

AT Command User Guide for 2G-3G-4G-5G

Issue	V2.9
Date	2021-01-28

Copyright © UNISOC (Shanghai) Technologies Co., Ltd. All rights reserved.

All data and information contained in or disclosed by this document is confidential and proprietary information of UNISOC (Shanghai) Technologies Co., Ltd. (hereafter referred as UNISOC) and all rights therein are expressly reserved. This document is provided for reference purpose, no license (express or implied, by estoppel or otherwise) to any intellectual property rights is granted by this document, and no express and implied warranties, including but without limitation, the implied warranties of fitness for any particular purpose, and non-infringement, as well as any performance. By accepting this material, the recipient agrees that the material and the information contained therein is to be held in confidence and in trust and will not be used, copied, reproduced in whole or in part, nor its contents revealed in any manner to others without the express written permission of UNISOC. UNISOC may make any changes at any time without prior notice. Although every reasonable effort is made to present current and accurate information, UNISOC makes no guarantees of any kind with respect to the matters addressed in this document. In no event shall UNISOC be responsible or liable, directly or indirectly, for any damage or loss caused or alleged to be caused by or in connection with the use of or reliance on any such content.

Please refer to the UNISOC Documents in the UNISOC Deliverables for the use of the Deliverables. Any loss caused by the modification, customization or use of the UNISOC Deliverables in violation of the instructions in the UNISOC Documents shall be undertaken by those who conduct so. The performance indicators, test results and parameters in the UNISOC Deliverables are all obtained in the internal development and test system of UNISOC and are only for the reference. Before using UNISOC Deliverables commercially or conducting mass production of the Deliverables, comprehensive testing and debugging in combination with its own software and hardware test environment are pre-requisite.

Unisoc Confidential For hiar

UNISOC (Shanghai) Technologies Co., Ltd.



About This Document

Purpose

This document describes the usage of UNISOC AT Command for 2G, 3G, 4G and 5G.

Intended Audience

This document is for UNISOC AT Command User.

Symbol Conventions

The symbols that may be found in this guide are defined in the following table.

Symbol	Description
 NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Acronyms and Abbreviations

Acronym and Abbreviation	Full Name
ACM	Accumulated Call Meter
APN	Access Point Name
DCE	Data Communication Equipment
DSP	Digital Signal Processing
DTE	Data Terminal Equipment
DMT	Data Mobile Termination
DTMF	Dual Tone Multi Frequency
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System For Mobile Communications
IA5	The T.50 International Alphabet 5

Acronym and Abbreviation	Full Name
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
MO	Mobile Originated
MT	Mobile Terminated
MS	Mobile Station
MT2	Mobile Termination
MSISDN	Mobile Station International ISDN Number
OMS RIL	Open Mobile System Radio Interface Layer
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PS	Protocol Stack
QOS	Quality Of Service
RSSI	Received Signal Strength Indication
SIM	Subscriber Identity Model
SM	SIM Storage
STK	SIM Application Toolkit
TE	Terminal Equipment
TA	Terminal Adaptation
USIM	Universal Subscriber Identity Model
USSD	Unstructured Supplementary Service Data
URC	Unsolicited Result Code
SS	Supplementary Service
TMSI	Temporary Mobile Subscriber Identity

Change History

Issue	Date	Description
V2.5	2019-11-22	Optimized document contents.
V2.6	2020-06-20	Updated document format.
V2.7	2020-10-15	Added 5G AT Command.

Issue	Date	Description
V2.8	2020-12-08	<ul style="list-style-type: none">• Updated document format.• Change document name from <i>AT Command User Guide</i> to <i>AT Command User Guide for 2G-3G-4G-5G</i>
V2.9	2021-01-28	<ul style="list-style-type: none">• Added more AT commands.• Updated description of Section 12.20.

Keywords

AT Command.

Unisoc Confidential For hiar

Contents

1 Overview	1
1.1 Serial Port Configuration.....	1
1.2 Commands.....	2
1.3 Information Responses and Result Codes	2
2 General Control Commands.....	8
2.1 Check communication with DCE - AT	8
2.2 Set the defaults of parameters - ATZ	8
2.3 Command echo - ATE.....	8
2.4 Result code suppression - ATQ.....	9
2.5 TA response format - ATV	10
2.6 Write the active configuration - AT&W.....	11
2.7 Set all parameters to default values - AT&F	11
2.8 Request product serial number identification +(C)GSN	12
2.9 Request model identification +CGMM	13
2.10 Request revision identification +CGMR	13
2.11 Request manufacturer identification +(C)GMI	14
2.12 Request overall capabilities of TA +GCAP	14
2.13 Read the EF-ICCID file +CCID	15
2.14 Request international mobile subscriber identity +CIMI.....	15
2.15 Select TE character set +CSCS.....	16
2.16 Searching and supplementary services +SAC	17
2.17 Multiplexing mode +CMUX	17
2.18 Time zone reporting +CTZR	19
2.19 Force power off PS without detach +OFF	19
2.20 Play tone +STONE	19
2.21 Play DTMF at local +SDTMF.....	20
2.22 Indicator control +CIND	21
3 Device Control & Status Report Commands	23
3.1 Report mobile termination error +CMEE.....	23
3.2 Set phone functionality +CFUN	23
3.3 Clock +CCLK.....	25
3.4 Phone activity status +CPAS	25
3.5 Extended signal quality +CESQ	26
3.6 Signal quality +CSQ.....	28
4 Network Service Commands	30
4.1 PLMN selection +COPS.....	30
4.2 Network registration +CREG	32
4.3 Selection of preferred PLMN list +CPLS	35

4.4 Preferred PLMN list +CPOL	35
4.5 5GS network registration status +C5GREG	37
4.6 Network emergency (bearer) services support +CNEM	40
4.7 EPS network registration status +CEREG	42
4.8 Signalling connection status +CSCON	43
4.9 Presentation of an unsolicited result code +CIREGU- +CIREG	45
5 Call Control Commands.....	47
5.1 Instructs the DCE to originate a call - ATD	47
5.2 Redial last telephone number used - ATDL	48
5.3 Connect to line and start answer sequence - ATA	48
5.4 Hang up all calls - ATH	49
5.5 Tone duration +VTD	49
5.6 DTMF and tone generation +VTS	50
5.7 Start/stop DTMF tone +EVTS	51
5.8 Receive gain selection +VGR	52
5.9 Mute control +CMUT	52
5.10 Set calls type +CICB	53
5.11 Hangup call +CHUP	54
5.12 Select type of address +CSTA	54
5.13 Select bearer service type +CBST	55
5.14 Service reporting control +CR	55
5.15 Extended error report +CEER	56
5.16 Cellular result codes +CRC	58
5.17 Call mode +CMOD	59
5.18 List current calls +CLCC	60
5.19 Report information about ^DSCI - ^DSCI	62
5.20 Control and modify the media description +CCMMD	63
5.21 Control the extended conference call +CGU	64
5.22 Bring call id and call type of current call - ^CONN	65
5.23 Report disconnect call information or PDP activate and deactivate information - ^CEND	65
5.24 Bring call id and call type for call start ^ORIG	68
5.25 Bring current call id ^CONF	69
5.26 Incoming calls indication +CRC	69
6 SS Commands	71
6.1 Call forwarding number and conditions +CCFC	71
6.2 Call waiting +CCWA	73
6.3 Call related supplementary services +CHLD	75
6.4 Calling line identification presentation +CLIP	76
6.5 Calling line identification restriction +CLIR	77
6.6 Connected line identification presentation +COLP	78
6.7 Connected line identification restriction status +COLR	79

6.8 Accumulated call meter +CACM	79
6.9 Accumulated call meter maximum +CAMM	80
6.10 Price per unit and currency table +CPUC.....	81
6.11 Unstructured supplementary service data +CUSD	81
6.12 Supplementary service notifications +CSSN.....	83
6.13 Advice of charge +CAOC.....	84
7 Security Commands	86
7.1 Enter PIN +CPIN.....	86
7.2 Change password +CPWD	87
7.3 Facility lock +CLCK	89
7.4 Get the remaining times +XX.....	90
7.5 Input or modify PIN2 code +ECPIN2	91
8 Short Message Commands.....	92
8.1 Select Message Service +CSMS.....	92
8.2 Save Settings +CSAS	93
8.3 Restore Settings +CRES	93
8.4 Show Text Mode Parameters +CSDH	94
8.5 Preferred Message Storage +CPMS	94
8.6 Update SMSC address +CSCA	96
8.7 Message Format +CMGF	97
8.8 List Messages +CMGL.....	98
8.9 Read Message +CMGR	100
8.10 Send Message +CMGS.....	102
8.11 Set Text Mode Parameters +CSMP	104
8.12 Write Message to Memory +CMGW	105
8.13 Send Message from Storage +CMSS	107
8.14 Delete Message +CMGD.....	108
8.15 Cell Broadcast Message Types +CSCB	109
8.16 New Message Indications to TE +CNMI	109
8.17 Changes the status in SIM card +SMSC.....	111
8.18 New Message Acknowledgement to ME/TA +CNMA	112
8.19 More Messages to Send +CMMS	113
8.20 Send Command +CMGC.....	114
8.21 5GS use of SMS over NAS +C5GUSMS	115
8.22 Notify not receive or retrieve to receive SMS +SPSMSFULL.....	116
9 SIM/STK Commands.....	117
9.1 Turn result to SIM after perform STK +SPUSATTERMINL.....	117
9.2 Set up call on STK +SPUSATCALLSETUP.....	118
9.3 ME Send EVENT to SIM +SPUSATENVECMD	118
9.4 ME supports STK feature +SPUSATPROFILE	119
9.5 Check if STK is activated +SPUSATCAPREQ.....	119

9.6 Notify CP that AP STK is ready or not +SPUSATAPREADY	120
9.7 Generic SIM access +CSIM	120
9.8 Generic UICC logical channel access +CGLA.....	122
9.9 Open logical channel +CCHO	123
9.10 Close logical channel +CCHC.....	124
9.11 Query current sim card type - ^CARDMODE.....	124
9.12 Authorize USIM/SIM - ^MBAU	125
9.13 Restricted SIM access +CRSM	126
9.14 Restricted UICC logical channel access +CRLA	127
9.15 Store or reset a given storage profiles +CUSATW	128
9.16 Inform a request from SIM card +SPUSATPROCMDIND	129
9.17 Informs ME to setup call + SPUSATSETUPCALL	130
9.18 Informs a request from SIM + SPUSATDISPLAY	130
9.19 STK session ended Indication +SPUSATENDSESSIONIND.....	131
9.20 Report STK REFRESH operation result +SPUSATREFRESH	131
10 GPRS Commands	133
10.1 Define PDP context +CGDCONT	133
10.2 Quality of service profile (requested)+CGQREQ.....	137
10.3 Quality of service profile (minimum acceptable)+CGQMIN.....	140
10.4 Configure the PDP context Parameters of PCO +CGPCO	143
10.5 PS attach or detach +CGATT	144
10.6 PDP context activate or deactivate +CGACT	145
10.7 Show PDP address(es) +CGPADDR	146
10.8 Enter data state +CGDATA	147
10.9 PDP context modify +CGCMOD	147
10.10 Automatic response to a network request for PDP context activation +CGAUTO.....	148
10.11 Manual response to a network request for PDP context activation +CGANS	149
10.12 GPRS mobile station class +CGCLASS.....	150
10.13 GPRS network registration status +CGREG	151
10.14 Select service for MO SMS messages +CGSMS	153
10.15 Build connections between terminal devices and networks - Extension of ATD.....	154
10.16 3G quality of service profile (requested)+CGEQREQ	154
10.17 3G quality of service profile (negotiated)+CGEQNEG.....	157
10.18 3G quality of service profile (minimum acceptable)+CGEQMIN	159
10.19 Packet domain event reporting +CGEREP	162
10.20 Traffic flow template +CGTFT	163
10.21 Define secondary PDP context +CGDSCONT	167
10.22 Set GPRS data of specified length sending by MT +SGPRSDATA	168
10.23 Attach or detach GPRS service +SATT	169
10.24 PDP context read dynamic parameters +CGCONTRDP	170
10.25 Traffic flow template read dynamic parameters +CGTFTRDP	172

10.26 Define EPS quality of service +CGEQOS	173
10.27 EPS quality of service read dynamic parameters +CGEQOSRDP	175
10.28 Define 5GS quality of service +C5GQOS	176
10.29 5GS quality of service read dynamic parameters +C5GQOSRDP	177
10.30 Secondary PDP context read dynamic parameters +CGS CONTRDP	178
10.31 PS data off status +CPSDO	179
10.32 Initial PDP context activation +CIPCA	179
10.33 Updating the default configured NSSAI +C5GNSSAI	180
10.34 Return NSSAIs +C5GNSSAIRDP	181
10.35 Specifies the preferred NSSAI +C5GPNSSAI	183
11 A-GPS Related Commands	185
11.1 Mobile originated location request +CMOLR	185
11.2 Mobile terminated location request disclosure allowance +CMLTRA	187
12 Extend Commands	189
12.1 Set sleep mode +S32K	189
12.2 Set/read frequency +SBAND	189
12.3 Open/close sim/protocol +SFUN	191
12.4 Disable all unsolicited reporting ^CURC	191
12.5 Control single URC +SPSURC	192
12.6 Set/read IMEI +SPIMEI	193
12.7 Report the flag of cell information +CCED	193
12.8 GPRS of current SIM enforces detachment +SGFD	194
12.9 USIM DRIVER LOG +SPUSIMDRVLS	194
12.10 Device information +SGMR	195
12.11 CUST TYPE +SPCUSTTYPE	196
12.12 Size of ring +CRSL	197
12.13 Request model identification +GMM	198
12.14 Select card id +SPACTCARD	198
12.15 UE modes of operation for EPS +CEMODE	198
12.16 Primary notification event reporting +CPNER	199
12.17 Service specific access control restriction status +CSSAC	200
12.18 UE's usage setting for EPS +CEUS	200
12.19 Mobile termination event reporting +CMER	201
12.20 Power off +CPOF	201
12.21 Test system function +SPTEST	202
12.22 Set network mode +SPTESTMODEM	202
12.23 Set dual sim network mode +SPTESTMODE	203
12.24 Set/Read UE capability +SPCAPABILITY	204
12.25 Obtain ATR of SIM card +SPATR	205
12.26 Auto attach +SAUTOATT	205
12.27 Get the IP fall back cause value +SPACTFB	206

