the device is automatically connected)

<err_code>:

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.

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"IPV4" IPV4 Protocol

"IPV6" IPV6 Protocol

18.3.4 Property Description

Saving upon Power-off	PIN
NA	N

18.3.5 Example

Report one or two group of connection status based on the IPv6 capability of the MT.

- If the MT supports IPv4 only, the IPv4 connection is in the connected state. In this case, only one group of connection status is reported:

```
Run:        AT^NDISSTATQRY?
Response:   ^NDISSTATQRY: 1,,,"IPV4"

            OK
```

- If the MT supports both IPv6 and IPv4, and IPv6 is in the disconnected state and IPv4 is in the connected state, two groups of connection status (regardless of before or after the dialing) are reported:

```
Run:        AT^NDISSTATQRY?
Response:   ^NDISSTATQRY: 1,,,"IPV4",0,0,,"IPV6"

            OK
```

18.4 AT^DHCPV6-Query DHCPV6 Information

18.4.1 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>

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AT^DHCPV6=?
Possible Response(s)
<CR><LF>OK<CR><LF>
In case of an MT-related error: <CR><LF>+CME ERROR: <err><CR><LF>

18.4.2 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.

18.4.3 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.

18.4.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.4.5 Example

```
Run:          AT^DHCPV6?
```


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```
Response:     ^DHCPV6: ::,::,::,::,fe80::e1ec:e44a:a28f:aeb1,::,7200000,
              384000

              OK
Run:          AT^DHCPV6=?
Response:     OK
```

18.5 AT^AUTHDATA-Set Username Password

18.5.1 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>

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18.5.2 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.

18.5.3 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.

18.5.4 Property Description

Saving upon Power-off	PIN
Y	N

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18.5.5 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
```

18.6 AT^DHCP-Query DHCP/IP

18.6.1 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>

18.6.2 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.

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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.

18.6.3 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).

18.6.4 Property Description

Saving upon Power-off	PIN
NA	Y

18.6.5 Example

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

18.7 AT^IPV6CAP-Query IPv6 Capability

18.7.1 Command Syntax

AT^IPV6CAP?
Possible Response(s)
<CR><LF>^IPV6CAP: <cfg_value><CR><LF><CR><LF>OK<CR><LF>

AT^IPV6CAP=?

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AT^IPV6CAP=?
Possible Response(s)
<CR><LF>^IPV6CAP: (list of supported <cfg_value>s)<CR><LF><CR><LF>OK<CR><LF>

18.7.2 Interface Description

The command queries the current IPv6 capabilities of MT.

18.7.3 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

18.7.4 Property Description

Saving upon Power-off	PIN
N	N

18.7.5 Example

```
Run:        AT^IPV6CAP?
Response:   ^IPV6CAP: 7

            OK
Run:        AT^IPV6CAP=?
Response:   ^IPV6CAP: (1,2,7)

            OK
```


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19 Huawei Proprietary Interface: Temperature Protection

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

19.1.1 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>

19.1.2 Interface Description

This command queries temperature on hardware spots, such as GSM PA, WCDMA PA, LTE PA, SIM card slot, battery and crystal oscillator.

19.1.3 Parameter Description

<G PAtemp>: an integer type value indicates the GSM PA chip's current temperature.

65535 (not supported currently)

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<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..

(-400-1100) The crystal's current temperature in the unit of 0.1 ℃.

<G PAtemp Range>: an integer type value indicates the temperature range of the GSM PA chip in the unit of 0.1 ℃.

(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 ℃.

(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 ℃.

(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 ℃.

(65535-65535) (not supported currently)

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<BATTERYtemp Range>: an integer type value indicates the temperature range of the battery in the unit of 0.1 ℃.

(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 ℃.

(-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 ℃. For example, if the returned value range is (-200,1000), the temperature ranges from -20 ℃ to 100 ℃.
- 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.

