



HUAWEI EM820W HSPA+ PC Embedded Module

AT Command Interface Specification

Issue 02

Date 2012-08-08

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, please contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

Huawei Industrial Base, Bantian, Longgang, Shenzhen 518129, People's Republic of China

Tel: +86-755-28780808 Global Hotline: +86-755-28560808 Website: www.huawei.com

E-mail: mobile@huawei.com

Please refer color and shape to product. Huawei reserves the right to make changes or improvements to any of the products without prior notice.

Copyright © Huawei Technologies Co., Ltd. 2012. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd.

The product described in this manual may include copyrighted software of Huawei Technologies Co., Ltd and possible licensors. Customers shall not in any manner reproduce, distribute, modify, decompile, disassemble, decrypt, extract, reverse engineer, lease, assign, or sublicense the said software, unless such restrictions are prohibited by applicable laws or such actions are approved by respective copyright holders under licenses.

Trademarks and Permissions



HUAWEI,

HUAWEI, and



are trademarks or registered trademarks of Huawei Technologies Co., Ltd.

Other trademarks, product, service and company names mentioned are the property of their respective owners.

Notice

Some features of the product and its accessories described herein rely on the software installed, capacities and settings of local network, and may not be activated or may be limited by local network operators or network service providers, thus the descriptions herein may not exactly match the product or its accessories you purchase.

Huawei Technologies Co., Ltd reserves the right to change or modify any information or specifications contained in this manual without prior notice or obligation.

NO WARRANTY

THE CONTENTS OF THIS MANUAL ARE PROVIDED "AS IS". EXCEPT AS REQUIRED BY APPLICABLE LAWS, NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE MADE IN RELATION TO THE ACCURACY, RELIABILITY OR CONTENTS OF THIS MANUAL.

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO CASE SHALL HUAWEI TECHNOLOGIES CO., LTD BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, OR LOST PROFITS, BUSINESS, REVENUE, DATA, GOODWILL OR ANTICIPATED SAVINGS.

Import and Export Regulations

Customers shall comply with all applicable export or import laws and regulations and will obtain all necessary governmental permits and licenses in order to export, re-export or import the product mentioned in this manual including the software and technical data therein.



About This Document

History

Version	Date	Chapter	Descriptions
01	2010-12-15		Creation
02	2012-08-08	3	Added AT commands ^NTCT and ^NWTIME
		4	Updated the parameter description in AT command +CNMI
		7	Added AT command ^WAKEUPCFG
		12	Updated AT commands related with Body SAR feature
		13	Updated AT commands related with STK feature
		14	Updated AT commands related with STK feature
		15	Added AT command ^ICCID
		All	Removed AT commands ^HSDPA and ^SYSCFGEX (EM820W do not support them)

Firmware Software

EM820WTCPU-11.810.10.03.000

Please read the release note released with the firmware software before using EM820W module and this document.



Contents

1 Scope	18
1.1 Interface Overview	18
1.2 Interface Design Principles	19
1.3 Interface Change Principles	20
2 Interface Introduction	21
3 Query of Basic Information and Description of Set Interface	22
3.1 Terminal Error Report Command +CMEE	22
3.1.1 Command Syntax	22
3.1.2 Description	22
3.1.3 Defined Values	22
3.2 Echo Command E	23
3.2.1 Command Syntax	23
3.2.2 Description	23
3.2.3 Defined Values	23
3.3 Command for Querying the Product Information I	23
3.3.1 Command Syntax	23
3.3.2 Description	24
3.3.3 Defined Values	24
3.3.4 Implementation	24
3.3.5 Informative Examples	24
3.4 Command Line Carriage Return Character S3	25
3.4.1 Command Syntax	25
3.4.2 Description	25
3.4.3 Defined Values	25
3.5 Response Format Character S4	25
3.5.1 Command Syntax	25
3.5.2 Description	26
3.5.3 Defined Values	26
3.6 ME Response Format Command V	26
3.6.1 Command Syntax	26
3.6.2 Description	26
3.6.3 Defined Values	27



3.7 Backspace Character S5.....	27
3.7.1 Command Syntax	27
3.7.2 Description.....	27
3.7.3 Defined Values	27
3.8 Returning the Factory Setting &F (not in use currently)	28
3.8.1 Command Syntax	28
3.8.2 Description.....	28
3.8.3 Defined Values	28
3.9 RSSI Query Function Command +CSQ.....	28
3.9.1 Command Syntax	28
3.9.2 Description.....	28
3.9.3 Defined Values	29
3.10 Operation Mode Setting Command +CFUN	29
3.10.1 Command Syntax	29
3.10.2 Description.....	29
3.10.3 Defined Values	30
3.11 Manufacturer Information Query Command +CGMI	30
3.11.1 Command Syntax	30
3.11.2 Description	30
3.11.3 Defined Value.....	31
3.11.4 Informative Examples	31
3.12 Software Version Number Query Command +CGMR	31
3.12.1 Command Syntax	31
3.12.2 Description.....	31
3.12.3 Defined Value	31
3.13 TE Character Set Command +CSCS.....	32
3.13.1 Command Syntax	32
3.13.2 Interface Description.....	32
3.13.3 Defined Value	32
3.13.4 PC Actions Performed by the Client	33
3.14 IMSI Query Command +CIMI.....	33
3.14.1 Command Syntax	33
3.14.2 Interface Description.....	33
3.14.3 Defined Value	33
3.14.4 Informative Examples	34
3.15 IMEI Query Command +CGSN	34
3.15.1 Command Syntax	34
3.15.2 Interface Description.....	34
3.15.3 Defined Value	34
3.15.4 Informative Examples	35
3.16 SPN Read Function Command ^SPN.....	35
3.16.1 Command Syntax	35



3.16.2 Description.....	35
3.16.3 Defined Values	35
3.16.4 Informative Examples	36
3.17 Hardware Version Number Query Function ^HWVER	36
3.17.1 Command Syntax	36
3.17.2 Description.....	36
3.17.3 Defined Value	36
3.18 Unsolicited Report Control Command ^CURC	37
3.18.1 Command Syntax	37
3.18.2 Interface Description.....	37
3.18.3 Defined Values	37
3.18.4 Implementation	41
3.18.5 Informative Examples	41
3.19 Product Model ID Command +CGMM/+GMM	42
3.19.1 Command Syntax	42
3.19.2 Interface Description.....	42
3.19.3 Defined Value	43
3.19.4 Informative Examples	43
3.20 Card Lock Command ^CARDLOCK	43
3.20.1 Command Syntax	43
3.20.2 Interface Description.....	43
3.20.3 Defined Values	44
3.21 W_DISABLE# Pin Status Query and Close Radio Command ^RFSWITCH	45
3.21.1 Command Syntax	45
3.21.2 Description.....	45
3.21.3 Defined Values	45
3.21.4 Informative Examples	46
3.22 W_DISABLE# Pin State and Radio Switch State Indication ^ RFSWITCH	46
3.22.1 Command Syntax	46
3.22.2 Description.....	46
3.22.3 Defined Values	46
3.22.4 Informative Examples	47
3.23 Query Dial-up Mode ^DIALMODE(Modem/NDIS)	47
3.23.1 Command Syntax	47
3.23.2 Description.....	47
3.23.3 Defined Values	47
3.23.4 Informative Examples	48
3.24 Set Presentation of Network Time ^NTCT	48
3.24.1 Command Syntax	48
3.24.2 Description.....	48
3.24.3 Defined Values	49
3.24.4 Informative Examples	49



3.25 Set Presentation of Network System Time ^NWTIME	49
3.25.1 Command Syntax	49
3.25.2 Description.....	50
3.25.3 Defined Values	50
3.25.4 Implementation	50
3.25.5 PC Actions Performed by the Client	50
4 SMS Interface Description	52
4.1 Select the SMS Type +CSMS	52
4.1.1 Command Syntax	52
4.1.2 Description.....	52
4.1.3 Defined Values	53
4.2 Set Message Format +CMGF	53
4.2.1 Command Syntax	53
4.2.2 Description.....	53
4.2.3 Defined Values	54
4.3 Message Arrival Indication +CMTI	54
4.3.1 Command Syntax	54
4.3.2 Description.....	54
4.3.3 Defined Values	54
4.4 Indication of New Message Reported Directly +CMT	55
4.4.1 Command Syntax	55
4.4.2 Description.....	55
4.4.3 Defined Values	55
4.5 Newly Received Message State Report +CDSI	55
4.5.1 Command Syntax	55
4.5.2 Description.....	55
4.5.3 Defined Values	56
4.6 Indication of New Message State Report Reported Directly +CDS	56
4.6.1 Command Syntax	56
4.6.2 Description.....	56
4.6.3 Defined Values	56
4.7 Unsolicited Reporting Indication of Cell Broadcast Messages +CBM	57
4.7.1 Command Syntax	57
4.7.2 Description.....	57
4.7.3 Defined Values	58
4.8 New Message Notification Setting +CNMI	58
4.8.1 Command Syntax	58
4.8.2 Description.....	58
4.8.3 Defined Values	59
4.8.4 Informative Examples	61
4.9 Delete Message +CMGD	61



4.9.1 Command Syntax	61
4.9.2 Description.....	62
4.9.3 Defined Values	62
4.10 New Message Acknowledgement to +CNMA	62
4.10.1 Command Syntax	62
4.10.2 Description.....	63
4.10.3 Defined Values	63
4.11 Message Storage Selection +CPMS	67
4.11.1 Command Syntax	67
4.11.2 Description	68
4.11.3 Defined Values	68
4.12 Reporting Message Storage Media Being Full ^SMMEMFULL	69
4.12.1 Command Syntax	69
4.12.2 Description.....	69
4.12.3 Defined Values	69
4.13 SMSC Number Command +CSCA	70
4.13.1 Command Syntax	70
4.13.2 Description.....	70
4.13.3 Defined Values	70
4.14 Message Sending +CMGS	71
4.14.1 Command Syntax	71
4.14.2 Interface Description.....	71
4.14.3 Defined Values	71
4.14.4 Examples.....	78
4.15 Message Storage Command +CMGW.....	79
4.15.1 Command Syntax	79
4.15.2 Interface Description.....	79
4.15.3 Defined Values	79
4.16 Message List Command +CMGL	80
4.16.1 Command Syntax	80
4.16.2 Description.....	80
4.16.3 Defined Values	80
4.17 Read a Message +CMGR.....	82
4.17.1 Command Syntax	82
4.17.2 Description.....	82
4.17.3 Defined Values	82
4.18 Message Bearer Domain Command +CGSMS	83
4.18.1 Command Syntax	83
4.18.2 Description.....	83
4.18.3 Defined Values	83
4.19 More Messages to Send +CMMS	84
4.19.1 Command Syntax	84



4.19.2 Description	84
4.19.3 Defined Values	84
5 Serializer Interface Description	85
5.1 Proactive Event Report Port Setting ^PORTSEL	85
5.1.1 Command Syntax	85
5.1.2 Description	85
5.1.3 Defined Values	85
6 Description of Security Setting Interface	86
6.1 PIN Password Modifying +CPWD	86
6.1.1 Command Syntax	86
6.1.2 Description	86
6.1.3 Defined Values	86
6.2 PIN Enabling and Query Function +CLCK	87
6.2.1 Command Syntax	87
6.2.2 Description	87
6.2.3 Defined Values	87
6.3 PIN Management Command +CPIN	88
6.3.1 Command Syntax	88
6.3.2 Description	88
6.3.3 Defined Values	89
6.4 PIN Management Command ^CPIN (new feature)	89
6.4.1 Command Syntax	89
6.4.2 Description	90
6.4.3 Defined Values	90
7 System Setting Interface Description	91
7.1 System Information Query ^SYSINFO	91
7.1.1 Command Syntax	91
7.1.2 Interface Description	91
7.1.3 Defined Values	91
7.2 Extended System Information Query ^SYSINFOEX	93
7.2.1 Command Syntax	93
7.2.2 Interface Description	93
7.2.3 Defined Values	94
7.2.4 Informative Examples	97
7.3 Service State Change Indication ^SRVST	97
7.3.1 Command Syntax	97
7.3.2 Description	97
7.3.3 Defined Values	97
7.4 SIM State Change Indication ^SIMST	98
7.4.1 Command Syntax	98
7.4.2 Interface Description	98



7.4.3 Defined Values	98
7.5 System Mode Change Event Indication ^MODE	98
7.5.1 Command Syntax	98
7.5.2 Interface Description.....	98
7.5.3 Defined Values	99
7.6 RSSI Change Indication ^RSSI.....	99
7.6.1 Command Syntax	99
7.6.2 Description.....	100
7.6.3 Defined Values	100
7.7 System Configuration Reference Setting ^SYSCFG (Legacy)	100
7.7.1 Command Syntax	100
7.7.2 Description.....	101
7.7.3 Defined Values	101
7.8 Set the Primary DNS Server Address ^DNSP	102
7.8.1 Command Syntax	102
7.8.2 Description.....	102
7.8.3 Defined Values	102
7.8.4 Informative Examples.....	102
7.9 Set the Secondary DNS Server Address ^DNSS.....	103
7.9.1 Command Syntax	103
7.9.2 Description.....	103
7.9.3 Defined Values	103
7.9.4 Informative Examples.....	103
7.10 RSCP and ECIO Query ^CSNR.....	104
7.10.1 Command Syntax	104
7.10.2 Interface Description.....	104
7.10.3 Defined Value	104
7.11 Remote Wakeup Feature Configure Command ^WAKEUPCFG	105
7.11.1 Command Syntax	105
7.11.2 Interface Description.....	105
7.11.3 Defined Value.....	105
7.11.4 Implementation	106
7.11.5 Informative Examples	106
8 Phonebook Service Interface Description.....	108
8.1 Phonebook Memory Selection +CPBS	108
8.1.1 Command Syntax	108
8.1.2 Description.....	108
8.1.3 Defined Values	109
8.2 Find Phonebook Entries +CPBF	109
8.2.1 Command Syntax	109
8.2.2 Description.....	109



8.2.3 Defined Values	110
8.3 Read Phonebook Entries +CPBR	110
8.3.1 Command Syntax	110
8.3.2 Description	110
8.3.3 Defined Values	111
8.4 Write Phonebook Entry +CPBW	111
8.4.1 Command Syntax	111
8.4.2 Description	112
8.4.3 Defined Values	112
8.5 Phonebook Reading ^CPBR	113
8.5.1 Command Syntax	113
8.5.2 Description	113
8.5.3 Defined Values	113
8.6 Phonebook Writing ^CPBW	114
8.6.1 Command Syntax	114
8.6.2 Description	114
8.6.3 Defined Values	115
8.6.4 Informative Examples	115
9 Network Service Interface Description	116
9.1 Operator Selection +COPS	116
9.1.1 Command Syntax	116
9.1.2 Interface Description	116
9.1.3 Defined Values	117
9.1.4 Examples of Searching Network	118
9.2 Network Registration +CREG	119
9.2.1 Command Syntax	119
9.2.2 Interface Description	119
9.2.3 Defined Values	119
9.3 Network Registration +CGREG	120
9.3.1 Command Syntax	120
9.3.2 Interface Description	120
9.3.3 Defined Values	121
10 Data Service Interface Description	122
10.1 3G Quality of Service Profile (Negotiated) +CGEQNEG	122
10.1.1 Command Syntax	122
10.1.2 Description	122
10.1.3 Defined Values	123
10.2 Enter Data State +CGDATA	124
10.2.1 Command Syntax	124
10.2.2 Description	124
10.2.3 Defined Values	126