12.28 Detach PS domain and re-attach again +SIPTYPECHANGE.....	206
12.29 Listening MT call +SPAUTO	207
12.30 MT CSFB +SCSF.....	207
12.31 Handle reset or deactivate PS +RESET.....	208
12.32 Downlink mute voice +SDMUT	208
12.33 Read/modify tmsi +SPTMSI	208
12.34 SIM lock status +SPSMNW	209
12.35 Check W/G Ciphering +SPFDDCIPHER.....	210
12.36 REF function +SPREF.....	210
12.37 Audio frequency loopback test +SPVLOOP	211
12.38 Report L2 data rate +SPRATTEMODE.....	212
12.39 Update or retrieve information to/from SIM card+SPCARDINFO.....	212
12.40 Inform voice call with the IMS available or not +CAVIMS	214
12.41 Boot up IMS registration +IMSEN.....	214
12.42 Return parameters of primary PDP contexts +SIPCONTEXT	215
12.43 Detach then reattach +SPREATTCH.....	215
12.44 Set associate_plmn nssai info +SPSETNSSAI	216
12.45 Enable /disable NR +SP5GRAN	216
12.46 Get CA info +SPCAINFO	217
12.47 Active reporting control switch ^CURC	217
12.48 Inquire status of SIM card +EUICC	218
12.49 Report Error +SPERROR	219
12.50 Achieve Fast Dormancy *FDY.....	223
13 Phonebook Commands	224
13.1 Select phonebook memory storage +CPBS	224
13.2 Read phonebook entries +CPBR	225
13.3 Write phonebook entry +CPBW	226
13.4 Find phonebook entries +CPBF	227
13.5 Subscriber number +CNUM.....	228
14 Engineering Mode Commands.....	229
14.1 Set SM Timer prohibit Cell Reselection to UTRAM +SMTIMER	229
14.2 Set NR PHY common command +NRPHY	229
14.3 Get system timer +SPTIMEINFO	229
14.4 Open/close arm log +ARMLOG	230
14.5 Lock plmn +SPPLMNLIST.....	230
14.6 Set CFT mode +SPCFT	231
14.7 RF power param +SPMAXRF	231
14.8 Band info scan +SPBANDSCAN.....	233
14.9 Control the log level +SPLOGLEVEL.....	234
14.10 Report RAU +SPREPORTRAU.....	239
14.11 HSUPA & HSDPA +SPHSPA.....	239

14.12 Mange the background paging +SPBPM.....	240
14.13 Frequency scan +SPFREQSCAN.....	241
14.14 P scan in RRC idle +SPSCAN.....	243
14.15 Enquire 5G NCELL+SPQ5GNCELLEX	244
14.16 Cell frequency locking +SPFRQ	245
14.17 Lock the LTE band +SPLBAND	246
14.18 DUAL RF select +SPDUALRFSEL.....	250
14.19 Power back off +SPPOWERBFCOM	251
14.20 Lock/unlock band of G/W/L+SPCOMMLOCKFRQ	251
14.21 Set AP Card mode +SMMSWAP.....	253
14.22 Change sim card as data card +SPSWDATA.....	254
14.23 LAS function +SPLASDUMMY	254
14.24 NAS function +SPLASDUMMY	255
14.25 GAS function +SPGASDUMMY.....	256
14.26 Set output port of DSP +SPDSPPOP	256
14.27 Open /Forbid a frequency band of FDD +SPFDDBAND	257
14.28 Set nas scri +CNMPSD	258
14.29 5G operation +SP5GCMDS	258
14.30 Clean history ba info +SPCLEANINFO	259
14.31 No more PS data +CNMPSD	259
14.32 Enable or disable the ATRouter +SPTTYROUTER	260
14.33 Set power back off +SPTPPB	260
14.34 Set rf max power +SPMAXPOWER	261
14.35 Set black cell info +SPBLACKCELL	262
14.36 Check whether SD card existed or not +SPCHKSD	263
15 VSIM Commands	264
15.1 SIM slot type setting +VIRUALSIMINIT.....	264
15.2 VSIM authentication setting +SPVSIMAUTHSET	264
15.3 Response for the request from modem +RSIMRSP	265
15.4 Send the Request to VSIM - %RSIMREQ	267
16 Appendix	270

List of Figures

Figure 1-1 HyperTerminal Settings.....	1
Figure 1-2 Description of the structure of a command line	2
Figure 1-3 the returned results of every executed command	3

Unisoc Confidential For hiar

1 Overview

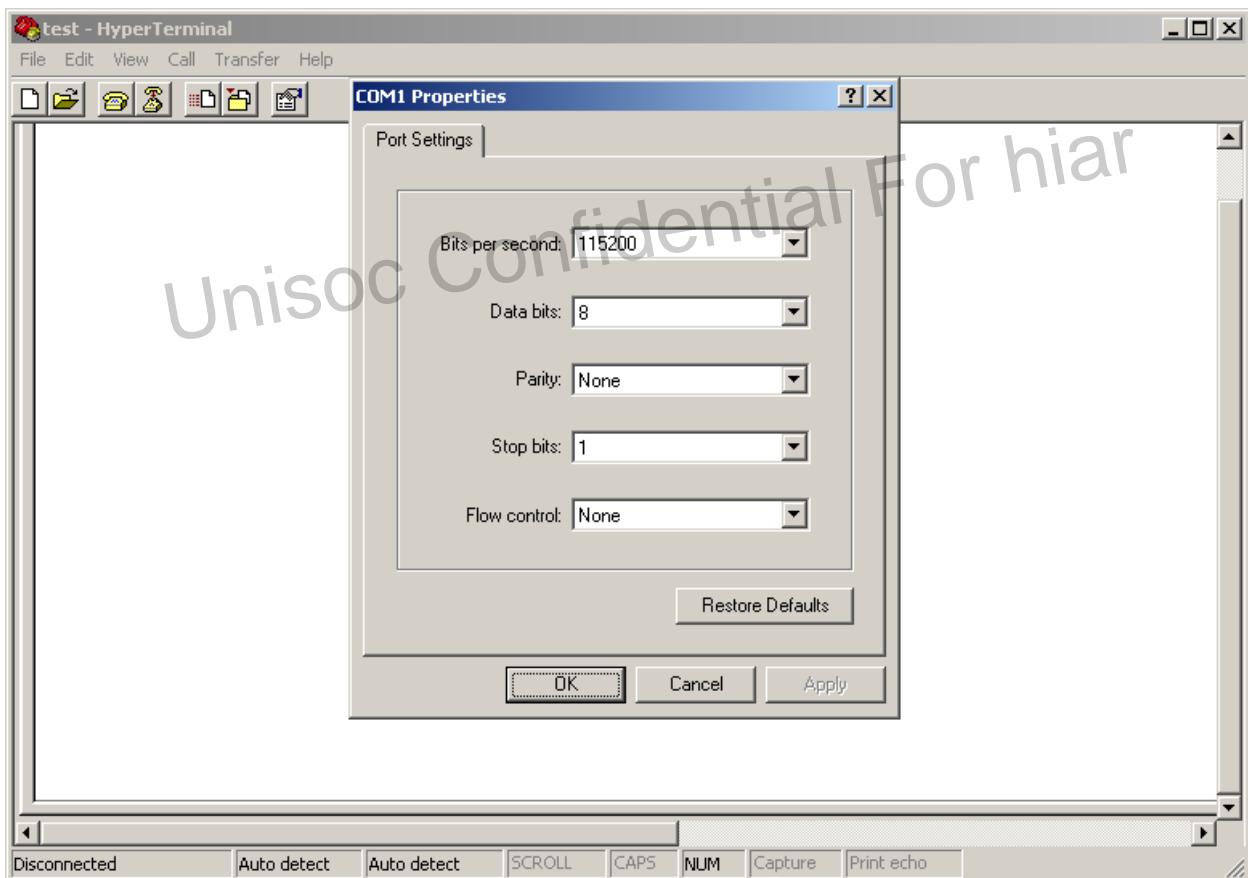
1.1 Serial Port Configuration

For UNISOC module, the serial port configuration is set with the following default values:

Data Bit	Parity Code	Stop Bit	Data Stream Control	Baud Rate
8	None	1	None	115200bps

The communication to UNISOC module can be realized by a serial link handler in Windows OS. First, input the name. Then, configure according to [Figure 1-1](#):

Figure 1-1 HyperTerminal Settings

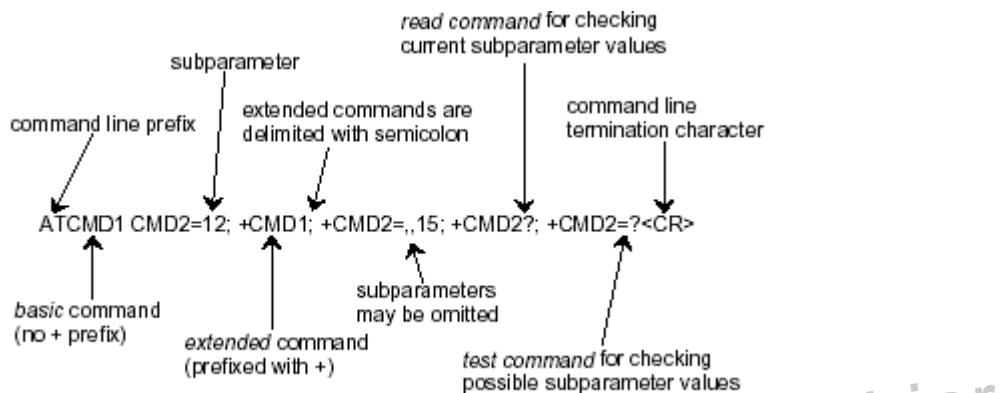


1.2 Commands

Each AT command is started with “AT” and ended with <CR>, some ended with <CTRL+Z> because need to input some long string parameters or pdu. **Figure 1-2** describes the structure of a command line, which consists of many commands, each command is separated by semicolon. The standard commands refer to ITU-T Recommendation V.250. GSM commands make use of the extended command grammar. Each extended command provides a test command (trailing=?) to check the existence of this command as well as offer the type and range of parameters. Usually every command with parameters provides a Read Command to read the current value of parameters.

Besides, an execution command is used to set Parameters and accomplish corresponding functions.

Figure 1-2 Description of the structure of a command line



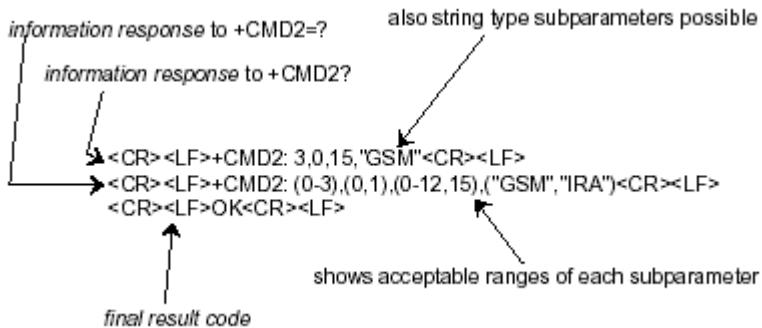
1.3 Information Responses and Result Codes

According to **Figure 1-3**, the returned results of every executed command started and ended with <CR>, <LF> except for those configured by AT&V0 and AT&Q1. If the executed command is AT&V0, then the returned value is 0<CR>. If is AT&Q1, don't return any result.

If command syntax is incorrect, an ERROR character string will be returned.

If command syntax is correct, but with some incorrect parameters, the +CMR ERROR: <err> (for commands except the SMS commands), or +CMS ERROR: <err> (for commands related with short messages) will be returned.

If a command has been performed successfully, an OK character string will be returned.

Figure 1-3 the returned results of every executed command

In some cases, such as receiving short messages, formatted character strings will be sent to the terminal. This will be illustrated in details, while respective commands are explained afterwards.

If the returned value indicates something wrong, different results can be achieved by AT+CMEE=<value>.

<value>	Description
0	Cancel +CME ERROR returning code
1	Activate+ CME ERROR returning code and usage of numeric error code
2	Activate+ CME ERROR returning code and detailed description

This table below lists the possible numeric error codes that can be returned, and their description (except those corresponding with short messages):

NUM	Numeric error code	Description
1	+CME ERROR:0	+CME ERROR: phone failure
2	+CME ERROR:1	+CME ERROR: no connection to phone
3	+CME ERROR:2	+CME ERROR: phone-adaptor link reserved
4	+CME ERROR:3	+CME ERROR: operation not allowed
5	+CME ERROR:4	+CME ERROR: operation not supported
6	+CME ERROR:5	+CME ERROR: PH-SIM PIN required
7	+CME ERROR:6	+CME ERROR: PH-FSIM PIN required
8	+CME ERROR:7	+CME ERROR: PH-FSIM PUK required
9	+CME ERROR:10	+CME ERROR: SIM not inserted
10	+CME ERROR:11	+CME ERROR: SIM PIN required
11	+CME ERROR:12	+CME ERROR: SIM PUK required
12	+CME ERROR:13	+CME ERROR: SIM failure
13	+CME ERROR:14	+CME ERROR: SIM busy
14	+CME ERROR:15	+CME ERROR: SIM wrong

NUM	Numeric error code	Description
15	+CME ERROR:16	+CME ERROR: incorrect password
16	+CME ERROR:17	+CME ERROR: SIM PIN2 required
17	+CME ERROR:18	+CME ERROR: SIM PUK2 required
18	+CME ERROR:20	+CME ERROR: memory full
19	+CME ERROR:21	+CME ERROR: invalid index
20	+CME ERROR:22	+CME ERROR: not found
21	+CME ERROR:23	+CME ERROR: memory failure
22	+CME ERROR:24	+CME ERROR: text string too long
23	+CME ERROR:25	+CME ERROR: invalid characters in text string
24	+CME ERROR:26	+CME ERROR: dial string too long
25	+CME ERROR:27	+CME ERROR: invalid characters in dial string
26	+CME ERROR:28	+CME ERROR: GPRS operation failure
27	+CME ERROR:29	+CME ERROR: GPRS send data failure
28	+CME ERROR:30	+CME ERROR: no network service
29	+CME ERROR:31	+CME ERROR: network timeout
30	+CME ERROR:32	+CME ERROR: network not allowed - emergency calls only
31	+CME ERROR:40	+CME ERROR: network personalization PIN required
32	+CME ERROR:41	+CME ERROR: network personalization PUK required
33	+CME ERROR:42	+CME ERROR: network subset personalization PIN required
34	+CME ERROR:43	+CME ERROR: network subset personalization PUK required
35	+CME ERROR:44	+CME ERROR: service provider personalization PIN required
36	+CME ERROR:45	+CME ERROR: service provider personalization PUK required
37	+CME ERROR:46	+CME ERROR: corporate personalization PIN required
38	+CME ERROR:47	+CME ERROR: corporate personalization PUK required
39	+CME ERROR:48	+CME ERROR: hidden key required
40	+CME ERROR:60	+CME ERROR: AT command discarded
41	+CME ERROR:62	+CME ERROR: SIM card reject by network
42	+CME ERROR:63	+CME ERROR: SIM card service not available
43	+CME ERROR:64	+CME ERROR: SIM card PIN uninitialized
44	+CME ERROR:65	+CME ERROR: SIM card PIN blocked
45	+CME ERROR:66	+CME ERROR: SIM card PUK blocked

NUM	Numeric error code	Description
46	+CME ERROR:100	+CME ERROR: unknown
47	+CME ERROR:103	+CME ERROR: illegal MS (#3)
48	+CME ERROR:106	+CME ERROR: illegal ME (#6)
49	+CME ERROR:107	+CME ERROR: GPRS services not allowed (#7)
50	+CME ERROR:111	+CME ERROR: PLMN not allowed (#11)
51	+CME ERROR:112	+CME ERROR: Location area not allowed (#12)
52	+CME ERROR:113	+CME ERROR: Roaming not allowed in this location area
53	+CME ERROR:128	+CME ERROR: FDN check fail
54	+CME ERROR:132	+CME ERROR: Service option not supported
55	+CME ERROR:133	+CME ERROR: Request service option not subscribed
56	+CME ERROR:134	+CME ERROR: Service option temporarily out of order
57	+CME ERROR:148	+CME ERROR: unspecified GPRS error
58	+CME ERROR:149	+CME ERROR: PDP authentication failure
59	+CME ERROR:150	+CME ERROR: invalid mobile class
60	+CME ERROR:533	+CME ERROR: Missing or unknown APN
61	+CME ERROR:65536014	The command is not supported
62	+CME ERROR: 50	Only allow IPV4 PDN
63	+CME ERROR: 176	Network not allow operation
64	+CME ERROR: 181	Network not allow operation
65	+CME ERROR: 280	GPRS operation not allowed
66	+CME ERROR: 267	PDP active reject

This table below lists the possible numeric error code and the detailed Description in CALL and GPRS service.

