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HUAWEI UMTS M2M Module AT

Command Interface Specification

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HUAWEI UMTS M2M Module AT Command Interface Specification

Keywords: UMTS, Module, WCDMA, GPRS, GSM

Abstract: This Document describes the AT command-based communication interface between TE and MS of Huawei UMTS Module. The interface can implement the functions such as voice call, SMS, telephone service, supplementary service, TCP, UDP and network setting.

List of abbreviations:

Abbreviations	Full spelling
TE	Terminal Equipment
MS	Mobile Station
SM	Short message
RSSI	Receive signal strength indicator
BER	Bit error rate
PLMN	Public land mobile network
RPLMN	Registered PLMN
URC	Unsolicited result code
DCS	Data coding scheme
DCE	Data Circuit Equipment
DTE	Data Terminal Equipment
CLIP	Call Line Identifier presentation
PDP	Packet Data Protocol
SCA	Service Center Address

This device complies with Part 15 of the FCC Rules [and with RSS-210 of Industry Canada]. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications made to this equipment not expressly approved by HUAWEI TECHNOLOGIES CO., LTD. may void the FCC authorization to operate this equipment.

Notes：

The max antenna gain is 2.15dBi.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons.

1 Scope

This document describes the AT interface of Huawei UMTS Module. The description on the AT interface is only limited to the interface packet itself, the usage and use procedure of TE and MS, and does not cover the contents which are not directly related to the interface.

Note: Reinforced insulation or double insulation must be provided to isolate DC source from AC mains supply.

1.1 Interface Overview

HUAWEI UMTS Module is a wireless terminal of UART or USB interface. It is used to provide data service, voice and SMS functions.

This document describes the AT interface. Therewith no description or definition explain for the document interface, and no temporary support to all kinds of parameter values, so no suggestion of usage.

In the subsequent AT command parameters, two formats are involved: <>, and [], as described below:

<...>   Parameters enclosed in angle brackets must be completed. Brackets themselves do not appear in the command line.

[...]   Optional subparameter of a command is enclosed in square brackets. Brackets themselves do not appear in the command line or response.

<CR>   Carriage return character, which value is specified with command S3.

<LF>   Linefeed character, which value is specified with command S4.
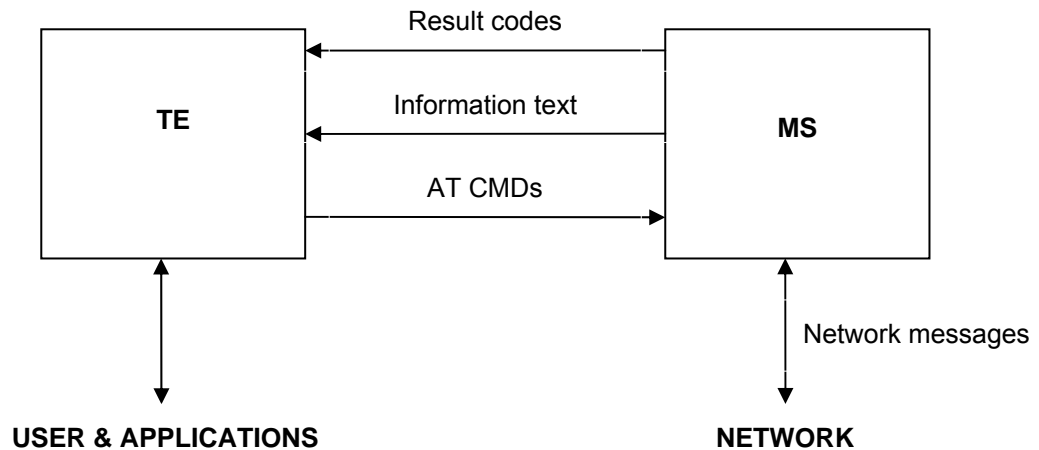
Figure 1 Block diagram of interaction between TE and MS

1.2 Interface Design Principles

1)   Each interface should be functionally convergent.

2)   Since the AT command is a packet transmitted via communication port, the packet size is limited. For the transmission of AT command, in addition to the two characters "AT", a maximum of 1600 characters can be received (including the empty characters

at the end). For the "response" message or URC reported by the board, the maximum length is limited to 1600 characters.

3)   Each command line can include only one AT command. For the URC instruction or response reported from MS to TE, only one AT command is allowed in a command line.

4)   In order to make the commands and response formats more readable and standard, except the original interfaces of Qualcomm, in all newly added interfaces, e.g. no space can be contained in the commands such as AT%XXX: <arg0>, <arg1>, or behind %, colon or comma. No redundant space is allowed at the head or end.

5)   After delivering each AT command, the TE cannot deliver the second AT command until the MS has made response to this AT command. Otherwise, the second AT command will not be executed.

6)   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 MS responds to the TE only after a long time of waiting, e.g. the "AT+CCFC=?" command receives a response only after a long time after the command is delivered, the MS may have received the reported instruction of RING on this occasion. Namely, the reporting of RING may interrupt other responses, and other URCs will not interrupt the response of command, and the interrupted part of the response will continue being reported.

7)   Unless otherwise specified, all default codes between TE and MS take on this format: GSM 7 bit Default Alphabet. See also Section 6 in protocol 23.038. The character @ is transmitted on the interface still according to 0x00 of 7bit coding. The board software and API should be able to process this character. The board uploads the carriage return character (<CR>) and linefeed character (<LF>) in the string in the form of space.

8)   a sort of compounding between quotation and comma can not exist in the string in this current version. For the data format of UCS2 code, the code value should be reported in the string format (if the code value is 0x553a, 553a should be reported).

9)   The "Possible response" sent from MS to TE is composed of "Information text" and "Result code", where "Information text" is optional, and "Result code" is mandatory. The format of "Possible response" is controlled by the ATV command, as detailed in the ATV command description. All "Possible responses" listed in the tables in this documents are in the ATV1 format.

1.3 Interface Change Principles

For the extended interface, parameters can be added behind the AT command. If the interface fails to meet the new requirements as detected in the later stage of product development, new parameters can be added on the basis of the original interface. In addition, for all the currently available interfaces, if the command received by MS is not identifiable, the "result code" of COMMAND NOT SUPPORT will be reported; if there is one surplus command parameter, the MS will report the "result code" of the corresponding TOO MANY PARAMETERS. No equal mark itself is deemed a surplus command parameter.

All newly added AT command interfaces of the E630 project team begin with "%". This project team specifies that: In the AT command name such as "AT%XXX", the number of X cannot be more than 9 currently.

2 Interface Introduction

All interfaces herein refer to the interfaces between TE and MS, and are used for guiding the implementation of the function requirements. The interface covers voice call, short message receiving and sending, data traffic flow, phone book statistics, supplementary service, and MS network system information setting.

For the commands sent from TE to MS, see also the detailed description in Appendix 16.1. Note that in the returned results of the TEST command, "," and "-" are different. For example, the returned result of "+CMGD=?" is: +CMGD: (1,5),(0-4), which means that the first parameter value may be 1 or 5, and the second parameter value may range from 0 to 4.

3 Query of Basic Information and Description of Set Interface

3.1 Terminal error report command +CMEE

3.1.1 Command Syntax

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

3.1.2 Description

This command is used to set whether to use result code: +CME ERROR:<err> indicates the error related to MS. When you set to use result code, the MS-related error will generate a result code: +CME ERROR: <err>, which will replace the ordinary ERROR result code. If the error reasons are not related to MS, the ordinary ERROR will still be returned.

3.1.3 Defined Values

<n>:

0   Do not use +CME ERROR :<err>result code, only ERROR is returned in case of error occurrence.

1   Use +CME ERROR :<err>result code, <err> adopts the error code value.

2   Use +CME ERROR :<err>result code, <err> adopts the detailed string value of the error.

<err>:

The value is given in the CME ERROR list in the Appendix.

3.2 Echo command E

3.2.1 Command Syntax

Command	Possible response(s)
E[<value>]	<CR><LF>OK<CR><LF>

3.2.2 Description

This command is used to set whether MS will echo the characters received from TE.

3.2.3 Defined Values

<value>:

0   MS does not echo the characters received from TE.

1   MS echoes the characters received from TE.

If no <value> is included, it is equivalent to the effect that the <value> is 0.

Note: Software may set ATE0 automatically.

3.3 Command line carriage return character S3

3.3.1 Command Syntax

Command	Possible response(s)
S3=<value>	<CR><LF>OK<CR><LF>
S3?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

3.3.2 Description

This command is used to set the command line carriage return character S3. S3 saves the command line carriage return character in the form of ASCII code value. This character is sent by TE. It means the end of a command line, and is identified by the MS. This character is also sent by MS, and serves as a part of the header, tail and end mark of the "result code" and "information response".

When using the "S3=<value>" command to set S3, the current S3 character can serve as carriage return character of this command line, and the "result code" of this command line will use the newly set S3 character immediately, rather than waiting until the next command line.

3.3.3 Defined Values

<value>:

0-127   The S3 character is set in the form of ASCII code value.

3.4 Response format character S4

3.4.1 Command Syntax

Command	Possible response(s)
S4=<value>	<CR><LF>OK<CR><LF>

| S4? | <CR><LF><value><CR><LF><CR><LF>OK<CR><LF> |

3.4.2 Description

This command is used to set the response format character S4. S4 saves the response format character in the form of ASCII code value. This character is sent by MS, and serves as a part of the header, tail and end mark of the "result code" and "information response".

If the S4 character is changed in a command line, the "result code" of this command line will use the new S4 character immediately, rather than waiting until the next command line.

3.4.3 Defined Values

<value>:

0-127   The S4 character is set in the form of ASCII code value.

3.5 ME response format command V

3.5.1 Command Syntax

Command	Possible response(s)
V[<value>]	<CR><LF>OK<CR><LF>

3.5.2 Description

This command is used to set the format of "result code" and "information response" of the AT command, including the composition of the header and tail, and the form of the result code contents. The result code contents may be in the form of numerals or detailed strings. The following table describes the influence of format setting on the format of "result code" and "information response". <cr> means S3 character, and <lf> means S4 character.

Table 1 Influence of V parameter on the response format

	V0	V1
Information responses	<text><cr><lf>	<cr><lf> <text><cr><lf>
Result codes	<numeric code><cr>	<cr><lf> <verbose code><cr><lf>

3.5.3 Defined Values

<value>:

0   MS sends the abbreviated header and tail, and uses the result code in the numeral form.

1   MS sends the complete header and tail, and uses the result code in the form of detailed strings.

If no <value> is included, it is equivalent to the effect that the <value> is 0.

3.6 Backspace character S5

3.6.1 Command Syntax

Command	Possible response(s)
S5=<value>	<CR><LF>OK<CR><LF>
S5?	<CR><LF><value><CR><LF><CR><LF>OK<CR><LF>

3.6.2 Description

This command is used to set the backspace character S5. S5 saves the backspace character in the form of ASCII code value. This character is sent by TE, and means to delete the previous character. It is identified by MS.

3.6.3 Defined Values

<value>:

0-127   The S5 character is set in the form of ASCII code value.

3.7 RSSI query function command +CSQ

3.7.1 Command Syntax

Command	Possible response(s)
+CSQ	<CR><LF>+CSQ: <rssi>,<ber><CR><LF><CR><LF>OK<CR><LF>
+CSQ=?	<CR><LF>+CSQ: (list of supported <rssi>s),(list of supported <ber>s) <CR><LF><CR><LF>OK<CR><LF>

3.7.2 Description

The EXECUTION command returns the RSSI and BER of ME.

The TEST command returns the supported RSSI and BER values.

3.7.3 Defined Values

<rssi>: Indication of the receiving signal strength

0   Equal to or less than -113 dBm

1   -111 dBm

2...30   -109... -53 dBm

31   Equal to or higher than -51 dBm

99   Unknown or unmeasurable.

<ber>(bit error rate): Currently, the BER query is not supported, and 99 will be returned after issuing the EXECUTION or TEST command.

3.8 RSSI level query function command + CSQLVL

3.8.1 Command Syntax

Command	Possible response(s)
+CSQLVL	\<CR>\<LF>\<uiPercent>,\<rssi>\<CR>\<LF>
+CSQLVL=?	\<CR>\<LF> +CSQLVL: \<uiPercent>,\<rssi>\<CR>\<LF>\<CR>\<LF>OK\<CR>\<LF>

3.8.2 Interface Description

This command is used to periodically reset the module automatically.

3.8.3 Defined Values

< uiPercent >: The grid of the signal.

0~5: Indicate the signal intensity.

\<rssi>: Indication of the receiving signal strength

0   Equal to or less than -113 dBm

1   -111 dBm

2...30   -109... -53 dBm

31   Equal to or higher than -51 dBm

99   Unknown or unmeasurable.

3.9 Operation mode setting command +CFUN

3.9.1 Command Syntax

Command	Possible response(s)
+CFUN=[\<fun>[,\<rst>]]	\<CR>\<LF>OK\<CR>\<LF> In case of MS-related error: \<CR>\<LF>+CME ERROR: \<err>\<CR>\<LF>
+CFUN?	\<CR>\<LF>+CFUN: \<fun>\<CR>\<LF>\<CR>\<LF>OK\<CR>\<LF> In case of MS-related error: \<CR>\<LF>+CME ERROR: \<err>\<CR>\<LF>
+CFUN=?	\<CR>\<LF>+CFUN: (list of supported \<fun>s), (list of supported \<rst>s)\<CR>\<LF>\<CR>\<LF>OK\<CR>\<LF>

3.9.2 Description

The "EXECUTION" command is used to set the MS mode or restart the MS.

The READ command is used to return the current mode.

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

3.9.3 Defined Values

<fun>:

0   Set as LPM (low power consumption) mode (previous mode must not be offline)

1   Set as online mode (default value) (previous mode must not be offline)

4   Set as offline mode (previous mode must not be FTM)

5   Set as offline FTM (previous mode must be online)

6   Reset MS (previous mode must be offline)

7   Set as RFoff mode (about radio frequency)

<rst>: Whether to restart MS before setting (currently not supported)

3.10 Manufacturer information query command +CGMI

3.10.1 Command Syntax

Command	Possible response(s)
+CGMI	<CR><LF><manufacturer><CR><LF><CR><LF>OK<CR><LF>
+CGMI=?	<CR><LF>OK<CR><LF>

3.10.2 Description

This command is used to query the manufacturer information.

3.10.3 Defined Value

<manufacturer>: Manufacturer information. Its value is a string.

3.10.4 Informative Examples

AT+CGMI

huawei

3.11 Software version number query command +CGMR

3.11.1 Command Syntax

Command	Possible response(s)
+CGMR	<CR><LF><softversion><CR><LF><CR><LF>OK<CR><LF>
+CGMR=?	<CR><LF>OK<CR><LF>

3.11.2 Description

The EXECUTION command returns the software version number of ME.

3.11.3 Defined Value

<softversion>: Software version number. It is a string composed of 31 characters at most.

3.12 IMSI query command +CIMI

3.12.1 Command Syntax

Command	Possible response(s)
+CIMI	<CR><LF><IMSI><CR><LF><CR><LF>OK<CR><LF>
+CIMI=?	<CR><LF>OK<CR><LF>

3.12.2 Interface Description

This command queries the IMSI value of the USIM card or SIM card.