10.3 Show PDP Address +CGPADDR	126
10.3.1 Command Syntax	126
10.3.2 Description.....	126
10.3.3 Defined Values	127
10.4 Define PDP Context +CGDCONT	127
10.4.1 Command Syntax	127
10.4.2 Description.....	127
10.4.3 Defined Values	128
10.4.4 Informative Examples	129
10.5 DS Traffic Reset ^DSFLOWCLR.....	130
10.5.1 Command Syntax	130
10.5.2 Description.....	131
10.6 DS Traffic Query ^DSFLOWQRY	131
10.6.1 Command Syntax	131
10.6.2 Description.....	131
10.6.3 Defined Values	132
10.7 DS Traffic Reporting ^DSFLOWRPT.....	132
10.7.1 Command Syntax	132
10.7.2 Description.....	132
10.7.3 Defined Values	133
11 GPS Interface Description.....	134
11.1 Specify GPS or AGPS Session Type ^WPDST	134
11.1.1 Command Syntax	134
11.1.2 Description	134
11.1.3 Defined Values.....	134
11.2 Specify Operation Mode ^WPDOM	135
11.2.1 Command Syntax	135
11.2.2 Description	135
11.2.3 Defined Values.....	135
11.3 Specify Fix Number and Interval Time ^WPDFR.....	136
11.3.1 Command Syntax	136
11.3.2 Description	136
11.3.3 Defined Values.....	137
11.4 Set AGPS Socket Profile ^SOCKETCONT	137
11.4.1 Command Syntax	137
11.4.2 Description	137
11.4.3 Defined Values.....	137
11.5 Set the SUPL Server Address ^WPURL	138
11.5.1 Command Syntax	138
11.5.2 Description	138
11.5.3 Defined Values.....	138



11.6 Start GPS/AGPS Command ^WPDGP	138
11.6.1 Command Syntax	138
11.6.2 Description	139
11.7 Stop GPS/AGPS Command ^WPEND	139
11.7.1 Command Syntax	139
11.7.2 Description	139
11.8 Response to NI request ^WNICT	139
11.8.1 Command Syntax	139
11.8.2 Description	139
11.8.3 Defined Values	139
11.9 Position Data Report ^POSITION	140
11.9.1 Command Syntax	140
11.9.2 Description	140
11.9.3 Defined Values	140
11.10 NI Notification ^WNINV	140
11.10.1 Command Syntax	140
11.10.2 Description	140
11.10.3 Defined Values	140
11.11 XTRA Initiation ^XTRAINIT	141
11.11.1 Command Syntax	141
11.11.2 Description	141
11.11.3 Defined Values	141
11.12 XTRA Inject Time ^XTRATIME	142
11.12.1 Command Syntax	142
11.12.2 Description	142
11.12.3 Defined Values	142
11.13 Time Injection Result Report ^TIMESETRULT	142
11.13.1 Command Syntax	142
11.13.2 Description	143
11.13.3 Defined Values	143
11.14 XTRA Inject Data ^XTRADATA	143
11.14.1 Command Syntax	143
11.14.2 Description	143
11.14.3 Defined Values	143
11.15 Data Injection Result Report ^DATASETRULT	144
11.15.1 Command Syntax	144
11.15.2 Description	144
11.15.3 Defined Values	144
11.16 XTRA Check Data Validity ^XTRASTA	144
11.16.1 Command Syntax	144
11.16.2 Description	144
11.16.3 Defined Values	144



11.17 Data Validity Check Result Report ^XDSTATUS.....	145
11.17.1 Command Syntax	145
11.17.2 Description	145
11.17.3 Defined Values.....	145
12 BodySAR Interface Description.....	146
12.1 Disabling or Enabling Body SAR ^BODYSARON.....	146
12.1.1 Command Syntax	146
12.1.2 Description.....	146
12.1.3 Defined Values	146
12.2 Set the Maximum Tx Power Limit of WCDMA ^BODYSARWCDMA	147
12.2.1 Command Syntax	147
12.2.2 Description.....	147
12.2.3 Defined Values	147
12.3 Set the Maximum Tx Power Limit of GSM ^BODYSARGSM	148
12.3.1 Command Syntax	148
12.3.2 Description.....	148
12.3.3 Defined Values	148
13 STK-related Interface Description (Common Mode)	149
13.1 Reporting of the STK Event Notification ^STIN	149
13.1.1 Command Syntax	149
13.1.2 Description.....	149
13.1.3 Defined Values	149
13.2 Obtaining Command Data ^STGI.....	150
13.2.1 Command Syntax	150
13.2.2 Description.....	150
13.2.3 Defined Values	151
13.2.4 Informative Examples	155
13.3 STK Responding Command ^STGR.....	156
13.3.1 Command Syntax	156
13.3.2 Description.....	156
13.3.3 Defined Values	156
13.3.4 Informative Examples	157
14 STK-related Interface Description(RAWDATA Mode)	158
14.1 STK Configuration Tool ^STSF	158
14.1.1 Command Syntax	158
14.1.2 Description.....	158
14.1.3 Defined Values	159
14.1.4 Informative Examples	159
14.2 STK Responding Command ^STGR.....	159
14.2.1 Command Syntax	159



14.2.2 Description	159
14.2.3 Defined Values	160
14.2.4 Informative Examples	160
14.3 Obtaining Command Data ^STGI.....	160
14.3.1 Command Syntax	160
14.3.2 Description.....	161
14.3.3 Defined Values	161
14.3.4 Informative Examples	161
14.4 Report the STK Event Notification ^STIN	162
14.4.1 Command Syntax	162
14.4.2 Description.....	162
14.4.3 Defined Values	162
15 WWAN-related Interface Description	163
15.1 Query the ICCID ^ICCID	163
15.1.1 Command Syntax	163
15.1.2 Description.....	163
15.1.3 Defined Values	163
16 Appendixes.....	164
16.1 Appendix 1 AT Command Description.....	164
16.1.1 Basic Commands	164
16.1.2 S Register Command	164
16.1.3 Extended Commands and Manufacturer Defined Commands	164
16.1.4 Abort Attribute	166
16.2 Appendix 2 CME Error List.....	166
16.3 Appendix 3 CMS Error List.....	170
16.4 Appendix 4 Summary of Final Result Codes	171
16.5 Appendix 5 List of Initial Values of Command Parameter After MS Restart	172
16.6 Appendix 6 Examples of Show Mode	173
16.7 Appendix 7 List of Unsolicited Report Command.....	174
16.8 Appendix 8 List of Reference	174
16.9 Appendix 9 List of Abbreviations	175



Tables

Table 3-1 Influence of V parameter on the response format	26
Table 3-2 Situation when MS supports WWAN port	38
Table 3-3 Situation when MS does not support WWAN port	38
Table 3-4 Definitions of Page 0 Bit [60~0] for the presentation of unsolicited results	39
Table 3-5 List for the presentation of unsolicited results when CURU =0/1	42
Table 4-1 Bit number.....	64



Figures

Figure 1-1 Block diagram of interaction between TE and MS.....	19
Figure 4-1 Format of User data of the default 7bit code	67
Figure 4-2 Format of User data of 8bit code or UCS2 code.....	67
Figure 4-3 Half byte coding with a total of 5 digits.....	73

1 Scope

This document describes the AT command interface of HUAWEI EM820W module. The description on the AT interface is only limited to the interface packet itself, the usage and use procedure of TE and MS, which are not directly related to the interface, is not covered.

1.1 Interface Overview

HUAWEI EM820W module is a wireless terminal of the USB interface. It is used together with PC to provide data service, GPS and SMS functions.

This document describes the AT interfaces. The interfaces or the parameters not mentioned in the document are not support temporarily.

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

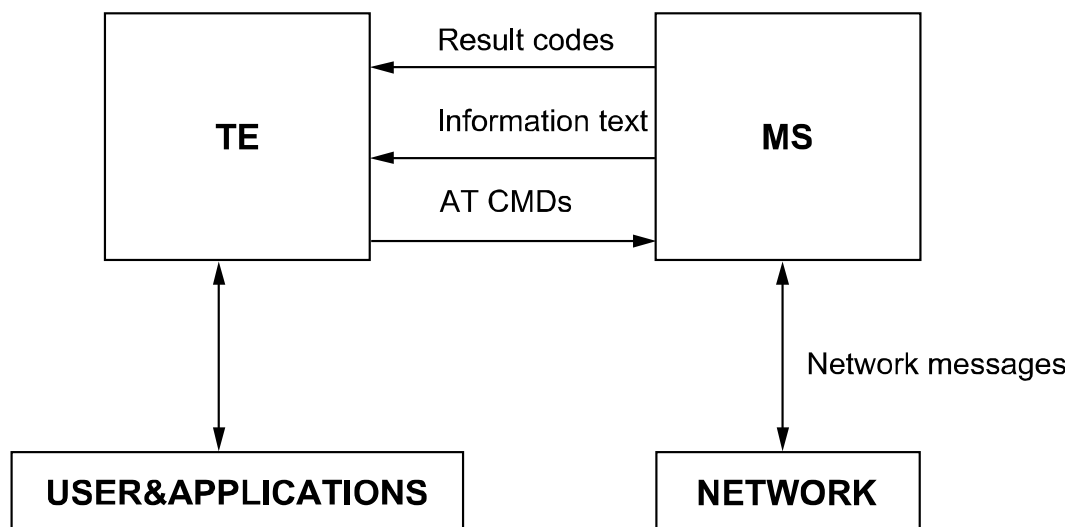
<...>: Parameters enclosed in angle brackets must be completed. Brackets themselves do not appear in the command line.

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

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

<LF>: Linefeed character, which value is specified with command S4.

Figure 1-1 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 560 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 560 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 Huawei devices 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 short message receiving and sending, data traffic flow, phone book statistics, GPS, 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

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 16.2 Appendix 2 CME Error List.

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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

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 1.

Note: Software may set ATE0 automatically.

3.3 Command for Querying the Product Information I

3.3.1 Command Syntax

Command	Possible response(s)
I[<value>]	<list of MS ID info><CR><LF>OK<CR><LF>

3.3.2 Description

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

Manufacturer (AT+GMI)

Product model (AT+GMM)

Software version (AT+GMR)

ESN/IMEI (AT+GSN)

Capability list (AT+GCAP)

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.3.3 Defined Values

<value>=0: queries the previously described MS ID information.

ATI is equivalent to ATI0.

3.3.4 Implementation

Follow the ITU-T Recommendation V.25 ter [14].

Mandatory.

3.3.5 Informative Examples

ATI

Manufacturer: huawei

Model: EM820W

Revision: 11.810.10.03.00

IMEI: 354283042356455

+GCAP: +CGSM, +DS, +ES

OK

3.4 Command Line Carriage Return Character S3

3.4.1 Command Syntax

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

3.4.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.4.3 Defined Values

<value>: (Default value is 13)

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

3.5 Response Format Character S4

3.5.1 Command Syntax

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

3.5.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.5.3 Defined Values

<value>: (Default value is 10)

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

3.6 ME Response Format Command V

3.6.1 Command Syntax

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

3.6.2 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 3-1 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>

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.6.3 Defined Values

<value>: (Default value is 1)

- | | |
|---|--|
| 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 1.

3.7 Backspace Character S5

3.7.1 Command Syntax

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

3.7.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.7.3 Defined Values

<value>: (Default value is 8)

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

3.8 Returning the Factory Setting &F (not in use currently)

3.8.1 Command Syntax

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

3.8.2 Description

This command is used to set all MS parameters as the factory default values. The command parameters recovered to the factory settings include: S3, S4, S5, E, V.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.8.3 Defined Values

<value>:

0 Recover all MS parameters to the factory settings.

Other values: Reserved by the manufacturer.

3.9 RSSI Query Function Command +CSQ

3.9.1 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>

3.9.2 Description

The EXECUTION command returns the RSSI and BER of ME.

The TEST command returns the supported RSSI and BER values.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

3.9.3 Defined Values

<rsi>: Indication of the receiving signal strength

0	Equal to or less than -113 dBm
1	-111 dBm
2...30	-109 dBm to -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.

3.10 Operation Mode Setting Command +CFUN

3.10.1 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>

3.10.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.10.3 Defined Values

<fun>:

- 0 Set as minimum functionality mode (set the RF off but keep the SIM power on, 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

- 0 Not restart MS before setting. (Default)
- 1 Restart MS before setting. (<fun> must be 1)

3.11 Manufacturer Information Query Command +CGMI

3.11.1 Command Syntax

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

3.11.2 Description

This command is used to query the manufacturer information.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.11.3 Defined Value

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

3.11.4 Informative Examples

AT+CGMI

huawei

OK

3.12 Software Version Number Query Command +CGMR

3.12.1 Command Syntax

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

3.12.2 Description

The EXECUTION command returns the software version number of ME.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.12.3 Defined Value

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

3.13 TE Character Set Command +CSCS

3.13.1 Command Syntax

Command	Possible response(s)
+CSCS=<chset>	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>ERROR<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
+CSCS?	<CR><LF>+CSCS: <chset><CR><LF><CR><LF>OK<CR><LF>
+CSCS=?	<CR><LF>+CSCS: (list of supported <chset>s) <CR><LF><CR><LF>OK<CR><LF>

3.13.2 Interface Description

This command notifies TA of the TE's current character set so that TA can correctly convert TE's and MS's character sets. If TA and TE use an 8-bit interface but TE uses a 7-bit character set, the most significant bit of a character sent by the TE is set to 0.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.13.3 Defined Value

<chset>: At present, the default character set used by MS is "IRA". Other character sets are listed below (only the "IRA", "GSM" and "UCS2" character sets are supported at present):

"GSM" GSM 7 bit default alphabet (3GPP TS 23.038); this setting causes easily software flow control (XON/XOFF) problems

Note 1: If MS is using GSM 7 bit default alphabet, its characters shall be padded with 8th bit (zero) before converting them to hexadecimal numbers (i.e. no SMS-style packing of 7-bit alphabet).

"IRA" international reference alphabet (ITU-T T.50 [13])

"UCS2" 16-bit universal multiple-octet coded character set (ISO/IEC10646 [32]); UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; for example, "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99.

3.13.4 PC Actions Performed by the Client

The client on a computer uses this command to select the required character set before sending the other commands. For example, before sending AT+CPBW, this command is used to select the character set according to the type of the characters to be written.