NUM	Numeric error code	Description
1	+CEER: 0	+CEER: no error
2	+CEER: 1	+CEER: unassigned (unallocated) number
3	+CEER: 3	+CEER: no route to destination
4	+CEER: 6	+CEER: unacceptable channel
5	+CEER: 8	+CEER: operator determinate barring
6	+CEER: 16	+CEER: normal clearing
7	+CEER: 17	+CEER: user busy

NUM	Numeric error code	Description
8	+CEER: 18	+CEER: no user responding
9	+CEER: 19	+CEER: alerting no answer
10	+CEER: 21	+CEER: call rejected
11	+CEER: 22	+CEER: number changed
12	+CEER: 26	+CEER: non select user clearing
13	+CEER: 27	+CEER: destination out of order
14	+CEER: 28	+CEER: invalid number format
15	+CEER: 29	+CEER: facility rejected
16	+CEER: 30	+CEER: response to status query
17	+CEER: 31	+CEER: normal unspecified
18	+CEER: 34	+CEER: no circuit channel available
19	+CEER: 38	+CEER: net out of order
20	+CEER: 41	+CEER: temporary failure
21	+CEER: 42	+CEER: switch congestion
22	+CEER: 43	+CEER: access information discarded
23	+CEER: 44	+CEER: request circuit channel unavailable
24	+CEER: 47	+CEER: resources unavailable
25	+CEER: 49	+CEER: quality of service unavailable
26	+CEER: 50	+CEER: request facility not subscribe
27	+CEER: 55	+CEER: CUG incoming barred
28	+CEER: 57	+CEER: bear capability not authorization
29	+CEER: 58	+CEER: bear capability unavailable
30	+CEER: 63	+CEER: service unavailable
31	+CEER: 65	+CEER: bear service not implement
32	+CEER: 68	+CEER: ACM equal to or greater than ACM _{max}
33	+CEER: 69	+CEER: request facility not implement
34	+CEER: 70	+CEER: only restrict digital available
35	+CEER: 79	+CEER: service option not implement
36	+CEER: 81	+CEER: invalid
37	+CEER: 87	+CEER: user not in CUG
38	+CEER: 88	+CEER: incompatibility destination

NUM	Numeric error code	Description
39	+CEER: 91	+CEER: invalid transit net
40	+CEER: 95	+CEER: invalid message semantic
41	+CEER: 96	+CEER: mandatory IE error
42	+CEER: 97	+CEER: message nonexistent
43	+CEER: 98	+CEER: message non-compatible error
44	+CEER: 99	+CEER: IE nonexistent
45	+CEER: 100	+CEER: invalid condition IE
46	+CEER: 101	+CEER: message incompatibility state
47	+CEER: 102	+CEER: recover on timer
48	+CEER: 111	+CEER: protocol error
49	+CEER: 127	+CEER: interworking
50	+CEER: 150	+CEER: authentication rejected
51	+CEER: 151	+CEER: emergency call only
52	+CEER: 152	+CEER: IMSI detach
53	+CEER: 153	+CEER: T3230 expiry
54	+CEER: 154	+CEER: connection error
55	+CEER: 171	+CEER: no network service
56	+CEER: 172	+CEER: emergency call only
57	+CEER: 173	+CEER: normal disconnect
58	+CEER: 174	+CEER: remote disconnect
59	+CEER: 175	+CEER: low failure
60	+CEER: 176	+CEER: network reject
61	+CEER: 177	+CEER: no cell
62	+CEER: 202	+CEER: supplement not provide

NOTE

The error code are redefined.

2 General Control Commands

2.1 Check communication with DCE - AT

Description

This command is used to check whether the DTE can communicate with DCE or not.

Type	Command	Return	Description
Execute	AT	OK	N/A

2.2 Set the defaults of parameters - ATZ

Description

This command instructs the DCE to set all parameters to their factory defaults as specified by the manufacturer.

Type	Command	Return	Description
Execute	ATZ	OK	N/A

Reference

ITU-T Rec.V.250

2.3 Command echo - ATE

Description

The setting of this parameter determines whether or not the DCE echoes characters received from the DTE during command state and online command state.

Type	Command	Return	Description
Execute	ATE[value]	OK	N/A

Parameter

value	Description
0	DCE does not echo characters during command state and online command state
1	DCE echoes characters during command state and online command state.

Example

```
ATE0
OK
ATE1
OK
```

Reference

ITU-T Rec. V.250

2.4 Result code suppression - ATQ

This command determines whether or not the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final, or unsolicited result code, header, result text, line terminator, or trailer is transmitted. Information text transmitted in response to commands is not affected by the setting of this parameter.

Type	Command	Return	Description
Set	ATQ[<value>]	OK/0	Value=0
		(none)	Value=1

Parameter

<value>	Description
0	DCE transmits result codes
1	Result codes are suppressed and not transmitted

Example

```
ATV1
ATQ0
OK
```

NOTE

When ATV0 execute, ATQ0 return 0, when ATV1 execute, ATQ0 return OK.

Reference

ITU-T Rec. V.250

2.5 TA response format - ATV

Description

This command determines whether or not the DCE transmits result codes to the DTE. When result codes are being suppressed, no portion of any intermediate, final, or unsolicited result code, header, result text, line terminator, or trailer is transmitted. Information text transmitted in response to commands is not affected by the setting of this parameter.

Type	Command	Return	Description
set	ATV[<value>]	0	Value=0
		OK	Value=1
		+CME ERROR <err>	fail
read	ATV?	0	When ATV0
		0	
		1 OK	When ATV1
test	ATV=?	V:(0,1) 0	When ATV0
		V:(0,1)	When ATV1
		OK	

NOTE

- ATV1 and ATV0 is not supported by serial port tools.
- When send ATV0, will return 0, then other AT can not send.

Parameter

<value>	Description
0	DCE transmits result codes
1	Result codes are suppressed and not transmitted

Example

```
ATV0
0
```

Reference

ITU-T Rec. V.250

2.6 Write the active configuration - AT&W

Description

This command is used to write the active configuration to non-volatile memory section and modify the respective values by commands (according to the table below). These values shall be reset, if system reboots or power off before AT&W command is performed and these values haven't been stored to the section.

Type	Command	Return	Description
Execute	AT&W	OK	N/A

The table below is the list of parameters stored to non-volatile section by AT&W command.

Number	Content	AT command (modify respective values)
1	Flag of CLIP	AT+CLIP
2	Flag of COLP	AT+COLP
3	Mode of SMS	AT+CMGF
4	Flag of mixed modes	AT+SMUX
5	Flag of charge state	AT+SBCM
6	Flag of echo character	ATE
7	Mode of CREG	AT+CREG
8	Sequence number of incoming music	AT+SCDM
9	Format of returned error	AT+CMEE

2.7 Set all parameters to default values - AT&F

Description

This command instructs the DCE to set all parameters to default values specified by the manufacturer, which may take into consideration hardware configuration switches and other manufacturer-defined criteria. The restored parameters include S3, S4, S5, E, V, +COPS(<format>), +CLIP, +CCWA(<n>), +CUSD(<n>), +CMEE, +CPMS, +CSMS, +CMGF, +CSCA, +CNMI, and so on.

Type	Command	Return	Description
Execute	AT&F[<value>]	OK	N/A

Parameter

<value>

0: restore all of MS' Parameters to default value.

Example

```
AT&F0
OK
```

Reference

ITU-T Rec. V.250

2.8 Request product serial number identification +(C)GSN

Description

Execution command causes the TA to return one or more lines of information text <sn>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the individual MT to which it is connected to. Typically, the text will consist of a single line containing the IMEI (International Mobile station Equipment Identity) number of the MT, but manufacturers may choose to provide more information if desired.

Type	Command	Result	Description
Execution	AT+CGSN	<sn> OK	N/A
Test	AT+CGSN=?	OK	N/A

Para	Value	Description
<sn>	determined by the MT manufacturer	The total number of characters, including line terminators, in the information text shall not exceed 2048 characters.

Example

```
AT+CGSN
33219070097265020
OK
```

Reference

3GPP TS 27.007

2.9 Request model identification +CGMM

Description

Execution command causes the TA to return one or more lines of information text <model>, determined by the MT manufacturer, which is intended to permit the user of the TA to identify the specific model of the MT to which it is connected to. Typically, the text will consist of a single line containing the name of the product.

Type	Command	Return	Description
execute	AT+CGMM	<module identification>	N/A
test	AT+CGMM=?	OK	N/A

Example

AT+CGMM
V1.0.1-B7
OK

Reference

3GPP TS 27.007

2.10 Request revision identification +CGMR

Description

This command is used to get DCE software version.

Type	Command	Return	Description
execute	AT+CGMR	<version number>	N/A
test	AT+CGMR=?	OK	N/A

Example

AT+CGMR
RIYUE_R1.8.7001.BL0005.BUILD0017
OK

Reference

ITU-T Rec. V.250

2.11 Request manufacturer identification +(C)GMI

Description

This command causes the DCE to transmit one or more lines of information text, determined by the manufacturer, which is intended to permit the user of the DCE to identify the version, revision level or date, or other pertinent information of the device. Typically, the text will consist of a single line containing the version of the product, but manufacturers may choose to provide any information desired. The total number of characters, including line terminators, in the information text returned in response to this command shall not exceed 2048 characters.

Type	Command	Return	Description
execute	AT+CGMI	<manufacturer>	N/A
test	AT+CGMI=?	OK	N/A
		+GMI: OK	N/A

Example

```
AT+CGMI  
Spreadtrum Communication CO  
OK
```

Reference

ITU-T Rec. V.250

2.12 Request overall capabilities of TA +GCAP

Description

Request overall capabilities of TA; the response code for a TA building on this document shall be +CGSM TA. The support of different areas is presented in the response of +GCAP command. Each area may be presented by the selection command name of a specific capability area (e.g. +FCLASS for fax support) or some other predefined response. For instance, a GSM TA with fax capabilities.

Type	Command	Return	Description
execute	AT+GCAP	+GCAP: <name> OK	N/A
test	AT+GCAP=?	+GCAP: OK	N/A

Parameter

<name>; e.g.: "+FCLASS ,+ DS" or "+FCLASS"

2.13 Read the EF-ICCID file +CCID

Description

This command reads the EF-ICCID file on the SIM card.

Type	Command	Return	Description
execute	AT+CCID	+CCID: <sim number>	N/A
test	AT+CCID=?	+CCID	N/A
read	AT+CCID?	+CCID: <sim number> OK	N/A

Example

```
AT+CCID?  
+CCID:"89860081090209606758"  
OK
```

2.14 Request international mobile subscriber identity +CIMI

Description

Execution command causes the TA to return <IMSI>, which is intended to permit the TE to identify the individual SIM card or active application in the UICC (GSM or USIM) which is attached to MT.

Type	Command	Return	Description
execute	AT+CIMI	<IMSI> OK	N/A
		+CME ERROR <err>	
test	AT+CIMI=?	OK	N/A

Parameter

<IMSI>; International Mobile Subscriber Identity (string without double quotes)

Example

```
AT+CIMI  
460006963106758  
OK
```

Reference

3GPP TS 27.007

2.15 Select TE character set +CSCS

Description

Set command informs TA which character set <chset> is used by the TE. TA is then able to convert character strings correctly between TE and MT character sets. When TA TE interface is set to 8 bit operation and used TE alphabet is 7 bit, the highest bit shall be set to zero.

Type	Command	Return	Description
set	AT+CSCS=<chset>	OK	N/A
read	AT+CSCS?	+CSCS: <chset>	N/A
test	AT+CSCS=?	+CSCS:(“GSM”, “IRA”, “HEX”, “UCS2”)	N/A

Parameter

chset	Description
“GSM”	GSM 7 bit default alphabet; this setting causes easily software flow control (XON/XOFF) problems.(not support)
“IRA”	International Reference Character set(ITU-T T.50)
“HEX”	Character strings consist only of hexadecimal numbers from 00 to FF; e.g. "032FE6" equals three 8-bit characters with decimal values 3, 47 and 230; no conversions to the original MT character set shall be done
“UCS2”	16-bit universal multiple-octet coded character set; UCS2 character strings are converted to hexadecimal numbers from 0000 to FFFF; e.g. "004100620063" equals three 16-bit characters with decimal values 65, 98 and 99.

Reference

3GPP TS 27.007

2.16 Searching and supplementary services +SAC

Description

Execution Command can stop the network searching and supplementary services. Query command can find whether it is searching the network and doing the supplementary services.

Type	Command	Return	Description
execute	AT+SAC	OK	N/A
read	AT+SAC?	OK	N/A
		+CME ERROR <err>	fail
test	AT+SAC=?	OK	N/A

2.17 Multiplexing mode +CMUX

This command is used to enable/disable the multiplexing protocol control channel.

Type	Command	Return	Description
set	AT+CMUX=<mode>[,<subset>[,<port_speed> [, <N1> [, <T1> [, <N2> [, <T2> [, <T3> [, <k>]]]]]]]	OK	N/A
read	AT+CMUX?	+CMUX:<mode>[,<subset>],<port_speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>]	N/A
test	AT+CMUX=?	+CMUX: (list of supported <mode>s), (list of supported <subset>s), (list of supported <port_speed>s), (list of supported <N1>s), (list of supported <T1>s), (list of supported <N2>s), (list of supported <T2>s), (list of supported <T3>s), (list of supported <k>s)	N/A

Parameter

<Mode> default value: 0.

Mode	Description
0	Basic mode
1	Advanced mode(Multiplexing mode)

<subset> default value: 0

Subset	Description
0	UIH frames used only
1	UI frames used only
2	I frames used only

<port_speed> default value: 5

Port_Speed	Description
1	9,600 bit/s
2	19,200 bit/s
3	38,400 bit/s
4	57,600 bit/s
5	115,200 bit/s
6	230,400 bit/s

Parameter	Description
<N1>	Maximum frame size: 1-32768 Default value: 31 (64 if Advanced option is used).
<T1>	Acknowledgement timer in units of ten milliseconds: 1-255 Default value: 10(100ms)
<N2>	Maximum number of re-transmissions: 0-100 Default value: 3
<T2>	Response timer for the multiplexer control channel in units of ten milliseconds: 2-255 Default value: 30(300ms)
<T3>	Wake up response timer in seconds: 1-255 Default value: 10 (10s)
<k>	Window size, for advanced operation with Error Recovery options: 1-7 Default value: 2

NOTE

- T2 must be longer than T1.
- <T3> (wake up response timer in seconds): 1-255, where 10 is default.
- <k> (window size, for advanced operation with Error Recovery options): 1-7, where 2 is default.