3.12.3 Defined Value

<IMSI>: The IMSI value stored in the card is returned directly. The returned value is a string composed of decimal digits that range from 0 to 9. Its composition is as follows:

A total of 15 characters or less		
3 char	2 or 3 char	
MCC	MNC	MSIN

MCC   Country code

MNC   Network code, GSM application

MSIN   Identifies the identity of the mobile subscriber

3.12.4 Informative Examples

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

```
AT+CIMI
1234512345678
```

3.13 IMEI query command +CGSN

3.13.1 Command Syntax

Command	Possible response(s)
+CGSN	<CR><LF><IMEI><CR><LF><CR><LF>OK<CR><LF>
+CGSN =?	<CR><LF>OK<CR><LF>

3.13.2 Interface Description

This command is used to query the IMEI of board.

3.13.3 Defined Value

<IMEI>: The IMEI value of the board is returned directly. The returned value is a string composed of:

8 char	6 char	1 char
TAC	SNR	Spare

TAC   Type code allocated for device

SNR   Sequence number of the device

Spare   For standby purpose

3.13.4 Informative Examples

If TAC is "35154800", SNR is "022544", and Spare is "4", then

AT+CGSN

```
351548000225444
```

3.14 SPN read function command %SPN

3.14.1 Command Syntax

Command	Possible response(s)
%SPN=<spn_type>	<CR><LF>%SPN:<disp_rplmn>,<coding>,<spn_name><CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
%SPN=?	<CR><LF>%SPN: (list of supported < spn_type >)<CR><LF><CR><LF>OK<CR><LF>

3.14.2 Description

This command is used for TE to query the SPN file of 2G/3G currently stored on the SIM/USIM card through the ME.

3.14.3 Defined Values

<spn_type>:

0   GSM_SPN

1   USIM_SPN

<disp_rplmn>:

0   Do not display RPLMN

1   Display RPLMN

99   This field is invalid, and it is not necessary to read the spn_name field any longer.

<coding>: Coding scheme. It means the character code of the spn_name field, and specifies the language.

0   GSM 7 bit Default Alphabet

1   RAW mode (namely, upload the spn_name in the format of original data).

<spn_name>: A string. In case of GSM7bit code, the string is composed of 16 characters at most. When the coding scheme is 1, and the contents of the string are data described by "hexadecimal text value", the string will not be greater than 32. When the coding mode reported on the board is "RAW mode", this parameter should be completed as a hexadecimal numeral with 0x removed.

3.14.4 Informative Examples

For example: When the 7bit coding format of SPN is read as "Vodafone", the following will be fed back after the read result is reported: %SPN:1,0,"vodafone"; if it is "China Mobile" in the USC2 coding format, the following will be fed back: %SPN:1,1,"804E2D56FD79FB52A8".

3.15 Hardware version number query function %HWVER

3.15.1 Command Syntax

Command	Possible response(s)
%HWVER	<CR><LF>%HWVER:<hardversion><CR><LF><CR><LF>OK<CR><LF>

3.15.2 Description

The EXECUTION command returns the hardware version number of ME.

3.15.3 Defined Value

<hardversion>: Hardware version number. It is a string composed of 31 characters at most.

3.16 Unsolicited report control command %CURC

3.16.1 Command Syntax

Command	Possible response(s)
%CURC=<mode>	<CR><LF>OK<CR><LF>
%CURC?	<CR><LF>%CURC:<mode><CR><LF><CR><LF>OK<CR><LF>
%CURC=?	<CR><LF>%CURC: (list of supported <mode>s)<CR><LF> <CR><LF>OK<CR><LF>

3.16.2 Interface Description

The SET command is used to set mode value to open or close unsolicited reports. The unsolicited reports it can control are listed below: %DSFLOWRPT, %RSSI, %MODE, %SIMST, %SRVST, %MODE, %EARST, %SMMEMFULL. The unsolicited reports are closed if the mode value is set to 0 and the unsolicited reports are open if the mode value is set to 1. The default value of mode is set to 0. So, "%CURC=1" should be executed if all the unsolicited reports need to be open.

The READ command returns the current mode value.

The TEST command returns the value range it supports.

Unsolicited report is disabled after reset.

3.16.3 Defined Values

<mode>:

0   the unsolicited reports closed (default value)

1   the unsolicited reports open

3.17 Product model ID command +CGMM/+GMM

3.17.1 Command Syntax

Command	Possible response(s)
+CGMM	<model>
+GMM	<model>

3.17.2 Interface Description

This command is used to get product model ID, the function of +CGMM and +GMM are identical. But the command +CGMM can be used when module have not SIM/USIM card . Product mode ID is composed of character string, the max length can not beyond 2048 byte , including the end character '\0' .

3.17.3 Defined Value

At present , the value of model id including :

EM700, EM770W.

EM700 HUAWEI 3G M2M MODULE-WCDMA/EDGE/GPRS/GSM

EM770W HUAWEI 3G M2M MODULE-HSPA/WCDMA/EDGE/GPRS/GSM

3.18 Network information query %NWINFO

3.18.1 Command Syntax

Command	Possible response(s)
%NWINFO	<CR><LF>%NWINFO: <srv_band>,< srv_nodeB_PLMN >, < srv_nodeB_BS >,<srv_cell_stat >,<srv_psc>,<neighbor_cell_num>,<neig_psc1>,<neig_psc2>,<neig_psc3>,<neig_psc4>,<neig_psc5>,<neig_psc6> <CR><LF><CR><LF>OK<CR><LF>

3.18.2 Interface Description

This command is used to query the registered network information of the wireless module in the normal state, includes serving cell information, neighbour cells information of the active set, base station ID, frequency and so on.

3.18.3 Defined Values

< srv_band >: Information of frequency the wireless module registered.

43（SYS_BAND_GSM_850）   GSM 850

44（SYS_BAND_GSM_EGSM_900）   Extended GSM 900

45（SYS_BAND_GSM_PGSM_900）   Primary GSM 900

47 （SYS_BAND_GSM_DCS_1800）   GSM DCS systems

48（SYS_BAND_GSM_PCS_1900）   GSM PCS

80（SYS_BAND_WCDMA_I_IMT_2000）   WCDMA IMT 2000

87 (SYS_BAND_WCDMA_VIII_900)   WCDMA PCS 900

< srv_nodeB_PLMN > and < srv_nodeB_BS >: Information of base station the wireless module maintained.

0～255: Base station ID.

Note: It only supports to query base station information at GSM mode now, and returns 0,0 at WCDMA mode.

<srv_cell_stat >: Serving cell state.

0: Indicates not register on serving cell currently.

1: Indicates register on serving cell currently.

<srv_psc>: Serving cell primary scrambling code.

0～65535: Serving cell primary scrambling code.

Note: It returns primary scrambling code at WCDMA mode but cell id at GSM mode.

<neighbor_cell_num>: Number of neighbour cells.

0～6: It supports to maintain six neighbour cells at most.

<neig_psc1>...<neig_psc6>: Primary scrambling code of neighbour cells.

0～65535: Primary scrambling code of neighbour cells.

Note: It returns primary scrambling code at WCDMA mode but cell id at GSM mode.

3.19 Temperature of PA and source voltage query %CONINFO

3.19.1 Command Syntax

Command	Possible response(s)
%CONINFO	<CR><LF>%CONINFO:<PA_temp>,<source_voltage><CR><LF><CR><LF>OK<CR><LF>

3.19.2 Interface Description

This command is used to query PA temperature of the module high frequency and external source voltage. To acquire module state by user for convenience, and help to consider if it has to be protected for safety.

3.19.3 Defined Values

<PA_temp>: PA temperature of high frequency.

-30～75: Range of PA temperature.

<source_voltage>: Source voltage.

3200～4300: Range of effective source voltage supported by module, indicates in mV.

3.20 Voltage warning %WARNVOLT

3.20.1 Command Syntax

Command	Possible response(s)
	<CR><LF>%WARNVOLT:<source_voltage><CR><LF>

3.20.2 Interface Description

This command is used to report current source voltage value to user automatically when external source input is out of range 3.6V to 4.2V. To acquire module state by user for convenience, and help to consider if it has to be protected for safety. If the voltage is lower than 3.3V or higher than 4.5V, module will be shut down.

3.20.3 Defined Values

<source_voltage>: Source voltage.

3200～4300: Voltage warning value, indicates in mV.

Note: The %CURC command has no bearing upon automatic report of the voltage warning.

3.21 Module delay resetting %RESET

3.21.1 Command Syntax

Command	Possible response(s)
%RESET=<delay_time>	<CR><LF>OK<CR><LF>
%RESET?	<CR><LF>%RESET:<delay_time><CR><LF><CR><LF>OK<CR><LF>
%RESET=?	<CR><LF>%RESET:(range of supported <delay_time>)<CR><LF><CR><LF>OK<CR><LF>

3.21.2 Interface Description

This command is used to delay to reset module by user.

3.21.3 Defined Values

<delay_time>: Delay time.

0: Disable the function of this command.

1～65535: Delay time, indicates in second.

Note: We can't use this command to reset module at FTM mode, it's need to switch module to ONLINE mode to use the command again.

3.22 Clock +CCLK

3.22.1 Command Syntax

Command	Possible response(s)
+CCLK=<time>	<CR><LF>OK<CR><LF>
	In case of MS-related error:
	<CR><LF>+CME ERROR: <err><CR><LF>
+CCLK?	+CCLK: <time>
+CCLK=?	<CR><LF>OK<CR><LF>

3.22.2 Interface Description

Set command sets the real-time clock of the MT. If setting fails in an MT error, +CME ERROR: <err> is returned.

Read command returns the current setting of the clock.

3.22.3 Defined Values

<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (indicates the difference, expressed in quarters of an hour, between the local time and GMT; range -47...+48). E.g. 6th of May 1994, 22:10:00 GMT+2 hours equals to "94/05/06,22:10:00+08"

NOTE: If MT does not support time zone information then the three last characters of <time> are not returned by +CCLK?.

4 SMS Interface Description

4.1 Select the SMS type +CSMS

4.1.1 Command Syntax

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

4.1.2 Description

The SET command is used to set the message service type. The returned <mt>, <mo> and <bm> mean whether this service type is supported for the messages received by the terminal, messages sent by the terminal, and the broadcast messages.

4.1.3 Defined Values

<service>: Message service type.

0   3G TS 23.040, 3G TS 23.041 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2 version 4.7.0)

1   3G TS 23.040, 3G TS 23.041 (the syntax of SMS AT commands is compatible with GSM 07.05 Phase 2+ version; note: command AT+CNMA requires <service> setting 1.)

<mt>, <mo>, <bm>:

0   Not supported.

1   Supported.

4.2 Set message format +CMGF

4.2.1 Command Syntax

Command	Possible response(s)

+CMGF[=<mode>]	<CR><LF>OK<CR><LF>
+CMGF?	<CR><LF>+CMGF: <mode><CR><LF><CR><LF>OK<CR><LF>
+CMGF=?	<CR><LF>+CMGF: (list of supported <mode>s)<CR><LF><CR><LF>OK<CR><LF>

4.2.2 Description

The SET command is used to set the format of the short message. The format has two modes, and depends on the <mode> parameter. The two modes are: PDU mode and text mode. The "text" mode is unable to display Chinese, so currently, only the PDU mode is used. For the format of message in the PDU mode, see also "+CMGS command".

The READ command is used to return the current mode selection.

The TEST command returns the applicable <mode> values.

4.2.3 Defined Values

<mode>:

0   PDU mode

1   text mode not supported currently.

If no <mode> is included, it is equivalent to the effect that the <mode> is 0.

4.3 Message arrival indication +CMTI

4.3.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CMTI: <mem>,<index><CR><LF>

4.3.2 Description

Indicate that a new message (or new message report) is received.

4.3.3 Defined Values

<mem>: Currently, only "SM" is supported.

"BM"   Broadcast message storage

"ME"   ME message storage

"MT"   ME-associated storage

"SM"   (U)SIM message storage

"TA"   TA message storage

"SR"   State report storage

<index>: Integer value, which indicates the position in the storage.

4.4 Indication of new message reported directly +CMT

4.4.1 Command Syntax

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

4.4.2 Description

Received new messages are not stored, but reported to TE directly.

4.4.3 Defined Values

<reserved>: Reserved.

<length>: Integer value, which indicates the number of bytes of PDU data.

<pdu>: Protocol data unit. Its format is the same as defined in section "Message list command".

4.5 Newly received message state report +CDSI

4.5.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CDSI: <mem>,<index><CR><LF>

4.5.2 Description

Indicate that a new message state report is received, and specify the storage position.

4.5.3 Defined Values

<mem>: Currently, only "SM" is supported.

"SM"　　(U)SIM message storage

<index>: Integer value, which indicates the position in the storage.

4.6 Indication of new message state report reported directly +CDS

4.6.1 Command Syntax

Command	Possible response(s)
	<CR><LF>+CDS: <length><CR><LF><pdu><CR><LF>

4.6.2 Description

Received new messages are not stored, but reported to TE directly.

4.6.3 Defined Values

<length>: Integer value, which indicates the number of bytes of PDU data.

<pdu>: Protocol data unit. The data structure is as follows:

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

Where, the <SCA>, <sc_len>, <type_addr>, and <numbers> fields are defined in the same way as in the section "Message sending command".

The data structure of TPDU is as follows:

Abbr.	Reference	P[1]	R[2]
TP-MTI	TP-Message-Type-Indicator	M	2b
TP-UDHI	TP-User-Data-Header-Indication	O	b
TP-MMS	TP-More-Messages-to-Send	M	b
TP-SRQ	TP-Status-Report-Qualifier	M	b
TP-MR	TP-Message-Reference [3]	M	I
TP-RA	TP-Recipient-Address	M	2-12o
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o
TP-DT	TP-Discharge-Time	M	7o
TP-ST	TP-Status	M	o
TP-PI	TP-Parameter-Indicator	O	o
TP-PID	TP-Protocol-Identifier	O	o
TP-DCS	TP-Data-Coding-Scheme	O	o
TP-UDL	TP-User-Data-Length	O	o
TP-UD	TP-User-Data	O	

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

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

4.7 New message notification setting +CNMI

4.7.1 Command Syntax

Command	Possible response(s)
+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	<CR><LF>OK<CR><LF> In case of SMS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CNMI?	<CR><LF>+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr><CR><LF><CR><LF>OK<CR><LF>
+CNMI=?	<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>

4.7.2 Description

The "SET" command is used to set the program of reporting new message to TE, where,

<mode> and <bfr> are used to set the mode of reporting the new message notification (including four types: +CMT, +CMTI, +CDSI, +CDS) to the TE.

<mt> is used to set whether reporting the new message to the TE, or storing the new message in the MS and reporting the storage position when a new message is received.

<bm> is not in use currently.

<ds> is used to set whether to report the message state report (+CDSI, +CDS).

The TEST command returns the supported parameter values.

Note: The set value of this command will be cleared to 0 after the MS is restarted. In this case, no new message will be reported. The "AT+CNMI=0,0,0,0,0" mode is not recommended.

4.7.3 Defined Values

<mode>: Set the message notification mode.

0   Buffer the message in the ME. If the buffer of ME is full, the new notification will overwrite the old notification.

1   Send the message notification to the TE directly. When it is impossible to send the notification (e.g. when in the online data mode), the notification will be discarded.

2   Report the message notification and message state report to the TE directly. When it is impossible to send them (e.g. when in the online data mode), the message notification will be buffered in the ME, and will be sent to the TE at a time later.