3.14 IMSI Query Command +CIMI

3.14.1 Command Syntax

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

3.14.2 Interface Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.14.3 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

3.14.4 Informative Examples

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

AT+CIMI

1234512345678

OK

3.15 IMEI Query Command +CGSN

3.15.1 Command Syntax

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

3.15.2 Interface Description

This command is used to query the IMEI of module.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

3.15.3 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

3.15.4 Informative Examples

If TAC is “35154800”, SNR is “022544”, and Spare is “4”, then

AT+CGSN

351548000225444

OK

3.16 SPN Read Function Command ^SPN

3.16.1 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>

3.16.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

3.16.3 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.

3.16.4 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 UCS2 coding format, the following will be fed back: ^SPN:1,1,"80004300680069006E00610020004D006F00620069006C0065".

3.17 Hardware Version Number Query Function ^HWVER

3.17.1 Command Syntax

Command	Possible response(s)
^HWVER	<CR><LF>^HWVER:<hardversion><CR> <LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

3.17.2 Description

The EXECUTION command returns the hardware version number of ME.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.17.3 Defined Value

<hardversion>: Hardware version number. It is a string composed of 30 characters at most.

3.18 Unsolicited Report Control Command ^CURC

3.18.1 Command Syntax

Command	Possible response(s)
^CURC=<mode> [,<Sleeping_UR_cfg>, <working_UR_cfg>]	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^CURC?	<CR><LF>^CURC: <mode> [,<Sleeping_UR_cfg>,<working_UR_cfg>]<CR><LF> <CR><LF>OK<CR><LF>
^CURC=?	<CR><LF>^CURC: (list of supported <mode>s)<CR><LF> <CR><LF>OK<CR><LF>

3.18.2 Interface Description

The SET command selects the control mode for the presentation of unsolicited results. When <mode>=2, the specific types of unsolicited results can be specified.

The READ command queries the current control mode for the presentation of unsolicited results. When <mode>=2, the specific types of unsolicited results can be queried.

The TEST command lists the supported control mode for the presentation of unsolicited results.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

3.18.3 Defined Values

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

0 The presentation of unsolicited indications added by Huawei in Table 3-5 is disabled:

1 Enables the presentation of unsolicited indications added by Huawei in Table 3-5 when not in sleep mode.

When <mode> is 0 or 1, the unsolicited AT is controlled in Table 3-2 and Table 3-3 .

Table 3-2 Situation when MS supports WWAN port

Mode	Status	
	Suspend	Normal
0	Cache (report to Wwan port after module is waken-up)	Report to Wwan port
1	Cache (report after module is waken-up)	Directly report

Table 3-3 Situation when MS does not support WWAN port

Mode	Status	
	Suspend	Normal
0	Discard	Discard
1	Cache (report after module is waken-up)	Directly report

2 According to <Sleeping_UR_cfg> and <working_UR_cfg>, customer can configure control the parameter mode for the presentation of unsolicited results and decide whether reporting for all UR in Table 3-4 .

<Sleeping_UR_cfg>: specifies the types of unsolicited results to be presented when in sleep mode. The length is 64-bits and the value must be entered in hexadecimal format.

- Bit [63-61] is reserved for page, it defines the page number of unsolicited results to be presented (which is used to expansion for the presentation of unsolicited results); Up to eight pages can be specified.
- Bit [60-0] is Sleep_ur_mask that defines the types of unsolicited results to be presented; each bit specifies whether the presentation of the corresponding type of unsolicited results is enabled or disabled. If the value of a bit is 1, the presentation is enabled, if the value of a bit is 0, the presentation is disabled. The detail information for each bit can be seen in Table 3-4 .

The following table describes the definitions of bit [63-61] and bit [60-0] for <Sleeping_UR_cfg>.

Bit[63-61]	Bit[60-0]
Page	Sleep_ur_mask

<working_UR_cfg>: specifies the types of unsolicited results to be presented when in working mode. The length is 64-bits and the value must be entered in hexadecimal format.

Bit [63-61] is reserved for page, it defines the page types of unsolicited results to be presented (which is used to expansion for the presentation of unsolicited results); Up to eight pages can be specified.

Bit [60-0] is Work_ur_mask that defines the types of unsolicited results to be presented; each bit specifies whether the presentation of the corresponding type of unsolicited results is enabled or disabled. If the value of a bit is 1, the presentation is enabled. If the value of a bit is 0, the presentation is disabled. The detail information for each bit can be seen in Table 3-4 .

The following table describes the definitions of bit [63-61] and bit [60-0] for <work_UR_cfg>.

Bit[63-61]	Bit[60-0]
Page	work_ur_mask

Table 3-4 Definitions of Page 0 Bit [60~0] for the presentation of unsolicited results

Bit 0	Bit 1	Bit 2	Bit 3
^MODE	^RSSI	^CSNR	^SRVST
Bit 4	Bit 5	Bit 6	Bit 7
+CREG/+CGREG	^SIMST	^NWTIME	^ACTIVEBAND
Bit 8	Bit 9	Bit 10	Bit 11
Reserved	Reserved	Reserved	^SMMEMFULL
Bit 12	Bit 13	Bit 14	Bit 15
Reserved	Reserved	Reserved	Reserved
Bit 16	Bit 17	Bit 18	Bit 19
Reserved	Reserved	Reserved	Reserved
Bit 20	Bit 21	Bit 22	Bit 23
^NDISEND	^BOOT	^DSFLOWRPT	Reserved
Bit 24	Bit 25	Bit 26	Bit 27
Reserved	Reserved	Reserved	Reserved
Bit 28	Bit 29	Bit 30	Bit 31
^RFSWITCH	Reserved	+CUSD	+CDS/+CDSI/ +CMT/+CMTI
Bit 32	Bit 33	Bit 34	Bit 35
Reserved	Reserved	Reserved	Reserved

Bit 36	Bit 37	Bit 38	Bit 39
Reserved	Reserved	Reserved	Reserved
Bit 40	Bit 41	Bit 42	Bit 43
Reserved	Reserved	Reserved	Reserved
Bit 44	Bit 45	Bit 46	Bit 47
Reserved	Reserved	Reserved	Reserved
Bit 48	Bit 49	Bit 50	Bit 51
Reserved	Reserved	Reserved	Reserved
Bit 52	Bit 53	Bit 54	Bit 55
Reserved	Reserved	Reserved	Reserved
Bit 56	Bit 57	Bit 58	Bit 59
Reserved	Reserved	Reserved	Reserved
Bit 60			
Reserved		-	-

Note:

- When <mode>=0 or 1, <Sleeping_UR_cfg> and <working_UR_cfg> must not be contained in the command. When <mode>=2, error will be returned if just one of the last two parameters is written. The default value of <Sleeping_UR_cfg> is 0x870 and the <Working_UR_cfg> is 0x872. When <mode>=2, the <Sleeping_UR_cfg> and <working_UR_cfg> configured will not be saved when the product is powered off.
- Up to $8 \times 61 = 488$ of the presentation of unsolicited results supported (including ones added by Huawei and standard) can be configured by customer. The strong related presentation of unsolicited results are controlled by the same bit, such as ^TIMESETRULT and ^DATASETRULT. For the presentation of unsolicited results added later, you must add the illustration for the bit.
- Undefined bits and currently-not-supported unsolicited results cannot be configured using the ^CURC command. The AT commands of each unsolicited result may vary with the specific products.
- The control mode when mode=2.

Parameters in sleeping mode	Parameters in working mode	Suspend status	Normal status
1	1	Directly report	Directly report
1	0	Directly report	Discard
0	1	Cache	Directly report
0	0	Discard	Discard

Cache: the unsolicited AT will be store when the host is in the suspend status. And the unsolicited AT result will be reported to the host when the host exit suspend status to reduce the wakeup times.

3.18.4 Implementation

This command is a Huawei proprietary interface and is only supported on modules.

This command is not restricted by PIN. For USB communications, <Sleep_UR_cfg> is used to control the USB to enter suspend state, and <working_UR_cfg> is used to control the USB to enter non-suspend state.

Note:

Since the SMS and voice can be waked up by AT^WAKEUPCFG, therefore, When disable SMS or voice's wakeup function (voice in some platforms need to report with AT^CURC), you need to disable the module's Remote Wake-up feature or the presentation of unsolicited indication.

3.18.5 Informative Examples

To set <mode> to 0:

```
AT^CURC=0
```

```
OK
```

To set <mode> to 1:

```
AT^CURC=1
```

```
OK
```

To set <mode> to 2:

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

```
OK
```

Quary the current mode

```
AT^CURC?
```

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

```
OK
```

Table 3-5 List for the presentation of unsolicited results when CURU =0/1

Command	REGISTER/DEREGISTER	Comment
^MODE	AT^CURC=0 or 1	
^RSSI		
^CSNR		
^DSFLOWRPT		
^ACTIVEBAND		
^LOCCHD		
^RSSILVL		
^HRSSILVL		
^HRRSSI		
^CRSSI		
^ANLEVEL		
^BOOT		

3.19 Product Model ID Command +CGMM/+GMM

3.19.1 Command Syntax

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

3.19.2 Interface Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:



NA.

3.19.3 Defined Value

<production_name>: the product model as string

3.19.4 Informative Examples

Query the model of current product.

Send:

AT+CGMM

Return:

EM820W

OK

3.20 Card Lock Command ^CARDLOCK

3.20.1 Command Syntax

Command	Possible response(s)
^CARDLOCK=<unlock_code>	<CR><LF>OK<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
^CARDLOCK?	<CR><LF>^CARDLOCK:<status>,<times>,<operator><CR><LF> <CR><LF>OK<CR><LF> or <CR><LF>+CME ERROR: <err><CR><LF>
^CARDLOCK=?	<CR><LF>^CARDLOCK: (list of available <operator>s)<CR><LF> <CR><LF>OK<CR><LF>

3.20.2 Interface Description

AT^CARDLOCK is used for unlock the device. When the SIM card which is not allowed by the operator (Called illegal SIM card) is inserted into the device, the device can detect it is a illegal SIM card and require a unlock code before it can register the network. If the right unlock code is inputted, the device is unlocked and then any other operator's SIM card can work in this device. If the wrong unlock code

inputted exceeds 10 times, the device is locked forever and only the SIM card which is allowed by the operator (Called legal SIM card) can work with this device.

The locked device with the illegal SIM Card can only provide emergency call service.

AT^CARDLOCK=<unlock_code> is used for unlock the device. Unlock_code is a serial number that contains 8 digits character composed of [0–9]. Each device has a unlock code uniquely.

After inputted AT^CARDLOCK=<unlock_code>, the response is “+CME ERROR: <err>” when one of the following case is happened: the device has been locked forever.

When the unlock code is right, the response is “OK” and this device is unlocked successfully.

When the unlock code is wrong, the response is “+CME ERROR: <err>” and the remaining times of unlock is decreased by 1. Once the remain times of unlock become 0, the device is locked forever, no chance to unlock it.

AT^CARDLOCK? is used for inquire the lock state of the device, the remain times of unlock, the operator currently.

AT^CARDLOCK=? is used for inquire the illegal operator range.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

3.20.3 Defined Values

<unlock_code>: Unlock code is a number that contains 8 digits character composed of [0 - 9], this number must be quoted by quotation marks, if the length of this number is not 8 or without quotation marks, the response of this command is “+CME ERROR:<err>”, but the remain times of unlock is not decreased.

<status>: It is an integer number that denotes the lock status of the device currently, including the following states:

- 1 Unlocked code need to be provided
- 2 Unlocked code need not to be provided
- 3 The device is locked forever

<times>: It is an integer number which value range is 0 to 10, denote the remain times of the attempt of unlock the device. When this parameter value is 0, it means this device is locked forever. After the device is unlocked, this parameter is not in use.

<operator>: It is an integer number denotes which operator lock this device, in fact it is the operator's PLMN ID, for example:

- 24202 Netcom China locks this device
- 46000 Mobile China locks this device
- 0 No any operators lock this device

Note:

This parameter is not supported currently, and the value is 0.

<err>: It is a error code denotes the failure reason, the below lists the possible values and reasons:

3 Operation not allowed

16 Incorrect password

3.21 W_DISABLE# Pin Status Query and Close Radio Command ^RFSWITCH

3.21.1 Command Syntax

Command	Possible response(s)
^RFSWITCH=[<SW state>]	<CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^RFSWITCH?	<CR><LF>^RFSWITCH:<SW state>,<HW state><CR><LF> <CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^RFSWITCH=?	<CR><LF>^ RFSWITCH: (0-1),(0-1) <CR><LF> <CR><LF>OK<CR><LF>

3.21.2 Description

This command switches the on-off of radio by software and writes the corresponding value to NV. The function of querying includes the state of W_DISABLE# pin (GPIO#30). The W_DISABLE# pin decides the on-off of radio section's hardware. The TE may decide if prompt the Msg1 by the return value of the command. The ^RFSWITCH command equals the combination function of +CFUN(7+1) and writes the corresponding value to NV.

AT^RFSWITCH=0 equals AT+CFUN=7 and writes NV.

AT^RFSWITCH=1 equals AT+CFUN=1 and writes NV.

3.21.3 Defined Values

<SW state>: the state of radio on-off. The values are as follow:

0 Switch off Radio software.

1 Switch on Radio software.

<HW state>:the state of W_DISABLE#, The values are as follow:

0 Switch off radio hardware.

1 Switch on radio hardware.

3.21.4 Informative Examples

Query the current state of Radio switch: (return the values that the state of radio hardware is on and the state of radio software is off.)

Send:

AT^RFSWITCH?

Return:

^RFSWITCH: 0,1

OK

3.22 W_DISABLE# Pin State and Radio Switch State Indication ^ RFSWITCH

3.22.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^RFSWITCH: <SW state>,<HW state> <CR><LF>

3.22.2 Description

When the W_DISABLE# pin changes, the MS will report the indication to TE. The TE will decide if need switch on the state of radio software and hardware.

3.22.3 Defined Values

<SW state>: the state of radio software's on-off. The values are as follow:

0 The on-off of radio software is off.

1 The on-off of radio software is on.

<HW state>: the state of W_DISABLE#. The values are as follow:

0 The on-off of radio hardware is off.

- 1 The on-off of radio hardware is on

3.22.4 Informative Examples

If the on-off of radio software and hardware are on, then changes the state of radio hardware as off. The MS will report the following value:

^RFSWITCH: 1, 0

3.23 Query Dial-up Mode ^DIALMODE(Modem/NDIS)

3.23.1 Command Syntax

Command	Possible response(s)
^DIALMODE=<value>[,<cdc_spec>]	<CR><LF>ERROR<CR><LF>
^DIALMODE?	<CR><LF>^DIALMODE: <value>[,<cdc_spec>] <CR><LF><CR><LF>OK<CR><LF>
^DIALMODE=?	<CR><LF>^DIALMODE: (0-2)[,(0-255)] <CR><LF><CR><LF>OK<CR><LF>

3.23.2 Description

The command is used to query the dial-up mode of firmware supported. Dashboard can select modem or NDIS approach by the return value. But the SET command is not supported.