19.1.4 Property Description

Saving upon Power-off	PIN
NA	N

19.1.5 Example

```
Run:        AT^CHIPTEMP?
Response:   ^CHIPTEMP:                                  Indicate the
            65535,65535,65535,65535,65535,300           current temperature
                                                        on hardware spots.

            OK
Run:        AT^CHIPTEMP=?
Response:   ^CHIPTEMP:                                  Indicate the
            (65535-65535),(65535-65535),(65535-65       temperature ranges
            535),(65535-65535),(65535-65535),(-40       on hardware spots.
            0-1100)

            OK
```


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19.2 AT^THERMFUN-Enable or Disable the Temperature Protection Function Command

19.2.1 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>

19.2.2 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.

19.2.3 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.

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1 Enable the temperature protection function. (default value)

NOTE
A parameter value takes effect immediately after setting.

19.2.4 Property Description

Saving upon Power-off	PIN
N	N

19.2.5 Example

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

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

              OK
Run:          AT^THERMFUN=1
Response:     OK
```

19.3 ^THERM-Thermal Protection Activated Unsolicited Report

19.3.1 Command Syntax

URC
Possible Response(s)
<CR><LF>^THERM: <ACTION><CR><LF>

19.3.2 Interface Description

This command sends an unsolicited report to the host when thermal protection active/inactive according temperature.

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19.3.3 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.

19.3.4 Property Description

Saving upon Power-off	PIN
NA	NA

19.3.5 Example

- The thermal protection is inactive:

```
Response:    ^THERM: 0
```

- The thermal protection is active:

```
Response:    ^THERM: 1
```


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20 Huawei Proprietary Interface: Power Config

20.1 AT^PWRCFG-Configure the Maximum Tx Power

20.1.1 Command Syntax

AT^PWRCFG=<mode>,<pdm>[,<band>[,<pdm>,<band>][...]]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^PWRCFG?
Possible Response(s)
<CR><LF>^PWRCFG: list of (<CR><LF><mode>: (<pdm>,<band>)s<CR><LF><CR><LF>OK<CR><LF>

AT^PWRCFG=?
Possible Response(s)
<CR><LF>^PWRCFG: list of supported (<CR><LF><mode>,list of supported <pdm>,list of supported <band>)s<CR><LF><CR><LF>OK<CR><LF>

20.1.2 Interface Description

This command sets and queries the maximum Tx power of each band.

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

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

The test command returns the supported parameter values.

There will be Tx power backoff in GPRS and EDGE for each band time-slot.

20.1.3 Parameter Description

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

0	GSM
1	WCDMA
2	CDMA (not supported currently)
3	LTE
4	TD-SCDMA (not supported currently)

<pdm>: indicates the maximum Tx power. The unit is 0.1 dBm, and the range is from x to y. x means the minimum value among all bands' maximum Tx power defined by the product specifications, and y means the maximum value. In fact, the range of maximum Tx power may be different between different platforms and bands. If <pdm> is not specified, the default value returned is the maximum Tx power defined by the product specifications.

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

Table 20-1 <mode>=0 (GSM)

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

Table 20-2 <mode>=1 (WCDMA)

Parameters	Band

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

Table 20-3 <mode>=2 (CDMA)

Parameters	Band
0000000000000001	BC0 A
0000000000000002	BC0 B
0000000000000004	BC1
0000000000000008	BC2
0000000000000010	BC3
0000000000000020	BC4
0000000000000040	BC5
0000000000000080	BC6
0000000000000100	BC7
0000000000000200	BC8
0000000000000400	BC9
0000000000000800	BC10
0000000000001000	BC11
0000000000002000	BC12
0000000000004000	BC13
0000000000008000	BC14
0000000000010000	BC15

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Parameters	Band
0000000000020000	BC16
0000000000040000	BC17
0000000000080000	BC18
0000000000100000	BC19
FFFFFFFFFFFFFFFF	All supported bands

Table 20-4 <mode>=3 (LTE)

Parameters	Band
0000000000000001	Band 1
0000000000000002	Band 2
0000000000000004	Band 3
0000000000000008	Band 4
0000000000000010	Band 5
0000000000000020	Band 6
0000000000000040	Band 7
0000000000000080	Band 8
0000000000000100	Band 9
0000000000000200	Band 10
0000000000000400	Band 11
0000000000000800	Band 12
0000000000001000	Band 13
0000000000002000	Band 14
0000000000004000	Band 15
0000000000008000	Band 16
0000000000010000	Band 17
0000000000020000	Band 18
0000000000040000	Band 19
0000000000080000	Band 20
0000000000100000	Band 21
0000000000200000	Band 22

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Parameters	Band
0000000000400000	Band 23
0000000000800000	Band 24
0000000001000000	Band 25
0000000002000000	Band 26
0000000004000000	Band 27
0000000008000000	Band 28
0000000010000000	Band 29
0000000020000000	Band 30
0000000040000000	Band 31
0000000080000000	Band 32
0000000100000000	Band 33
0000000200000000	Band 34
0000000400000000	Band 35
0000000800000000	Band 36
0000001000000000	Band 37
0000002000000000	Band 38
0000004000000000	Band 39
0000008000000000	Band 40
0000010000000000	Band 41
0000020000000000	Band 42
0000040000000000	Band 43
0000080000000000	Band 44
0000100000000000	Band 45
0000200000000000	Band 46
0000400000000000	Band 47
0000800000000000	Band 48
0001000000000000	Band 49
0002000000000000	Band 50
0004000000000000	Band 51
0008000000000000	Band 52
0010000000000000	Band 53

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Parameters	Band
0020000000000000	Band 54
0040000000000000	Band 55
0080000000000000	Band 56
0100000000000000	Band 57
0200000000000000	Band 58
0400000000000000	Band 59
0800000000000000	Band 60
1000000000000000	Band 61
2000000000000000	Band 62
4000000000000000	Band 63
8000000000000000	Band 64
FFFFFFFFFFFFFFFF	All supported bands

Table 20-5 <mode>=4 (TD-SCDMA)

Parameters	Band
0000000000000001	Band A
0000000000000002	Band B
0000000000000004	Band C
0000000000000008	Band D
0000000000000010	Band E
0000000000000020	Band F

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

20.1.4 Property Description

Saving upon Power-off	PIN
Y	N

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20.1.5 Example

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