Note: The message notifications are buffered in the volatile storage. If the MS is powered off before sending the message, the message will probably be lost. Therefore, in case of <mode>=0 or 2, it is not allowed to use direct forwarding of message (<mt>=2 and 3

<mt>: Set the rules of storing and notifying the received messages.

New messages can be stored and notified in the following three modes:

1   If SMS-DELIVER is not stored into MS, SMS-DELIVERs are routed directly to TE.

+CMT: [<reserved>], <length><CR><LF><pdu>

2   If SMS-DELIVER is stored into MS, indication of the memory location is routed to the TE.

+CMTI: <mem>,<index>

3   If SMS-DELIVER is stored into MS, SMS-DELIVER indication is not routed to TE.

In the above three modes, the interaction between TE and MS is shown in the following diagram.
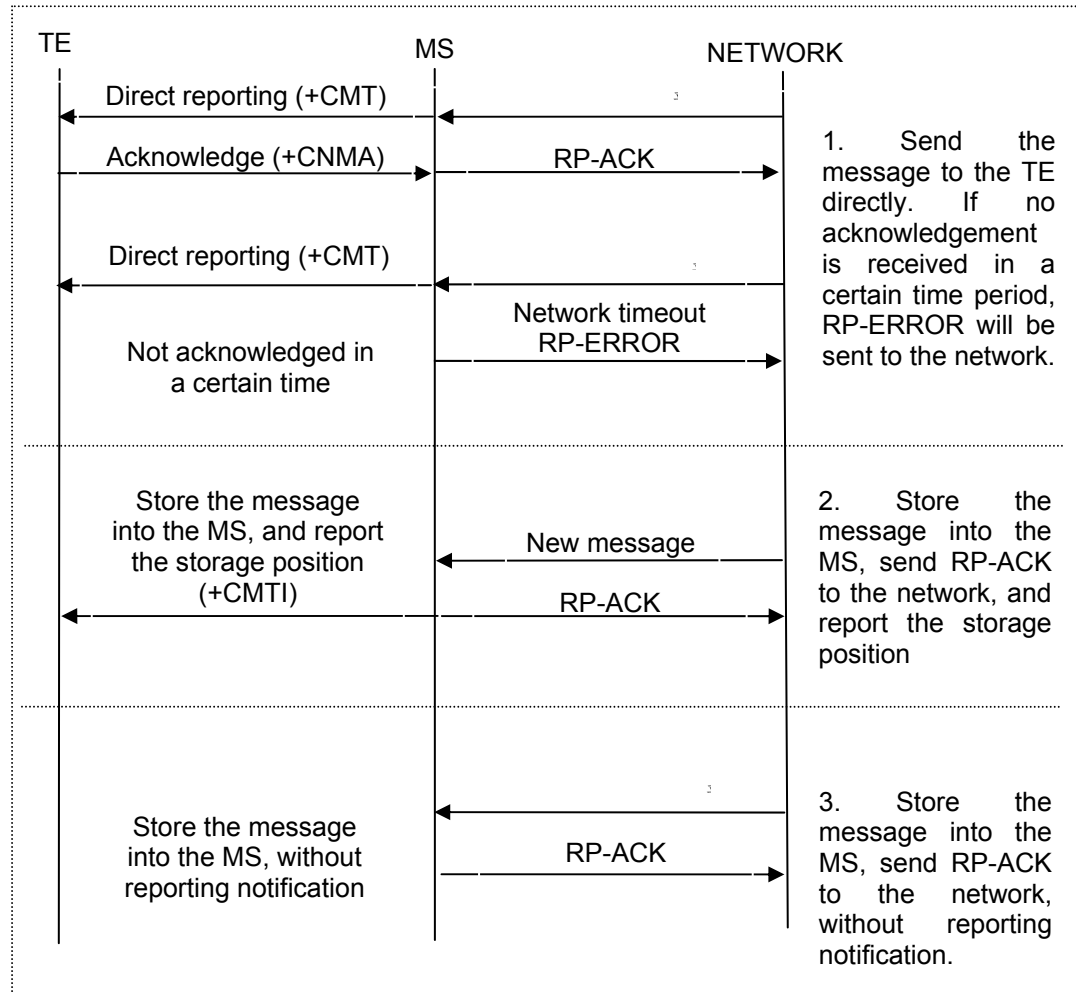
The relationship between the parameter value of <mt> and the mode of storing and notifying various messages is shown in the following table.

<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 class of message is given by the TP-DCS domain of the message. For details, see the DCS parameter description of the "+CMGS" command.

+CMT & +CNMA means requiring TE to send a confirmation (+CNMA).

<bm>: For use of setting the cell broadcast information. It is not supported currently.

<ds>: For use of setting the message acknowledgement.

0   Do not send message acknowledgement to the TE.

1   Do not store message acknowledgement in MS, route message acknowledgement directly to TE.

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

2   If the message acknowledgement is stored in the MS, a storage position notification will be sent to the TE via "+CDSI".

+CDSI: <mem>,<index>

<bfr>: For use of setting buffer processing after transition from <mode>=0 to <mode>=1, 2.

0   After entering the <mode>1-2, the buffered unsolicited result codes will be sent to the TE at a time.

1   After entering the <mode>1-2, the buffered unsolicited result codes will be emptied.

4.7.4 Informative Examples

For example, set CNMI=1,1,0,1,0.

It indicates that the new class1 messages will be stored in the MS first, and the storage position will be reported (+CMTI: ME,1}; the message state reports will be reported directly (+CDS:).

When it is impossible to report the message notification (e.g. when in the online data mode), the message notification will be discarded.

4.8 Delete Message +CMGD

4.8.1 Command Syntax

Command	Possible response(s)
+CMGD=<index>[,<delflag>]	<CR><LF>OK<CR><LF> In case of SMS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGD=?	<CR><LF>+CMGD: (list of supported <index>s)[,(list of supported <delflag>s)]<CR><LF><CR><LF>OK<CR><LF>

4.8.2 Description

EXECUTION command deletes message from memory <mem1> location <index>. For the setting of <mem1> and description, see the "+CPMS command". If the second

parameter <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below. If deleting fails, +CMS ERROR: <err> is returned.

TEST command returns the valid memory locations and the supported values of <delflag>.

The TEST command returns the storage position where the message is currently stored, and the supported <delflag> values.

4.8.3 Defined Values

<index>: Storage position of message

<delflag>:

0 (or default)   Delete the messages specified by <index>.

1   Delete all read messages from preferred message storage, leaving unread messages stored mobile originated messages (whether sent or not) untouched.

2   Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched.

3   Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.

4   Delete all messages from preferred message storage including unread messages.

4.9 New Message Acknowledgement to +CNMA

4.9.1 Command Syntax

Command	Possible response(s)
+CNMA[=<n>[,<length>[<CR> ***PDU is given***<ctrl-Z/ESC>]]]	<CR><LF>OK<CR><LF> In case of SMS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CNMA=?	<CR><LF>+CNMA: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

4.9.2 Description

EXECUTION command confirms reception of a new message which is routed directly to the TE. This acknowledgement command shall be used when +CSMS parameter <service> equals 1. For the usage of this command, see also description of "+CNMI" command.

In PDU mode, it is possible to send either positive (RP-ACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent.

Optionally, an acknowledgement TPDU (SMS-DELIVER-REPORT for RP-ACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command Send Message +CMGS, except that the format of <ackpdu> is used instead of <pdu>. PDU shall not be bounded by double quotes.

MS shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.

If ME does not get acknowledgement within required time (network timeout), ME should send RP-ERROR to network, and should shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.

To make the MS report the message notification again, you need to set <mt> and <ds> again.

If the command is executed but no message is available for confirmation, the "+CMS ERROR" will be returned: <err>

The TEST command returns the supported <n> values. If only 0 is supported, it indicates that the command does not support TPDU sending.

4.9.3 Defined Values

<n>:

0   This option is not supported currently.

1   If the sending is successful, acknowledge with "RP-ACK (or receiving buffered result code successfully).

2   If the sending is unsuccessful, acknowledge with "RP-ERROR".

<ackpdu> description:

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	Indicate that TP-UD has a header
TP-PI	TP-Parameter-Indicator	M	o	Indicate which optional parameters exist
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:

1) Whether it is mandatory or optional: Mandatory (M) or Optional (O).

2) Indicates: Integer (I), Bit (b), 2 bits (2b), octet (o).

3) Depends on TP-DCS.

Table 2 Bit number

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 |

The 7th bit and bits 2~5 of the first byte are not used in SMS-DELIVER-REPORT, and the sender should set them to 0. If any bit of them is not 0, the receiver should ignore them.

Description:

<TP-MTI>: TP-message type. Bits 0 and 1 in the first byte.

bit1 bit0 Message type

0	0	SMS-DELIVER (in the direction SC to MS)
0	0	SMS-DELIVER REPORT (in the direction MS to SC)
1	0	SMS-STATUS-REPORT (in the direction SC to MS)
1	0	SMS-COMMAND (in the direction MS to SC)
0	1	SMS-SUBMIT (in the direction MS to SC)
0	1	SMS-SUBMIT-REPORT (in the direction SC to MS)
1	1	Reserved

< TP-UDHI >: Indicates that TP-UD has a header. It is located in bit 6 in the first byte.

0   TP-UD domain contains only messages.

1   The beginning of TP-UD domain has a header.

< TP-PI >: Indicates which optional parameters exist. If the bit is set as 1, it means no corresponding parameter exists.

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

<TP-PID>: Protocol ID. The default value set by TE when sending the message is 00000000. If the transmitting address is an E-mail, the TE should fill in 00110010=0x32.

<TP-DCS>: While sending the message, the TE selects the TP-DCS mode.

bit7~bit6(while sending the message, the TE selects the TP-DCS mode)	00, while sending the message, the TE selects this value.	bit5	0	If TE sets bit5 to be 0, it indicates no message is compressed.
			1	If bit5 is 1, it indicates the sent message is compressed, and TE does not select this value.
		bit4	0	If TE sets bit4 to be 0, it indicates that bit1 and bit0 are reserved, and the value is 00.
			1	If bit4 is 1, it indicates that bit1 and bit0 have the meaning of message type (The message type depends on the user's settings. If the message type is set by the user, TE sets bit4 to be 1, e.g. set class 1 or class 2).
		bit3~2 (message code format)	0 0	GSM 7 bit default code
			0 1	8bit data

			1 0	UCS2 code mode. When the user inputs Chinese characters, the TE will select this value.
		bit1~0 (message type, its value is selected by TE according to the user's options)	0 0	Class 0, provided to the interface to display and reply that the SC has received but not stored it.
			0 1	Class 1, stored to the MS (i.e., NV), or stored to the SIM card when the MS is full
			1 0	Class 2, for special use of SIM. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported.
			1 1	Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.
bit7~4 (while sending the message, the TE does not select this TP-DCS mode)	1100 and 1101 (GSM 7 bit code), 1110 (uncompressed UCS2 code)	bit3	0	The message wait prompt function is invalid. Currently, the functions that require prompting, e.g. enforcement message, E-mail and voice mail, are not supported.
			1	Activate the message waiting prompt function
		bit2	0	Reserved bits, which make no sense.
		bit1~0 (message waiting type)	0 0	With voice message waiting.
			0 1	With fax message waiting.
			1 0	With E-mail message waiting.
			1 1	Message waiting of other unknown types
	1111 (TE does not select this value either)	bit3	0	Reserved bits, which make no sense.
		bit2	0	7bit code
			1	8bit data
		bit1~0	0 0	Class 0, providing display and reply to SC that the message is received but not stored.
			0 1	Class 1, stored to the MS (i.e., NV), or stored to the SIM card
			1 0	Class 2, for use of SIM only. After storing it, the storage state is returned to the SC.

				1 1	Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.

<TP-UDL>: Number of bytes occupied by the "user data" domain. If the value is 0, the "User data" domain does not exist.

<TP-UD>: The "user data" domain may include "user data header". If it includes the header (namely, the value of bit6 in byte0 is 1), the value of TP-UDL is equal to the length filled in the "User-Data-Header" plus the length of "User-Data". The value of TP-UDL depends on the specific coding mode. If it is a 7-bit default code, it indicates that there are a total of how many septets; if it is a 8-bit code, it indicates there are a total of how many Octets; if it is a UCS2 code, the TP-UDL still means a total of how many Octets; if there are compressed 7-bit or 8bit or UCS2 codes, the TP-UDL indicates there are a total of how many Octets after compression. The specific representation structure in the "User data" domain is shown in the following diagram:
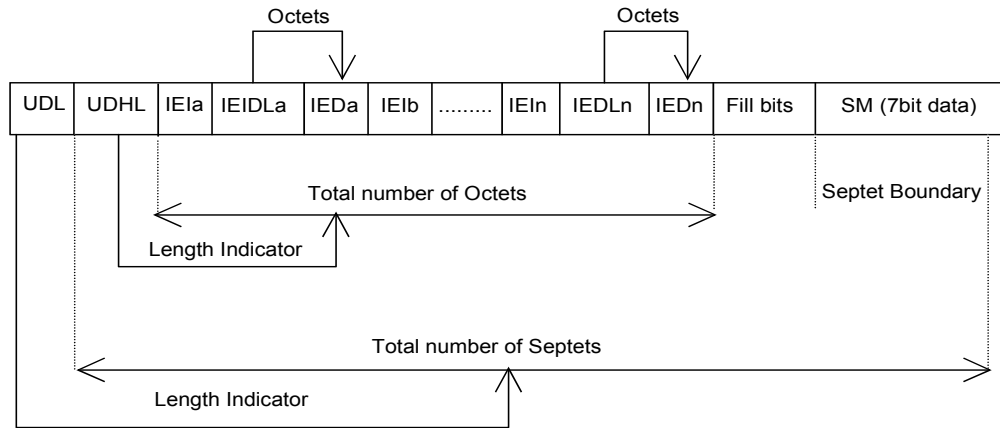
Format of User data of the default 7bit code
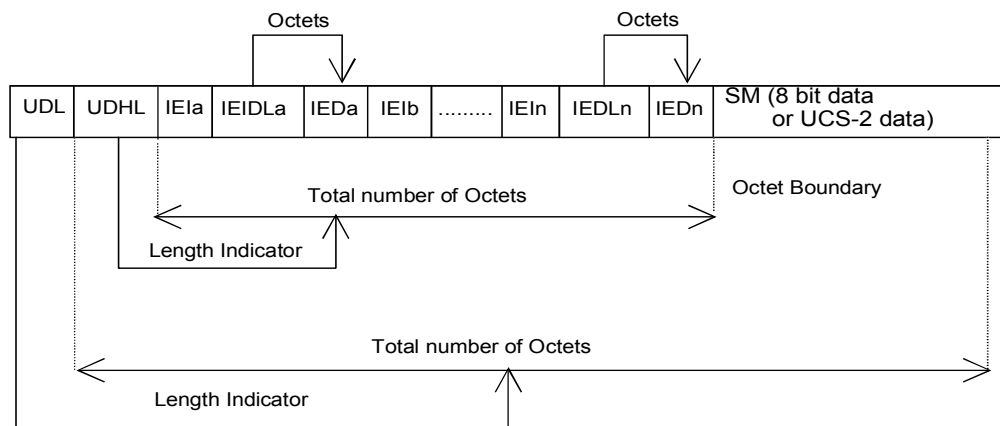
Format of User data of 8bit code or UCS2 code

The above two diagrams show the format of filling in the User data, where IEI means "Information Element Identifier".