3.23.3 Defined Values

<value>:

- 0 Modem mode;
- 1 NDIS mode;
- 2 support both Modem and NDIS

<cdc_spec>:

- 0 viz. 0x00, means both Modem and NDIS port don't support CDC specification.
- 1 viz. 0x01, means only Modem port supports CDC specification.
- 2 viz. 0x10, means only NDIS port supports CDC specification.
- 3 viz. 0x11, means both Modem and NDIS port support CDC specification.
- 4-255 Reserved

Remark 2009-11-5 <cdc_spec> is only used on Mac/Linux, if this parameter was not reported, that means both Modem and NDIS port don't support CDC specification.

3.23.4 Informative Examples

AT^DIALMODE?

^DIALMODE: 2,2

OK

Remark: The first 2 means the device supports both Modem and NDIS port; the second 2 means only NDIS port supports CDC specification. Hence you can use both Modem and NDIS port on Windows but only NDIS port on Linux and MAC.

AT^DIALMODE?

^DIALMODE: 0,0

OK

Remark: The first 0 means the device only supports Modem port; the second 0 means the Modem port does not support CDC specification. Hence you can only use the Modem port on Windows.

3.24 Set Presentation of Network Time ^NTCT

3.24.1 Command Syntax

Command	Possible response(s)
^NTCT[=<n>]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF> ERROR<CR><LF>
^NTCT?	<CR><LF>^NTCT: <n><CR><LF> <CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF> ERROR<CR><LF>
^NTCT=?	<CR><LF>^NTCT: (supported <n>)<CR><LF> <CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>

3.24.2 Description

This command controls the presentation of network time.

The SET command selects the control mode for the presentation of network time. When <n> is set to 1, ^NWTIME is presented.

The READ command returns the current presentation status.

The TEST command returns the value range of supported parameters.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

3.24.3 Defined Values

<n>: enables or disables the presentation

0 disable

1 enable (default)

Note:

If <n> is not specified, the value of <n> is 1. The settings are not saved when the MS is powered off. The command is controlled by PIN.

3.24.4 Informative Examples

Run the following command to disable the presentation of network time ^NWTIME:

```
AT^NTCT=0
```

```
OK
```

Run the following command to enable the presentation of network time ^NWTIME:

```
AT^NTCT=1
```

```
OK
```

3.25 Set Presentation of Network System Time ^NWTIME

3.25.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^NWTIME:<time><tz>,<dt><CR><LF>

3.25.2 Description

This command used to report the network time, time zone and daylight saving time.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

3.25.3 Defined Values

<time>: specifies date and time in the format of yy/MM/dd, hh:mm:ss. The value of <time> consists of date and time, for example, 10/09/07,05:56:13.

<tz>: specifies the time zone. The unit of time zones is 15 minutes. The **+32** value indicates 32 times of 15 minutes, that is, + 8 hours.

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

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

3.25.4 Implementation

10.5.97a/3GPP TS 24.008

3.25.5 PC Actions Performed by the Client

MS will present the current network time information to TE after MS receives the GMM or MM information with valid time information which is transmitted by network.

MS will present the network time after a PIN code status query is executed, which will avoid the problem that MS receives the GMM or MM information and present it at once, yet the dashboard cannot receive the GMM or MM information because the

If MS receives the GMM or MM information before the dashboard has not prepared:

- Time A: MS will buffer the network time that gets form GMM or MM information (buffer time).
- Time B: MS takes down the local time when MS receives GMM or MM information.

- Time C: MS starts the presentation of network time asynchronous event after the PIN code status query has been executed for the first time. MS takes down the local time before the presentation.

The asynchronous presentation time is $\text{Time A} + \text{Time C} - \text{Time B}$.

The asynchronous presentation is disabled after a PIN code status query is executed. The follow-up presentation is the synchronous presentation. That is MS will present the network time as soon as MS receives the GMM or MM information.

The presentation of network time is that MS transparently transmits the GMM or MM information and does not ensure the time correctness. The presentation of time fields are configured by network and the range is configured by network according to the protocol.

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.

The READ command is used to read the current message service type.

The TEST command is used to check the parameter range supported by the command.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

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

This command indicate that a new message (or new message report) is received.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

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

This command indicates received new messages are not stored, but reported to TE directly.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

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

This command indicate that a new message state report is received, and specify the storage position.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

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

This command indicates received new messages are not stored, but reported to TE directly.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

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

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

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

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

4.7 Unsolicited Reporting Indication of Cell Broadcast Messages +CBM

4.7.1 Command Syntax

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

4.7.2 Description

The cell messages are not stored and are reported to the TE directly.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

4.7.3 Defined Values

<reserved>: Reserved.

<length>: An integer that indicates the number of bytes of PDU data.

<pdu>: Protocol data unit. Its format is defined in "3G TS 23.041".

4.8 New Message Notification Setting +CNMI

4.8.1 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>

4.8.2 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 used to set whether reporting the new cell broadcast message to the TE, or storing the new cell broadcast message in the MS and reporting the storage position when a new cell broadcast message is received.
- <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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

4.8.3 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 recommended to use direct forwarding of message (<mt>=2 or 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 stored into MS, indication of the memory location is routed to the TE.

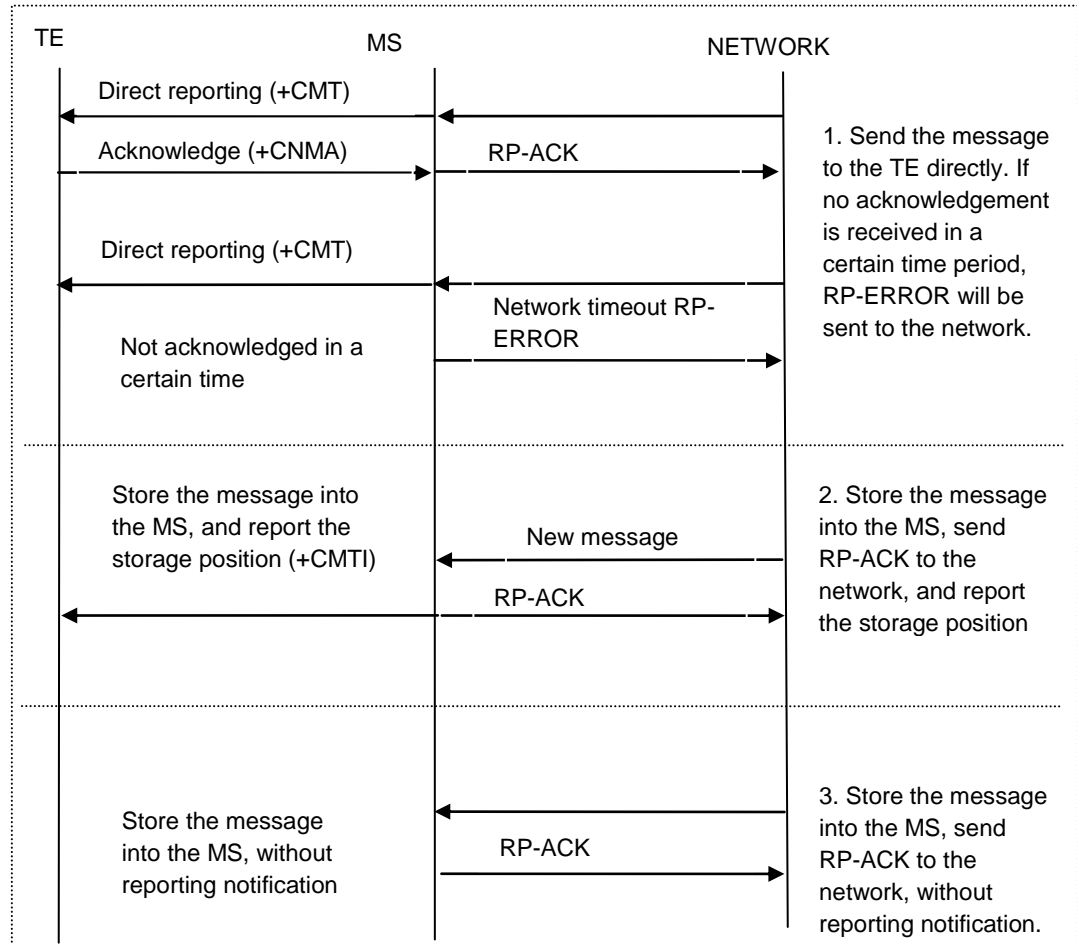
+CMTI: <mem>,<index>

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

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

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.

<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.

4.8.4 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.

4.9 Delete Message +CMGD

4.9.1 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>

4.9.2 Description

The 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.

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

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.9.3 Defined Values

<index>: Storage position of message

<delflag>:

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

4.10 New Message Acknowledgement to +CNMA

4.10.1 Command Syntax

Command	Possible response(s)
+CNMA[=<n>[,<length>[<CR> <i>PDU is given</i> <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>

4.10.2 Description

The 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 MS does not get acknowledgement within required time (network timeout), MS 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.10.3 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>:

Basic elements:

Abbr	Reference	P ¹⁾	P ²⁾	Description
TP-MTI	TP-Message Type Indicator	M	2b	TP-message type

Abbr	Reference	P ¹⁾	P ²⁾	Description
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 4-1 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 bit 7 and bit 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)

bit1	bit0	Message type
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)	00	GSM 7 bit default code
			01	8bit data
			10	UCS2 code mode. When the user inputs Chinese characters, the TE will select this value.
		bit1–0 (message type, its value is selected)	00	Class 0, provided to the interface to display and reply that the SC has received but not stored it.
			01	Class 1, stored to the MS (i.e., NV), or stored to the SIM card when the MS is full

		by TE according to the user's options)	10	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.
			11	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.
			1	Reserved bits, which make no sense.
		bit1–0 (message waiting type)	00	With voice message waiting.
			01	With fax message waiting.
			10	With E-mail message waiting.
			11	Message waiting of other unknown types
	1111 (TE does not select this value either)	bit3	0	Reserved bits, which make no sense.
			1	Reserved bits, which make no sense.
		bit2	0	7bit code
			1	8bit data
		bit1–0	00	Class 0, providing display and reply to SC that the message is received but not stored.
			01	Class 1, stored to the MS (i.e., NV), or stored to the SIM card
			10	Class 2, for use of SIM only. After storing it, the storage state is returned to the SC.
			11	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:

Figure 4-1 Format of User data of the default 7bit code

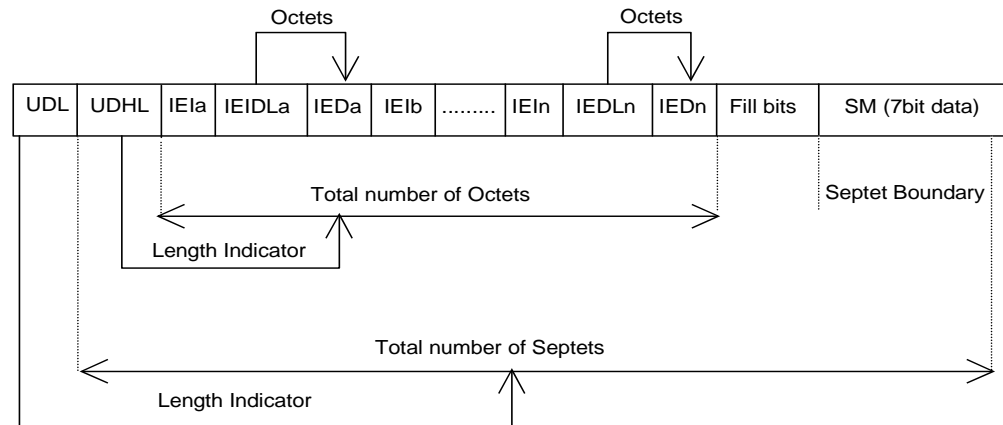
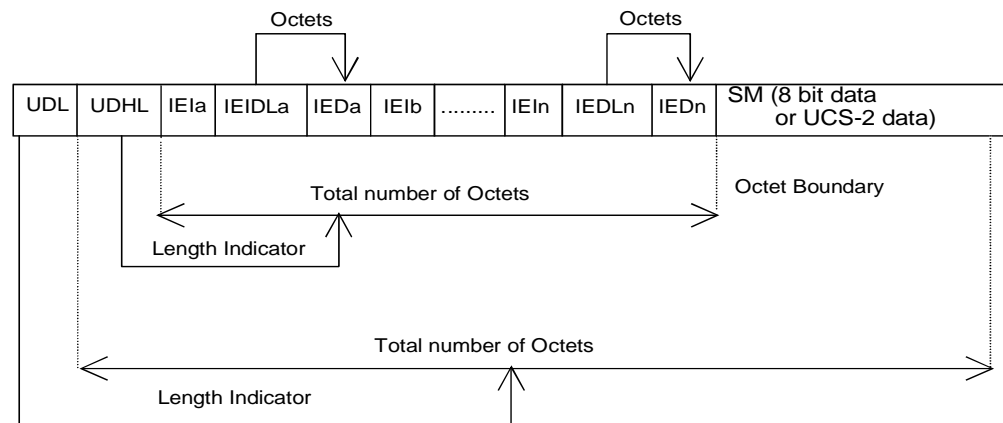


Figure 4-2 Format of User data of 8bit code or UCS2 code



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

4.11 Message Storage Selection +CPMS

4.11.1 Command Syntax

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

Command	Possible response(s)
+CPMS?	<CR><LF>+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=?	<CR><LF>+CPMS: (list of supported <mem1>s),(list of supported <mem2>s), (list of supported <mem3>s)<CR><LF> <CR><LF>OK<CR><LF>

4.11.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

4.11.3 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.

“ME”, which means the NV.

<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>.

4.12 Reporting Message Storage Media Being Full ^SMMEMFULL

4.12.1 Command Syntax

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

4.12.2 Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

4.12.3 Defined Values

<mem_type>:

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

“SM”, which means the (U)SIM card.

“ME”, which means NV

4.13 SMSC Number Command +CSCA

4.13.1 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>

4.13.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

Support.

4.13.3 Defined Values

<sca>:

String value. It indicates the SMSC number. The number is composed “*”, “+”, “#” and “0”-“9”. The number contains 20 characters(excluding “+”) 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.

4.14 Message Sending +CMGS

4.14.1 Command Syntax

Command	Possible response(s)
+CMGS=<length><CR> <i>PDU is given</i> <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>

4.14.2 Interface Description

This command indicates 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).

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.14.3 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.