2.18 Time zone reporting +CTZR

Description

This command is used to enable auto time zone update.

Type	Command	Return	Description
read	AT+CTZR?	+CTZR : ctzr_flag OK	N/A
set	AT+CTZR=<ctzr_flag>	N/A	N/A
test	AT+CTZR=?	+CTZR: (0,1) OK	N/A

Parameter

ctzr_flag:

- 0: disable
- 1: enable

2.19 Force power off PS without detach +OFF

Description

The command force power off PS without detach.

Set Command

AT+OFF

Return:

OK

2.20 Play tone +STONE

Description

This command is used to play one or more tone with allocated frequency and duration.

Type	Command	Return	Description
Set	AT+STONE=<mode>[,<freq1>,<freq2>,<freq3>,<duration>]	OK	N/A

Type	Command	Return	Description
Test	AT+STONE=?	+STONE=(0,1),(0-3400),(0-3400),(0-3400),(0-50) OK	N/A

Parameter

<mode>	Description
0	to stop
1	to play tone

<freqX>	Description
0-3400	the frequency of the tone (Hz)

<duration>	Description
0-50	duration of the tone(ms)

NOTE

When duration is equal to zero, the tone has been playing until send AT+STONE=0 to stop.

2.21 Play DTMF at local +SDTMF

Description

This command is used to play DTMF at local.

Type	Command	Return	Description
Set	AT+SDTMF=<mode>[,<dtmf>,<duration>]	OK	N/A
Test	AT+SDTMF=?	+SDTMF: (0-1), ("0","1","2","3","4","5","6","7","8", "9","*","#","A","B","C","D"), (0- 50) OK	N/A

Parameter

<mode>:

<mode>	Description
0	stop playing DTMF
1	start playing DTMF

<dtmf>:

<dtmf>	Description
{0-9, *, #, A, B, C, D }	the tone of the specified character

<duration>:

<duration>	Description
0-50	Duration of the playing tone, 0 default value

NOTE

When duration is equal to zero, the tone has been playing until send AT+SDTMF=0 to stop.

2.22 Indicator control +CIND

Description

Read command is used to get the values of MT indicators. e.g. voltage of battery, strength of signal, availability of network, stillness, whether receives short messages, existence of a call, roam status and full statutes of SMS.

Type	Command	Return	Description
Read	AT+CIND?	+CIND: <battery>, <signal>, <service>, <sounder>, <message>, <call>, <roam>, <smsfull> OK	N/A
Test	AT+CIND=?	+CIND: (0-5), (0-31, 100-191), (0,1), (0,1), (0,1), (0,1), (0,1) OK	N/A

Parameter

Parameter Name	Description
battery	Voltage of a Battery
signal	Signal strength indication(0-31,100-191)

Parameter Name	Description
service	Availability of network (0-1) (value = '1' means registered to network)
sounder	Stillness(0-1) ('1' = Mute)
message	Whether receives short messages (0-1)
call	Existence of a call (0-1)
roam	net status (0-1) (Home net status, '0' = Home Net)
smsfull	Short message memory storage has become full ('0'), or memory locations are available ('1').

Reference

3GPP TS 27.007

3

Device Control & Status Report Commands

3.1 Report mobile termination error +CMEE

Description

This command disables or enables the use of result code +CME ERROR: <err> as an indication of an error relating to the functionality of the MT. When enabled, MT related errors cause +CME ERROR: <err> final result code instead of the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters, or TA functionality.

Type	Command	Return	Description
set	AT+CMEE=[<value>]	OK	N/A
		+CME ERROR:<err>	value out of range
read	AT+CMEE?	+CMEE: <value>	N/A
test	AT+CMEE=?	+CMEE: (0-2)	N/A

Parameter

<value>	Description
0	Deactivate +CME ERROR Return code
1	Activate +CME ERROR return code and use numeric error values
2	Activate +CME ERROR return code and use verbose error description

Reference

3GPP TS 27.007

3.2 Set phone functionality +CFUN

Description

Set command selects the level of functionality <fun> in the MT. Level "full functionality" is where the highest level of power is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these may also be specified by manufacturers. When supported by manufacturers, MT resetting with <rst> parameter may be utilized.

Type	Command	Return	Description
set	AT+CFUN=<fun>[,<rst>]	OK	N/A
		+CME ERROR:<err>	out of range
test	AT+CFUN=?	+CFUN: (0-4), (0-1)	N/A
read	AT+CFUN?	+CFUN: value OK	N/A

Parameter

<fun>:

fun	Description
0	minimum functionality
1	full functionality
2	disable phone transmit RF circuits only(not support, and it is same with AT+CFUN=0)
3	disable phone receive RF circuits only(not support, and it is same with AT+CFUN=0)
4	disable phone both transmit and receive RF circuits(not support, only return OK)

<rst>:

rst	Description
0	do not reset the MT before setting it to <fun> power level
1	reset the MT before setting it to <fun> power level

Example

Reboot module

```
AT+CFUN=1, 1
OK
```

Activate PS

```
AT+CFUN=1
OK
```

Reference

3GPP TS 27.007

3.3 Clock +CCLK

Description

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

Type	Command	Return	Description
set	AT+CCLK=<time>	OK	N/A
		+CME ERROR:<err>	fail
test	AT+CCLK=?	OK	N/A
read	AT+CCLK?	+CCLK: <current date and time> OK	N/A

Reference

3GPP TS 27.007

3.4 Phone activity status +CPAS

Description

Execution command returns the activity status <pas> of the MT. It can be used to interrogate the MT before requesting action from the phone. Test command returns values supported by the MT as a compound value.

Type	Command	Return	Description
execute	AT+CPAS	+CPAS: <pas>	N/A
test	AT+CPAS=?	+CPAS: <list supported value>	N/A

Parameter

pas	Description
0	ready (MT allows commands from TA/TE)
1	unavailable (MT does not allow commands from TA/TE)(Not supported)
2	unknown (MT is not guaranteed to respond to instructions) (Not supported)
3	ringing (MT is ready for commands from TA/TE, but the ringer is active)
4	call in progress (MT is ready for commands from TA/TE, but a call is in progress)

pas	Description
5	asleep (MT is unable to process commands from TA/TE because it is in a low functionality state) (Not supported)

Reference

3GPP TS 27.007

3.5 Extended signal quality +CESQ

Description

Execution command returns received signal quality parameters. If the current serving cell is not a GERAN cell, <rxlev> and <ber> are set to value 99. If the current serving cell is not a UTRA FDD or UTRA TDD cell, <rscp> is set to 255. If the current serving cell is not a UTRA FDD cell, <ecno> is set to 255. If the current serving cell is not an E-UTRA cell, <rsrq> and <rsrp> are set to 255. If the current serving cell is not an NR cell, <ss_rsrq>, <ss_rsrp> and <ss_sinr> are set to 255. Test command returns values supported as compound values.

Command	Possible response(s)
AT+CESQ	+CESQ:<rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp>,<ss_rsrq>,<ss_rsrp>,<ss_sinr> +CME ERROR: <err>
AT+CESQ=?	+CESQ: (list of supported <rxlev>s),(list of supported <ber>s),(list of supported <rscp>s),(list of supported <ecno>s),(list of supported <rsrq>s),(list of supported <rsrp>s), (list of supported <ss_rsrq>s),(list of supported <ss_rsrp>s), (list of supported <ss_sinr>s)

Parameter

<rxlev>: integer type, received signal strength level (see 3GPP TS 45.008 [20] subclause 8.1.4).

- 0: rssi <= -110 dBm
- 1: -110 < dBm rssi < -109 dBm
- 2: -109 dBm <= rssi < -108 dBm
-
- 61: -50 dBm <= rssi < -49 dBm
- 62: -49 dBm <= rssi < -48 dBm
- 63: -48 dBm <= rssi
- 99: not known or not detectable

<ber>: integer type; channel bit error rate (in percent).

- 0...7: as RXQUAL values in the table in 3GPP TS 45.008 [20] subclause 8.2.4
- 99: not known or not detectable

<rscp>: integer type, received signal code power (see 3GPP TS 25.133 [95] subclause 9.1.1.3 and 3GPP TS 25.123 [96] subclause 9.1.1.3).

- 0: rscp <= -120 dBm
- 1: -120 dBm < rscp < -119 dBm
- 2: -119 dBm <= rscp < -118 dBm
-
- 94: -27 dBm <= rscp < -26 dBm
- 95: -26 dBm <= rscp < -25 dBm
- 96: -25 dBm <= rscp
- 255: not known or not detectable

<ecno>: integer type, ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133 [95] subclause).

- 0: Ec/Io <= -24 dB
- 1: -24 dB < Ec/Io < -23.5 dB
- 2: -23.5 dB <= Ec/Io < -23 dB
-
- 47: -1 dB <= Ec/Io < -0.5 dB
- 48: -0.5 dB <= Ec/Io < 0 dB
- 49: 0 dB = Ec/Io
- 255: not known or not detectable

<rsrq>: integer type, reference signal received quality (see 3GPP TS 36.133 [96] subclause 9.1.7).

- 0: rsrq <= -19.5 dB
- 1: -19.5 dB < rsrq < -19 dB
- 2: -19 dB <= rsrq < -18.5 dB
-
- 32: -4 dB <= rsrq < -3.5 dB
- 33: -3.5 dB <= rsrq < -3 dB
- 34: -3 dB <= rsrq
- 255: not known or not detectable

<rsrp>: integer type, reference signal received power (see 3GPP TS 36.133 [96] subclause 9.1.4).

- 0: rsrp <= -140 dBm
- 1: -140 dBm < rsrp < -139 dBm
- 2: -139 dBm <= rsrp < -138 dBm
-
- 95: -46 dBm <= rsrp < -45 dBm
- 96: -45 dBm <= rsrp < -44 dBm
- 97: -44 dBm < rsrp
- 255: not known or not detectable

<ss_rsrq>: integer type, synchronization signal based reference signal received quality (see 3GPP TS 38.133 [169] subclause 10.1.11).

- 0: ss_rsrq <= -43 dB
- 1: -43 dB < ss_rsrq < -42.5 dB
- 2: -42.5 dB <= ss_rsrq < -42 dB
-
- 124: 18.5 dB <= ss_rsrq < 19 dB
- 125: 19 dB <= ss_rsrq < 19.5 dB
- 126: 19.5 dB <= ss_rsrq < 20 dB
- 255: not known or not detectable

<ss_rsrp>: integer type, synchronization signal based reference signal received power (see 3GPP TS 38.133 [169] subclause 10.1.6).

- 0: ss_rsrp <= -156 dBm
- 1: -156 dBm < ss_rsrp < -155 dBm
- 2: -155 dBm < ss_rsrp < -154 dBm
-
- 125: -32 dBm < ss_rsrp < -31 dBm
- 126: -31 dBm < ss_rsrp
- 255: not known or not detectable

<ss_sinr>: integer type, synchronization signal based signal to noise and interference ratio (see 3GPP TS 38.133 [169] subclause 10.1.16).

- 0: ss_sinr <= -23 dB
- 1: -23 dB < ss_sinr < -22.5 dB
- 2: -22.5 dB < ss_sinr < -22 dB
-
- 125: 39 dB < ss_sinr < 39.5 dBm
- 126: 39.5 dB < ss_sinr < 40 dB
- 127: 40 dB < ss_sinr
- 255: not known or not detectable

Reference

3GPP TS 27.007

3.6 Signal quality +CSQ

Description

This command is used to receive signal strength indication <rssi> and channel bit error rate <ber> from the MT. If current rat is LTE, rssi should be 99.

Type	Command	Return	Description
Execute	AT+CSQ	+CSQ: <rssi>, <ber> OK	N/A

Type	Command	Return	Description
Test	AT+CSQ=?	+CSQ: (0-31,100-191, 199), (0-7, 99) OK	N/A

Parameter

<rssi>:

- when current rat=2G,rssi range is 0-31,
- when rat=3G,rssi range is 0-31,99,
- when rat=4G,rssi rang is 0-97

<ber>: integer type; channel bit error rate (in percent).

- 0..7: as RXQUAL values in the table in 3GPP TS 45.008 [20]
- 99: not known or not detectable

NOTE

Rssi range is 100~199: only used in TD-SCDMA (indicating value of RSCP, but the command not used).

Example

```
AT+CSQ
+CSQ: 23, 99
OK
```

Reference

3GPP TS 27.007

4 Network Service Commands

4.1 PLMN selection +COPS

Description

This command is used to select and register GSM/UMTS/E-UTRAN network operator.

Type	Command	Return	Description
Set	AT+COPS=<mode> [,<format>[, <oper>[,<AcT>]]]	OK/+CME ERROR: <err>	N/A
Read	AT+COPS?	+COPS: <mode>[,<format>,<current oper>[,<AcT>]]	N/A
Test	AT+COPS=?	+COPS:[list of supported (<stat>, long alphanumeric<oper>, short alphanumeric<oper>s, numeric<oper>, <AcT>)s][,(list of supported <mode>s),(list of supported <format>s)]	N/A

Parameter

<mode>:

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

<format>:

format	Description
0	long format alphanumeric <oper>

format	Description
1	short format alphanumeric <oper>
2	numeric <oper> (default value)

<stat>:

stat	Description
0	Unknown
1	Available
2	Currently used
3	Forbidden

<AcT>:

AcT	Description
0	GSM
1	GSM Compact
2	UTRAN
3	GSM w/EGPRS (see <i>NOTE 1</i>)
4	UTRAN w/HSDPA (see <i>NOTE 2</i>)
5	UTRAN w/HSUPA (see <i>NOTE 2</i>)
6	UTRAN w/HSDPA and HSUPA (see <i>NOTE 2</i>)
7	E-UTRAN
8	EC-GSM-IOT(A/Gb mode) (see <i>NOTE 3</i>)
9	E-UTRAN (NB-S1 mode) (see <i>NOTE 4</i>)
10	E-UTRA connected to a 5GCN (see <i>NOTE 5</i>)
11	NR connected to a 5GCN (see <i>NOTE 5</i>)
12	NG-RAN
13	E-UTRA-NR dual connectivity (see <i>NOTE 6</i>)

AcT	Description
NOTE 1:	3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.
NOTE 2:	3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.
NOTE 3:	3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.
NOTE 4:	3GPP TS 36.331 [86] specifies the System Information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).
NOTE 5:	3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is connected to a 5G CN. This value is not applicable in set command.
NOTE 6:	3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

<oper>: Operation code (MCC/MNC numeric codes which is used in network selection, such as 46000 is China Mobile Communication, 46001 is China Unicom).