4.10 Message storage selection +CPMS

4.10.1 Command Syntax

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

4.10.2 Description

The SET command is used to set the message storage media corresponding to the message read/write operations, and return the current use state of the selected media. The READ command returns the name and use state of the currently selected media. The TEST command returns all the media types supported by the MS.

4.10.3 Defined Values

<mem1>:

String value. It indicates the media for use of reading and deleting messages. Optional values are:

"SM", which means the (U)SIM card.

<mem2>:

String value. It indicates the media for use of writing and sending messages. The optional values are the same as those of <mem1>.

<mem3>:

String value. It indicates the media for use of storing the received message. The optional values are the same as those of <mem1>.

<total1>:

Integer value. It indicates the total number of messages that can be saved in <mem1>.

<total2>:

Integer value. It indicates the total number of messages that can be saved in <mem2>.

<total3>:

Integer value. It indicates the total number of messages that can be saved in <mem3>.

<used1>:

Integer value. It indicates the total number of messages currently stored in <mem1>.

<used2>:

Integer value. It indicates the total number of messages currently stored in <mem2>.

<used3>:

Integer value. It indicates the total number of messages currently stored in <mem3>.

4.11 Reporting message storage media being full %SMMEMFULL

4.11.1 Command Syntax

Command	Possible response(s)
	<CR><LF>%SMMEMFULL:<mem_type><CR><LF>

4.11.2 Description

When the message storage media overflow, the event will be reported automatically.

4.11.3 Defined Values

<mem_type>:

String value. It indicates the type of the overflowing media.

"SM", which means the (U)SIM card. (Status will not be reported because of the custom-built requirement of Maxon. The oldest message which stored in SM will be replaced by the new message automatically if SM is full. So there is no "SMMEMFULL" report.)

"ME", which means NV

4.12 SMSC number command +CSCA

4.12.1 Command Syntax

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

4.12.2 Description

The SET command is used to set the SMSC number. For the message in the PDU mode, the setting of this command can be used only if the SMSC-related parameter

sc_len has the value of 0 (for the PDU format, see the "+CMGS" command) in the PDU.

4.12.3 Defined Values

<sca>:

String value. It indicates the SMSC number. The number is composed "*", "#" and "0"-"9". The number contains 20 characters at most.

<tosca>:

Integer value. It indicates the number type, where "145" means an international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

If no <tosca> parameter is included, it is equivalent to the effect that the <tosca> parameter is not modified.

4.13 Message sending +CMGS

4.13.1 Command Syntax

Command	Possible response(s)
+CMGS=<length><CR> ***PDU is given***<ctrl-Z/ESC>	<CR><LF>+CMGS: <mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF> In case of SMS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGS=?	<CR><LF>OK<CR><LF>

4.13.2 Interface Description

Send a message to the network side. The process of sending a message includes two steps:

First, deliver "+CMGS=<length>" ended with (CR).

After MS returns <CR><LF><greater_than><space>(IRA 13, 10, 62, 32), the TE delivers the PDU packet, which is ended with <ctrl-Z>(IRA 26).

4.13.3 Defined Values

<length>: The number of actually sent TPDU characters/2. The digits are decimal numbers that range from 0 to 9. The maximum value is 178.

<mr>: Message ID. The digits are decimal numbers that range from 0 to 9. The value range is: 0~255

<ackpdu>: When the value of <service> in "+CSMS" is 1, which is supported by the network, this field will be returned. Unless no SCA exists, the format is the same as the format of PDU. This field is not supported currently.

<ctrl-Z>: Identifies the end of a PDU data. The characters are: '0x1A'

<ESC>: Cancels the sending of this message. The characters are: '0x1B'

The structure of the PDU packet is as follows: (The values of the characters described in the packet are: 0~9, A~F, a~f. Two characters make up one Octet value. for example: '23'=0x23, '2a'=0x2a, all are hexadecimal}

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

<SCA> SMSC address. Its structure is as follows:
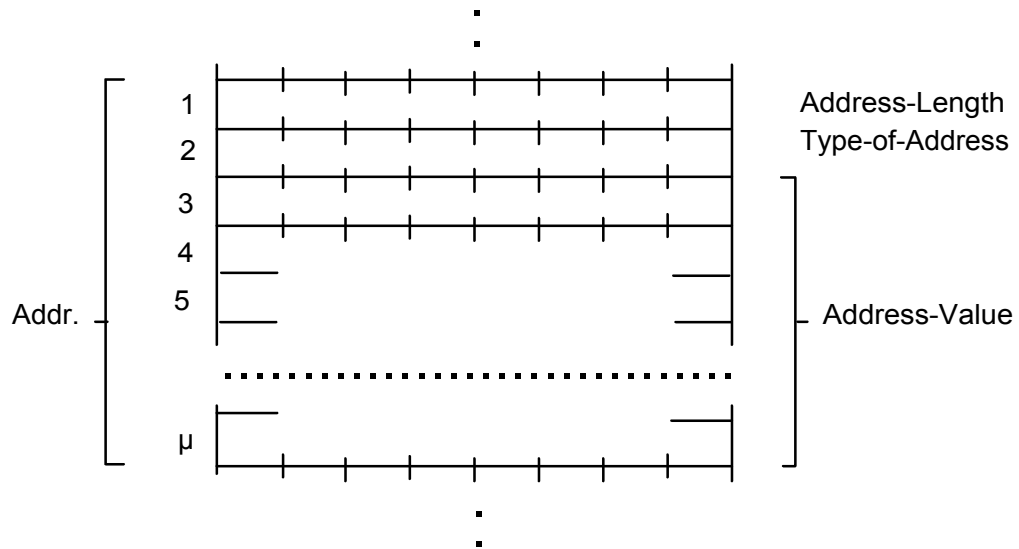
<sc_len>: Length of the SCA (short message service center number). It is composed of two characters. It indicates the number of characters occupied by <type_addr> and <numbers>/2.

<type_addr>: Number address type. It is composed of two characters. Its structure is as follows:

1	Type-of-number	Numbering-plan-identification
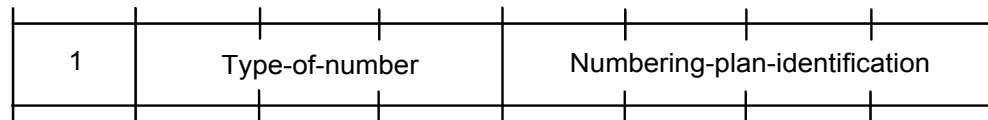
Type-of-Number(bit6…bit4). The values are as follows:

0 0 0   This value is written when the user does not know the authentication information of the target address number. In this case, the address number is organized at the network side.

0 0 1   This value is selected if the user knows that it is an international number, or believes that it falls in the domestic range.

0 1 0   Domestic number. No prefix or suffix is allowed. This value is selected when the user sends a message to a domestic telephone set.

0 1 1   A specific number in this network. It is used for management or service and cannot be selected by the user.

1 0 1   The number type is the default 7bit code mode of GSM. It is not in use currently.

1 1 0   Short number. It is not in use currently.

1 1 1   Reserved for extension. It is not in use currently.

Numbering-plan-identification(bit3…bit0). The values are as follows:

(Note: It is valid only when the values of bit6…bit4 are 000, 001, 010. In other circumstances, bit3…bit0 are not valid)

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

0 0 0 1　　　　ISDN/telephone numbering plan.

0 0 1 1　　　　Data numbering plan, not in use currently.

0 1 0 0　　　　Telex numbering plan, not in use currently.

1 0 0 0　　　　National numbering plan, not in use currently.

1 0 0 1　　　　Private numbering plan, not in use currently.

1 0 1 0　　　　ERMES numbering plan, not in use currently.

<numbers>: Address number. One byte contains two digits. Bit3~bit0 contain the first digit, and bit7~bit4 contain the second digit. Coding sequence of half bytes, as shown in the following example:

n+1	Digit 2				Digit 1			
n+2	Digit 4				Digit 3			
n+3	1	1	1	1	Digit 5			
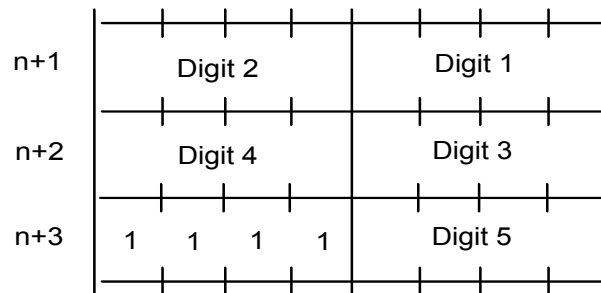
Figure 2　　Half byte coding with a total of 5 digits

Note: If the number length is an odd number, the highest four digits of this octet should be filled with 1111.

　　'*': 1010　　　　　　　　'#': 1011

　　'a': 1100　　　　　　　　b': 1101　　　　　　　　'c': 1110

For example:

　　If the number of SCA is 13902900, then the <numbers> is: 31099200

If the number length of SCA is an odd number: 139029001, then <numbers> is: 31099200F1

　　If the number type is: 'A1', the corresponding <SCA> will be 05a131099200.

　　If the type is indicated as an international number 'A1', while the number 13902900 is a domestic number, it is necessary to additionally dial 86 before the number, hence the corresponding <SCA> in this case is 06a16831099200.

The data structure of TPDU is as follows:

1Octet								**1Oct**	**2Oct~12Oct**	**1Oct**	**1Oct**	**1Oct**	**1Oct**	
RP	UDHI	SRR	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0							

<MTI>: Message type. The values are as follows:

bit1　bit0

0　　0　　　　SMS-DELIVER (in the direction SC to MS)

0　　0　　　　SMS-DELIVER REPORT (in the direction MS to SC)

1　　0　　　　SMS-STATUS-REPORT (in the direction SC to MS)

1　　0　　　　SMS-COMMAND (in the direction MS to SC)

0   1   SMS-SUBMIT (in the direction MS to SC)

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

1   1   Reserved

<RD>: It indicates whether the SC needs to receive the short message that is still stored in the SC and has the MR and DA identical with those of the message sent previously from the same OA. The values are as follows:

0   To receive

1   Not to receive

<VPF>: It indicates the validity of the VP field and the format. The values are as follows:

bit4 bit3

0   0   The VP field is invalid

1   0   The VP field is valid and the format is "relative". Only this format is available currently.

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 the setting of the path of the message reply. The values are as follows:

0   No setting.

1   Settings are available. It indicates that the reply has the SC number settings identical with those of the message, and the return path is the same.

<UDHI>: Indicates the user data header. The values are as follows:

0   The user data segment contains only contents of the message.

1   In addition to the message, the user data segment contains a data header.

<SRR>: State report request indication

0   State report information about successful sending of a message is not required.

1   State report information about successful sending of a message is required.

<MR>: Message ID. Value range: 0~255.

<DA>: DA (destination address), same as defined in SCA. There are a total of 2~12Otects. Therefore, the longest address in the DA segment contains 20 digits.

<PID>: Protocol indication. The values are as follows:

PID							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0

Bit7 bit6 (here we assume bit 7 = 0 and bit 6 = 0)

0   0   Allocate bits 0..5. The values are defined below.

1   0   Allocate bits 0..5. The values are defined below.

0   1   Reserved.

1   1   Allocate bits 0..5, for special purpose of SC.

The values of Bit5 are as follows:

0   no interworking, but SME-to-SME protocol

1   telematic interworking (in this case, the values of bits 4...0 are valid)

Bit4...bit0   telematic devices type indication:

If the values are 1 0 0 1 0, it indicates Email. Other values are not supported currently.

<DCS>: Coding mode of user data. The values are as follows:

Bit7…bit4			Bit3…..bit0
00xx	Bit5	0: Message is not compressed	Bit1 bit0 indicate message type 0 0 : Class 0, providing display and reply to the SC that the message is received but not stored. 0 1 : Class 1, stored to the NV (or SIM card if the NV is full) 1 0 : Class 2, for use of SIM only. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported. 1 1 : Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC. Bit3 bit2 message type indication 0 0 : GSM 7 bit default code 0 1 : 8bit data 1 0 : UCS2 code mode. When the user inputs Chinese characters, this value will be selected. 1 1 : Reserved.
		1: Message is compressed. Not supported currently.	
	Bit4	0: Bit1 and bit0 are reserved	
		1: Bit1 and bit0 indicate message type	
0100 … 1011	Reserved.		
1100	The message contents are discarded. The message waiting prompt is given, and the user data adopts GSM 7 bit coding		The settings of Bit3…0 are identical with the settings made in case of bit7…4=1101
1101	The message is stored. The message waiting prompt is given, and the user data adopts GSM 7 bit coding		Bit3 Prompt indication. The values are as follows: 0: The message waiting prompt function is invalid 1: Activate the message waiting prompt function Bit2 Reserved. The value is 0. Bit1 bit0 message type indication 0 0 : With voice message waiting. 0 1 : With fax message waiting. 1 0 : With E-mail message waiting. 1 1 : Message waiting of other unknown types
1110	The message is stored. The message waiting prompt is given, and the user data adopts uncompressed UCS2 coding		The settings of Bit3…0 are identical with the settings made in case of bit7…4=1101
1111	Data coding/message class		Bit2 Reserved. The value is 0.

		Bit2　　Coding mode of message. The values are as follows:
		0: GSM 7 bit default code
		1: 8bit data
		Bit1 bit0　　message type indication
		0　　0　　: Class 0, providing display and reply to the SC that the message is received but not stored.
		0　　1　　: Class 1, stored to the NV (or SIM card if the NV is full)
		1　　0　　: Class 2, for use of SIM only. After the message is stored, the storage state will be replied to the SC. If the SIM card is full, the SC failure and the reasons will be reported.
		1　　1　　: Class 3, stored to the TE. When the MS receives the message, but has not transmitted it to the TE, it will give a response to the SC.

<VP>: Indicates the validity period, which starts from the message being received by the SC. If VPF=00, this field is lacking. The duration is expressed as follows:

VP value	Description
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>: Length of user data. The value of UDL depends on the specific coding mode.

In case of default 7-bit coding, it indicates there are a total of how many septets.

In case of 8bit coding, it indicates there are a total of how many Octets.

In case of UCS2 coding, UDL indicates there are a total of how many Octets.

In case of compressed 7-bit or 8bit or UCS2 coding, UDL indicates there are a total of how many Octets after compression.

For the compressed message codes, the data length of <UD> should not be more than 160septets; for the message of uncompressed codes, the <UD> length should not be more than 140Octets.

<UD>: User data. The data validity depends on the parameter UDL.

4.13.4　Examples

The SMSC number is: 13902900, and the message is sent to the number: 13901000453, and the contents are: 0x53 0x4E 0x4E 0x3A ("华为" for UCS2 encode), then:

If "+CSCA" has set SCA, then

　a) When sending the message, the <SCA> field can be left uncompleted. The <SCA> value is obtained through the value set via "+CSCA" command.

AT+CMGS=17(CR)

>81000B813109010054F3001804534E4E3A \x1A

Note: Data interpretation, 81(<RP~MTI>)00(<MR>)0B(<DA-len>)81(<DA-type>) 3109010054F3(<DA-numbers>)00(<PID>)18(<DCS>)04(<UDL>)534E4E3A (<UD>)\x1A(<ctrl-Z>)

b) When sending the message, the <SCA> field can also be completed, and the <SCA> value can be obtained directly from the PDU packet.