```
Run:        AT^PWRCFG=0,330
Response:   OK
```

- Set the maximum Tx power of WCDMA Band I, Band II to be 24 dBm, WCDMA Band V and Band VIII to be 25.5 dBm:

```
Run:        AT^PWRCFG=1,240,0000000000000003,255,0000000000000090
Response:   OK
```

- Query the current maximum Tx power of each band:

```
Run:        AT^PWRCFG?
Response:   ^PWRCFG:                        Indicates that the maximum Tx
            0: 330,FFFFFFFFFFFFFFFF         power of all GSM bands is 33 dBm;
            1:                              WCDMA Band I and Band II are 24
            240,0000000000000003,255,0      dBm; WCDMA Band V and Band VIII
            000000000000090                 are 25.5 dBm; All LTE bands are
            3: 230,FFFFFFFFFFFFFFFF         23 dBm.

            OK
```

- Query the supported parameter values:

```
Run:        AT^PWRCFG=?
Response:   ^PWRCFG:                        Indicates that the product
            0,(260-340),00000000000F        supports GSM LTE and WCDMA
            000F                            network. The range of GSM Tx
            1,(235-260),000000000000        power is from 26 dBm to 34 dBm.
            009B                            The range of WCDMA Tx power is
            3,(230-250),000000000808        from 23.5 dBm to 26 dBm. The range
            00D7                            of LTE Tx power is form 23 dBm to
                                            25 dBm. The supported GSM bands
            OK                              are GPRS 850, GPRS 900, GPRS1800,
                                            GPRS1900, EDGE850, EDGE900,
                                            EDGE1800 and EDGE1900. The
                                            supported WCDMA bands are Band I,
                                            Band II, Band V and Band VIII. The
                                            supported LTE bands are Band 1,
                                            Band 2, Band 3, Band 5, Band 7,
                                            Band 8, Band 20 and Band 28.
```


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20.2 AT^PWRCFGON-Enable the Maximum Tx Power Configuration

20.2.1 Command Syntax

AT^PWRCFGON=<op>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^PWRCFGON?
Possible Response(s)
<CR><LF>^PWRCFGON: <status><CR><LF><CR><LF>OK<CR><LF>

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

20.2.2 Interface Description

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

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

The test command returns the supported parameter values.

20.2.3 Parameter Description

<op>:

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

<status>:

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

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20.2.4 Property Description

Saving upon Power-off	PIN
Y	N

20.2.5 Example

Enable the maximum Tx power configuration function:

```
Run:        AT^PWRCFGON=1
Response:   OK
```


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21 Huawei Proprietary Interface: Customer Production Line Tests Interface

21.1 AT^TMODE-Set the Operating Mode

21.1.1 Command Syntax

AT^TMODE=<test_mode>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^TMODE?
Possible Response(s)
<CR><LF>^TMODE:<status><CR><LF><CR><LF>OK<CR><LF>

AT^TMODE=?
Possible Response(s)
<CR><LF>^TMODE:<test_mode><CR><LF><CR><LF>OK<CR><LF>

21.1.2 Interface Description

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

21.1.3 Parameter Description

<test_mode>: test mode.

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

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1 Non-signaling mode, performing RF-related non-signaling control.
(In non-signaling mode, RF circuits on the module are disabled by default.)

3 Restart mode, instructing the module to perform a soft reset.

<status>: module switching status.

0 Switching is in progress.

1 Switching is complete.

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

21.1.4 Property Description

Saving upon Power-off	PIN
N	N

21.1.5 Example

None

21.2 AT^FCHAN-Set Non-signaling Channels

21.2.1 Command Syntax

AT^FCHAN=<mode>,<band_switch>,<channel>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^FCHAN?
Possible Response(s)
<CR><LF>^FCHAN:<mode>,<band_switch>,<ul channel>,<dl channel><CR><LF><CR><LF>OK<CR><LF>

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21.2.2 Interface Description

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

21.2.3 Parameter Description

<mode>:

0	WCDMA
3	GSM
6	FDD LTE

<band_switch>: frequency band.

Table 21-1 Mapping between operating bands and <band_switch> values

Operating Band		<band_switch>
GSM	EGSM900	6
	DCS1800	2
	GSM850	7
	PCS1900	1
	GSM450	9
	GSM750	17
WCDMA	I	0
	II	1
	III	2
	IV	15
	V	7
	VI	8
	VII	10
	VIII	6
	IX	3
	X	14
	XI	5

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Operating Band		<band_switch>
	XII	4
	XIII	9
	XIV	11
	XV	12
	XVI	13
	XVII	16
	XVIII	17
	XIX	18
	XX	19
	XXI	20
	XXII	21
	XXIII	22
	XXIV	23
	XXV	24
LTE	1	0
	2	1
	3	2
	4	3
	5	7
	6	21
	7	10
	8	6
	9	13
	10	14
	11	5
	12	16
	13	17
	14	19
	15	Reserved
	16	Reserved
	17	18

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Operating Band		<band_switch>
	18	8
	19	22
	20	20
	21	23
	24	4
	25	31
	26	Reserved
	27	Reserved
	28	Reserved
	29	Reserved
	30	Reserved
	31	Reserved
	32	Reserved
	33	25
	34	24
	35	12
	36	9
	37	26
	38	15
	39	27
	40	11
	41	28
	42	29
	43	30

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

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

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

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21.2.4 Property Description

Saving upon Power-off	PIN
N	N

21.2.5 Example

None

21.3 AT^TSELRF-Select RF Channel

21.3.1 Command Syntax

AT^TSELRF=<path>[,<group>]
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^TSELRF?
Possible Response(s)
<CR><LF>^TSELRF:<number><CR><LF><CR><LF>^TSELRF:<path>[,<support_group>[...]]<CR><LF>[<CR><LF>^TSELRF:<path>[,<support_group>[...]]<CR><LF>[...]]<CR><LF>OK<CR><LF>

21.3.2 Interface Description

This command sets the RF channel for a module. It takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off. This command is used in non-signaling mode (AT^TMODE=1).

21.3.3 Parameter Description

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

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

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9	FDD-LTE main channel
10	FDD-LTE diversity channel
11	FDD-LTE MIMO

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

21.3.4 Property Description

Saving upon Power-off	PIN
N	N

21.3.5 Example