Example

```
AT+COPS=?
+COPS:(1,"CHINA MOBILE","CMCC","46000",0),(3,"CHN-CUGSM","CU-GSM","46001",0),(0-4),(0-2)
OK
```

```
AT+COPS?
+COPS: 1, 2, "46000", 0
```

Select network automatically

```
AT+COPS=0
OK
```

Search network manually

```
AT+COPS=1,2,"46000",0
OK
```

BOOK NOTE

- Only when network is idle, searching network information can process.
- when call existed and mode=2, set command will return error.

Reference

3GPP TS 27.007

4.2 Network registration +CREG

Description

This command controls the presentation of an unsolicited result code when there is a change of the network cell.

Type	Command	Return	Description
Set	AT+CREG=<mode>	OK/ERROR	N/A
Read	AT+CREG?	+CREG: <mode>, <state> [, <lac>, <ci> [, <AcT>]] OK	N/A
Test	AT+CREG=?	+CREG: (0, 1, 2) OK	N/A

Parameter

<mode>: default value is 0

mode	Description
0	disable network registration unsolicited result code
1	enable network registration unsolicited result code +CREG: <stat>
2	enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>,<ci>[,<AcT>]]

<stat>:

stat	Description
0	No registered network, ME does not search new network.
1	Register local network successfully.
2	No register network, ME is searching new network.
3	Network registration is denied
4	Unknown
5	Register roam network successfully
8	Emergency
9	registered for "CSFB not preferred", home network (applicable only when <AcT> indicates E-UTRAN)
10	registered for "CSFB not preferred", roaming (applicable only when <AcT> indicates E-UTRAN)
11	attached for access to RLOS (applicable only when <AcT> indicates E-UTRAN)

<Lac>: location id of cell

<ci>: cell id

<AcT>: access technology of the registered network.

AcT	Description
0	GSM
1	GSM Compact
2	UTRAN
3	GSM w/EGPRS (see NOTE 1)
4	UTRAN w/HSDPA (see NOTE 2)
5	UTRAN w/HSUPA (see NOTE 2)
6	UTRAN w/HSDPA and HSUPA (see NOTE 2)
7	EUTRAN
8	EC-GSM-IoT (A/Gb mode)
9	E-UTRAN (NB-S1 mode)
10	E-UTRA connected to a 5GCN
11	NR connected to a 5GCN
12	NG-RAN
13	E-UTRA-NR
15	HSPA+
16	E_UTRAN_CA

NOTE 1: 3GPP TS44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

NOTE 2: 3GPP TS25.331 specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

Example

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

AT+CREG=2
OK
+CREG: 1, "1868", "1501", 0

AT+CREG=0
OK
```

Reference

3GPP TS 27.007

4.3 Selection of preferred PLMN list +CPLS

Description

This command is used to select one PLMN selector with Access Technology list in the SIM card or active application in the UICC (GSM or USIM), that is used by +CPOL command.

Type	Command	Return	Description
Set	AT+CPLS=<list>	OK/ERROR	N/A
Read	AT+CPLS?	+CPLS: <list> OK	N/A
Test	AT+CPLS=?	+CPLS: (0-2) OK	N/A

Parameter

<list> default value is 0

list	Description
0	User controlled PLMN selector with Access Technology EF _{OPLMNwAcT} , if not found in the SIM/UICC then PLMN preferred list EF _{PLMNsel} (this file is only available in SIM card or GSM application selected in UICC)
1	Operator controlled PLMN selector with Access Technology EF _{OPLMNwAcT}
2	HPLMN selector with Access Technology EF _{HPLMNwAcT}

Reference

3GPP TS 27.007

4.4 Preferred PLMN list +CPOL

Description

This command is used to edit the PLMN selector with Access Technology lists in the SIM card or active application in the UICC (GSM or USIM).

Execute command writes an entry in the SIM/USIM list of preferred PLMNs, previously selected by the command +CPLS. If no list has been previously selected, the User controlled PLMN selector with Access Technology, EF_{PLMNwAcT}, is the one accessed by default. If <index> is given but <oper> is left out, entry is deleted. If <oper> is given but <index> is left out, <oper> is put in the next free location. If only <format> is given, the format of the <oper> in the read command is changed. The Access Technology selection parameters, <GSM_AcT>, <GSM_Compact_AcT>, <UTRAN_AcT>, <E-UTRAN_AcT> and <NG-RAN_AcT> are required when writing User controlled PLMN selector with Access Technology, EF_{PLMNwAcT}, Operator controlled PLMN

selector with Access Technology EF_{OPLMNwAcT} and HPLMN selector with Access Technology EF_{HPLMNwAcT}, see 3GPP TS 31.102 [59].

Command	Possible response(s)
+CPOL=[<index>][,<format>[,<oper>[,<GSM_AcT>,<GSM_Compact_AcT>,<UTRAN_AcT>,<E-UTRAN_AcT>,<NG-RAN_AcT>]]]	+CME ERROR: <err>
+CPOL?	+CPOL:<index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_Compact_AcT1>,<UTRAN_AcT1>,<E-UTRAN_AcT1>,<NG-RAN_AcT1>] [<CR><LF>+CPOL:<index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2>,<E-UTRAN_AcT2>,<NG-RAN_AcT2>]] [...]] +CME ERROR: <err>
+CPOL=?	+CPOL: (list of supported <index>s),(list of supported <format>s) +CME ERROR: <err>

Parameter

<index>: integer type; the order number of operator in the SIM/USIM preferred operator list.

NOTE

When index set to 0, it will write value to a invalid bit in PLMN.

<format>: indicates if the format is alphanumeric or numeric (see +COPS),rang is 0-2.

<oper>: Operands(string type)(MCC/MNC numeric codes which is used in network selection, such as 46000 is China Mobile Communication, 46001 is China Unicom).

<GSM_AcT>:

GSM_AcT	Description
0	access technology not selected
1	access technology selected

<GSM_Compact_AcT1>:

GSM_Compact_AcT	Description
0	access technology not selected
1	access technology selected

NOTE

Now not support GSM Compact access technology.

<UTRAN_AcT>:

UTRAN_AcT	Description
0	access technology not selected
1	access technology selected

<E-UTRAN_AcT>:

E-UTRAN_AcT	Description
0	access technology not selected
1	access technology selected

<NG-RAN_AcT>:

NG-RAN_AcT	Description
0	access technology not selected
1	access technology selected

Reference

3GPP TS 27.007

4.5 5GS network registration status +C5GREG

Description

The set command controls the presentation of an unsolicited result code +C5GREG: <stat> when <n>=1 and there is a change in the MT's network registration status in 5GS, or unsolicited result code +C5GREG:

<stat>[,<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>] when <n>=2 and there is a change of the network cell in 5GS or the network provided an Allowed NSSAI. The parameters <AcT>, <tac>, <ci>, <Allowed_NSSAI_length> and <Allowed_NSSAI> are provided only if available. The value <n>=3 further extends the unsolicited result code with [<cause_type>,<reject_cause>], when available, when the value of <stat> changes.

Command	Possible response(s)
+C5GREG=[<n>]	+CME ERROR: <err>

Command	Possible response(s)
+C5GREG?	when <n>=0, 1, 2 or 3 and command successful: +C5GREG:<n>,<stat>[,,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>][,<cause_type>,<reject_cause>]]
+C5GREG=?	+C5GREG: (list of supported <n>s)
NOTE 1: If the 5G MT in GERAN/UTRAN/E-UTRAN also supports one or more of the circuit mode services, GPRS services or EPS services, the +CREG command and +CREG: result codes, the +CGREG command and +CGREG: result codes and the +CEREG command and +CEREG: result codes apply to the registration status and location information for those services.	

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <tac>, <ci> and <AcT>, and parameters <Allowed_NSSAI_length>, <Allowed_NSSAI>, if available, are returned only when <n>=2 and MT is registered in the network. The parameters [,<cause_type>,<reject_cause>], if available, are returned when <n>=3.

Test command returns values supported as a compound value.

Parameter

<n>: integer type

- 0 disable network registration unsolicited result code
- 1 enable network registration unsolicited result code +C5GREG: <stat>
- 2 enable network registration and location information unsolicited result code
+C5GREG:<stat>[,,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>]]
- 3 enable network registration, location information and 5GMM cause value information unsolicited result code +C5GREG:
<stat>[,,[<tac>],[<ci>],[<AcT>],[<Allowed_NSSAI_length>],[<Allowed_NSSAI>][,<cause_type>,<reject_cause>]]

<stat>: integer type; indicates the NR registration status.

stat	Description
0	not registered, MT is not currently searching an operator to register to
1	registered, home network
2	not registered, but MT is currently trying to attach or searching an operator to register to
3	registration denied
4	unknown (e.g. out of NR coverage)
5	registered, roaming
6	registered for "SMS only", home network (not applicable)
7	registered for "SMS only", roaming (not applicable)
8	registered for emergency services only (See NOTE 2)
9	registered for "CSFB not preferred", home network (not applicable)
10	registered for "CSFB not preferred", roaming (not applicable)
11	attached for access to RLOS (See NOTE 2a) (not applicable)

NOTE 2: 3GPP TS 24.501 [161] specifies the condition when the MT is considered as registered for emergency services.

NOTE 2a: 3GPP TS 24.301 [83] specifies the condition when the MT is considered as attached for access to RLOS.

<tac>: string type; three byte tracking area code in hexadecimal format (e.g. "0000C3" equals 195 in decimal).

<ci>: string type; five byte NR cell ID in hexadecimal format.

<Allowed_NSSAI_length>: integer type; indicates the number of octets of the <Allowed_NSSAI> information element.

<Allowed_NSSAI>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs received from the network.

<AcT>: integer type; indicates the access technology of the serving cell.

AcT	Description
0	GSM (not applicable)
1	GSM Compact (not applicable)
2	UTRAN (not applicable)
3	GSM w/EGPRS (see NOTE 3) (not applicable)
4	UTRAN w/HSDPA (see NOTE 4) (not applicable)
5	UTRAN w/HSUPA (see NOTE 4) (not applicable)
6	UTRAN w/HSDPA and HSUPA (see NOTE 4) (not applicable)

AcT	Description
7	E-UTRAN (not applicable)
8	EC-GSM-IoT (A/Gb mode) (see NOTE 5) (not applicable)
9	E-UTRAN (NB-S1 mode) (see NOTE 6) (not applicable)
10	E-UTRA connected to a 5GCN (see NOTE 7)
11	NR connected to a 5GCN (see NOTE 7)
12	NG-RAN (not applicable)
13	E-UTRA-NR dual connectivity (see NOTE 8) (not applicable)

NOTE 3: 3GPP TS 44.018 [156] specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

NOTE 4: 3GPP TS 25.331 [74] specifies the System Information blocks which give the information about whether the serving cell supports HSDPA or HSUPA.

NOTE 5: 3GPP TS 44.018 [156] specifies the EC-SCH INFORMATION message which, if present, indicates that the serving cell supports EC-GSM-IoT.

NOTE 6: 3GPP TS 36.331 [86] specifies the System Information blocks which give the information about whether the serving cell supports NB-IoT, which corresponds to E-UTRAN (NB-S1 mode).

NOTE 7: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is connected to a 5GCN.

NOTE 8: 3GPP TS 38.331 [160] specifies the information which, if present, indicates that the serving cell is supporting dual connectivity of E-UTRA with NR and is connected to an EPS core.

<cause_type>: integer type; indicates the type of <reject_cause>.

- 0: Indicates that <reject_cause> contains an EMM cause value, see 3GPP TS 24.301 [83] Annex A.
- 1: Indicates that <reject_cause> contains a manufacturer-specific cause.

<reject_cause>: integer type; contains the cause of the failed registration. The value is of type as defined by <cause_type>.

4.6 Network emergency (bearer) services support +CNEM

Description

Set command enables reporting of changes in the emergency (bearer) services support indicators and emergency services fallback indicator with the unsolicited result code +CNEMIU: <emb_Iu_supp> according to the network feature support information element, see 3GPP TS 24.008 [8] subclause 10.5.5.23, the unsolicited result code +CNEMS1: <emb_S1_supp> according to the EPS network feature support information element, see 3GPP TS 24.301 [83] subclause 9.9.3.12A, and the unsolicited result code +CNEM5G: <ems_5G_supp>, <emf_5G_supp> according to the 5GS network feature support information element, see 3GPP TS 24.501 [161] subclause 9.11.3.5.

Read command returns current command setting and if enabled, the settings of the emergency bearer services support indicator in Iu mode and the emergency bearer services support indicator in S1 mode for the network where the UE is attached. The read command also returns the emergency services support indicator in 5G and the emergency services fallback indicator in 5G for the network where the UE is registered.

Test command returns values supported as a compound value.

Command	Possible response(s)
+CNEM=[<reporting>]	+CME ERROR: <err>
+CNEM?	+CNEM:<reporting>[,<emb_Iu_supp>[,<emb_S1_supp>[,<ems_5G_supp>,<emf_5G_supp>]]]
+CNEM=?	+CNEM: (list of supported <reporting>s)

Parameter

<reporting>: integer type

- 0: Reporting not enabled
- 1: Reporting enabled

<emb_Iu_supp>: integer type. Emergency bearer services support indicator for Iu mode (See NOTE).

- 0: Emergency bearer services in Iu mode and A/Gb mode not supported
- 1: Emergency bearer services supported in Iu mode, but not supported in A/Gb mode

<emb_S1_supp>: integer type. Emergency bearer services support indicator for S1 mode (See NOTE).

- 0: Emergency bearer services in S1 mode not supported
- 1: Emergency bearer services in S1 mode supported

<ems_5G_supp>: integer type. Emergency services support indicator for 5G (See NOTE).

- 0: Emergency services in 5G not supported
- 1: Emergency services supported in NR connected to 5GC only
- 2: Emergency services supported in E-UTRA connected to 5GC only
- 3: Emergency services supported in NR connected to 5GC and E-UTRA connected to 5GC

<emf_5G_supp>: integer type. Emergency services fallback indicator for 5G (See NOTE).

- 0: Emergency services fallback in 5G not supported
- 1: Emergency services fallback supported in NR connected to 5GC only
- 2: Emergency services fallback supported in E-UTRA connected to 5GC only
- 3: Emergency services fallback supported in NR connected to 5GC and E-UTRA connected to 5GC

NOTE

The indicators <emb_Iu_supp>, <emb_S1_supp>, <ems_5G_supp> and <emf_5G_supp> are only set to supported when explicitly signalled from the network. When an emergency (bearer) services support indicator is not signalled from the network or if no network is available, this is interpreted as "Emergency (bearer) services not supported". When the emergency services fallback indicator is not signalled from the network or if no network is available, this is interpreted as "Emergency services fallback in 5G not supported".

4.7 EPS network registration status +CEREG

Description

The set command controls the presentation.

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT.

Type	Command	Return	Description
set	AT+CEREG=[<N>]	OK	N/A
		+CME ERROR: <err>	
read	AT+CEREG?	+CEREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>][,<cause_type>] ,[<reject_cause>]]	when <n>=0, 1, 2 or 3 and command successful
		+CEREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>]]	when <n>=4 or 5 and command successful
test	AT+CEREG=?	+CEREG: (list of supported <n>s)	N/A

Parameter

<N>:

- 0 disable network registration
- 1 enable network registration
- 2 enable network registration and location information
- 3 enable network registration, location information and EMM cause value information.

<stat>: indicates the EPS registration status

- 0 not registered, MT is not currently searching an operator to register to
- 1 registered, home network
- 2 not registered, but MT is currently trying to attach or searching an operator to register to
- 3 registration denied
- 4 unknown (e.g. out of E-UTRAN coverage)
- 5 registered, roaming
- 6 registered for "SMS only", home network (not applicable)
- 7 registered for "SMS only", roaming (not applicable)
- 8 attached for emergency bearer services only
- 9 registered for "CSFB not preferred", home network (not applicable)
- 10 registered for "CSFB not preferred", roaming (not applicable)

<tac>: two byte tracking area code in hexadecimal format

(e.g. "00C3" equals 195 in decimal)

<ci>: four byte E-UTRAN cell ID in hexadecimal format

<AcT>: indicates the access technology of the serving cell

- 0 GSM (not applicable)
- 1 GSM Compact (not applicable)
- 2 UTRAN (not applicable)
- 3 GSM w/EGPRS (not applicable)
- 4 UTRAN w/HSDPA (not applicable)
- 5 UTRAN w/HSUPA (not applicable)
- 6 UTRAN w/HSDPA and HSUPA (not applicable)
- 7 E-UTRANOTE
- 8 EC-GSM-IoT (A/Gb mode) (not applicable)
- 9 E-UTRAN (NB-S1 mode)
- 10 E-UTRA connected to a 5GCN (not applicable)
- 11 NR connected to a 5G CN (not applicable)
- 12 NG-RAN (not applicable)
- 13 E-UTRA-NR dual connectivity
- 15 UTRAN_w_HSPAPLUS
- 16 E_UTRAN_CA

<cause_type>: integer type; indicates the type of <reject_cause>.

- 0 : <reject_cause> contains an EMM cause value, see 3GPP TS 24.301 [83] Annex A.
- 1 : <reject_cause> contains a manufacturer-specific cause.

<reject_cause>: contains the cause of the failed registration which defined by<cause_type>.

Reference

3GPP TS 27.007

4.8 Signalling connection status +CSCON

Type	Command	Return	Description
set	AT+CSCON=[<n>]	OK	N/A
		+CME ERROR: <err>	
read	AT+CSCON?	+CSCON: <n>,<mode>[,<state>[,<access>]] [<CR><LF>+CSCON:<n>,<mode>[,<state>[,<access>[,<coreNetwork>]]] [...]] +CME ERROR: <err>	N/A

Description

The set command controls the presentation of an unsolicited result code +CSCON. If $<\text{n}>=1$, +CSCON:<mode> is sent from the MT when the connection mode of the MT is changed. If $<\text{n}>=2$ and there is a state within the current mode, +CSCON:<mode>[,<state>] is sent from the MT when the connection mode or state information of the MT is changed. If $<\text{n}>=3$, +CSCON:<mode>[,<state>[,<access>]] is sent from the MT when the connection mode, state or access information of the MT is changed. If $<\text{n}>=4$, +CSCON:<mode>[,<state>[,<access>[,<coreNetwork>]]] is sent from the MT. If setting fails, an MT error, +CME ERROR:<err> is returned. Refer subclause 9.2 for possible <err> values.

When the MT is in UTRAN, E-UTRAN or NG-RAN, the <mode> refers to idle when no PS signalling connection between UE and network is setup and to connected mode when a PS signalling connection between UE and network is setup. When the UE is in GERAN, the mode refers to idle when the MT is in either the IDLE state or the STANDBY state and to connected mode when the MT is in READY state.

The <state> indicates the state of the MT when the MT is in GERAN, UTRAN connected mode, E-UTRAN or NG-RAN.

The <access> indicates the current radio access type of the MT when the MT is in GERAN, UTRAN, E-UTRAN or NG-RAN.

The <coreNetwork> indicates the core network type the MT is connected to when the MT is in E-UTRAN or NG-RAN.

The read command returns the status of result code presentation and an integer <mode> which shows whether the MT is currently in idle mode or connected mode. State information <state> is returned only when $<\text{n}>=2$. Radio access type information <access> is returned only when $<\text{n}>=3$. Core network type information <coreNetwork> is returned only when $<\text{n}>=4$. For Multi-RAT Dual Connectivity (MR-DC) architecture (see 3GPP TS 37.340 [162]), information is presented for the master RAT followed by optionally, information for each of the secondary RATs on a separate line.

Test command returns supported values as a compound value.

Parameter

<n>: integer type

- 0: disable unsolicited result code
- 1: enable unsolicited result code +CSCON:<mode>
- 2: enable unsolicited result code +CSCON:<mode>[,<state>]
- 3: enable unsolicited result code +CSCON:<mode>[,<state>[,<access>]]
- 4: enable unsolicited result code +CSCON:<mode>[,<state>[,<access>[,<coreNetwork>]]]

<mode>: integer type; indicates the signalling connection status

- 0: idle
- 1: connected

<state>: integer type; indicates the CS or PS state while in GERAN and the RRC state information if the MT is in connected mode while in UTRAN, E-UTRAN and NG-RAN. (this parameter not support)

- 0: UTRAN URA_PCH state (not support)
- 1: UTRAN Cell_PCH state (not support)
- 2: UTRAN Cell_FACH state (not support)
- 3: UTRAN Cell_DCH state (not support)
- 4: GERAN CS connected state (not support)

- 5: GERAN PS connected state (not support)
- 6: GERAN CS and PS connected state (not support)
- 7: E-UTRAN connected state (not support)
- 8: NG-RAN connected state (not support)
- 9: NG-RAN inactive state (see 3GPP TS 38.331 [160]) (not support)

<access>: integer type; indicates the current radio access type.

- 0: Indicates usage of radio access of type GERAN, see 3GPP TS 45.001 [146] (not support)
- 1: Indicates usage of radio access of type UTRAN TDD, see 3GPP TS 25.212 [144] (not support)
- 2: Indicates usage of radio access of type UTRAN FDD, see 3GPP TS 25.212 [144] (not support)
- 3: Indicates usage of radio access of type E-UTRA TDD, see 3GPP TS36.300 [145]
- 4: Indicates usage of radio access of type E-UTRA FDD, see 3GPP TS36.300 [145]
- 5: Indicates usage of radio access of type NR, see 3GPP TS38.300 [159]

<coreNetwork>: integer type; indicates the core network type the UE is connected to.

- 0: Indicates MT is connected to EPC, see 3GPP TS23.401 [82]
- 1: Indicates MT is connected to 5GCN, see 3GPP TS23.501 [165]

Reference

3GPP TS 27.007

4.9 Presentation of an unsolicited result code +CIREGU- +CIREG

Description

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

When the IMS start to registration or in progress, protocol stack will report the +CIREGU to indicate that the device is not registered (0).

Type	Command	Return	Description
Set	AT+CIREG=<n>	OK/+CMS ERROR: <err>	N/A
Read	AT+CIREG?	+CIREG: <n>,<reg_info>,[<ext_info>] OK	N/A

Parameter

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

- 0: disable reporting.
- 1: enable reporting (parameter <reg_info>).

- 2: enable extended reporting (parameters <reg_info> and <ext_info>)

<reg_info>: integer type. Indicates the IMS registration status. The UE is seen as registered as long as one or more of its public user identities are registered with any of its contact addresses, see 3GPP TS 24.229 [89].

- 0: not registered
- 1: registered.
- 2: registering
- 3: register fail
- 4: unknown
- 5: registered and roaming
- 6: deregistering

<ext_info>: numeric value in hexadecimal format. The value range is from 1 to FFFFFFFF. It is a sum of hexadecimal values, each representing a particular IMS capability of the MT. The MT can have IMS capabilities not covered by the below list. This parameter is not present if the IMS registration status is "not registered".

- 1: RTP-based transfer of voice according to MMTEL, see 3GPP TS 24.173 [87]. This functionality can not be indicated if the UE is not available for voice over PS, see 3GPP TS 24.229 [89].
- 2: RTP-based transfer of text according to MMTEL, see 3GPP TS 24.173 [87].
- 4: SMS using IMS functionality, see 3GPP TS 24.341 [101].
- 8: RTP-based transfer of video according to MMTEL, see 3GPP TS 24.173 [87].
- The hexadecimal values 10, 20, 40 ... 80000 are reserved by the present document

Example