AT+CMGS=17

>05a13109920081000B813109010054F3001804534E4E3A \x1A

or

AT+CMGS=17

>0081000B813109010054F3001804534E4E3A \x1A

(In this case, since <sc_len>=0,when sending the message, the <SCA> can be obtained through the value set via the "+CSCA" command)

If "+CSCA" has not set SCA, then

When sending the message, the <SCA> field must be completed, and the <SCA> value can be obtained directly from the PDU packet.

AT+CMGS=17

>05a13109920081000B813109010054F3001804534E4E3A \x1A

4.14 Message storage command +CMGW

4.14.1 Command Syntax

Command	Possible response(s)
+CMGW=<length>[,<stat>]<CR>***PDU is given***<ctrl-Z/ESC>	<CR><LF>+CMGW: <index><CR><LF><CR><LF>OK<CR><LF> In case of SMS-related error: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGW=?	<CR><LF>OK<CR><LF>

4.14.2 Interface Description

Store a message to the <mem2> storage set via the "+CPMS" command.

4.14.3 Defined Values

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

<mr>: Message ID. The digits are decimal numbers that range from 0 to 9. The value range is: 0~255.

<ctrl-Z>: Identifies the end of a PDU data. The characters are: '0x1A'

<ESC>: Cancels the sending of this message. The characters are: '0x1B'

<stat>: Storage state of the message. The values are as follows: (In the PDU mode, the default value is 0)

0   Unread message that has been received

1   Read message that has been received

2   Unsent message that has been stored

3   Sent message that has been stored

4   Any message (This value is only applicable to the "+CMGL" command)

<index>: Position number in the storage. The digits are decimal numbers that range from 0 to 9. The value range is 0~maximum capacity of storage-1.

The PDU packet structure is consistent with the description of the "+CMGS" command.

4.15 Message list command +CMGL

4.15.1 Command Syntax

Command	Possible response(s)
+CMGL[=<stat>]	In case of pdu mode and successful execution of command: [<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>
+CMGL=?	<CR><LF>+CMGL: (list of supported <stat>s) <CR><LF><CR><LF>OK<CR><LF>

4.15.2 Description

The EXECUTION command returns all messages from <mem1>, which are in the state specified by the parameter <stat>. If the message state is "Unread message that has been received", the state of the message in the storage will be converted to "Read message that has been received" after the command is executed successfully.

When the <stat> takes on the default value, the EXECUTION command is equivalent to the SET command +CMGL=0.

The TEST command returns all the supported stat values.

4.15.3 Defined Values

PDU mode:

<stat> Message type. The default value is 0:

0   Unread messages that has been received

1   Read message that has been received

2   Unsent message that has been stored

3   Sent message that has been stored

4   Any message

<index>: Integer value, which indicates the position in the storage.

<reserved>: Reserved.

<length>: Integer value, which indicates the number of bytes of TPDU data.

<pdu>: Protocol data unit. The data structure is as follows:

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

Where, the <SCA>, <sc_len>, <type_addr>, and <numbers> fields are defined in the same way as in the section "Message sending command".

For sent message, the data structure of TPDU is the same as defined in "Message sending command". For the received message, the data structure of TPDU is as follows:

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>: Same as defined in the section "Message sending command".

<MMS>: Indicates whether there are more messages to be sent.

0   Nonexistent

1   Existent

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

0   Nonexistent

1   Existent

<UDHI>: Same as defined in the section "Message sending command".

<RP>: Same as defined in the section "Message sending command".

<OA>: Source address. Same as defined in SCA. Total 2~12Otects. Therefore, the longest address in the OA segment contains 20 digits.

<PID>: Protocol indication. Same as defined in the section "Message sending command".

<DCS>: Coding mode of user data. Same as defined in the section "Message sending command".

<SCTS>: Time chop of SMC, including year, month, day, hour, minute, second and time difference. Time difference refers to the difference of time between the local time and the Greenwich standard time.

<UDL>: User data length. Same as defined in the section "Message sending command".

<UD>: The length of a specific user data depends on the UDL.

Text mode:

<stat> Message type. The default value is 0:

"REC UNREAD"   unread SMS

"REC READ"   read SMS
"STO UNSENT"   stored and unsent SMS
"STO SENT"   stored and sent SMS
"ALL"   all SMS

4.16 Read a message +CMGR

4.16.1 Command Syntax

Command	Possible response(s)
+CMGR=<index>	In case of pdu mode and successful execution of command: <CR><LF>+CMGR: <stat>,[<reserved>],<length><CR><LF><pdu><CR><LF><CR><LF>OK<CR><LF> or: <CR><LF>+CMS ERROR: <err><CR><LF>
+CMGR=?	<CR><LF>OK<CR><LF>

4.16.2 Description

The EXECUTION command returns the messages whose storage position is "index" from <mem1>. If the message state is "Unread message that has been received", the state of the message in the storage will be converted to "Read message that has been received" after the command is executed successfully.

The TEST command returns OK.

4.16.3 Defined Values

<index>: Integer value, which indicates the position in the storage.

<stat> Message type:

0   Unread message that has been received

1   Read message that has been received

2   Unsent message that has been stored

3   Sent message that has been stored

<reserved>: Reserved.

<length>: Integer value, which indicates the number of bytes of PDU data.

<pdu>: Protocol data unit. Its format is the same as defined in section "Message list command".

4.17 Message bearer domain command +CGSMS

4.17.1 Command Syntax

Command	Possible response(s)

Command	Possible response(s)
+CGSMS=<service>	<CR><LF>OK<CR><LF>
+CGSMS?	<CR><LF>+CGSMS:<service><CR><LF><CR><LF>OK<CR><LF>
+CGSMS=?	<CR><LF>+CGSMS: (list of supported <service>s)<CR><LF><CR><LF>OK<CR><LF>

4.17.2 Description

The SET command is used to set the message bearer domain, namely, selection of CS/PS domain.

The READ command returns the current message bearer domain.

The TEST command returns the supported parameter values.

4.17.3 Defined Values

<service>:

0   Only select the PS domain (not supported currently)

1   Only select the CS domain (not supported currently)

2   Prefer the PS domain

3   Prefer the CS domain

4.18 More Messages to Send +CMMS

4.18.1 Command Syntax

Command	Possible response(s)
+CMMS=[<n>]	<CR><LF>OK<CR><LF>
+CMMS?	<CR><LF>+CMMS:<n><CR><LF><CR><LF>OK<CR><LF>
+CMMS=?	<CR><LF>+CMMS: (list of supported <n>s)<CR><LF><CR><LF>OK<CR><LF>

4.18.2 Description

Set command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.

Test command returns supported values as a compound value.

4.18.3 Defined Values

<n>:

0   disable

1　　keep enabled until the time between the response of the latest message send command (+CMGS, +CMSS, etc.) and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), then ME shall close the link and TA switches <n> automatically back to 0

2　　enable (if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), ME shall close the link but TA shall not switch automatically back to <n>=0)

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5 Description of Security Setting Interface

5.1 PIN password modifying +CPWD

5.1.1 Command Syntax

Command	Possible response(s)
+CPWD=<fac>,<oldpwd>,<newpwd>	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPWD=?	<CR><LF>+CPWD:　　list　of　supported (<fac>,<pwdlength>)s<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

5.1.2 Description

The EXECUTION command is used to modify the equipment lock function (e.g. PIN).

The TEST command returns the supported device, and the maximum length of the password corresponding to this equipment.

5.1.3 Defined Values

<fac>: Specify the object of operation of this command (only supporting SIM card, the value is "SC").

"SC": SIM card PIN

"P2": SIM card PIN2

"AB": No support for a while

<oldpwd>,<newpwd>: Old password, new password, string type, and maximum length are specified by the parameter <pwdlength>.

<pwdlength>: Maximum length of the equipment lock password.

5.2 PIN enabling and query function +CLCK

5.2.1 Command Syntax

Command	Possible response(s)
+CLCK=<fac>,<mode>[, <passwd>[,<class>]]	In case of <mode>=2 and successful execution of command: <CR><LF>+CLCK: <status><CR><LF><CR><LF>OK<CR><LF> In case of <mode>≠2 and successful execution of command: <CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CLCK=?	<CR><LF>+CLCK: (list of supported <fac>s)<CR><LF><CR><LF>OK<CR><LF>

5.2.2 Description

The EXECUTION command is used to lock, unlock and query the MS or network equipment <fac>. Generally, the password needs to be input.

The TEST command returns the supported devices.

5.2.3 Defined Values

<fac>: Specify the object of operation of this command (only supporting SIM card, the value is "SC").

"SC": SIM card (if this command is configured, the password must be input when powering on the MS)

<mode>:

0   Unblock

1   Lock

2   Query state

< status >:

0   Unactivated

1   Activated

<passwd>: String type; same as the password set via "modify password +CPWD".

<class*x*> (7 by default):

1   Voice call

2   Data

4   Fax

8   SMS

5.3 PIN management command +CPIN

5.3.1 Command Syntax

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

5.3.2 Description

The READ command is used to indicate whether password input request exists.

The SET command is used to check and unlock the PIN and PIN2.

If the current password input request is PIN or PIN2, input "+CPIN=<pin>" to check.

If the current password input request is PUK or PUK2, input "+CPIN=<pin>,<newpin>" to unlock. The first parameter is SIM PUK or SIM PUK2, and the second parameter is <newpin>, which is a new PIN or PIN2.

When using the SET command, if the no PIN input request exists currently, an error message "+CME ERROR" will be returned.

Note: Verifying PIN or PUK during an emergency call may make the call disconnected.

5.3.3 Defined Values

<pin>, <newpin>: String

<code>: String (without quotation marks)

READY: MT without password input request

SIM PIN: UICC/SIM PIN password request

SIM PUK: UICC/SIM PUK password request, to unblock the SIM PIN which was blocked for 3 verification failure.

SIM PIN2:   PIN2 password requestSIM PUK2:   PUK2 password request, to unblock the SIM PIN2 which was blocked for 3 verification failure

5.4 SIMLOCK unlocking and query command %SIMLOCK

5.4.1 Command Syntax

Command	Possible response(s)
%SIMLOCK=<mode>[,<password>]	<mode>=0 and executes successfully: <CR><LF>OK<CR><LF> <mode>=2 and executes successfully: <CR><LF>%SIMLOCK: <status><CR><LF><CR><LF>OK<CR><LF> Use this in a wrong way: <CR><LF>ERROR<CR><LF>

Command	Possible response(s)
% SIMLOCK =?	<CR><LF>% SIMLOCK:(0,2),"password(6~8)"<CR><LF> <CR><LF>OK<CR><LF>

5.4.2 Interface Description

This command is used to unlock simlock function and query if enable simlock or not. If user inputs wrong password three times continuously, module will be reset.

5.4.3 Defined Values

<mode>:

0: Unlock simlock function.

2: Query simlock state.

<password>: A string is combined by 6~8 numbers, these numbers must be digits 0~9. If it's the permanent password, the length of password will be 8 numbers only. Password is effective when mode sets to be 0.

<status>:

0: Disable simlock function.

1: Enable simlock function.

6 System Setting Interface Description

6.1 System information query %SYSINFO

6.1.1 Command Syntax

Command	Possible response(s)
%SYSINFO	<CR><LF>%SYSINFO:< srv_status >,< srv_domain >,< roam_status >,< sys_mode >,< sim_state >[,<reserved>,<sys_submode>]<CR><LF><CR><LF> OK<CR><LF>
%SYSINFO?	<CR><LF>ERROR<CR><LF>
%SYSINFO=?	<CR><LF>ERROR<CR><LF>

6.1.2 Interface Description

This command is used to query the current system information, e.g. system service state, domain, roaming or not.

6.1.3 Defined Values

<srv_status>: System service state. The values are as follows:

0   No service.

1   Restricted service

2   Valid service

3   Restricted regional service.

4   Power-saving and deep sleep state

<srv_domain>: System service domain. The values are as follows:

0   No service.

1   Only CS service

2   Only PS service

3   PS+CS service

4   CS and PS not registered, searching

<roam_status>: Roaming status. The values are as follows:

0   Non roaming state

1   Roaming state

<sys_mode>: System mode. The values are as follows:

0   No service.

1   AMPS mode (not in use currently)

2   CDMA mode (not in use currently)

3   GSM/GPRS mode

4   HDR mode

5   WCDMA mode

6   GPS mode

<sim_state>: SIM card state. The values are as follows:

0   Invalid USIM card state or pin code locked

1   Valid USIM card state

2   USIM is invalid in case of CS

3   USIM is invalid in case of PS

4   USIM is invalid in case of either CS or PS

255   USIM card is not existent,

<reserved>:reserved. E618 used it to indicate the simlock state

<sys_submode>:System sub mode, the values are as follows:

0:      No service

1:      GSM mode

2:      GPRS mode

3:      EDGE mode

4:      WCDMA mode

5:      HSDPA mode

6:      HSUPA mode

7:      HSDPA mode and HSUPA mode

6.2 Service state change indication %SRVST

6.2.1 Command Syntax

Command	Possible response(s)
	\<CR>\<LF>%SRVST:\<srv_status>\<CR>\<LF>

6.2.2 Description

When the service state changes, the MS will report the new service state to the TE.

6.2.3 Defined Values

\<srv_status>: System service state. The values are as follows:

0   No service.

1   Restricted service.

2   Valid service

3   Restricted regional service.

4   Power-saving and deep sleep state

6.3 SIM state change indication %SIMST

6.3.1 Command Syntax

Command	Possible response(s)
	\<CR>\<LF>%SIMST:\<sim_state>

6.3.2 Interface Description

When the USIM card state changes, the MS will report the new state to the TE. At the same time, report the lock state of USIM card.

6.3.3 Defined Values

\<sim_state>: USIM card state. The values are as follows:

0   Invalid USIM card state or pin code locked

1   Valid USIM card state

2   USIM is invalid in case of CS

3   USIM is invalid in case of PS

4   USIM is invalid in case of either CS or PS

255   USIM card is not existent,

6.4 System mode change event indication %MODE

6.4.1 Command Syntax

Command	Possible response(s)

	<CR><LF>%MODE:<sys_mode>[,<sys_submode>]<CR><LF>

6.4.2 Interface Description

When the system mode or sub-mode changes, the MS will report this indication to the TE.

6.4.3 Defined Values

<sys_mode>: System mode. The values are as follows:

0   No service.

1   AMPS mode (not in use currently)

2   CDMA mode (not in use currently)

3   GSM/GPRS mode

4   HDR mode

5   WCDMA mode

6   GPS mode

<sys_submode>: System sub mode. The values are as follows:

0   No service.

1   GSM mode

2   GPRS mode

3   EDEG mode

4   WCDMA mode

5   HSDPA mode

6   HSUPA mode

7   HSDPA mode and HSUPA mode

6.5 RSSI change indication %RSSI

6.5.1 Command Syntax

Command	Possible response(s)
	<CR><LF>%RSSI: <rssi><CR><LF>

6.5.2 Description

When the change of RSSI is more than 5dBm, the MS will report this indication to the TE.