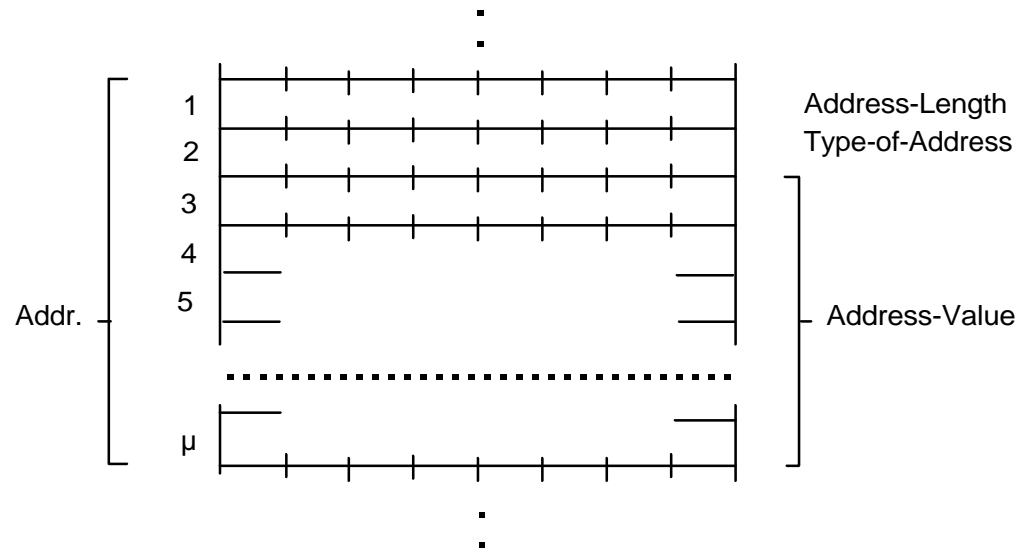
<ctrl-Z>: Identifies the end of a PDU data. The characters are: '0x1A'

<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)

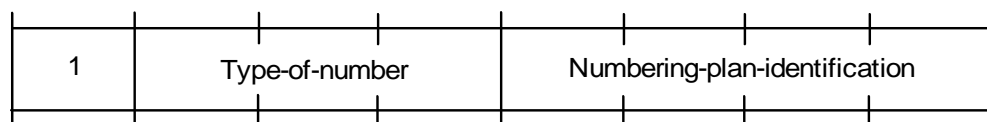
[<SCA>]			
<sc_len>	<type_addr>	<numbers>	TPDU

<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:



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.

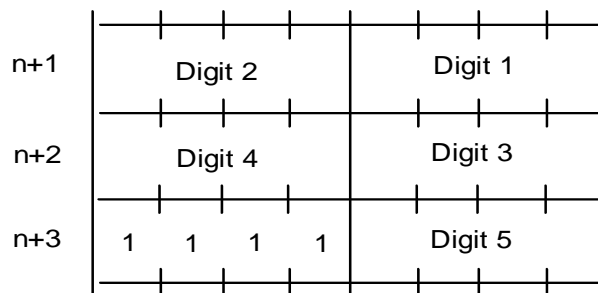
Numbering-plan-identification(bit3...bit0). The values are as follows:

(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:

Figure 4-3 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	SR R	VPF		RD	MTI		MR	DA	PID	DCS	VP	UDL	UD
Bit 7	Bit6	Bit5	Bit 4	Bit 3	Bit2	Bit 1	Bit 0							

<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 "absolute".
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 2~12 octets. 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

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.

Note:

Here, assume bit 7=0 and bit 6=0

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

Bit7...bit4			Bit3....bit0
		1: Message is compressed. Not supported currently.	<p>reply to the SC that the message is received but not stored.</p> <p>0 1 : Class 1, stored to the NV (or SIM card if the NV is full)</p> <p>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.</p> <p>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.</p> <p>Bit3 bit2 message type indication</p> <p>0 0 : GSM 7 bit default code</p> <p>0 1 : 8bit data</p> <p>1 0 : UCS2 code mode. When the user inputs Chinese characters, this value will be selected.</p> <p>1 1 : Reserved.</p>
	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		<p>Bit3 Prompt indication. The values are as follows:</p> <p>0: The message waiting prompt function is invalid</p> <p>1: Activate the message waiting prompt function</p> <p>Bit2 Reserved. The value is 0.</p> <p>Bit1 bit0 message type indication</p> <p>0 0 : With voice message waiting.</p> <p>0 1 : With fax message waiting.</p> <p>1 0 : With E-mail message waiting.</p> <p>1 1 : Message waiting of other unknown types</p>

Bit7...bit4		Bit3....bit0
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 8-bit 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 160septs; 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.

4.14.4 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

4.15 Message Storage Command +CMGW

4.15.1 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>

4.15.2 Interface Description

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

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.15.3 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.

4.16 Message List Command +CMGL

4.16.1 Command Syntax

Command	Possible response(s)
+CMGL[=<stat>]	<p>In case of pdu mode and successful execution of command:</p> <p>[<CR><LF>+CMGL: <index>,<stat>,<reserved>,<length><CR><LF><pdu> [<CR><LF>+CMGL:<index>,<stat>,<reserved>,<length><C R><LF><pdu> [...]]<CR><LF>] <CR><LF>OK<CR><LF> Otherwise: <CR><LF>+CMS ERROR: <err><CR><LF></p>
+CMGL=?	<CR><LF>+CMGL: (list of supported <stat>s) <CR><LF> <CR><LF>OK<CR><LF>

4.16.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.16.3 Defined Values

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

<MTI>: 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 2~12Octets. 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.

4.17 Read a Message +CMGR

4.17.1 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>

4.17.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

4.17.3 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”.

4.18 Message Bearer Domain Command +CGSMS

4.18.1 Command Syntax

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>

4.18.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

Support.

4.18.3 Defined Values

<service>:

- 0 Only select the PS domain
- 1 Only select the CS domain
- 2 Prefer the PS domain
- 3 Prefer the CS domain

4.19 More Messages to Send +CMMS

4.19.1 Command Syntax

Command	Possible response(s)
+CMMS=[<n>]	<CR><LF>OK<CR><LF> In case of error: <CR><LF>ERROR<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>

4.19.2 Description

The 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.

The READ command returns the current status of the continuity of SMS relay protocol(RP) link.

The TEST command returns supported values as a compound value.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

4.19.3 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)

5

Serializer Interface Description

5.1 Proactive Event Report Port Setting ^PORTSEL

5.1.1 Command Syntax

Command	Possible response(s)
^PORTSEL=<n>	<CR><LF>OK<CR><LF> In case of error: <CR><LF>ERROR<CR><LF>
^PORTSEL?	<CR><LF>^PORTSEL:<n><CR><LF> <CR><LF>OK<CR><LF>
^PORTSEL=?	<CR><LF>^PORTSEL:(list of supported <n>s) <CR><LF><CR><LF>OK<CR><LF>

5.1.2 Description

The SET command of this command is used to set the target port reported proactively by the non data service.

The READ command is used to read the current set port value.

The TEST command is used to return the value range of the set port value.

5.1.3 Defined Values

<n>:

0 PCUI port

1 Modem port

6 Description of Security Setting Interface

6.1 PIN Password Modifying +CPWD

6.1.1 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>

6.1.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

6.1.3 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.

6.2 PIN Enabling and Query Function +CLCK

6.2.1 Command Syntax

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

6.2.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

Support.

6.2.3 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>:

1 Voice call

2 Data

4 Fax

8 SMS

6.3 PIN Management Command +CPIN

6.3.1 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>

6.3.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

6.3.3 Defined Values

<pin>, <newpin>: String, the value is a number that contains 4-8 digits character composed of [0-9], this number must be quoted by quotation marks, otherwise return an error.

<code>: String (without quotation marks)

READY MS 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 request

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

6.4 PIN Management Command ^CPIN (new feature)

6.4.1 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>[,<times>],<puk_times>,<pin_times>,<puk2_times>,<pin2_times><CR><LF> <CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>
^CPIN=?	<CR><LF>OK<CR><LF>

6.4.2 Description

The READ command is used to indicate whether password input request exists. The remaining password input times will be given.

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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

No Support.

6.4.3 Defined Values

<pin>, <newpin>: String, the value is a number that contains 4-8 digits character composed of [0-9], this number must be quoted by quotation marks, otherwise return an error.

<code>: String (without quotation marks)

READY MS 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 request

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

<times>: In terms of the remaining input times, for PIN and PIN2, the maximum input times is 3 times; for PUK and PUK2, the maximum input times are 10 times.

Note: If there is password verify request, <times> will be the remaining retry times. Otherwise, <times> will be empty.

<puk_times>: remaining PUK verify times, the maximum verify times is 10 times.

<pin_times>: remaining PIN verify times, the maximum verify times is 3 times.

<puk2_times>: remaining PUK2 verify times, the maximum verify times is 10 times.

<pin2_times>: remaining PIN2 verify times, the maximum verify times is 3 times.

7

System Setting Interface Description

7.1 System Information Query ^SYSINFO

7.1.1 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>

7.1.2 Interface Description

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

Note:

You should use SYSINFOEX command rather than SYSINFO on some new products. For the compatibility to the old devices, the best solution is using SYSINFOEX first; if the device does not support SYSINFOEX, then use SYSINFO as well.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.1.3 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
- 7 GSM/WCDMA
- 8 CDMA/HDR HYBRID (Not support)
- 15 TD-SCDMA 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.

<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
- 8 TD_SCDMA mode
- 9 HSPA+ mode
- 17 HSPA+(64QAM) mode
- 18 HSPA+(MIMO) mode

Note:

When the returned value of <sys_submode> is out of (0–18), you should treat it as 4 (WCDMA) by default.

7.2 Extended System Information Query ^SYSINFOEX

7.2.1 Command Syntax

Command	Possible response(s)
^SYSINFOEX	<CR><LF>^SYSINFOEX:<srv_status>,<srv_domain>,<roam_status>,<sim_state>,<reserved>,<sysmode>,<sysmode_name><submode>,<submode_name><CR><LF> <CR><LF>OK<CR><LF>

7.2.2 Interface Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.2.3 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

<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

<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
- 240 ROMSIM
- 255 USIM card is not existent,

<reserved>: reserved.

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

- 0 NO SERVICE
- 1 GSM
- 2 CDMA
- 3 WCDMA
- 4 TD-SCDMA
- 5 WIMAX
- 6 LTE



Notice: When the returned value of sysmode is out of (0~6), you should treat it as 3 (WCDMA) by default.

<sysmode_name>: System mode as string, the values are as follows:

This parameter returns the name of current system mode with a string. Its possible values should comply the description of the corresponding <sysmode>.

E.g. <sysmode>=3, <sysmode_name>="WCDMA"

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

0 NO SERVICE

1 GSM

2 GPRS

3 EDGE

4

:

:

20 (Undefined)

21 IS95A

22 IS95B

23 CDMA2000 1X

24 EVDO Rel0

25 EVDO RelA

26 EVDO RelB

27 HYBRID (CDMA2000 1X)

28 HYBRID (EVDO Rel0)

29 HYBRID (EVDO RelA)

30 HYBRID (EVDO RelB)

31

:

:

40 (Undefined)

41 WCDMA

42 HSDPA



43 HSUPA

44 HSPA

45 HSPA+

46 DC-HSPA+

47

:

:

60 (Undefined)

61 TD-SCDMA

62 HSDPA

63 HSUPA

64 HSPA

65 HSPA+

:

:

80 (Undefined)

81 802.16e

:

:

100 (Undefined)

101 LTE

:

:

120 (Undefined)

121

:

:

140 (Undefined)

<submode _name> System sub mode as string, the values are as follows:

This parameter returns the name of current system sub mode with a string. Its possible values should comply the description of the corresponding <submode>. E.g.<submode>=45, <submode _name> =" HSPA+"

7.2.4 Informative Examples

Send: AT^SYSINFOEX

Return: ^SYSINFOEX:2,3,1,1,,3,"WCDMA",46,"DC-HSPA+"

UE is working on DC-HSPA+ mode of WCDMA

7.3 Service State Change Indication ^SRVST

7.3.1 Command Syntax

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

7.3.2 Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.3.3 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

7.4 SIM State Change Indication ^SIMST

7.4.1 Command Syntax

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

7.4.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.4.3 Defined Values

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

- 0 Invalid USIM card state
- 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,

7.5 System Mode Change Event Indication ^MODE

7.5.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^MODE:<sys_mode>[,<sys_submode>]<CR><LF>

7.5.2 Interface Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.5.3 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
- 8 TD-SCDMA mode
- 9 HSPA+

7.6 RSSI Change Indication ^RSSI

7.6.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^RSSI: <rss><CR><LF>

7.6.2 Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.6.3 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 to -53 dBm
31	Equal to or higher than -51 dBm
99	Unknown or unmeasurable

7.7 System Configuration Reference Setting ^SYSCFG (Legacy)

7.7.1 Command Syntax

Command	Possible response(s)
^SYSCFG=<mode>,<acqorder>,<band>,<roam>,<srvdomain>	<CR><LF>OK<CR><LF> Or <CR><LF>ERROR<CR><LF>
^SYSCFG?	<CR><LF>^SYSCFG:<mode>,<acqorder>,<band>,<roam>,<srvdomain><CR><LF> <CR><LF>OK<CR><LF>
^SYSCFG=?	<CR><LF>^SYSCFG: (list of supported <mode>s), (list of supported <acqorder>s), (list of supported (<band>,<band_name>)s), (list of supported <roam>s), (list of supported <srvdomain>s) <CR><LF><CR><LF>OK<CR><LF>

7.7.2 Description

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

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

7.7.3 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
0002000000000000(CM_BAND_PREF_WCDMA_VIII_900)	WCDMA_VIII_900

<band_name>: String type, Band name.

<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

7.8 Set the Primary DNS Server Address ^DNSP

7.8.1 Command Syntax

Command	Possible response(s)
^DNSP=<pri_dns>	<CR><LF>OK<CR><LF> or: <CR><LF>ERROR<CR><LF>
^DNSP?	<CR><LF>^DNSP:<pri_dns><CR><LF> <CR><LF>OK<CR><LF>
^DNSP=?	<CR><LF>OK<CR><LF>

7.8.2 Description

It is used to set the primary DNS server address from the user's manual setting.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

7.8.3 Defined Values

<pri_dns>: Default value is 0.0.0.0

7.8.4 Informative Examples

1. Set the primary DNS server address to 10.11.12.13

AT^DNSP=10.11.12.13

Return:

OK

2. Query the primary DNS server address from the user's manual setting.

AT^DNSP?

Return:

^DNSP: 10.11.12.13

OK

7.9 Set the Secondary DNS Server Address ^DNSS

7.9.1 Command Syntax

Command	Possible response(s)
^DNSS=<sec_dns>	<CR><LF>OK<CR><LF> or: <CR><LF>ERROR<CR><LF>
^DNSS?	<CR><LF>^DNSS:<sec_dns><CR><LF> <CR><LF>OK<CR><LF>
^DNSS=?	<CR><LF>OK<CR><LF>

7.9.2 Description

It is used to set the secondary DNS server address from the user's manual setting.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

7.9.3 Defined Values

<sec_dns>: Default value is 0.0.0.0

7.9.4 Informative Examples

1. Set the secondary DNS server address to 10.11.12.13

AT^DNSS=10.11.12.13

Return:

OK

2. Query the secondary DNS server address from the user's manual setting.

AT^DNSS?