```
AT+CIREG=2  
OK
```

5 Call Control Commands

5.1 Instructs the DCE to originate a call - ATD

Description

This command instructs the DCE to originate a call. This may include several steps, depending upon the DCE type, such as: connecting to the line (going off-hook), waiting for the network to indicate readiness to receive call addressing information (wait for dial tone), signaling call addressing information to the network (dialing the number), monitoring the line for call progress signals (e.g. busy), and instructing the underlying DCE to start the call origination procedure (modulation handshaking).

Type	Command	Return	Description
execute	ATD<dialing_string>	OK	call setup request is already sent to network
		+CME ERROR<err>	error occurs
		NO CARRIER	call connection fails or is released by remote

Parameter

<dialing_string>: {0-9, *, #, +}, the maximum length is 40.

When semicolon character is given after dialing digits, a voice call originated to the given address.

This command support modifier characters (P, W, p, w). But it will be ignored, and the digits after the modifier characters (P, W, p, w) will send to network in DTMF format.

ATC have a special format to support AP side to decide a number is emergency number, like ATD<emergency number>@[emergency category],#

Example

Voice call:

ATD10086;

Return:

OK

Video call:

ATD10086

Return:

OK

Emergency call:

ATD911@,#;

Return:

OK

Reference

3GPP TS 27.007

5.2 Redial last telephone number used - ATDL

Description

This command is used to redial last telephone number used

Type	Command	Return	Description
execute	ATDL	OK	call setup request is already sent to network
		ERROR	If the phone has not been dialed after booting

Example

ATD10086;

Return:

OK

ATDL

Return:

OK

5.3 Connect to line and start answer sequence - ATA

Description

This command instructs the DCE to immediately connect to the line and start the answer sequence as specified for the underlying DCE. Any additional commands that appear after ATA on the same command line are ignored.

Type	Command	Return	Description
Execute	ATA	OK/ERROR	N/A

Reference

ITU-T Rec. V.250

5.4 Hang up all calls - ATH

Description

This command is used to hang up all (one or several) connecting or connected calls.

The cause is for local use only.

Type	Command	Return	Description
execute	ATH/ATH<cause>	OK	N/A

Parameter

<cause> : Default value is MN_CAUSE_NORMAL_CLEARING = 16

Reference

ITU-T Rec. V.250

5.5 Tone duration +VTD

Description

This refers to an integer <n> that defines the length of tones emitted, as a result of the +VTS command. This does not affect the D command. A value different from zero causes a tone of duration <n>/10 seconds. The value zero causes a "manufacturer specific" value.

Type	Command	Return	Description
set	AT+VTD=<n>	OK	N/A
read	AT+VTD?	<n> OK	N/A
test	AT+VTD=?	(0-255) OK	N/A

Parameter

<n>: (0-255) n*100ms

Example

AT+VTD=1

Return:

OK

Reference

3GPP TS 27.007

5.6 DTMF and tone generation +VTS

Description

This command transmits DTMF, after a successful call connection. Setting Command is used to send one or more ASCII characters that make MSC (Mobile Switching Center) send DTMF tone to remote User. Setting command is forbidden in the case of Data or Fax Mode (+FCLASS=0, 1, 2-7).

Type	Command	Return	Description
Set	AT+VTS=<dtmf> or AT+VTS=<dtmf>, <duration>	OK/+CME ERROR: <err>	N/A
Test	AT+VTS=?	(0-9, *, #, A, B, C, D) OK	N/A

NOTE

At present, only support sending one DTMF digits once time.

Parameter

<dtmf>

A single ASCII character in the set { 0 -9, #, *, A – D }.

< duration>

Refer to duration value range of +VTD command

Example

AT+VTS=2

Return:

OK

AT+VTS=2,1

Return:

OK

Reference

3GPP TS 27.007

5.7 Start/stop DTMF tone +EVTS

Description

START/STOP DTMF tone.

Type	Command	Return	Description
set	AT+EVTS=<mode>[,<dtmf>]	OK	N/A
		+CMEERROR: <err>	N/A

NOTE

The set command will return error if UE is not in calling. The start and stop commands are executed in turn. That is to say, once you start a DTMF tone, you need to first stop it before sending another DTMF tone.

Parameter

parameter	Value
<mode>	<ul style="list-style-type: none"> • 0: stop • 1: start
<dtmf>	A single ASCII character in the set 0 9, #,* ,A - D.

Example

```
AT+EVTS=1,2
OK
AT+EVTS=0,2
OK
```

5.8 Receive gain selection +VGR

Description

This refers to the amplification by the TA of audio samples sent from the TA to the computer. The command operates on an integer <n>.

Type	Command	Return	Description
Set	AT+VGR=<n>	OK	N/A
Read	AT+VGR?	+VGR: <n>	N/A
Test	AT+VGR=?	+VGR: (1-9)	N/A

Parameter

<n>: the volume of speaker, value range 1-9.

Example

AT+VGR=1

Return:

OK

Reference

3GPP TS 27.007

5.9 Mute control +CMUT

Description

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

Type	Command	Return	Description
Set	AT+CMUT=<mode>	OK/ERROR	N/A
Read	AT+CMUT?	+CMUT: <mode> OK	N/A
Test	AT+CMUT=?	+CMUT: <supported value> OK	N/A

Parameter

<mode>:

- 0: mute off.
- 1: mute on.

Example

```
AT+CMUT=0
```

Return:

```
OK
```

Reference

3GPP TS 27.007

5.10 Set calls type +CICB

Description

This command sets the type of incoming calls, which is data, fax or speech.

Type	Command	Return	Description
Set	AT+CICB=<value>	OK	N/A
Read	AT+CICB?	+CICB: <value>	N/A
Test	AT+CICB=?	+CICB: (0-2)	N/A

NOTE

Currently, only speech is supported.

Parameter

value	Description
0	data
1	fax
2	speech

5.11 Hangup call +CHUP

Description

Execution command causes the TA to hang up the current GSM/UMTS call of the MT.

Type	Command	Return	Description
Execute	AT+CHUP	OK/ERROR	N/A
Test	AT+CHUP=?	OK	N/A

Reference

3GPP TS 27.007

5.12 Select type of address +CSTA

Description

Set command selects the type of number for further dialing commands (ATD) according to GSM/UMTS specifications. Test command returns values supported a compound value.

Type	Command	Return	Description
Set	AT+CSTA=<type>	OK	N/A
Read	AT+CSTA?	+CSTA: <type> OK	N/A
Test	AT+CSTA=?	+CSTA: (128,129,145,161) OK	N/A

Parameter

<type>: Default value is 129

- 128: Unknown numbering plan, unknown number
- 129: ISDN/telephony number plan, unknown number
- 145: ISDN/telephony number plan, international number
- 161: ISDN/telephony number plan, national number

Example