6.5.3 Defined Values

<rssi>: Strength of the receiving signal. The values are defined as follows:

0   Equal to or less than -113 dBm

1   -111 dBm

2...30   -109... -53 dBm

31   Equal to or higher than -51 dBm

99   Unknown or unmeasurable.

6.6 System configuration reference setting %SYSCFG

6.6.1 Command Syntax

Command	Possible response(s)
%SYSCFG= <mode>,<acqorder>,<band>,<roam>,<srvdomain>	<CR><LF>OK/ERROR<CR><LF>
% SYSCFG?	<CR><LF>%SYSCFG:<mode>,<acqorder>,<band>,<roam>,<srvdomain><CR><LF><CR><LF>OK<CR><LF>
%SYSCFG=?	<CR><LF>OK<CR><LF>

6.6.2 Description

This command is used to set the characteristics such as system mode, GW access sequence, band, roaming support and domain.

6.6.3 Defined Values

<mode> system mode reference:

2   Automatic search

13   GSM ONLY

14   WCDMA ONLY

16   No change

<acqorder> Network access sequence reference:

0   Automatic search

1   GSM first, WCDMA later

2   WCDMA first, GSM later

3   No change

<band> The band of frequency relate to selection of mode, which is actually up to the performance of MS. The parameter is HEX string, whose value is as follows or with the exception of 0x3FFFFFFF and 0x40000000 parameter as combination:

00080000 (CM_BAND_PREF_GSM_850)   GSM 850

00000080（CM_BAND_PREF_GSM_DCS_1800）   GSM DCS systems

00000100（CM_BAND_PREF_GSM_EGSM_900）   Extended GSM 900

00000200（CM_BAND_PREF_GSM_PGSM_900）   Primary GSM 900

00100000（CM_BAND_PREF_GSM_RGSM_900）   Railway GSM 900

00200000（CM_BAND_PREF_GSM_PCS_1900）   GSM PCS

00400000（CM_BAND_PREF_WCDMA_I_IMT_2000）   WCDMA IMT 2000

00800000 (CM_BAND_PREF_WCDMA_II_PCS_1900)   WCDMA_II_PCS_1900

04000000 (CM_BAND_PREF_WCDMA_V_850)   WCDMA_V_850

<roam> Roaming support:

0   Not supported

1   Roaming is supported

2   No change

<srvdomain> domain setting:

0   CS_ONLY

1   PS_ONLY

2   CS_PS

3   ANY

4   No change

7 Phonebook Service Interface Description

7.1 Phonebook memory selection +CPBS

7.1.1 Command Syntax

Command	Possible response(s)
+CPBS=<storage> [,<reserved>]	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBS?	<CR><LF>+CPBS: <storage>[,<used>,<total>]<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+CPBS=?	<CR><LF>+CPBS: (list of supported <storage>s)<CR><LF><CR><LF>OK<CR><LF>

7.1.2 Description

The SET command is used to select a phonebook memory. The initial value after restarting the MS is "SM". Other phonebook-related commands will be operated by using the memory selected via this command.

The READ command returns the currently selected phonebook memory. Optionally, the number of entries in use and the maximum number of entries should also be returned.

The TEST command returns the supported phonebook memory types.

7.1.3 Defined Values

<storage> : Phonebook memory type. Currently, only "SM","ON","EN" are supported.

"SM" SIM/UICC phonebook

"ON" SIM/USIM own numbers (MSISDNs) list

"EN" SIM/USIM emergency number

<reserved>: Reserved.

<used>: Integer value. It indicates the number of entries in use in the currently selected memory.

<total>: Integer value. It indicates the maximum number of entries in the currently selected memory.

7.2 8.13   Find phonebook entries +CPBF

7.2.1 command syntax

Command	Possible response(s)
+CPBF=<findtext>	[+CPBF: <index1>,<number>,<type>,<text>[,<hidden>][[...] <CR><LF>+CBPF: <index2>,<number>,<type>,<text>[,<hidden>]]] *+CME ERROR: <err>*
+CPBF=?	+CPBF: [<nlength>],[<tlength>] *+CME ERROR: <err>*

7.2.2 Description

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field starts with string <findtext>. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If listing fails in an MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

7.2.3 Defined values

<index1>, <index2>: integer type values in the range of location numbers of phonebook memory

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

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

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

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

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

<hidden>: indicates if the entry is hidden or not

<u>0</u>:   phonebook entry not hidden

1:   phonebook entry hidden

7.3 Read phonebook entries +CPBR

7.3.1 Command syntax

Command	Possible response(s)
+CPBR=<index1>[,<index2>]	[+CPBR: <index1>,<number>,<type>,<text>[,<hidden>][[...] <CR><LF>+CPBR: <index2>,<number>,<type>,<text>[,<hidden>]]] *+CME ERROR: <err>*
+CPBR=?	+CPBR: (list of supported <index>s),[<nlength>],[<tlength>] *+CME ERROR: <err>*

7.3.2 Description

Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned. Entry fields returned are location number <index*n*>, phone number stored there <number> (of format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> indicating if the entry is hidden. If all queried locations are empty (but available), no information text lines may be returned. If listing fails in an MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

7.3.3 Defined values

<index1>, <index2>, <index>: integer type values in the range of location numbers of phonebook memory

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

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7)

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

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

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

<hidden>: indicates if the entry is hidden or not

      <u>0</u>:   phonebook entry not hidden

      1:    phonebook entry hidden

7.4 Write phonebook entry +CPBW

7.4.1 command syntax

Command	Possible response(s)
+CPBW=[<index>][,<number>[,<type>[,<text>[,<hidden>]]]]	*+CME ERROR: <err>*
+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>],(list of supported <type>s),[<tlength>] *+CME ERROR: <err>*

7.4.2 Description

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> (in the format <type>), text <text> associated with the number and, if the selected phonebook supports hidden entries, <hidden> parameter, which indicates if the entry is hidden or not. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook (the implementation of this feature is manufacturer specific). If writing fails in an MT error, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values.

Test command returns location range supported by the current storage as a compound value, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. In case of SIM storage, the lengths may not be available. If MT is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 9.2 for <err> values. If storage does not offer format information, the format list should be empty parenthesis

7.4.3 Defined values

<index>: integer type values in the range of location numbers of phonebook memory

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

<type>: type of address octet in integer format (refer TS 24.008 [8] subclause 10.5.4.7) ; default 145 when dialling string includes international access code character "+", otherwise 129

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

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

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

<hidden>: indicates if the entry is hidden or not

> <u>0</u>:   phonebook entry not hidden
>
> 1:   phonebook entry hidden

7.5 Phonebook reading %CPBR

7.5.1 Command Syntax

Command	Possible response(s)
%CPBR=<index1> [,<index2>]	[<CR><LF>%CPBR: <index1>,<number>,<type>,<text>,<coding>[,<email>][[...]<CR><LF>%CPBR: <index2>,<number>,<type>,<text>],<coding>[,<email>]]<CR><LF>]<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
%CPBR=?	<CR><LF>%CPBR: (list of supported <index>s),[<nlength>],[<tlength>],[<mlenth>]<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.5.2 Description

This command returns the phonebook entries between positions index1 and index2 in the currently selected phonebook memory. If no entry exists between index1 and index2, the following will be returned:

+CME ERROR: not found

Alternatively, you can input index1 only, and only the phonebook entries in the position index1 will be returned.

The TEST command returns the position range of the currently selected phonebook memory, and the maximum length of <number>, <text> and <email>.

7.5.3 Defined Values

<index1>, <index2>, <index>: Integer value. It indicates the position in the phonebook memory. The values of index1 and index2 are less than or equal to the "total" field returned by the "+CPBS?" command.

<number>: String type, telephone number.

<type>: Number type: "145" means an international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

<text>: String type. It indicates a name. In case coding=1, it indicates that the <text> is a hexadecimal text value of the original data.

<coding>: Coding scheme. It means the character code of the <text> field, and specifies the language.

0   GSM 7 bit Default Alphabet

1   RAW mode (namely, upload the <text>in the format of original data).

<email>: String type. It indicates the email address. not supported Currently.

<nlength>: Integer value. It indicates the maximum length of the telephone number.

<tlength>: Integer value. It indicates the maximum length of the name.

<mlength>: Integer value. It indicates the maximum length of the email. (currently not supported)

7.6 Phonebook writing %CPBW

7.6.1 Command Syntax

Command	Possible response(s)
%CPBW=[<index>][,<number>[,<type>[,<text>,<coding>[,email]]]]	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
%CPBW=?	<CR><LF>%CPBW: (list of supported <index>s),[<nlength>], (list of supported <text>s),[<tlength>],[<mlength>]<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

7.6.2 Description

This command writes the phonebook entries into the position specified by "index" in the currently selected phonebook memory. If only "index" is included in the command parameter, the phonebook entry at the position corresponding to "index" will be deleted. If the "index" field is omitted, but the "number" field is included in the parameter, this phonebook entry will be written to the first empty position.   If no empty position is available in this case, the following will be reported:

+CME ERROR: memory full

The TEST command returns the position range of the currently selected phonebook memory, the maximum length of the "number" field, all values of the "type" field,

maximum length of the "text" field, and maximum length of the "email" field. When storing the phonebook, all input lengths must fall within the maximum length range.

7.6.3 Defined Values

<index>: Integer value. It indicates the position in the phonebook memory.

<number>: String type, telephone number. (legal characters only include: '0' – '9', '*', '#', '+', '(', ')', '-'.But '(', ')', '-' will be ignored)

<type>: Number type: "145" means international call. For the specific values, see also the definition of the "type_addr" parameter in the SC number, as described in the section "Short message sending +CMGS".

<text>: String type. It indicates a name(no support character 'enter ', '"').

<coding>: Coding scheme. It means the character code of the <text> field, and specifies the language.

0   GSM 7 bit Default Alphabet

1   RAW mode (namely, upload the <text> in the format of original data).

<email>: String type. It indicates the email address. Currently not supported

<nlength>: Integer value. It indicates the maximum length of the telephone number.

<tlength>: Integer value. It indicates the maximum length of the name.

<mlength>: Integer value. It indicates the maximum length of the email. (currently not supported)

7.6.4 Informative Examples

For example: AT%CPBW = 1,"28780808",129,"80534E4E3A",1

note:data explain 1(the location of this record int the memory); "28780808"(telephone number); 129(number style); "80534E4E3A"(name 华为); 1(encode format of name UCS2)

8 Network Service Interface Description

8.1 Operator selection +COPS

8.1.1 Command Syntax

Command	Possible response(s)
+COPS=[<mode>[,<format> [,<oper>[,< rat>]]]]	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
+COPS?	<CR><LF>+COPS: <mode>[,<format>,<oper>[,<rat>]]<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

+COPS=?	<CR><LF>+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,< rat>])s][,,(list of supported <mode>s),(list of supported <format>s)]<CR><LF>OK<CR><LF>
	In case of CME error:
	<CR><LF>+CME ERROR: <err><CR><LF>

8.1.2 Interface Description

This interface enables to query the network state and network selection mode currently registered by the MS. The Execution command enables to select the GSM/UMTS network automatically or manually. The READ command returns the current network selection mode. If the registration is successful, the current operator information will be returned. The TEST command returns the list of (up to 20) operators existent in the current network.

8.1.3 Defined Values

<mode>:

    0   automatic (<oper> field is ignored)

    1   manual (<oper> field shall be present, and <AcT> optionally)

    2   deregister from network (NOT SUPPORT)

    3   set only <format> (for read command +COPS?), do not attempt

       registration/deregistration (<oper> and < AcT> fields are ignored);

       this value is not applicable in read command response

    4   manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered

<format>:

    0   long format alphanumeric <oper>

    1   short format alphanumeric <oper>

    2   numeric <oper>

<oper>:

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

<stat>:

    0   unknown

    1   available

    2   current

    3   forbidden

<rat> access technology selected

0   GSM
2   UTRAN

8.1.4 Examples of searching network

I. To query the present status of ME's network registration using the test command:

+COPS:(2,"","","46007",2),(3,"China Unicom","UNICOM","46001",0),(3,"China Mobile Com","CMCC","46000",0),,(0,1,3,4),(0,1,2)

OK

II. Automatic search of network

AT+COPS=0

OK

Note: in SET command, that mode equals to 0 makes other parameters invalid.

III. Manual search of network

AT+COPS=1,2,46000 (+CREG=1, +CGREG=1, enable URC reporting)

OK

(If the selected operator was not allowed, the ME is now unregistered. The
READ command will return only the mode, but no operator:
AT+COPS?
+COPS: 1

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

IV. query the status of the ME's network registration using the read command:

AT+COPS? (query the information of the network currently logged in)
+COPS:1,2,46000 (command returns mode, format, registered operator)
OK

8.2 Network registration +CREG

8.2.1 Command Syntax

Command	Possible response(s)
+CREG=[<n>]	<CR><LF>OK<CR><LF>
+CREG?	<CR><LF>+CREG:<n>,<stat>[,<lac>,<ci>]<CR><LF><CR><LF>OK<CR><LF>

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

8.2.2 Interface Description

The SET command is used to control "+CREG" to report event proactively.

When <n>=1, and the state of network registration changes, the following will be reported: +CREG:< stat >

When <n>=2, and the cell information changes, the following will be reported: +CREG: <stat>[,<lac>,<ci>]

The READ command returns the current registration state <stat>. The position information <lac> and <ci> is reported only when <n>=2.

8.2.3 Defined Values

<n>:

0   Disable proactive reporting of "CREG"

1   Enable proactive reporting of "+CREG   <stat>"

2   Enable proactive reporting of "+CREG: <stat>[,<lac>,<ci>]"..

<stat>:

0   Not registered. The MS is not searching the new operators to be registered.

1   Local network is registered

2   Not registered. But the MS is searching the new operators to be registered.

3   Registration rejected

4   Unknown reasons

5   Roaming network is registered

<lac>: Position code information, composed of four characters and expressed in hexadecimal. (Example: "00C3"= "195" in decimal)

<ci>: Cell information, composed of four characters and expressed in hexadecimal. (Extended Information: according 3GPP Rel7, four characters are requested, but if before Rel7, for example the currently network is Rel6 mostly, only the last two characters is valid, the other characters is invalid and should be ignored. For example, if the <CI> return 3B3DE1C, only DE1C is valid and could be used as DE1C is the last two characters.)

8.3 Network registration +CGREG

8.3.1 Command Syntax

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

8.3.2 Interface Description

The SET command is used to control "+CGREG" to report event proactively.

When <n>=1, and the state of network registration changes, the following will be reported: +CGREG:< stat >

When <n>=2, and the cell information changes, the following will be reported: +CGREG: <stat>[,<lac>,<ci>]

The READ command returns the current registration state <stat>. The position information <lac> and <ci> is reported only when <n>=2.

8.3.3 Defined Values

<n>:

0   Disable proactive reporting of "CGREG"

1   Enable proactive reporting of "+CGREG   <stat>"

2   Enable proactive reporting of "+CGREG: <stat>[,<lac>,<ci>]"..

<stat>:

0   Not registered. The MS is not searching the new operators to be registered.

1   Local network is registered

2   Not registered. But the MS is searching the new operators to be registered.

3   Registration rejected

4   Unknown reasons

5   Roaming network is registered

<lac>: Position code information, composed of four characters and expressed in hexadecimal. (Example: "00C3"= "195" in decimal)

<ci>: Cell information, composed of four characters and expressed in hexadecimal.

Extended Information: according 3GPP Rel7, four characters are requested, but if

before Rel7, for example the currently network is Rel6 mostly, only the last two

characters is valid, the other characters is invalid and should be ignored. For example,

if the <CI> return 3B3DE1C, only DE1C is valid and could be used as DE1C is the last

two characters.