Return:

^DNSS: 10.11.12.13

OK

7.10 RSCP and ECIO Query ^CSNR

7.10.1 Command Syntax

Command	Possible response(s)
^CSNR?	<CR><LF>^CSNR: <rscp>,<ecio><CR><LF><CR><LF>OK<CR><LF>
^CSNR=?	<CR><LF>^CSNR:(list of supported <rscp>s),(list of supported <ecio>s) <CR><LF><CR><LF>OK<CR><LF>

7.10.2 Interface Description

This command is used to query the RSCP/ECIO signal strength. The RSCP/ECIO signal strength depends on the change of the RSSI.

The relationship between RSCP, ECIO and RSSI is as follows: $RSCP = ECIO + RSSI$. In the equation, RSCP, ECIO and RSSI must be absolute values instead of relative values.

7.10.3 Defined Value

<rscp>: A value ranges from -145 dBm to -60 dBm.

<ecio>: A value ranges from -32 dBm to 0 dBm.

7.11 Remote Wakeup Feature Configure Command ^WAKEUPCFG

7.11.1 Command Syntax

Command	Possible response(s)
^WAKEUPCFG=<n>[,<channel> [,<source>]]	If the command is successfully executed: <CR><LF>OK<CR><LF> If the command is unsuccessfully executed: <CR><LF>ERROR<CR><LF>
^WAKEUPCFG?	<CR><LF>^WAKEUPCFG: <n>,<channel>,<source><CR><LF> <CR><LF>OK<CR><LF>
^WAKEUPCFG=?	<CR><LF>^WAKEUPCFG: (list of supported <n>s), (list of supported <channel>s), (list of supported <source>s) <CR><LF><CR><LF>OK<CR><LF>

7.11.2 Interface Description

This command is used to enable and disable the module's Remote Wake-up feature, and to set the wake-up channels and sources for the device.

7.11.3 Defined Value

<n>: enable or disable the Remote Wake-up feature.

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

1 enable the module's Remote Wake-up feature. This is the default value of <n>.

<channel>: set Remote Wake-up channels.

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

1 enable the channel controlled by the bit.

0 disable the channel controlled by the bit.

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

0x01 PIN Wake-up

0x02: USB Remote Wake-up

0x08–0x10: reserved.

The default value is 0x02.

<source>: set Remote Wake-up sources.

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

1 enable the source controlled by the bit.

0 disable the source controlled by the bit.

Bit[4-15]	Bit[3]	Bit[2]	Bit[1]	Bit[0]
Undefined	UR	DATA	SMS	VOICE

0x0001: Voice

0x0002: SMS

0x0004: Data

0x0008: UR (unsolicited report)

0x0010–0x8000: reserved.

The default value is 0x000F (VOICE+SMS+DATA+UR).

7.11.4 Implementation

This command is not controlled by PIN. Parameters support sudden power loss protection (NV storage). The values that NV saved are not influenced by factory default recovery and will not backup when update. This command supports variable-parameter input. If parameters are not input entirely, the previous value will not be changed.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

Support.

7.11.5 Informative Examples

SET command

If only support USB Remote Wakeup

AT^WAKEUPCFG=1,2,7

OK

Query command

AT^WAKEUPCFG?



^WAKEUPCFG: 1,2,7

OK

TEST command

AT^WAKEUPCFG=?

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

OK

8 Phonebook Service Interface Description

8.1 Phonebook Memory Selection +CPBS

8.1.1 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>

8.1.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

8.1.3 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.

8.2 Find Phonebook Entries +CPBF

8.2.1 Command Syntax

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

8.2.2 Description

The 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 MS error, +CME ERROR: <err> is returned. Refer 16.2 for <err> values.

The TEST command returns the maximum lengths of <number> and <text> fields. In case of SIM storage, the lengths may not be available. If MS is not currently reachable, +CME ERROR: <err> is returned. Refer 16.2 for <err> values.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

8.2.3 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)

<indtext>, <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

0 phonebook entry not hidden

1 phonebook entry hidden

8.3 Read Phonebook Entries +CPBR

8.3.1 Command Syntax

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

8.3.2 Description

The 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 <indexn>, 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 MS error, +CME ERROR: <err> is returned. Refer 16.2 for <err> values.

The 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 MS is not currently reachable, +CME ERROR: <err> is returned. Refer subclause 16.2 for <err> values.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

8.3.3 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

0 phonebook entry not hidden

1 phonebook entry hidden

8.4 Write Phonebook Entry +CPBW

8.4.1 Command Syntax

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

8.4.2 Description

The 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 MS error, +CME ERROR: <err> is returned. Refer 16.2 for <err> values.

The 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 MS is not currently reachable, +CME ERROR: <err> is returned. Refer 16.2 for <err> values. If storage does not offer format information, the format list should be empty parenthesis

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

8.4.3 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

0 phonebook entry not hidden

1 phonebook entry hidden

8.5 Phonebook Reading ^CPBR

8.5.1 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>

8.5.2 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>.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

8.5.3 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)

8.6 Phonebook Writing ^CPBW

8.6.1 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 <type>s),[<tlength>],[<mlength>]<CR><LF><CR><LF>OK<CR><LF> In case of MS-related error: <CR><LF>+CME ERROR: <err><CR><LF>

8.6.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

8.6.3 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)

8.6.4 Informative Examples

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

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

9 Network Service Interface Description

9.1 Operator Selection +COPS

9.1.1 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>

9.1.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

9.1.3 Defined Values

<mode>:

- 0 automatic (<oper> field is ignored)
- 1 manual (<oper> field shall be present, and <rat> optionally)
- 2 deregister from network (NOT SUPPORT)
- 3 set only <format> (for read command +COPS?), do not attempt registration/deregistration (<oper> and <rat> 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:(in set command this parameter is not supported by E620/E630/E660/E270/E800/E870. These HW cards can support at most 3 parameters. Only In E220 and E618 rat parameters can be supported, however.

Currently the command ^syscfg can be used to implement the function of register network with specific rat)

0 GSM
2 UTRAN
7 EUTRAN

9.1.4 Examples of Searching Network

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

AT+COPS=?

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

OK

Automatic search of network

AT+COPS=0

OK

Note:

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

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

OK

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

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",2 (command returns mode, format, registered operator)

OK

9.2 Network Registration +CREG

9.2.1 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>

9.2.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

9.2.3 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.)

9.3 Network Registration +CGREG

9.3.1 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>

9.3.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

9.3.3 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.

10 Data Service Interface Description

10.1 3G Quality of Service Profile (Negotiated) +CGEQNEG

10.1.1 Command Syntax

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

10.1.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

10.1.3 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.

10.2 Enter Data State +CGDATA

10.2.1 Command Syntax

Command	Possible response(s)
+CGDATA=[<L2P> , [<cid> [,<cid> [...]]]]	<CR><LF>CONNECT<CR><LF> or <CR><LF>ERROR<CR><LF>
+CGDATA=?	<CR><LF>+CGDATA: (list of supported <L2P>s) <CR><LF><CR><LF>OK<CR><LF>

10.2.2 Description

The EXECUTION command causes the MS 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 MS, the MS shall return an ERROR or +CME ERROR response. Otherwise, the MS 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 MS.

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 MS may have access to some or all of the following information -

The MS 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 MS 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 MS 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 MS shall attempt to activate the context with whatever information is available to the MS. 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 MS 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 MS 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

10.2.3 Defined Values

<L2P>: a string parameter that indicates the layer 2 protocol to be used between the TE and MS

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).

10.3 Show PDP Address +CGPADDR

10.3.1 Command Syntax

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

10.3.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

10.3.3 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 MS in the address space applicable to the PDP. The address may be static or dynamic. For a static address, it will be the one set by the +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.

10.4 Define PDP Context +CGDCONT

10.4.1 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>
+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>

10.4.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

Support.

10.4.3 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”: point-to-point 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 MSI.

<d_comp>:

A numerical value, controlling the compression of PDP data.

0 No compression.

1 Compression.

2 V.42bis.

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.

2 RFC1144(applicable for SNDCCP only).

3 RFC2507.

4 RFC3095(applicable for PDCP only).

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

10.4.4 Informative Examples

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

Command 1: AT+CGDCONT=?

Result 1:

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

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

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.

10.5 DS Traffic Reset ^DSFLOWCLR

10.5.1 Command Syntax

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

10.5.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

10.6 DS Traffic Query ^DSFLOWQRY

10.6.1 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>

10.6.2 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.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

10.6.3 Defined Values

All parameters of this interface are reported in 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.

10.7 DS Traffic Reporting ^DSFLOWRPT

10.7.1 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>

10.7.2 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.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

No Support.

10.7.3 Defined Values

All parameters of this interface are reported in 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.

11 GPS Interface Description

11.1 Specify GPS or AGPS Session Type ^WPDST

11.1.1 Command Syntax

Command	Possible response(s)
^WPDST=<type>	<CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDST?	<CR><LF>^WPDST: <type><CR><LF><CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDST=?	<CR><LF>^WPDST: (list of supported <type>s) <CR><LF><CR><LF>OK<CR><LF>

11.1.2 Description

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

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

The READ command is used to read the current session type.

The TEST command is used to return the value range of the session type.

11.1.3 Defined Values

<type>: session type. The default value is 1.

0 provides a single positioning operation.

1 provides tracing positioning. The positioning value is obtained using the designated frequency. The positioning frequency is set by running ^WPDFR.

11.2 Specify Operation Mode ^WPDOM

11.2.1 Command Syntax

Command	Possible response(s)
^WPDOM=<mode>	<CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDOM?	<CR><LF>^WPDOM: <mode><CR><LF> <CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDOM=?	<CR><LF>^WPDOM: (list of supported <mode>s) <CR><LF><CR><LF>OK<CR><LF>

11.2.2 Description

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

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

The READ command is used to read the current operation mode.

The TEST command is used to return the value range of the operation mode.

11.2.3 Defined Values

<mode>: operation mode. The default value is 6.

- 0 standalone only. In this mode, no network assistance is required, and an MS can be in or not in the network coverage area. This mode can be used to position the session without SIM cards.
- 1 network only, The MS-assisted positioning mode, which is one of Assisted Global Positioning Systems (A-GPSs), is used here. The MS needs to communicate with PDE or PDM upon each positioning, and the PDE or PDM calculates position information. In this operation mode, the PDE or PDM needs to be accessed, and network coverage is required.
- 2 speed optimal, The positioning data with the optimal speed is obtained, that is, the minimum TTF mode is used. The speed optimal mode is only MS-based in UMTS.

- 3 accuracy optimal, The positioning data with the optimal accuracy is obtained. The accuracy optimal mode is only MS-assisted in UMTS.
- 4 data optimal, The MS uses the minimum PDE data interaction mode with the network side. The data optimal mode is only standalone in UMTS.
- 5 MS-based only. The network needs to provide positioning assistance information, and the MS calculates the position information. When the GPS fails in this mode, this mode is automatically switched to the standalone mode for positioning.
- 6 gpsOneXTRA which is the enhanced mode of standalone. Before the GPS searches the satellite, the GPS downloads the ephemeris data from the Internet. The orbit equation contained in the ephemeris data can save the time during data demodulation.vvvvvv

11.3 Specify Fix Number and Interval Time ^WPDFR

11.3.1 Command Syntax

Command	Possible response(s)
^WPDFR=<n um>,<time>	<CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDFR?	<CR><LF>^WPDFR:<num>,<time><CR><LF><CR><LF>OK<CR><LF> In case of ERROR: <CR><LF>ERROR<CR><LF>
^WPDFR=?	<CR><LF>^WPDFR: (list of supported <num>,<time>s) <CR><LF><CR><LF>OK<CR><LF>

11.3.2 Description

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

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

The READ command is used to read the current positioning frequency.

The TEST command is used to return the value range of the positioning frequency.

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

11.3.3 Defined Values

<num>: number of positioning operations triggered by the designated UE. The value ranges from 1 to 65535, and the default value is **65536**. The parameter settings are not saved when the MS is powered off.

<time>: valid positioning time interval. This parameter can be set only when the positioning number triggered by the designated UE is greater than 1. The valid positioning time interval of this parameter ranges from 1s to 1800s, and the default time interval is 1s. The parameter settings are not saved when the MS is powered off.

11.4 Set AGPS Socket Profile ^SOCKETCONT

11.4.1 Command Syntax

Command	Possible response(s)
^SOCKETCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]	<CR><LF>OK<CR><LF> ERROR: <CR><LF>ERROR<CR><LF>
^SOCKETCONT?	<CR><LF>^SOCKETCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[<CR><LF>^SOCKETCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[...]]<CR><LF><CR><LF>OK<CR><LF>
^SOCKETCONT=?	CR><LF>^SOCKETCONT: (range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s)[<CR><LF>^SOCKETCONT: (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>

11.4.2 Description

AGPS socket profile is only used for AGPS setting. Now we can only support the cid=1 profile setting. The other cid profiles are not used to AGPS socket profile.

11.4.3 Defined Values

<cid>: Context profile ID, now we can only support cid = 1.

<PDP_type>: This value specifies packet switch protocol type to be used.

IP IP protocol

PPP point-to-point protocol

<APN>: Access point name.

<PDP_addr>: UE's IP address, we do not setup it usually.

<d_comp>: Digital type. This value indicates whether or not data will be compressed. It is not to be compressed by default.

0 not compressed

1 compressed

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

<h_comp>: Digital type. This value indicates whether or not the head data of PDP will be compressed. It is not to be compressed by default.

0 not compressed

1 Compressed

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

11.5 Set the SUPL Server Address ^WPURL

11.5.1 Command Syntax

Command	Possible response(s)
^WPURL=<URL>	<CR><LF>OK<CR><LF> ERROR: <CR><LF>+CME ERROR: <err><CR><LF>
^WPURL?	<CR><LF>^WPURL:<URL> <CR><LF> <CR><LF>OK <CR><LF>

11.5.2 Description

Set the SUPL Server address. This is only for AGPS setting.

11.5.3 Defined Values

<URL>: SUPL server URL address(Default is empty).

11.6 Start GPS/AGPS Command ^WPDGP

11.6.1 Command Syntax

Command	Possible response(s)
^WPDGP	<CR><LF>OK<CR><LF> ERROR: <CR><LF>+CME ERROR: <err><CR><LF>

11.6.2 Description

Start GPS/AGPS with current user settings.

11.7 Stop GPS/AGPS Command ^WPEND

11.7.1 Command Syntax

Command	Possible response(s)
^WPEND	<CR><LF>OK<CR><LF> Error: <CR><LF>+CME ERROR: <err><CR><LF>

11.7.2 Description

Stop GPS/AGPS and the ongoing PD session.

11.8 Response to NI request ^WNICT

11.8.1 Command Syntax

Command	Possible response(s)
^WNICT=<choice>	<CR><LF>OK<CR><LF> Error: <CR><LF>ERROR<err><CR><LF>
^WNICT?	<CR><LF>^WNICT:<choice> <CR><LF> <CR><LF>OK<CR><LF>

11.8.2 Description

When the network initiates location request, it will be used to give the user's response.

11.8.3 Defined Values

<choice>: user's response to NI location request.

0 reject the NI location request. (Default value)

1 accept the NI location request.