```
Run:          AT^TSELRF?
Response:     ^TSELRF:7

              ^TSELRF:0

              ^TSELRF:1

              ^TSELRF:2

              ^TSELRF:3

              ^TSELRF:9

              ^TSELRF:10

              ^TSELRF:11

              OK
Run:          AT^TSELRF=1
Response:     OK
```


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21.4 AT^FRXON-Enable a Receiver in Non-signaling Mode

21.4.1 Command Syntax

AT^FRXON=<switch>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^FRXON?
Possible Response(s)
<CR><LF>^FRXON:<switch><CR><LF><CR><LF>OK<CR><LF>

21.4.2 Interface Description

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

21.4.3 Parameter Description

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

0 Disable the receiver.

1 Enable the receiver.

21.4.4 Property Description

Saving upon Power-off	PIN
N	N

21.4.5 Example

None

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21.5 AT^FLNA-Set the LNA Level of a Receiver

21.5.1 Command Syntax

AT^FLNA=<level>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^FLNA?
Possible Response(s)
<CR><LF>^FLNA:<level><CR><LF><CR><LF>OK<CR><LF>

AT^FLNA=?
Possible Response(s)
<CR><LF>^FLNA:<total level>[,<support level>,...]<CR><LF><CR><LF>OK<CR><LF>

21.5.2 Interface Description

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

21.5.3 Parameter Description

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

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

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

21.5.4 Property Description

Saving upon Power-off	PIN
N	N

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21.5.5 Example

None

21.6 AT^FRSSI-Obtain the Current Channel RSSI

21.6.1 Command Syntax

AT^FRSSI?
Possible Response(s)
<CR><LF>^FRSSI:<rvalue><CR><LF><CR><LF>OK<CR><LF>

21.6.2 Interface Description

This command reads the RSSI value in debugging mode, with no need for an SIM/USIM card. It must be executed after the command AT^FCHAN is run. If the product does not support the command, OK is returned. This command is used in non-signaling mode (AT^TMODE=1) and returns the error in other modes. This command needs to be executed after the non-signaling channel is set (AT^FCHAN) and the command AT^FRXON is set. This command takes effect once only. The settings by the command will not be reserved upon a soft or hard reset, that is, will not be saved upon a power-off.

21.6.3 Parameter Description

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

21.6.4 Property Description

Saving upon Power-off	PIN
N	N

21.6.5 Example

None

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21.7 AT^FWAVE-Set the Waveform in Non-signaling Mode

21.7.1 Command Syntax

AT^FWAVE=<type>,<amplitue_dbm_percent>
Possible Response(s)
<CR><LF>OK<CR><LF>

21.7.2 Interface Description

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

21.7.3 Parameter Description

<type>: type of the radiated waveform.

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

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

21.7.4 Property Description

Saving upon Power-off	PIN
N	N

21.7.5 Example

None

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21.8 AT^FTXON-Enable the Transmitter in Non-signaling Mode

21.8.1 Command Syntax

AT^FTXON=<switch>
Possible Response(s)
<CR><LF>OK<CR><LF>

AT^FTXON?
Possible Response(s)
<CR><LF>^FTXON:<switch><CR><LF><CR><LF>OK<CR><LF>

21.8.2 Interface Description

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

21.8.3 Parameter Description

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

0	Disable the transmitter
1	Enable the transmitter

21.8.4 Property Description

Saving upon Power-off	PIN
N	N

21.8.5 Example

None

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21.9 AT^GNSSCNO-Request GPS CN0

21.9.1 Command Syntax

AT^GNSSCNO
Possible Response(s)
[<CR><LF>^GNSSCNO: <svs>,<cno>[<CR><LF>^GNSSCNO: <svs>,<cno>[...]]<CR><LF>]<CR><LF>OK<CR><LF>

21.9.2 Interface Description

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

21.9.3 Parameter Description

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

0–32	GPS
33–64	SBAS
64–96	Glonass

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

21.9.4 Property Description

Saving upon Power-off	PIN
N	N

21.9.5 Example

- If no satellites are searched:

```
Run:        AT^GNSSCNO
Response:   OK
```

- If satellites are searched:

```
Run:        AT^GNSSCNO
```


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

              OK
```


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22 Appendix

22.1 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

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URC	Function
+XADPCLKFREQINFO	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)
^DATASETRULT	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

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URC	Function
^HCDS	Report a New Status Report Short Message
^HCMGS	Unsolicitedly 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
^HDRRSSI	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	Unsolicitedly Report Data Arrival in Data Receive Buffer
^IPSRVST	Unsolicitedly 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	Unsolicitedly Report Short Messages with Specified Destination Port Numbers
^NWNAME	Unsolicitedly Report NITZ Operator Name
^NWTIME	Unsolicitedly report network system time
^ORIG	Indicate the origination of a call
^OTACMSG	(Only for the HUAWEI specified client)
^PDPSTATUS	Unsolicitedly Report Deactivation Reason
^POSEND	Report positioning end information
^POSITION	Notify positioning result
^RFSWITCH	Report the RFSWITCH State

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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")
^SIMFILEREFRESH	(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

22.2 General CME Error List

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

Table 22-1 General CME ERROR Codes

Numeric mode	Verbose mode
0	phone failure
1	no connection to phone
2	phone adaptor link reserved

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Numeric mode	Verbose mode
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
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required

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Numeric mode	Verbose mode
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
263	unknown class
264	unknown network message
273	Minimum TFT per PDP address error
274	Duplicate TFT eval prec index

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Numeric mode	Verbose mode
275	Invalid TFT param combination
323	Parameters error

Table 22-2 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 22-3 GPS related CME ERROR Codes (Huawei proprietary)

Numeric mode	Verbose mode
276	GPS function disabled
277	Standalone disabled
278	AGPS disabled
279	gpsOneXTRA disabled
280	Cell-ID disabled
281	Invalid parameter
282	Unable to delete parameters
283	PD session is ongoing
284	PD session is in off status
285	too many parameters
286	invalid server address
287	GPS locked

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Numeric mode	Verbose mode
288	GPS type not supported
289	MGP receiver is ongoing

22.3 CMS Error List

The following lists the <err> value of CMS ERROR that may be returned by all AT commands of short messages.

<err> values used by common messaging commands:

Numeric mode	Verbose mode
0-127	3GPP TS 24.011 clause E.2 values
128-255	3GPP TS 23.040 clause 9.2.3.22 values.
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong
316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid index
322	memory full
330	SMSC address unknown

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Numeric mode	Verbose mode
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
...511	other values in range 256...511 are reserved
512...	manufacturer specific

22.4 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.

22.5 References

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

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[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 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] ETSI TS 102.221

[27] ETSI TS 102.223

[28] GSM 07.05

[29] GSM 11.11

[30] GSM MoU SE.13

[31] ITU-T E.212 Annex A

[32] ITU-T Recommendation V.250

[33] ITU-T Recommendation V.42

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

[35] ITU-T V.25 ter

[36] HUAWEI Terminal AT Command Interface Specifications

22.6 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
CUG	Closed User Group
DCD	Data Carrier Detection

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Acronym Or Abbreviation	Full Spelling
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 Optimized
EVPF	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
GLONASS	Global Navigation Satellite System
GMM	GPRS Mobility Management

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Acronym Or Abbreviation	Full Spelling
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	Circuit Card
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
IVS	In Vehicle System
IWF	Interworking Function

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Acronym Or Abbreviation	Full Spelling
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
PAP	Password Authentication Protocol
PC	Personal Computer

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Acronym Or Abbreviation	Full Spelling
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 Unblocking Key
QoS	Quality Of Service
RF	Radio Frequency
RFC	Request 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
SAR	Specific Absorption Rate
SC	Service Center

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Acronym Or Abbreviation	Full Spelling
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
UART	Universal Asynchronous Receiver/Transmitter
UCS	Universal Character Set

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Acronym Or Abbreviation	Full Spelling
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

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