9 Data Service Interface Description

9.1 3G Quality of Service Profile (Negotiated) +CGEQNEG

9.1.1 Command Syntax

Command	Possible Response(s)
+CGEQNEG =[<cid>[,<cid>[,…]]]	+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>
	[…]]
+CGEQNEG=?	+CGEQNEG: (list of <cid>s associated with active contexts)

9.1.2 Description

This command allows the TE to retrieve the negotiated QoS profiles returned in the Activate PDP Context Accept message.

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.

9.1.3 Defined values

<cid>: a numeric parameter which specifies a particular PDP context definition (see +CGDCONT commands),the value range is 1 to 16.

<Traffic class>: a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.
0 - conversational
1 - streaming
2 - interactive
3 - background
Other values are reserved.

<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 bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …)

<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 bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …)

<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 bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …)

<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 bitrate of 32kbit/s would be specified as '32' (e.g. +CGEQNEG:…,32, …)

<Delivery order>: a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.
0 - no
1 - yes
Other values are reserved.

`<Maximum SDU size>`: a numeric parameter that (1,2,3,…) indicates the maximum allowed SDU size in octets

`<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 $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:…,"5E3",…).

`<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 $5 \cdot 10^{-3}$ would be specified as '5E3' (e.g. +CGEQNEG:…,"5E3",…)

`<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

Other values are reserved.

`<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

`<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.

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

9.2 Enter data state +CGDATA

9.2.1 Command Syntax

Command	Possible Response(s)
+CGDATA=[`<L2P>` ,[`<cid>` [,`<cid>` [,…]]]]	CONNECT ERROR
+CGDATA=?	+CGDATA: (list of supported `<L2P>`s)

9.2.2 Description

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

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

The detailed behaviour after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060[34] and in more detail in 3GPP TS 29.061[39] and the specifications for the relevant PDPs. PS attachment and PDP

context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

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

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

The MT may have a priori knowledge, for example, it may implement only one PDP type.

The command may have provided an <L2P> parameter value.

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

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

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

The PDP type must match exactly.

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

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

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

If the activation is successful, data transfer may proceed.

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

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

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

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

9.2.3 Defined Values

<L2P>: a string parameter that indicates the layer 2 protocol to be used between the TE and MT
PPP   Point-to-point protocol for a PDP such as IP
M-xxxx   manufacturer-specific protocol (xxxx is an alphanumeric string)

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

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

9.3 Show PDP address +CGPADDR

9.3.1 Command Syntax

Command	Possible response(s)
+CGPADDR=[<cid> [,<cid> [,…]]]	+CGPADDR: <cid>,<PDP_addr> [<CR><LF>+CGPADDR: <cid>,<PDP_addr> [...]]
+CGPADDR=?	+CGPADDR: (list of defined <cid>s)

9.3.2 Description

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

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

9.3.3 Defined values

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

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

9.4 PDP environment setting command +CGDCONT

9.4.1 Command Syntax

Command	Possible response(s)
+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]	<CR><LF>OK<CR><LF>
+CGDCONT?	<CR><LF>+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <d_comp>, <h_comp>[<CR><LF>+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <d_comp>, <h_comp>[...]]<CR><LF><CR><LF>OK<CR><LF>

Command	Possible response(s)
+CGDCONT=?	\<CR\>\<LF\>+CGDCONT: (range of supported \<cid\>s), \<PDP_type\>,,,(list of supported \<d_comp\>s),(list of supported \<h_comp\>s) [\<CR\>\<LF\>+CGDCONT: (range of supported \<cid\>s), \<PDP_type\>,,,(list of supported \<d_comp\>s), (list of supported \<h_comp\>s)[...]]\<CR\>\<LF\>\<CR\>\<LF\>OK\<CR\>\<LF\>

9.4.2 Description

A group of setting environments indexed by \<cid\> are stored locally. Each stored setting environment contains a group of parameters related to PDP. The SET command stores a group of PDP-related parameters to the setting environment indexed by \<cid\>. Initially, each setting environment is not defined. After a group of parameters are stored via the SET command, the setting environment enters the "defined" state. The number of defined setting environments that can be stored depends on the value range of \<cid\>.

A special SET command "+CGDCONT= \<cid\>" will clear all parameters in the setting environment indicated by \<cid\>.

The READ command returns all the parameter values of the defined setting environments. The setting environments are displayed by means of linefeed.

The TEST command returns all supported values. In the response, they are displayed one by one by using "PDP_type" values supported by MS as index. Each entry takes a determined PDP_type value, and includes the supported value ranges of other parameters under the value of PDP_type. The entries are displayed by means of linefeed.

9.4.3 Defined Values

\<cid\>:

1-16: Index value of PDP setting environment. Other PDP-related commands can be used for invoking the storage position through this index value.

\<PDP_type\>:

String value. It indicates the type of the packet switching protocol.

"IP": IP protocol

"PPP": End-to-end protocol

\<APN\>:

String value. It indicates the access point domain name of the connected GGSN or external network.

\<PDP_addr\>:

String value. It indicates the address of MSl.

\<d_comp\>:

A numerical value, controlling the compression of PDP data.

0   No compression.

1   Compression.

If no \<d_comp\> is included, it is equivalent to the effect that the \<d_comp\> is 0.

<h_comp>:

A numerical value, controlling the compression of PDP header.

0   No compression.

1   Compression.

If no <h_comp> is included, it is equivalent to the effect that the <h_comp> is 0.

9.4.4 Informative Examples

After executing the following commands consecutively, the results are as follows:

Command 1: AT+CGDCONT=?

Result 1:

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

+CGDCONT:(1-16),"PPP",,,(0-1),(0-1)

OK

Note: This command supports two kinds of packet switching protocols: "IP" and "PPP". The TEST command lists the values of other parameters supportable by each protocol.

Command 2: AT+CGDCONT?

Result 2:

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

OK

Note: The MS stores 1 PDP setting environment currently. The <cid> of this setting environment is 1.

Command 3: AT+CGDCONT=16,"PPP","abc.com","10.111.145.233",1,1

Result 3:

OK

Note: This command stores 1 new BDP setting environment in the MS. The <cid> is 16.

Command 4: AT+CGDCONT?

Result 4: +CGDCONT:1,"IP","vcol.com","",0,0

+CGDCONT:16,"PPP","abc.com","10.111.145.233",1,1

OK

Note: Now the MS has an additional PDP setting environment whose <cid> is 16.

Command 5: AT+CGDCONT=16

Result 5:

OK

Note: Clear the PDP setting environment whose <cid>=16

Command 6: AT+CGDCONT?

Result 6:

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

OK

Note: The PDP setting environment whose <cid>=16 in the MS has been cleared.

9.5 DS traffic reset %DSFLOWCLR

9.5.1 Command Syntax

Command	Possible response(s)
%DSFLOWCLR	<CR><LF>OK<CR><LF>

9.5.2 Description

This command clears the DS traffic to zero, including the DS accumulated connection time, DS accumulated transmitting traffic, DS accumulated receiving traffic, last DS connection time, last DS transmitting traffic, and last DS receiving traffic (for description of these 6 entries, see also "%DSFLOWQRY" command). All the default values of the above 6 data entries are set to 0 at the time of delivery.

9.6 DS traffic query %DSFLOWQRY

9.6.1 Command Syntax

Command	Possible response(s)
%DSFLOWQRY	<CR><LF>%DSFLOWQRY:<last_ds_time>,<last_tx_flow>,<last_rx_flow>,<total_ds_time>,<total_tx_flow>,<total_rx_flow><CR><LF><CR><LF>OK<CR><LF>

9.6.2 Description

This command is used to query the last DS connection time and traffic, and DS accumulated connection time and traffic. If in the online_data state currently, the last DS refers to the current DS; otherwise, it refers to the last generated DS before this. DS accumulated connection time and traffic refer to: Accumulated values of DS connection and traffic generated from the last clearing-to-zero to the current time.

Note: The data rate here is computed on the RLC layer.

9.6.3 Defined Values

All parameters of this interface are reported in 16 hexadecimal numbers with a fixed length. For example: last_ds_time is a 8-digit hexadecimal number, so the possible values are: 00000000-FFFFFFFF. The numbers composed of less than 8 digits shall be preceded by 0s to make up 8 digits. The 0000001A is equivalent to "26" in decimal. In the hexadecimal, all letters are upper-case "A"-"F" rather than lower-case "a"-"f".

<last_ds_time>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the last DS connection time, unit: s.

<last_tx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the last DS transmitting traffic, unit: byte.

<last_rx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the last DS receiving traffic, unit: byte.

<total_ds_time>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the DS accumulated connection time, unit: s.

<total_tx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the DS accumulated transmitting traffic, unit: byte.

<total_rx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the DS accumulated receiving traffic, unit: byte.

9.7 DS traffic reporting %DSFLOWRPT

9.7.1 Command Syntax

Command	Possible response(s)
	<CR><LF>%DSFLOWRPT:<curr_ds_time>,<tx_rate>, <rx_rate>,<curr_tx_flow>,<curr_rx_flow>, <qos_tx_rate>, <qos_rx_rate><CR><LF>

9.7.2 Description

When the MS is in the online_data state, this proactive message is sent once every other 2s. The reported contents include the connection time of this DS, current transmitting rate, current receiving rate, current DS transmitting traffic, current DS receiving traffic, the PDP connection transmitting rate determined after negotiation with network side, the PDP connection receiving rate determined after negotiation with network side.

Note: The data rate here is computed on the RLC layer.

9.7.3 Defined Values

All parameters of this interface are reported in 16 hexadecimal numbers with a fixed length. For example: last_ds_time is a 8-digit hexadecimal number, so the possible values are: 00000000-FFFFFFFF. The numbers composed of less than 8 digits shall be preceded by 0s to make up 8 digits. The 0000001A is equivalent to "26" in decimal. In the hexadecimal, all letters are upper-case "A"-"F" rather than lower-case "a"-"f".

<curr_ds_time>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the current DS connection time, unit: s.

<tx_rate>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the current transmitting rate, unit: bps.

<rx_rate>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the current receiving rate, unit: bps.

<curr_tx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the current DS transmitting traffic, unit: byte.

<curr_rx_flow>:

0000000000000000-FFFFFFFFFFFFFFFF, 16-digit hexadecimal number, indicating the current DS receiving traffic, unit: byte.

<qos_tx_rate>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the PDP connection transmitting rate determined after negotiating with the network side, unit: Bps.

<qos_rx_rate>:

00000000-FFFFFFFF, 8-digit hexadecimal number, indicating the PDP connection receiving rate determined after negotiating with the network side, unit: Bps.

10 TCP/UDP Service Interface Description

10.1 Initialize IP service %IPINIT

10.1.1 Command Syntax

Command	Possible response(s)
%IPINIT=<APN>[,<user_name>[,<password>]]	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
%IPINIT?	<CR><LF>%IPINIT:<state>,<ip_address>,<APN>,<pri_dns_address>,<sec_dns_address>,<CR><LF><CR><LF>OK<CR><LF>
%IPINIT=?	<CR><LF>%IPINIT:(list of supported <state>s)<CR><LF><CR><LF>OK<CR><LF>

10.1.2 Description

This command is used to initialize TCP/UDP connection, access ISP or establish GPRS/UMTS network, in order to establish a physical connection. After initialization, module gets a local IP, then to open TCP link or transfer UDP data.

10.1.3 Defined Values

<APN>:   string type, (Access Point Name).

<user_name>: string type, user name, can be default

<password>: string type,   password, can be default

<state>:   initialization sign

    0   not initialized

    1   initialized

<ip_address >: string type, local IP

< pri_dns_address>: string type,primary DNS IP

< sec_dns_address >: string type,secondary DNS IP

10.2 Open TCP/UDP link %IPOPEN

10.2.1 Command Syntax

Command	Possible response(s)
%IPOPEN=<link_id>,<type>[,<dest_ip>[,<dest_port>[,<local_port>]]]	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
%IPOPEN?	<CR><LF>%IPOPEN:<link_id>,<type>,<local_port>[,<dest_ip>[,<dest_port>]] [<CR><LF>%IPOPEN:<link_id>,<type>,<local_port>[,<dest_ip>[,<dest_port>]] [. . .]]<CR><LF><CR><LF>OK<CR><LF>
%IPOPEN=?	<CR><LF>%IPOPEN:(range of supported <link_id>s), (range of supported <type>),(range of supported <local_port>),(range of supported <dest_ip>),(range of supported <dest_port>)<CR><LF><CR><LF>OK<CR><LF>

10.2.2 Description

This command is used to open one TCP or one UDP link or open one or more TCP/UDP links.

10.2.3 Defined Values

<link_id>: link ID

$1\sim5$ the range of link ID .

<type>: string type,   link type

"TCP"   the link type is set to TCP

"UDP"   the link type is set to UDP

<dest_ip>: string type, IP address to be connected

<dest_port>: 16-bit integer type, Port of the IP address to be connected

<local_port>: 16-bit integer type, local port

10.3 Configure TCP/UDP as a server %IPLISTEN

10.3.1 Command Syntax

Command	Possible response(s)
%IPLISTEN=<type>,<listen_p ort>	<CR><LF>OK<CR><LF> <CR><LF>ERROR<CR><LF>
%IPLISTEN?	<CR><LF>%IPLISTEN:<type>,<listen_port>,<idle _num><CR><LF><CR><LF>OK<CR><LF>
%IPLISTEN=?	<CR><LF>% IPLISTEN:(range of supported <type>),(list of supported <listen_port>),(range of supported <idle_num>)<CR><LF><CR><LF>OK<CR><LF>

10.3.2 Description

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

10.3.3 Defined Values

<type>: string type, link type

"TCP"   the link type is set to TCP

"UDP"   the link type is set to UDP

"NULL"   the server is not on,only used in %IPLISTEN? command

< listen_port>: 16-bit integer type, local listening port

<idle_num>: 16-bit integer type, the number of free links

0～5   It just supports 5 links currently.

10.4 Send TCP/UDP data %IPSEND

10.4.1 Command Syntax

Command	Possible response(s)
%IPSEND=<link_id>,<data>	<CR><LF>%IPSEND:<link_id><CR><LF><CR><LF>OK<CR><LF>
	ERROR
%IPSEND=？	OK

10.4.2 Description

This command is used to send data on the TCP or UDP connection that has been established already.

10.4.3 Defined Values

<link_id >: link ID

1～5   the range of link ID.

<data>: user data, supporting GSM7 and UCS2 coding.The maximum length of the userdata is 1024 bytes.

10.5 Data buffer query command %IPGETDATA

10.5.1 Command Syntax

Command	Possible response(s)
%IPGETDATA=<link_id>,[<index>]	<CR><LF>%IPGETDATA:<link_id>,<data_len><CR><LF><data><CR><LF><CR><LF>OK<CR><LF>
%IPGETDATA？	<CR><LF>%IPGETDATA:<link_id>,<packet_sum>[<CR><LF>%IPGETDATA:<link_id>,<packet_sum>[...]]<CR><LF><CR><LF>OK<CR><LF>
%IPGETDATA=？	<CR><LF>%IPGETDATA:(range of supported <link_id>s),(range of supported <index>s),(list of supported <packet_sum>)<CR><LF><CR><LF>OK<CR><LF>

10.5.2 Description

This command is used to query data buffer for users.The newest three packages are buffered, it is convenience for users to query.

10.5.3 Defined Values

<link_id>: link ID

    1～5　　the range of link ID.