11.9 Position Data Report ^POSITION

11.9.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^POSITION:<long>,<lat>,<alt><CR><LF>

11.9.2 Description

Report the position data via Control COM when the generation of the reported fix meets the QOS.

11.9.3 Defined Values

<long>: longitude, in the range from -180 degrees to +180 degrees, referenced to the WGS-84 reference ellipsoid, counting positive angles east of the Greenwich meridian and negative angles west of the Greenwich meridian.

<lat>: latitude, in the range from -90 degrees to +90 degrees, referenced to the WGS-84 reference ellipsoid, counting positive angles north of the equator and negative angles south of the equator.

<alt>: the number of satellites in view.

11.10 NI Notification ^WNINV

11.10.1 Command Syntax

Command	Possible response(s)
For Control Plane	<CR><LF>^WNINV:<req_type>,<agps_type>,<client_name>,<client_add>,<req_id><CR><LF>
For User Plane(SUPL)	<CR><LF>^WNINV:<req_type>,<agps_type>,<client_add>,<req_id><CR><LF>

11.10.2 Description

Report the NI (Network Initiated) or MS (Mobile Station) location request type when LCS Mobile terminated location request (MS-LR) is triggered, or the network initiates a location request.

11.10.3 Defined Values

<req_type>: NI location request type.

0 Notify and Verify. Need user accept or deny the location request before the internal SET timer expires (20s by default). If the user performs no action to the Location attempt prompt and the internal SET timer expires, it will deny the NI request.

1 Notify Only. The network just notifies UE that the NI request is coming and don't need a response from UE.

2 No Notify No Verify. The network has initiated a NI location request, and don't need notify UE or get a response from UE.

<agps_type>: agps network

0 control plane

1 user plane

<client_name>: The LCS Client name.

<client_add>: The LCS Client address.

<req_id>: The NI requestor ID.

11.11 XTRA Initiation ^XTRAINIT

11.11.1 Command Syntax

Command	Possible response(s)
^xtrainit	<CR><LF> XTRAINIT:<xtra_server_primary>,<xtra_server_secondary>,<xtra_server_tertiary>,<maxFileSize><CR><LF> <CR><LF>OK<CR><LF>

11.11.2 Description

PC inform module to initiate a xtra, request module providing server URLs and the max file size which can be download.

11.11.3 Defined Values

<xtra_server_primary>: URL of primary gpsOneXTRA server.

<xtra_server_secondary>: URL of secondary gpsOneXTRA server.

<xtra_server_tertiary>: URL of tertiary gpsOneXTRA server.

<maxFileSize>: the max file size which can be download.

11.12 XTRA Inject Time ^XTRATIME

11.12.1 Command Syntax

Command	Possible response(s)
<code>^xtratetime=<timeMsecUpper>,<timeMsecLower>,<timeUncMsec>,<refToUtcTime>,<forceFlag></code>	<code><CR><LF>OK<CR><LF></code> Error: <code><CR><LF>ERROR<CR><LF></code>

11.12.2 Description

PC will use the AT command to inject time to module after it get time information from SNTP server.

11.12.3 Defined Values

<timeMsecUpper>: high 32 bits of time

<timeMsecLower>: low 32 bits of time

<timeUncMsec>: the uncertainty of time, it's always the gap between request SNTP time and receive SNTP time

<refToUtcTime>: reference time

0 GPS

1 UTC

<forceFlag>:whether force the module receive the time

0 not force

1 force

Notes: <timeMsecUpper>, <timeMsecLower> combined together represent the gps time, from 00:00:00 Jan 6, 1980 to the current time, in milliseconds.

11.13 Time Injection Result Report ^TIMESETRULT

11.13.1 Command Syntax

Command	Possible response(s)
	<code><CR><LF>^TIMESETRULT:<status><CR><LF></code>

11.13.2 Description

After PC inject time to module, module will report the injection result.

11.13.3 Defined Values

<status>: indicate the time injection result

- 0 time injection fail
- 4 time injection success

11.14 XTRA Inject Data ^XTRADATA

11.14.1 Command Syntax

Command	Possible response(s)
^xtradata=<total>,<index>,<item>,<length>,<xtra_dc_status>	<CR><LF>OK<CR><LF> Error: <CR><LF>ERROR<CR><LF>

11.14.2 Description

PC will use the AT command to inject xtra data to module after it get xtra,bin file from the xtra server.

11.14.3 Defined Values

<total>: the total package number, the value range is 1–160

<index>: the index of current package, the value range is 1–160

<item>: the content of data package

<length>: the transmitted data byte, the value range is 1–1024

<xtra_dc_status>: indicate download successfully or not

- 0 download fail
- 1 download success

Note:

Each time the max transmitted data is 1024 byte because of AT command restriction. The max total data file size is 45*1024 byte.

11.15 Data Injection Result Report ^DATASETRULT

11.15.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^DATASETRULT:<status><CR><LF>

11.15.2 Description

After PC inject data to module, module will report the injection result.

11.15.3 Defined Values

< status >: indicate the injection result

- 0 XTRA_DOWNLOAD_STATUS_SUCCESS
- 1 XTRA_DOWNLOAD_STATUS_BAD_CRC
- 2 XTRA_DOWNLOAD_STATUS_BAD_BUFFER_LENGTH
- 3 XTRA_DOWNLOAD_STATUS_TOA_BAD_RANGE
- 4 XTRA_DOWNLOAD_STATUS_FAILURE
- 50 XTRA_DOWNLOAD_STATUS_WAIT_DATA
- Others UNKNOWN_STATUS_ERROR

11.16 XTRA Check Data Validity ^XTRASTA

11.16.1 Command Syntax

Command	Possible response(s)
^XTRASTA	<CR><LF>OK<CR><LF> Error: <CR><LF>ERROR<CR><LF>

11.16.2 Description

PC will use the AT command to check the xtra data status.

11.16.3 Defined Values

None.

11.17 Data Validity Check Result Report ^XDSTATUS

11.17.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^XDSTATUS: <year>,<month>,<day>,<hour><CR><LF>

11.17.2 Description

After PC successfully send the command to check the xtra data status, module will report the current status of xtra data through this command.

11.17.3 Defined Values

<year>: the start year of xtra data. If the return value is 0, it means that there is no valid xtra data in efs.

<month>,<day>,<hour>: the accurate start time(UTC time) of xtra data. User can compare the xtra data start time to the current time and decide whether to download new xtra data or not. If the current time is seven days after the xtra data start time, it means the xtra data is totally invalid.

12 BodySAR Interface Description

12.1 Disabling or Enabling Body SAR ^BODYSARON

12.1.1 Command Syntax

Command	Possible response(s)
^BODYSARON=<on>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARON?	<CR><LF>^BODYSARON:<on><CR><LF> <CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARON=?	<CR><LF>^BODYSARON:(0,1)<CR><LF> <CR><LF>OK<CR><LF>

12.1.2 Description

The EXECUTION command is used to enable or disable the Body SAR function.

The READ command is used to query the current state of the Body SAR function.

The TEST command is used to check the supported values by this command.

12.1.3 Defined Values

<on>: state of Body SAR function

0 disable Body SAR(default).

1 enable Body SAR.

12.2 Set the Maximum Tx Power Limit of WCDMA ^BODYSARWCDMA

12.2.1 Command Syntax

Command	Possible response(s)
^BODYSARWCDMA=<power>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARWCDMA?	<CR><LF>^BODYSARWCDMA:<power><CR><LF> <CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARWCDMA=?	<CR><LF>^BODYSARWCDMA:(17,24)<CR><LF> <CR><LF>OK<CR><LF>

12.2.2 Description

The EXECUTION command is used to set the maximum Tx power limit of WCDMA for each band.

The READ command is used to query the maximum Tx power limit of WCDMA for each band. If the parameter values are not set, the default values are displayed after the query.

The TEST command is used to query the parameter values supported by the maximum Tx power limit for each band.

12.2.3 Defined Values

<power>: the max transmit power limit of WCDMA

Integer from 17 to 24 in dBm, default value is 24.

12.3 Set the Maximum Tx Power Limit of GSM ^BODYSARGSM

12.3.1 Command Syntax

Command	Possible response(s)
^BODYSARGSM=<power1>,<power2>,<power3>,<power4>	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARGSM?	<CR><LF>^BODYSARGSM: <power1>, <power2>,<power3>,<power4>]<CR><LF><CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^BODYSARGSM=?	<CR><LF>^BODYSARGSM:(15,33),(15,33),(15,33),(15,33) <CR><LF><CR><LF>OK<CR><LF>

12.3.2 Description

The EXECUTION command is used to set the maximum Tx power limit of GSM for four bands.

The READ command is used to query the maximum Tx power limit of GSM for four bands. If the parameter values are not set, the default values are displayed after the query.

The TEST command is used to query the parameter values supported by the maximum Tx power limit for four bands.

12.3.3 Defined Values

<power1>, <power2>, <power3>, <power4>: the max transmit power limit of GSM850,GSM900,GSM1800,GSM1900,Integer from 15 to 33 in dBm; default value is 32,32,29,29.

13

STK-related Interface Description (Common Mode)

13.1 Reporting of the STK Event Notification ^STIN

13.1.1 Command Syntax

Command	Possible response(s)
	<CR><LF>^STIN: <CmdType>,<CmdIndex>,<isTimeOut><CR><LF>

13.1.2 Description

This command is used to notify the TE that the SIM card reports a proactive command to the MS. When the TE receives the notification, it sends the **^STGI** command to obtain the proactive command data and complete the unsolicited request.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

13.1.3 Defined Values

<CmdType>:

- 0 The SIM card has sent a proactive command **Setup Menu**.
- 1 The SIM card has sent a proactive command **Display Text**.
- 2 The SIM card has sent a proactive command **Get Inkey**.
- 3 The SIM card has sent a proactive command **Get Input**.

- 4 The SIM card has sent a proactive command **Setup Call**.
- 5 The SIM card has sent a proactive command **Play Tone**.
- 6 The SIM card has sent a proactive command **Sel Item**.
- 7 The SIM card has sent a proactive command **Refresh**.
- 8 The SIM card has sent a proactive command **Send SS**.
- 9 The SIM card has sent a proactive command **Send SMS**.
- 10 The SIM card has sent a proactive command **Send USSD**.
- 11 The SIM card has sent a proactive command **LAUNCH BROWSER**.
- 12 The SIM card has sent a proactive command **SET UP IDLE MODE TEXT**.
- 99 The SIM card has sent a command **End Session** to end the session.

<CmdIndex>: It is the index of the proactive command, ranging from 0 to 8.

<isTimeOut>: Indicates whether a proactive command is timeout.

- 0 not timeout
- 1 timeout

13.2 Obtaining Command Data ^STGI

13.2.1 Command Syntax

Command	Possible response(s)
^STGI=<CmdType>,<CmdIndex>	See the STGI Response Table. In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^STGI=?	<CR><LF>^STGI: (range of supported <CmdType>),(range of supported <CmdIndex>)<CR><LF><CR><LF>OK<CR><LF>

13.2.2 Description

This command is used to obtain the data of proactive commands. After the TE receives the notification of a proactive command, it performs the EXECUTION command to obtain the information of the proactive command (including the displayed text, menus, properties).

The TEST command is used to return the supported STK commands.

To obtain the information about the main menu, the TE can perform the command AT^STGI=0,0 anytime. Other command information can be obtained only when the command is reported.

CmdType	Possible response(s)
0	<CR><LF>^STGI: <Id>, <NbItems>, <Alpha Identifier menu><CR><LF>^STGI : <Id1>, <NbItems>, <Alpha Id1 Label>, <Help Info> [,<NextActionId>]<CR><LF>^STGI: <Id2>, <NbItems>, <Alpha Id2 Label>, <Help Info>[,<NextActionId>]<CR><LF>[...] <CR><LF>OK<CR><LF>
1	<CR><LF>^STGI:<TextInfo>,<TextFormat>,<ClearMode>[,<Duration Time>]<CR><LF><CR><LF>OK<CR><LF>
2	<CR><LF>^STGI: <TextInfo>,<textCode>,<rspFormat>, <HelpInfo>[,<Timeout>[,<Icon>]]<CR><LF><CR><LF>OK<CR><LF>
3	<CR><LF>^STGI: <TextInfo>,<textCode>,<rspFormat>, <PackMode>, <EchoMode>, <SizeMin>, <SizeMax>, <HelpInfo> [,<DefaultTextInfo>,<textCode >]<CR><LF><CR><LF>OK<CR><LF>
5	<CR><LF>^STGI: <ToneType>[,<Duration>,<TextInfo>,<textCode>,<icon>]<CR><LF><CR><LF>OK<CR><LF>
6	<CR><LF>^STGI: <DefaultItem>, <NbItems>, <Alpha Identifier menu><CR><LF> ^STGI: <Id1>, <NbItems>, <Alpha Id1 Label>, <Help Info>[,<NextActionId>]<CR><LF> ^STGI: <Id2>, <NbItems>, <Alpha Id2 Label>, <Help Info>[,<NextActionId>]<CR><LF> [...] <CR><LF>OK<CR><LF>
7	<CR><LF>^STGI:<Refresh Type>[,<File List>]<CR><LF><CR><LF>OK<CR><LF>
11	<CR><LF>^STGI:<URL>,<LaunchMode><CR><LF><CR><LF>OK<CR><LF>
12	<CR><LF>^STGI:<TextInfo>,<textCode>[,<icon>]<CR><LF><CR><LF>OK<CR><LF>

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

13.2.3 Defined Values

Parameter Values in the Response When CmdType=0 (Setup Menu)

<CmdIndex>: It is consistent with the <CmdIndex> in the ^STIN notification.

<Alpha Identifier menu> indicates the alpha identifier of the main menu, that is, the title of the main menu. The decoding method is as follows: Identify whether the first byte is 80, 81 or 82. If yes, decode the title according to the UCS2 coding scheme. If no, decode the title according to uncompressed GSM 7-bit coding scheme.

<Id>	(0)	indicates the main menu
<Idx>	(1–255)	indicates the identifier of the menu item
<NbItems>	(1–255)	indicates the number of options in the main menu

<Alpha Idx Label>: indicates the alpha identifier label of the menu option, that is, the name of the menu option. The decoding method is as follows: identify whether the first byte is 80, 81 or 82. If yes, decode the menu option according to the UCS2 coding scheme. If no, decode menu option according to uncompressed GSM 7-bit coding scheme.

<HelpInfo>:

0	The help information is unavailable.
1	The help information is available.

<NextActionId>: It includes a proactive command identifier. The TA can always obtain the information about the setup menu after receiving the notification of ^STIN:0.

Parameter Values in the Response When CmdType=1 (Display Text)

<TextInfo>: a character string, which is the text to be displayed.

<TextFormat>: indicates the coding scheme of the text to be displayed.

0	compressed GSM 7-bit coding
4	8-bit coding
8	UCS2 coding

<ClearMode>: The user disables the prompt mode.

0	The displayed text will be cleared after a certain period of time.
1	The displayed text remains until it is cleared by the user.