```
AT+CSTA=129
```

Return:

OK

Reference

3GPP TS 27.007

5.13 Select bearer service type +CBST

Description

Set command selects the bearer service with data rate and the connection element to be used when data calls are originated (refer 3GPP TS 22.002). Values may also be used during mobile terminated data call setup, especially in case of single numbering scheme calls (refer +CSNS).

Type	Command	Return	Description
Set	AT+CBST=<speed>,<name>,<ce>	OK	N/A
Read	AT+CBST?	+CBST: <speed>, <name>, <ce> OK	N/A
Test	AT+CBST =?	+CBST: (0-134),(0-7),(0-3) OK	N/A

Parameter

<speed>: 64000 bps (X.31 flag stuffing; this setting can be used in conjunction with asynchronous non-transparent UDI service in order to get FTM) At present, just support 84.

<name>: data circuit synchronous (UDI or 3.1 kHz modem).At present, just support 1.

<ce>: transparent. At present, just support 0.

Reference

3GPP TS 27.007

5.14 Service reporting control +CR

Description

The command has replaced modulation reporting control command +MR in V.250 [14], the latter doesn't suitable to GSM/UMTS networks. Using error control command +ER and data compression command +DR, in V.25ter, could open error control reporting (not radio link protocol) and data compression reporting.

Setting command uses to control whether middle result code will report to TE from TA. If switch on report, the mid result code will transport in a point during process of connecting transmission. At the same time, TA already decided during the process before transmission error control or data compression report, and connection of mid result code.

Type	Command	Return	Description
Set	AT+CR=[<mode>]	OK/ERROR	N/A
Read	AT+CR?	+CR: [<mode>] OK	N/A
Test	AT+CR=?	+CR: (list of supported <mode>s) OK	N/A

Parameter

mode	Description
0	Disable reporting
1	Enable reporting

Reference

3GPP 27.007

5.15 Extended error report +CEER

Description

Extended error reporting command.

Executing the command, TA will return a line or multi-line information text(s) <report>, determined by MT manufacturers. MT manufacturers provide extended report for TA user as followed reasons:

- Call setup fails (REQ or ACK) or Modification fails after call setup at latest
- Call releases at latest
- GPRS attachment fails or PDP context activation fails at latest
- GPRS detaches or PDP context deactivates

Type	Command	Return	Description
Execute	AT+CEER	+CEER:<report> OK	N/A
Test	AT+CEER=?	OK	N/A

Parameter

<report> : string type

The may values:

- no error
- unassigned (unallocated) number
- no route to destination
- unacceptable channel
- operator determinate barring
- normal clearing
- user busy
- no user responding
- alerting no answer
- call rejected
- number changed
- nonselect user clearing
- destination out of order
- invalid number format
- facility rejected
- response to status query
- normal unspecified
- no circuit channel available
- net out of order
- temporary failure
- switch congestion
- access information discarded
- request circuit channel unavailable
- resources unavailable
- quality of service unavailable
- request facility not subscribe
- CUG incoming barred
- bear capability not authorization
- bear capability unavailable
- service unavailable
- bear service not implement
- ACM equal to or greater than ACM_{max}
- request facility not implement
- only restrict digital available
- service option not implement
- invalid ti
- user not in CUG
- incompatibility destination
- invalid transit net
- invalid message semantic

- mandatory IE error
- message nonexistent
- message incompatibility error
- IE nonexistent
- invalid condition IE
- message incompatibility state
- recover on timer
- protocol error
- interworking
- authentication rejected
- emergency call only
- IMSI detach
- T3230 expiry
- connection error
- no network service
- emergency call only
- normal disconnect
- remote disconnect
- low failure
- network reject
- no cell
- GPRS detached
- PDP deactivation
- supplement not provide
- FDN reject

Example

```
AT+CEER
+CEER: unacceptable channel
OK
```

Reference

3GPP 27.007

5.16 Cellular result codes +CRC

Description

The setting command is used to control incoming calls indication, GPRS network request of PDP context activation or VBS/VGCS call indication whether using extended format. If using the format, it will actively report result code +CRING: <type> to TE, not to report normal RING.

Type	Command	Return	Description
Set	AT+CRC=[<mode>]	OK	N/A
Read	AT+CRC?	+CRC:[<mode> OK	N/A
Test	AT+CRC=?	+CRC:(0,1) OK	N/A

Parameter

Mode	Description
0	Disable extended format
1	Enable extended format

Reference

3GPP 27.007

5.17 Call mode +CMOD

Description

Set command selects the call mode of further dialing commands (ATD) or for next answering command (A). Mode can be either single or alternating (in the present document, terms "alternating mode" and "alternating call" refer to all GSM/UMTS bearer and teleservices that incorporate more than one basic service (voice, data, fax) within one call). When single mode is selected the call originating and hangup procedures are similar to procedures specified in ITU-T Recommendations V.250 [14], T.31 [11] and T.32 [12]. In GSM/UMTS there can be voice followed by data (refer 3GPP TS 22.002), alternating voice/data (refer 3GPP TS 22.002) and alternating voice/fax calls (refer 3GPP TS 22.003). Refer next two subclauses for alternating call control methods. In the following case, +CMOD is set to 0

- Power-on
- Restore factory setting (AT&F)
- User default setting(ATZ)
- Alternate mode, call finished successfully
- Alternate mode, answer fail

Type	Command	Return	Description
Set	AT+CMOD=[<mode>]	OK/+CME ERROR: <err>	N/A
Read	AT+CMOD?	+CMOD: <mode>	N/A

Test	AT+CMOD=?	+CMOD: (0-3, 129, 130, 131) OK	N/A
------	-----------	-----------------------------------	-----

Parameter

mode	Description
0	Single mode
1	Voice/fax alternate mode
2	Voice/data alternate mode
3	Data and voice mode
129	Multimedia call only, without fallback or service change
130	Multimedia call with fallback to speech
131	Multimedia call with fallback and service change (allowed for UDI/RDI call only)

Example

AT+CMOD=2

OK

Reference

3GPP TS 27.007

5.18 List current calls +CLCC

Description

Returns list of current calls of MT. If command succeeds but no calls are available, no information response is sent to TE.

Type	Command	Return	Description
Execute	AT+CLCC	+CME ERROR: <err>	At least one call exist

Type	Command	Return	Description
		[+CLCC: <ccid1>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<priority>[,<CLI validity>]]]]] <CR><LF> +CLCC: <ccid2>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>[,<priority>[,<CLI validity>]]]]] OK	
test	AT+CLCC=?	OK	N/A

Parameter

<ccidx>: integer type , call id.

<dir>	Description
0	Mobile originated(MO) call
1	Mobile terminated(MT) call

<stat>:

<stat>	Description
0	Activate
1	Hold
2	Dialing(MO)
3	Alerting(MO)
4	Incoming(MT)
5	Waiting(MT)

<mode>:

<mode>	Description
0	Speech (call)
1	Dataall (services)
2	Fax
9	Unknown

<mpty>:

<mpty>	Description
0	Call is not one of multiparty call parties
1	Call is one of multiparty call parties

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

<type>: type of address octet in integer format

<priority>: integer type parameter indicating the eMLPP priority level of the call, values specified in 3GPP TS 22.067 [54].

<CLI validity>: integer type. This parameter can provide details why <number> does not contain a calling party BCD number (refer 3GPP TS 24.008 [8] subclause 10.5.4.30). The parameter is not present for MO call types.

<alpha>: At present, report NULL.

Example

```
AT+CLCC
+CLCC: 1, 0, 2, 2, 0, "13888888888", 129 , "", 0, 0
OK
```

Reference

3GPP TS 27.007

5.19 Report information about ^DSCI - ^DSCI

Description

This command is used to indicate whether or not to report the following information When ME status update. The information is about ^DSCI: <id>,<idr>,<stat>,<type>,<mpty>,<number>,<num_type>,[<bs_type>][,cause]

Type	Command	Return	Description
set	AT^DSCI=<n>	OK	N/A
		CME ERROR:<err>	
read	AT^DSCI?	^DSCI: <n>	N/A
test	AT^DSCI=?	OK	N/A

Parameter

Parameter	Description
<n>	0-1 (0 not allow unsolicited report 1 otherwise)
<id>	Integer: 1—7, caller identifier(be used in the command +CHILD).
<dir>	call direction <ul style="list-style-type: none"> • 0: user initiated • 1: user hung up
<stat>	call status <ul style="list-style-type: none"> • 0: Active • 1: Hang up • 2: Dialing(MO) • 3: Alerting(MO) • 4: incoming call(MT) • 5: Waiting • 6: Stop
<type>	call type <ul style="list-style-type: none"> • 0: voice call via CS • 1: voice call via IMS • 2: video call via CS • 3: video call via IMS
<mpty>	indicate the call is in multiparty conversation <ul style="list-style-type: none"> • 0: not in multiparty conversation • 1: in multiparty conversation
<number>	calling address , the format is specified by <type>
<num_type>	address type (refer to TS 24.008)
<bs_type>	when <type > is not voice service, the field is validate and indicates detail data service.

5.20 Control and modify the media description +CCMMD

Description

This Command is used to control and modify the media description.

Type	Command	Return	Description
Set	AT+CCMMD=<ccidx>,<neg_status>,<SDP_md>	OK/+CMS ERROR: <sm_sc>	N/A

Parameter

Parameter	Description
<ccidx>	integer type. Call identification number as defined in the +CMCCS and +CLCCS commands.
<neg_status>	integer type. The <SDP_md> parameter describes the desired set of media for the call. The <SDP_md> parameter describes a proposal for a new set of media for the call. Accept the most recently received media proposal. The <SDP_md> parameter describes the accepted media for the call. Reject the most recently received media proposal. Cancel the call upgrade. Close the local video media , receive only. Open the local video media, send and receive.
<SDP_md>	string type represented with IRA characters. Media description as per the +CDEFMP command. This parameter shall not be subject to conventional character conversion as per +CSCS. Now support two string for set the media to audio or video call, “m=video”, “m=audio”

Example:

AT+CCMMD=1, 2, “m=audio”

5.21 Control the extended conference call +CGU

Description

This command is used to control the extended conference call.

Type	Command	Return	Description
Set	AT+CGU=<operation>,<participants_address_string>	OK/+CMS ERROR:<err>	N/A

Parameter

<operation>:

<operation>	Description
1	Start an extended conference
2	Connect conference center

<operation>	Description
4	Add a call to extended conference

< participants_address_string >: string type, if there are multiple participants, each participant address is Separated by comma.

Example

```
AT+CGU=1, "tel: +8210223330215, tel: +8210223330216"
OK
```

5.22 Bring call id and call type of current call - ^CONN

Description

This command can bring call id and call type of current call.

```
^CONN: <call_id>, <call_type>
```

Parameter

Parameter	Description
call_id	Call number
call_type	0: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_VOICE 1: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_DATA 2: ATC_CMCC_CALLIND_CALL_TYPE_PACKET_DATA 9: ATC_CMCC_CALLIND_CALL_TYPE_EMERGENCY others: ATC_CMCC_CALLIND_CALL_TYPE_INVALID

5.23 Report disconnect call information or PDP activate and deactivate information - ^CEND

Description

This command can report disconnect call information and PDP activate and deactivate information.

```
^CEND: < id>, <reserved>, <call_end_status>, <disconnect_call_cause>, <call_type>
```

Parameter

Parameter	Description
id	PDP identity or call id
reserved	N/A
call_end_status	0: ATC_CM_CALL_END_OFFLINE 21: ATC_CM_CALL_END_NO_SRV 29: ATC_CM_CALL_END_CLIENT_END 101: ATC_CM_CALL_END_CONF_FAILED 104: ATC_CM_CALL_END_NETWORK_END
disconnect_call_cause	0: MN_CAUSE_ERROR_NONE 1: MN_CAUSE_UNASSIGNED_NO 3: MN_CAUSE_NO_ROUTE_TO_DEST 6: MN_CAUSE_CHAN_UNACCEPTABLE 8: MN_CAUSE_OPER_DETERM_BARRING 16: MN_CAUSE_NORMAL_CLEARING 17: MN_CAUSE_USER_BUSY 18: MN_CAUSE_NO_USER_RESPONDING 19: MN_CAUSE_ALERTING_NO_ANSWER 21: MN_CAUSE_CALL_REJECTED 22: MN_CAUSE_NUMBER_CHANGED 26: MN_CAUSE_NONSEL_USER_CLRNG 27: MN_CAUSE_DEST_OUT_OF_ORDER 28: MN_CAUSE_INVALID_NO_FORMAT 29: MN_CAUSE_FACILITY_REJECTED 30: MN_CAUSE_RSP_TO_STATUS_ENQ 31: MN_CAUSE_NORMAL_UNSPECIFIED 34: MN_CAUSE_NO_CIRC_CHAN_AV 38: MN_CAUSE_NET_OUT_OF_ORDER 41: MN_CAUSE_TEMP_FAILURE 42: MN_CAUSE_SWITCH_CONGESTION 43: MN_CAUSE_ACC_INFO_DISCARDED 44: MN_CAUSE_REQ_CIRC_CHAN_UNAV 47: MN_CAUSE_RESOURCES_UNAV

Parameter	Description
	49: MN_CAUSE_QOS_UNAV 50: MN_CAUSE_REQ_FAC_NOT_SUBSCR 55: MN_CAUSE_CUG_INCOMING_BARRED 57: MN_CAUSE_BEAR_CAP_NOT_AUTH 58: MN_CAUSE_BEAR_CAP_UNAV 63: MN_CAUSE_SERV_OPT_UNAV 65: MN_CAUSE_BEAR_SVC_NOT_IMPL 68: MN_CAUSE_ACM_EQ_OR_GT_ACMMAX 69: MN_CAUSE_REQ_FACIL_NOT_IMPL 70: MN_CAUSE_ONLY_RESTRIC_DIG_AV 79: MN_CAUSE_SVC_OPT_NOT_IMPL 81: MN_CAUSE_INVALID_TI 87: MMN_CAUSE_USER_NOT_IN_CUG 88: MN_CAUSE_INCOMPAT_DEST 91: MN_CAUSE_INVALID_TRANSIT_NET 95: MN_CAUSE_INVALID_MSG_SEMANTIC 96: MN_CAUSE_MAND_IE_ERROR 97: MN_CAUSE_MSG_NONEXISTENT 98: MN_CAUSE_MSG_GEN_ERROR 99: MN_CAUSE_IE_NONEXISTENT 100: MN_CAUSE_INVALID_CONDITION_IE 101: MN_CAUSE_MSG_INCOMPAT_STATE 102: MN_CAUSE_RECov_ON_TIMER_EXP 111: MN_CAUSE_PROTOCOL_ERROR 127: MN_CAUSE_INTERWORKING 128: MN_CAUSE_CC_TIMER_EXPIRY 150: MN_CAUSE_AUTHENTICATION_REJ 151: MN_CAUSE_EMERGENCY_CALL_ONLY 152: MN_CAUSE_IMSI_DETACH 153: MN_CAUSE_T3230_EXPIRY 154: MN_CAUSE_RR_CONNECTIN_ERROR 155: MN_CAUSE_CALL_HAS_DISCONNECTED

Parameter	Description
	301: MN_CAUSE_REMOTE_USER_DISCONNECT MN_CAUSE_LOW_FAILURE MN_CAUSE_NETWORK_REJECT MN_CAUSE_NO_CELL MN_CAUSE_SUPPLEMENT_NOT_PROVIDE MN_CAUSE_SIM_STK_NOT_ALLOWED MN_CAUSE_ILLEGAL_CC_OPERATION 202: CEER_ERR_202_SUPPLEMENT_NOT_PROVIDE 241: CEER_ERR_241_FDN_REJECT
call_type	0: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_VOICE 1: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_DATA 2: ATC_CMCC_CALLIND_CALL_TYPE_PACKET_DATA 9: ATC_CMCC_CALLIND_CALL_TYPE_EMERGENCY others: ATC_CMCC_CALLIND_CALL_TYPE_INVALID

5.24 Bring call id and call type for call start ^ORIG

Description

This command can bring call id and call type for call start.

^ORIG: <call_id>, <call_type>

Parameter

Parameter	Description
call_id	Call number
call_type	0: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_VOICE 1: ATC_CMCC_CALLIND_CALL_TYPE_CIRCUIT_DATA 2: ATC_CMCC_CALLIND_CALL_TYPE_PACKET_DATA 9: ATC_CMCC_CALLIND_CALL_TYPE_EMERGENCY others: ATC_CMCC_CALLIND_CALL_TYPE_INVALID

5.25 Bring current call id ^CONF

Description

This command can bring current call id.

`^CONF: <call_id>`

Parameter

`<call_id>`: Call number

5.26 Incoming calls indication +CRC

Description

The setting command is used to control incoming calls indication, GPRS network request of PDP context activation or VBS/VGCS call indication whether using extended format. If using the format, it will actively report result code +CRING: <type> to TE, not to report normal RING.

Type	Command	Return	Description
Set	AT+CRC=[<mode>]	OK/ERROR	N/A
Read	AT+CRC?	+CRC: [<mode>]	N/A
Test	AT+CRC=?	+CRC: (list of supported <mode>s)	N/A

Parameter

Mode	Description
0	Disable extended format
1	Enable extended format

Type	Description
ASYNC [, <priority> [, <subaddr>, <satype>]]	Asynchronous transparent transmission
SYNC [, <priority> [, <subaddr>, <satype>]]	Synchronous transparent transmission
REL ASYNC[,<priority>[,<subaddr>,<satype>]]	Asynchronous non-transparent transmission
REL SYNC [,<priority>[,<subaddr>,<satype>]]	Synchronous non-transparent transmission
FAX [,<priority>[,<subaddr>,<satype>]]	Fax (telecommunications business 62)
VOICE [,<priority>[,<subaddr>,<satype>]]	Normal voice business (telecommunications business 11)

VOICE/XXX [,<priority>[,<subaddr>,<satype>]]	Data following voices (carrying services 81) (XXX could be ASYNC,SYNC, REL ASYNC or REL SYNC)
ALT VOICE/XXX [,<priority>[,<subaddr>,<satype>]]	Voices, data alternately, voice priority (carrying services 61)
ALT XXX/VOICE [,<priority>[,<subaddr>,<satype>]]	Voices, data alternately, data priority (carrying services 61)
ALT VOICE/FAX [,<priority>[,<subaddr>,<satype>]]	Voices, fax alternately, voice priority (carrying services 61)
GPRS <PDP_type>, <PDP_addr>[, [<L2P>][,<APN>]]	GPRS network request of PDP context activation
VGC <GCA>, <GId>, <ackflag> [,<priority>]	Voice call (telecommunications business 91)
VBC <GCA>, <GId>, <ackflag> [,<priority>]	Voice broadcast call (telecommunications business 92)

NOTE

<type> only supports VOICE, ALT XXX/VOICE, and <priority> optional parameters also don't support in current.

Example