<index >: cache data index

    0～2　　the range of cache data index

<data>: user data

<data_len>: 16-bit integer type, data length

<packet_sum>: the packet sum of current link cache

10.6 Arrival data notification %IPDATA

10.6.1 Command Syntax

Command	Possible response(s)
	<CR><LF>%IPDATA:<link_id>,<data_len>,<data><CR><LF><CR><LF>OK<CR><LF>

10.6.2 Description

This command is used to notify the user network of the arrival of valid data.

10.6.3 Defined Values

<link_id>: link ID

    1～5　　the range of link ID

<data_len>: 16-bit integer type, data length

<data>: new arrival data information

10.7 Close TCP/UDP link %IPCLOSE

10.7.1 Command Syntax

Command	Possible response(s)
%IPCLOSE=[<link_id>]	<CR><LF>OK<CR><LF>
%IPCLOSE?	<CR><LF>%IPCLOSE:<link1_state>,<link2_state>,<link3_state>,<link4_state>,<link5_state><CR><LF><CR><LF>OK<CR><LF>
%IPCLOSE=?	<CR><LF>%IPCLOSE:(range of <link_id>)<CR><LF><CR><LF>OK<CR><LF>

10.7.2 Description

This command is used to close a TCP/UDP link or exit TCP/UDP function.

Link ID 1~5 means closing real link. TCP link needs to finish 4 times handshakes to other side. UDP only needs to deactivate the local link.

Input 6 for closing listening function of server.

Input 7 for unsubscribing from network, the same as deactivating the network while dialing.

If all parameters are default, means closing link 1, equally AT%IPCLOSE=1.

10.7.3 Defined Values

<link_id>: link ID

1~7　　the range of link ID

<linkx_state>: the state of link x

　　0　　closing link

　　1　　opening link

10.8 Transparent mode %IPENTRANS

10.8.1 Command Syntax

Command	Possible response(s)
%IPENTRANS	<CR><LF>">"

10.8.2 Description

This command is used to enable TCP/UDP transparent transfer mode. In this mode the user data is transferred to remote terminal through TCP/UDP link without length limit.

After ">" prompt, user can input sending data continuously, Ctrl-Z is used as a send symbol, then wait for another.

At the same time of sending data ,the terminal data will appear after "<" prompt to tell apart.

After ">" prompt, Ctrl-Q is used as a quit symbol, firstly send all the remained data, then disable TCP/UDP transparent transfer mode.

Note:

%IPENTRANS command will set current link into transparent mode. Before this command, please make sure that first data packet is sent with %IPSEND command, which set current link available.

11 Overall Design Constraints

11.1 Standards Compliance

AT command standards. For details, see the protocols 27.007, 27.005 and V0025-TE.

11.2 Hardware Limitations

11.3 Technology Limitations

12 Software Quality Attributes

None

13 Dependencies

Dependent on the stability of Qualcomm codes.

14 Feasibility Analysis

None

15 Issues To Be Determined

None

16 Appendixes

16.1 Appendix 1 AT Command Description

16.1.1 Basic Commands

The format of a basic command is:

<command>[<number>]

Where, <command> is a single letter (A-Z) or a "&" plus a single letter, and <number> is a decimal number composed of one or more digits. The 0s at the head of <number> will be ignored. If a basic command that can carry <number> carries no <number>, the <number> value is 0 by default. If a basic command that cannot carry <number> carries a <number>, the information "TOO MANY PARAMETERS" will be returned.

16.1.2 S Register Command

All commands that begin with "S" are collectively called "S register command". Command format:

S<parameter number>?

S<parameter number>=<value>

The S register command name is composed of the letter "S" combined with a decimal number. This decimal number is called "register sequence number (parameter number)". If the register is not identified, it indicates that this command does not exist, and the "COMMAND NOT SUPPORT" information will be returned. Each S register saves a character. If the command name is followed by "?", it indicates a READ recommend. The ASCII code values currently saved in this S register expressed by a 3-digit decimal number, will be returned. Make up three digits by filling 0s at the end if there are less than 3 digits. If the command name is followed by "=", the command is a SET command. In this case, replace the characters stored in this S register with the characters corresponding to the <value>.

16.1.3 Extended Commands and Manufacturer Defined Commands

The extended commands begin with "+". The commands defined by the manufacturer also begin with a special character, e.g. "$", "%". For purpose of this document, all commands defined by manufacturers begin with "%". All extended commands and manufacturer-defined commands are divided into two categories: Action command and parameter command.

I. Action commands

Action commands are the commands that carry out a specific action rather than only dealing with local parameters of the MS, e.g. AT+CCFC, AT+CMGS. An action command may carry parameters or not. Action commands include EXECUTION and TEST.

1)   EXECUTION command

Command format:

No parameter   <name>

With 1 parameter   <name>[=<value>]

With more parameters   <name>[=<compound_value>]

<compound_value> indicates multiple parameters, separated by "," in the middle. For the parameters that have a default value, they can be omitted and substitute the default value. If all the parameters are omitted, the "=" behind <name> should be omitted too. If <name> is not identified, it indicates that this command does not exist, and the information "COMMAND NOT SUPPORT" will be returned. If <name> is identifiable, and the command contains uncalled-for parameters, or the number of parameters goes beyond the defined range, the information "TOO MANY PARAMETERS" will be returned.

2) TEST command

Command format:

<name>=?

If the MS cannot identify <name>, the information "COMMAND NOT SUPPORT" will be given. If the MS can identify <name>, and the command carries no parameter, the information "OK" will be returned. If the command carries parameters, the value range of each parameter will be returned first, then "OK" will be returned.

II. Parameter commands

Parameter commands refer to the commands that can only deal with the local parameters of MS. These parameters may affect the execution of the action commands. Parameter commands include SET, READ and TEST commands.

1) SET command

Command format:

With 1 parameter: <name>[=<value>]

With more parameters   <name>[=<compound_value>]

The SET command is used to set the parameters. <compound_value> means multiple parameters, separated by "," in the middle. For the parameters that have a default value, they can be omitted and substitute the default value. If all the parameters are omitted, the "=" behind <name> should be omitted too. If <name> is not identified, it indicates that this command does not exist, and the "COMMAND NOT SUPPORT" information will be returned. If <name> is identifiable, and the command contains uncalled-for parameters, or the number of parameters goes beyond the defined range, the information "TOO MANY PARAMETERS" will be returned.

2) READ command

Command format:

<name>?

The READ command is used to read the current value of the parameter.

3) TEST command

Command format:

<name>=?

If the MS cannot identify <name>, the information "COMMAND NOT SUPPORT" will be given. If the MS can identify <name>, and the command carries no parameter, the information "ok" will be returned. If the command carries parameters, the value range of each parameter will be returned first, then "OK" will be returned.

16.1.4 Abort Attribute:

Abort means the TE sends an instruction to interrupt a command being executed. The "Abort" command must be issued before the command finishes execution, so it makes sense only to the commands that require a certain time period for executing. However, not all commands that require a certain time period for executing can be aborted,

depending on the abort attribute of the command. Each AT command has the abort attribute. This attribute is a two-option choice. Namely, the command either supports abort or does not support abort. The commands that support abort include some basic commands and the EXECUTION command of action command. These commands do not accept any abort request within 125ms after being issued. After the command has been issued for 125ms but has not finish execution, if any character is received from the TE, it will interrupt the execution of the command immediately.

The commands that support abort are as follows:

atD	Can be aborted
atA	Can be aborted
at+CLCK	Can be aborted
at+COPS	Can be aborted except "at+COPS=?"
at+CLCC	Can be aborted
at+CLIP	Can be aborted

16.2 Appendix 2 CME Error List

Note: The following table lists the possible CME errors and reasons for all the interface command. The code in the first row of the table represents the <err> value of CME ERROR. The numerals in the table represent the sequence number of reasons. The table of correspondence between CME ERROR and text string is attached later, together with detailed description on the reasons.

For example: "7" is filled in the column whose <err> is 16 in the "+CPWD=" command. This indicates the "+CPWD=" may incur the CME ERROR whose <err> is 16. Its text string is "incorrect password". The reason is that the sequence number is 7, and the detailed reason is "password incorrect".

	0	3	4	5	10	12	13	14	16	17	18	20	21	22	23	24
+CPWD=									7							
+CPIN=		3				5										
+CPIN?					4		6	1								
+CFUN=			2													
+CCWA=									7							
+CCFC=									7							
+CUSD=									7							
+CIMI=		40					6									
+CGSN															8	
+COPS=	27 31													32		
+CHLD=															30	
+CSCA=							1									
+CSCA?							1							41		

%DTMF=													30	
%CPBS=			9	4		1								
%CPBR=			9	4	6	1					10	11		
%CPBW=			9	4	6	1				13	10			14
%SPN=						1								

	26	27	30	31	32	100	134	257	258	259	260	261	262	263	264
+CLCK=														25	
+CCWA=				17			18	19	20	21	22	23	24	25	26
+CCFC=				17			18	19	20	21	22	23	24	25	26
+CUSD=				17			18	19	20	21	22	23	24	25	26
+COPS=			27												
%DTMF=		16													
%CPBR=						12									
%CPBW=	15	16				12									
%SPN						12									

	65280	65281	65282	65823	65284	65285	65286	65287
+CHLD=	33		34,35	37				
%DTMF=	33	38	34					
%SPN=					28	29	30	39

The reasons are described as follows:

1   SIM card busy
2   Operation not supported
3   Check performed without the check request
4   No SIM card
5   PUK check request existent
6   SIM card failure
7   Password error
8   Failure in obtaining IMEI from NV or invalid IMEI
9   Requiring PH-SIM PIN code
10   Index number not correct
11   Corresponding phonebook storage entry not found

12	Unknown error
13	Phonebook storage is full
14	Too long text string
15	Too long number
16	Invalid characters included in the number
17	Network timeout
18	Temporary disorder of service options
19	Rejected by network
20	Retry operations caused by system error or operation busy
21	Call deviated to the incorrect number
22	Call deviated to the user's own number
23	User unidentifiable
24	Service resources nonexistent
25	Unknown service type
26	Unknown network message
27	CM has no buffer to send command request
28	Incorrect SPN file contents in SIM card
29	Access to SPN file is rejected
30	SPN file nonexistent
31	MCC/MNC fails to construct PLMN
32	Long name/short name of the operator is not found
33	Call corresponding to CALL_X is not existent
34	Operation mode is not in the online state
35	Service state is not a service valid state.
36	The state of call_x corresponding to the call forwarding command (CF) is not "income".
37	The parameter of supplementary service is NULL (commands 1x, 2x)
38	Corresponding call is not in an activated state.
39	Another SPN query operation is underway
40	Operation not allowed
41	SCA file does not exist in SIM card

The correspondence between <err> value of CME ERROR and the text string is as follows:

0	phone failure
3	operation not allowed
4	operation not supported
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy

15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
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
100	unknown
134	service option temporarily out of order (#34)
257	network rejected supervision request
258	retry operation
259	invalid deflected to number
260	deflected to own number
261	unknown subscriber
262	service not in use
263	unknown class
264	unknown network message
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

16.3 Appendix 3 CMS Error List

The following table presents all <err> values of CMS Errors that may be returned by the AT command of SMS.

	0 … 127	128 … 255	301	302	304	310	311	312	316	320	321	322	330	331	332	340	500
+CNMI			3			6				10							17
+CMGD			3			6	7	8	9	10	11						

+CNMA				5											16	
+CPMS			3			6	7	8	9	10						
+CSCA						6	7	8	9			13				
+CMGS	1	2	3		5	6	7	8	9			13	14	15		
+CMGW			3		5	6	7	8	9	10	12					
+CMGL			3			6	7	8	9	10						
+CMGR			3			6	7	8	9	10	11					

Note:

1   RP layer error

2   TP layer error

3   Some other applications leave SMS interface reserved

4   Operation not supported.

5   In the PDU mode, the PDU parameter is incorrect (actual data length of PDU packet is inconsistent with the given <length>; or PDU format error is detected)

6   SIM card not inserted

7   PIN request of SIM card

8   PH-(U)SIM PIN request of SIM card

9   PUK request of SIM card

10   Memory error (communication with database of SMS is faulty)

11   Invalid memory index number <index>

12   Memory is full

13   SMSC error (message contains no SCA, or the SCA set via the CSCA command is unavailable)

14   No network service is available

15   Network timeout

16   No status of new SM,error execute this command

17   Unbeknown error

16.4 Appendix 4 Summary of Final Result Codes

Final result code	Code	Description
OK	0	It indicates a command line is executed correctly.
CONNECT	1	Connection established
RING	2	Incoming call
NO CARRIER	3	Connection terminated
ERROR	4	Ordinary error
NO DIALTONE	6	No dialling tone

BUSY	7	Opposite party busy
NO ANSWER	8	Connection completion timeout, no answer
+CME ERROR: <err>		Error type is specified by the parameter <err>
+CMS ERROR: <err>		SMS-related error
COMMAND NOT SUPPORT	Numbering mode is not supported	Issued command is not supported
TOO MANY PARAMETERS	Numbering mode is not supported	Too many parameters in the issued command

16.5 Appendix 6 List of Initial Values of Command Parameter After MS Restart

The following table presents the initial values of interface parameters mentioned herein at the time of MS startup.

	Description of initial value
E	<value> is 0
V	<value> is 1
S3	<value> is 013
S4	<value> is 010
S5	<value> is 008
+CPMS	<mem1>, <mem2> and <mem3> are "ME"
+CMEE	<value> is 2
+CGDCONT	Obtained from NV after restart
+CCWA	<n> is 0
+CUSD	<n> is 0
+CSCA	<sca> and <tosca> are empty. It is necessary to read the SMSC number in the SIM card to the MS via "+CSCA?" command
+CSMS	<service> is 0
+CMGF	<mode> is 0
+CNMI	<mode>,<mt>,<bm>,<ds> and <bfr> are 0
+COPS	<mode> is 0, <format> is 2
+CREG	<n> is 0
+CGREG	<n> is 0

	Description of initial value
+CLIP	\<n> is 0
+CMUT	\<n> is 0
+CLVL	\<level> is read from NV.
+CSSN	\<n> is 0, \<m> is 0
%PROTSEL	\<n> is 0
+CMMS	\<n> is 2
%CURC	\<curc_status> is 0x00000003

16.6 Appendix 7 Examples of Show Mode

Query Mode:We can use "AT%SYSINFO?" to acquire system server domain and system mode. According to the parameter \<srv_domain> and the parameter \<sys_mode>, host software will achieve the mode which would be shown to the user.

\<srv_domain>	\<sys_mode>	shown
1	3	GSM
2	3	GPRS
3	3	GPRS
1	5	3G CS
2	5	3G PS
3	5	3G

Report Mode:We can get the parameter \<sys_mode> by the command "%MODE", and then get the parameter \<stat> by the command "+CREG"(or "+CGREG").Finally, host software can use them to determine the mode which would be shown to the user.

\<sys_mode>	creg: \<stat>	cgreg: \<stat>	shown
3	reg（1、5）	unreg(0、2、3、4、)	GSM
3	any	reg（1、5）	GPRS
5	reg（1、5）	unreg（0、2、3、4、)	3G CS
5	unreg(0、3、4)	reg(1、5)	3G PS
5	reg(1、5)	reg（1、5）	3G

List of reference:

        [1] 3GPP protocol 27.005-3d0

        [2] 3GPP protocol 27.007-320

        [3] ITU-T Recommendation V.25 ter V0025-TE.DOC