<DurationTime>: indicates the displaying duration requested for the displayed text.

Parameter Values in the Response When CmdType=2 (Get Inkey)

<TextInfo>: a character string that indicates the prompt information.

<textCode>:

0	compressed GSM 7-bit coding
4	8-bit coding
8	UCS2 coding

<rspFormat>: indicates the user's input mode or character type of the input contents.

0	GSM 7-bit coding
---	------------------

- 1 YES or NO mode
 - 2 digits (0–9, *, #, and +)
 - 3 UCS2 coding
- <HelpInfo>:
- 0 The help information is unavailable.
 - 1 The help information is available.
- <Timeout>: time-out time, in seconds

Parameter Values in the Response When CmdType=3 (Get Input)

- <TextInfo>: a character string that indicates the prompt information.
- <textCode>
- 0 compressed GSM 7-bit coding
 - 4 8-bit coding
 - 8 UCS2 coding
- <rspFormat> indicates the character type of contents that the user inputs.
- 0 GSM 7-bit coding characters
 - 2 digits (0–9, *, #, and +)
 - 3 UCS2 coding characters
- <PackMode>:
- 0 uncompressed mode
 - 1 compressed mode
- <EchoMode>:
- 0 Disable the echo mode.
 - 1 Enable the echo mode.
- <SizeMin> (1–255) indicates the minimum input length
- <SizeMax> (1–255) indicates the maximum input length
- <HelpInfo>:
- 0 The help information is unavailable.
 - 1 The help information is available.
- <DefaultTextInfo>: Text information. By default, it is the strings that the user inputs.

Parameter Values in the Response When CmdType=5 (Play Tone)

- <ToneType>: indicates the type of the tone.
- 0 Tone dial

- 1 Tone busy
- 2 Tone Conestion
- 3 Tone Radio ack
- 4 Tone Dropped
- 5 Tone Error
- 6 Tone Call waitting
- 7 Tone Ringing
- 8 Tone General beep
- 9 Tone Positive beep
- 10 Tone Negative beep

When the tone is not specified, the ME uses the default tone "general beep".

<Duration>: indicates the duration for playing the tone, in seconds.

<TextInfo>: indicates the text information to be displayed.

<textCode>: indicates the coding scheme of the text to be displayed.

- 0 compressed GSM 7-bit coding
- 4 8-bit coding
- 8 UCS2 coding

<icon>: indicates the icon information.

Parameter Values in the Response When CmdType=6 (Sel Item)

<CmdIndex>: It is consistent with the <CmdIndex> in the STIN notification.

<DefaultItem> (1–255) Default item identifier

<Alpha Identifier menu> indicates the alpha identifier of the main menu, that is, the title of the main menu. The decoding method is as follows: Identify whether the first byte is 80, 81 or 82. If yes, decode the title according to the UCS2 coding scheme. If no, decode the title according to uncompressed GSM 7-bit coding scheme.

<Idx> (1–255) Identifier items

<NbItems> (1–255) indicates the number of the menu items

<Alpha Idx Label> indicates the alpha identifier label of the menu option, that is, the name of the menu option. The decoding method is as follows: identify whether the first byte is 80, 81 or 82. If yes, decode according to the UCS2 coding scheme. If no, decode the title according to uncompressed GSM 7-bit coding scheme.

<HelpInfo>:

- 0 The help information is unavailable.
- 1 The help information is available.

<NextActionId>: It includes a proactive command **Identifier**.

Parameter Values in the Response When CmdType=7 (Refresh)

<Refresh Type>: indicates the refresh type.

- | | |
|---|---|
| 0 | NAA initialization |
| 1 | NAA file change notification (FCN) |
| 2 | NAA initialization and FCN |
| 3 | NAA initialization and FCN of all files |
| 4 | UICC restart |
| 5 | NAA application restart |
| 6 | NAA session restart |

<File List>: indicates the file list to be refreshed.

Parameter Values in the Response When CmdType=11 (Launch Browser)

<URL>: Uniform Resource Location

<LaunchMode>: indicates the launch mode

- 0 Launch a browser if no browser has been launched.
- 2 Use the existing browser (do not use the browser whose session has been activated).
- 3 Close the existing browser, and then launch a new browser.

Parameter Values in the Response When CmdType=12 (SET UP IDLE MODE TEXT)

<TextInfo>: indicates the text information to be displayed.

<textCode>

- | | |
|---|-----------------------------|
| 0 | compressed GSM 7-bit coding |
| 4 | 8-bit coding |
| 8 | UCS2 coding |

<icon>: indicates the icon information.

13.2.4 Informative Examples

Precondition: All the STK-related functions are enabled; PIN is not required or has been verified; the STK function is enabled.

^STIN:0.0 The SIM card has sent the main menu.

AT^STGI=0,0 The information about the main menu is obtained.

^STGI:0,3,"8051687403901A4E13533A"

The main menu contains three items, including:

^STGI:1,3,"444953504C41592054455854",0

^STGI:2,3,"47455420494E4B4559",0

^STGI:3,3,"47455420494E505554",0

OK

13.3 STK Responding Command ^STGR

13.3.1 Command Syntax

Command	Possible response(s)
^STGR=<CmdType> ,<CmdIndex> [,<Result>[, <Data>]]	<CR><LF>OK<CR><LF> In case of error: <CR><LF>ERROR<CR><LF>
^STGR=?	<CR><LF>^STGR: (range of supported <CmdType>),(range of supported <CmdIndex>)<CR><LF><CR><LF>OK<CR><LF>

13.3.2 Description

This command is used to report the result of the proactive command that the TE executes to the SIM card.

The TEST command is used to return the type and the index of the proactive command currently supported.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

13.3.3 Defined Values

<CmdType> See the values of CmdType in the ^STIN command.

<CmdIndex> It is consistent with <CmdIndex> reported by the ^STIN command.

<Result> an integer that indicates the type of the executed action.

- 0 The user terminated the session.
- 1 Execute the action of the user operation.
- 2 The help information required by the user.
- 3 Return to the upper level menu.
- 4 Not supported by the ME.

5 The browser on the ME is busy or the command cannot be parsed by the browser.

6 The ME is busy in supplementary service transmission.

<Data> a character string that indicates the data closely related to the **CmdType** type and <rspFormat> (indication of the character type of the contents that the user inputs). This parameter does not have a length identifier.

13.3.4 Informative Examples

Precondition: All the STK-related functions are enabled; PIN is not required or has been verified; the STK function is enabled.

^STIN:0,0 The SIM card has sent the main menu.

AT^STGI=0,0 The information of the main menu is obtained.

^STGI:0,3,"8051687403901A4E13533A"

The main menu contains three items, including:

^STGI:1,3,"444953504C41592054455854",0

^STGI:2,3,"47455420494E4B4559",0

^STGI:3,3,"47455420494E505554",0

OK

AT^STGR=0,0,1,2 Item2 of the main menu is selected.

OK

^STIN:6,1,0 The SIM card has sent the **Sel item** menu.

AT^STGI=6,1 Obtain the information of the **BANK** menu.

^STGI:0,2,"47455420494E4B4559"

The **BANK** menu contains two items, including:

^STGI:1,2,"372E322E312E31",0

^STGI:2,2,"372E322E312E32",0

OK

14 STK-related Interface Description(RAWDATA Mode)

14.1 STK Configuration Tool ^STSF

14.1.1 Command Syntax

Command	Possible response(s)
^STSF=<Mode>[,<RawMode>]	<CR><LF>OK<CR><LF> In case of an MS-related error: <CR><LF>ERROR<CR><LF>
^STSF?	<CR><LF>^STSF: <Mode>, <RawMode><CR><LF><CR><LF>OK<CR><LF>
^STSF=?	<CR><LF>^STSF: (0-2), (0,1)<CR><LF><CR><LF>OK<CR><LF>

14.1.2 Description

This command is used to configure the function of STK, including:

- Active and de-active the function of STK
- Set STK RAW DATA mode and STK common mode
- Configure STK command supported by SIM card

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

14.1.3 Defined Values

<mode>

- 0 Disable the function of STK
- 1 Active the function of STK
- 2 Configure the function of STK (not supported currently)

<RawMode>

- 0 raw data mode
- 1 common mode (default)

AT^STSF=<Mode> is equivalent to AT^STSF=<Mode>,1

14.1.4 Informative Examples

AT^STSF=0,0 Disable the function of STK

OK

AT^STSF=3,0 syntax error

ERROR

AT^STSF=1,0 Active the function of STK and set STK to RAW DATA mode

OK

14.2 STK Responding Command ^STGR

14.2.1 Command Syntax

Command	Possible response(s)
^STGR=<CmdType> ,<rawdata>	<CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>
^STGR?	<CR><LF>OK<CR><LF>
^STGR=?	<CR><LF>OK<CR><LF>

14.2.2 Description

This command is used to report the result of the proactive command that the TE executes to the SIM card.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

14.2.3 Defined Values

<CmdType>

0 Envelope command

1 Terminal responding command

<rawdata >: Data package of envelope command or terminal responding command, strings with double quotation marks.

14.2.4 Informative Examples

Run: envelope command: MENU SELECT

Run: AT^STGR=0,"D30782020181900102"

Response: OK

Report last proactive command :SELECT ITEM

Response:

^STIN:0,"D01B8103012400820281828F0701372E31392E318F0702372E31392E32"

Run: Terminal responding command: SELECT ITEM

Run: AT^STGR=1,"810301240082028281830100900101"

Response: OK

Report last proactive command :SELECT ITEM

Response:

^STIN:0,"D0568103012400820281828F0901372E31392E312E318F0902372E31392E312E328F0903372E31392E312E338F0904372E31392E312E348F0905372E31392E312E358F0906372E31392E312E368F0907372E31392E312E37"

14.3 Obtaining Command Data ^STGI

14.3.1 Command Syntax

Command	Possible response(s)
^STGI=<CmdType>,<CmdIndex>	When SIM card supports STK: <CR><LF>^STIN:<stkmode>,<rawdata><CR><LF> <CR><LF>OK<CR><LF> In case of an error: <CR><LF>ERROR<CR><LF>

14.3.2 Description

This command is used to obtain RAW DATA data of the main menu.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

14.3.3 Defined Values

<CmdType>:

0 main menu

<CmdIndex>:

0 Obtain the main menu, which is used with <CmdType> together.

<stkmode>:

0 unsolicitedly report command

1 Event notification command

99 Session end command

<rawdata>:

RAW DATA data of the main menu, strings with double quotation marks.

14.3.4 Informative Examples

Obtain the main menu

Run: AT^STGI=0,0

Response:

```
^STIN:0,"D081C8810301250082028182850B8051687403901A4E13533A8F0F014C
41554E43482042524F575345528F0D024F50454E204348414E4E454C8F0E03434
C4F5345204348414E4E454C8F0D045245434549564520444154418F0A0553454E
4420444154418F1306474554204348414E4E454C205354415455538F150743414C
4C20434F4E54524F4C204259205553494D8F21084D4F2053484F5254204D45535
341474520434F4E54524F4C204259205553494D8F0A4C805E9475287BA174068F
0A4D804E0B8F7D8BBE7F6E"
```

OK

14.4 Report the STK Event Notification ^STIN

14.4.1 Command Syntax

Command	Possible response(s)
	<CR><LF> ^STIN:<CmdType>,<rawdata><CR><LF>

14.4.2 Description

This command is used to notify the TE that the SIM card reports a proactive command to the MS.

Relationship with the PIN:

It is controlled by the pin.

Support sudden power loss protection:

NA.

14.4.3 Defined Values

<CmdType>:

- 0 Unsolicitedly report command
- 1 Event notification command
- 99 Session end command

<rawdata>: Data package of unsolicitedly report command, strings with double quotation marks.

15

WWAN-related Interface Description

15.1 Query the ICCID ^ICCID

15.1.1 Command Syntax

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

15.1.2 Description

This command queries the integrated circuit card identity (ICCID) of the SIM card. The ICCID can also be queried when the SIM card is locked.

Relationship with the PIN:

It is not controlled by the pin.

Support sudden power loss protection:

NA.

15.1.3 Defined Values

<iccid>: A string indicates ICCID value of the maximum length with 20.

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 command. 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 in the front 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.

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.

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
+CPW=									7							
+CPIN=		3				5										
+CPIN?					4		6	1								
+CFUN=			2													
+CIMI=		40					6									
+CGSN															8	
+COPS=	27 31													32		
+CSCA=								1								
+CSCA?								1						41		
^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	
+COPS=			27												
^CPBR=						12									
^CPBW=	15	16				12									
^SPN						12									

	65280	65281	65282	65823	65284	65285	65286	65287
^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 AT command processing failure due to occupation of the modem port, all AT commands may encounter the error.

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 ... 12 7	12 8 ... 25 5	30 1	30 2	30 4	31 0	31 1	31 2	31 6	32 0	32 1	32 2	33 0	33 1	33 2	34 0	50 0
+CNMI			3			6				10							17
+CMGD			3			6	7	8	9	10	11						

	0 ... 12 7	12 8 ... 25 5	30 1	30 2	30 4	31 0	31 1	31 2	31 6	32 0	32 1	32 2	33 0	33 1	33 2	34 0	50 0
+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.

Final result code	Code	Description
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 5 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
+CSCA	<sca> and <tosca> are empty. It is necessary to read the SMSC number in the SIM card to the MS via "+CSCA?" command

	Description of initial value
+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
+CSSN	<n> is 0, <m> is 0
^PROTSEL	<n> is 0
+CMMS	<n> is 2
^CURC	<curc_status> is 0x00000003

16.6 Appendix 6 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
3	reg (1, 5)	unreg (0, 2, 3, 4)	3G CS

<sys_mode>	creg: <stat>	cgreg: <stat>	shown
5	unreg (0, 3, 4)	reg (1, 5)	3G PS
5	reg (1, 5)	reg (1, 5)	3G

16.7 Appendix 7 List of Unsolicited Report Command

COMMAND	REGISTER/DEREGISTER	COMMENT
+CREG	+CREG = 0 or 1 or 2	Refer to +CREG command
+CGREG	+CGREG = 0 or 1 or 2	Refer to +CGREG command
^SIMST	AT+CURC=0 or 1	
^SRVST		
^MODE		
^RSSI		
^CSNR		
^DSFLOWRPT		
+CMTI	Application need this report, can't disable it.	
+CMT		
^RFSWITCH		
+CDS		
^SMMEMFULL		
^STIN		
+CDSI		

16.8 Appendix 8 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
- [4] 3GPP protocol 24.008[8]

16.9 Appendix 9 List of Abbreviations

Abbreviations	Full spelling
BER	Bit Error Rate
DCE	Data Circuit Equipment
DCS	Data Coding Scheme
DTE	Data Terminal Equipment
GPS	Global Positioning System
MS	Mobile Station
PDP	Packet Data Protocol
PLMN	Public Land Mobile Network
RPLMN	Registered PLMN
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address
SM	Short Message
TE	Terminal Equipment
URC	Unsolicited Result Code