```
AT+CRC=1<CR>
OK
+CRING: VOICE //NOTE: voice services
+CRING: VOICE
```

Reference

3GPP 27.007

6 SS Commands

6.1 Call forwarding number and conditions +CCFC

Description

This command allows control of the call forwarding supplementary service (SS) according to 3GPP TS 22.082. Registration, erasure, activation, deactivation, and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>.

Type	Command	Return	Description
set	AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<s ubaddr>[,<satype>[,<time>]]]]]]]	OK	N/A
		+CCFC:<status>,<class1>[,<number>,<t ype>[,<subaddr>,<satype>[,<time>]]] [<CR><LF>+CCFC:<status>,<class2>[<number>,<type>[,<subaddr>,<satype> [,<time>]]] [...]]	when <mode>=2 and command successful
		OK	
		+CME ERROR: <err>	fail
test	AT+CCFC=?	+CCFC: (list of supported <reason>s) OK	N/A

Parameter

<reason>:

reason	Description
0	Unconditional
1	Mobile busy
2	No reply
3	Not reachable
4	All call forwarding
5	All conditional call forwarding

<mode>:

<mode>	Description
0	Deactivation
1	Activation
2	Query
3	Registration
4	Erasure

<number>: forwarding number (number character string)

type	Description
128	Unknown number type
129	ISDN number type (default)
145	International ISDN
161	National ISDN

<satype>: type of sub-address octet in integer format

satype	Description
128	NSAP (X.213/ISO 8348 AD2)(default)
136	NSAP (X.213/ISO 8348 AD2)
160	User specific(even number of address signals)
168	User specific(odd number of address signals)

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

class	Description
1	voice (telephony)
2	data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
4	fax (facsimile services)
8	short message service
16	data circuit sync
32	data circuit async

class	Description
64	dedicated packet access
128	dedicated PAD access

<time> 5-30 when "no reply", "all call forwarding" or "all conditional call forwarding" is enabled or queried, this gives.

NOTE

The time in seconds to wait before call is forwarded, default value 20 .

<time> if set 1~5, will return OK.

<status> :

- 0: not active
- 1: active

<subaddr>: not support

Example

```
AT+CCFC=3, 3, "02150802727", 128
```

```
OK
```

```
AT+CCFC=3, 1
```

```
OK
```

```
AT+CCFC=3, 2
```

```
+CCFC: 1, 1, "+862150802727", 145
```

```
OK
```

Reference

3GPP TS 27.007

6.2 Call waiting +CCWA

Description

This command allows control of the Call Waiting supplementary service according to GSM 02.83. Activation, deactivation and status query are supported. When querying the status of a network service (<mode>=2) the response line for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter <n> is used to disable/enable the presentation of an unsolicited result code +CCWA: <number>,<type>,<class>,[<alpha>][,<CLI validity>] to the TE when call waiting service is enabled Command should be abortable when network is interrogated.

Type	Command	Return	Description
set	AT+CCWA=<n>[,<mode>[,<class>]]	OK	N/A

Type	Command	Return	Description
		+CCWA:<status>,<class1>[<CR><LF>]+CCWA:<status>,<class2>[...]] OK	when<mode>=2 and command successful
		+CME ERROR: <err>	fail
test	AT+CCWA=?	+CCWA: (list of supported <n>s) OK	N/A
read	AT+CCWA?	+CCWA: <n> OK	N/A

Parameter

<n>

- 0: disable
- 1: enable

<mode>:

- 0: Disable
- 1: Enable
- 2: Query status

<class>:

- | | |
|--|--|
| ● 1 | voice (telephony) |
| ● 2 | data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if |
| TA does not support values 16, 32, 64 and 128) | |
| ● 4 | fax (facsimile services) |
| ● 8 | short message service |
| ● 16 | data circuit sync |
| ● 32 | data circuit async |
| ● 64 | dedicated packet access |
| ● 128 | dedicated PAD access |

NOTE

Currently, only voice service is supported.

<status>: integer type

- 0 not active
- 1 active

Reference

3GPP TS 27.007

6.3 Call related supplementary services +CHLD

Description

This command allows the control of the following call related services:

- A call can be temporarily disconnected from the MT but the connection is retained by the network.
- Multiparty conversation (conference calls).
- The served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Type	Command	Return	Description
Set	AT+CHLD=<n>	OK	N/A
		+CME ERROR: <err>	fail
Test	AT+CHLD=?	+CHLD: (list of supported <n>s)	N/A

Parameter

<n>	Description
0	Release all held calls or set User Determined User Busy(UDUB) for a waiting call
1	Release all active calls and accepts the other(hold or waiting) call
1X	Release a specific active call X
2	Place all active calls on hold and accepted the other (held or waiting) call
2X	Disconnects a call from the conversation
3	Adds an held call to the conversation
4	connects the two calls and disconnects the subscriber from both call(ECT)
6	Releases all existing calls
7	Hold Activate call only
8	Release all active calls and accepts the held calls without caring waiting call
7X	Releases the specific existing call X

Reference

3GPP TS 27.007

6.4 Calling line identification presentation +CLIP

Description

This command refers to the GSM/UMTS supplementary service CLIP (Calling Line Identification Presentation) that enables a called subscriber to get the calling line identity (CLI) of the calling party when receiving a mobile terminated call. Set command enables or disables the presentation of the CLI at the TE. It has no effect on the execution of the supplementary service CLIP in the network.

Type	Command	Return	Description
set	AT+CLIP=<n>	OK	N/A
		+CME ERROR: <err>	fail
read	AT+CLIP?	+CLIP: <n>, <m>	N/A
test	AT+CLIP=?	+CLIP: (0, 1)	N/A

Parameter

<n>:

<n>	Description
0	Disable CLIP
1	Enable CLIP

<m>:

<m>	Description
0	CLIP not provisioned
1	CLIP provisioned
2	Unknown

Reference

3GPP TS 27.007

6.5 Calling line identification restriction +CLIR

Description

This command refers to CLIR-service according to 3GPP TS 22.081 that allows a calling subscriber to enable or disable the presentation of the CLI to the called party when originating a call.

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command. If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according 3GPP TS 22.081.

Type	Command	Return	Description
set	AT+CLIR=<n>	OK	N/A
		+CME ERROR: <err>	fail
read	AT+CLIR?	+CLIR: <n>, <m>	N/A
		+CME ERROR: <err>	fail
test	AT+CLIR=?	+CLIR: (0-2)	N/A

NOTE

At present, setting command is not supported by network.

Parameter

<n>:

<n>	Description
0	presentation indicator is used according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

<m>:

<m>	Description
0	CLIR not provisioned
1	CLIR provisioned in permanent mode
2	Unknown(e.g. not network)
3	CLIR temporary mode presentation restricted
4	CLIR temporary mode presentation allowed

Reference

3GPP TS 27.007

6.6 Connected line identification presentation +COLP

Description

This command allows control of the connected line identification presentation supplementary service - useful for call forwarding of the connected line.

Type	Command	Return	Description
set	AT+COLP=<n>	OK	N/A
		+CME ERROR: <err>	fail
read	AT+COLP?	+COLP: <n>, <m>	N/A
		+CME ERROR: <err>	fail
test	AT+COLP=?	+COLP: (0-1)	N/A

NOTE

Currently, setting command is not supported by network.

Parameter

<n>:

<n>	Description
0	Deactivate
1	Active

<m>:

<m>	Description
0	COLP not provisioned
1	COLP provisioned
2	Unknown(no network)

Reference

3GPP TS 27.007

6.7 Connected line identification restriction status +COLR

Description

This command refers to the GSM/UMTS supplementary service COLR (Connected Line Identification Restriction) that enables a called subscriber to restrict the possibility of presentation of connected line identity (COL) to the calling party after receiving a mobile terminated call. The command displays the status of the COL presentation in the network. It has no effect on the execution of the supplementary service COLR in the network. The command triggers an interrogation of the activation status of the COLR service according 3GPP TS 22.081 (given in <m>). Activation, deactivation, registration and erasure of the supplementary service COLR are not applicable.

Type	Command	Return	Description
set	AT+COLR=<m>	OK	N/A
		+CME ERROR: <err>	fail
read	AT+COLR?	+COLR:<m>,<service_active >	service_active range is 0 or 1
		+CME ERROR: <err>	fail
test	AT+COLR=?	+COLR:(0,1)	N/A

Parameter

<m>	Description
0	COLR not provisioned
1	COLR provisioned

6.8 Accumulated call meter +CACM

Description

Set command resets the Advice of Charge related accumulated call meter value in SIM card or in the active application in the UICC (GSM or USIM) file EF_{ACM}. ACM contains the total number of home units for both the current and preceding calls. SIM PIN2 is usually required to reset the value. If setting fails in an MT error, +CME ERROR: <err> is returned.

Type	Command	Return	Description
set	AT+CACM=< password >	OK	N/A
		+CME ERROR: <err>	fail
read	AT+CACM?	+ CACM: <ACM>	N/A
		OK	
test	AT+CACM=?	OK	N/A

Parameter

<m>	Description
<password>	string type; SIM PIN2

Example

```
AT+CACM="1234"
OK
```

Reference

3GPP TS 27.007

6.9 Accumulated call meter maximum +CAMM

Description

Set command sets the Advice of Charge related accumulated call meter maximum value in SIM card or in the active application in the UICC (GSM or USIM) file EF_{acmmmax}. acmmmax contains the maximum number of home units allowed to be consumed by the subscriber. When ACM (refer +CACM) reaches acmmmax calls are prohibited. SIM PIN2 is usually required to set the value. If setting fails in an MT error, +CME ERROR: <err> is returned.

Type	Command	Return	Description
set	AT+CAMM=[<acmmmax>[,<passwd>]]	OK	N/A
		+CME ERROR: <err>	fail
read	AT+CAMM: <acmmmax >	+CAMM:<acmmmax> OK	N/A
test	AT+CAMM=?	OK	N/A

Parameter

<acmmmax>:

<acmmmax>	Description
“000000”-“FFFFF”	N/A

<PIN2>: string type; SIM PIN2

Example

```
AT+CAMM="001000","1234"
OK
```

Reference

3GPP TS 27.007

6.10 Price per unit and currency table +CPUC

Description

Set command sets the parameters of Advice of Charge related price per unit and currency table in SIM card or in the active application in the UICC (GSM or USIM) file EFPUCT. PUCT information can be used to convert the home units (as used in +CAOC, +CACM and +CAMM) into currency units. SIM PIN2 is usually required to set the parameters. If setting fails in an MT error, +CME ERROR: <err> is returned.

Type	Command	Return	Description
set	AT+CPUC=<currency>,<ppu>[,<passwd>]	OK	N/A
		+CMEERROR:<err>	fail
read	AT+CPUC?	+CPUC: <currency>,<ppu>	N/A
		+CMEERROR: <err>	fail
test	AT+CPUC=?	OK	N/A

Parameter

Parameter	Description
currency	string type .three-character currency code (e.g. "GBP", "DEM"); character set as specified by command Select TE Character Set +CSCS. Currency default value is "".
ppu	string type; price per unit; dot is used as a decimal separator (e.g. "2.66")
passwd	string type; SIM PIN2

Reference

3GPP TS 27.007

6.11 Unstructured supplementary service data +CUSD

Description

This command allows control of the Unstructured Supplementary Service Data (USSD). Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD: <m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session.

When <str> is given, a mobile initiated USSD-string or a response USSD-string to a network initiated operation is sent to the network. The response USSD-string from the network is returned in a subsequent unsolicited +CUSD result code.

Type	Command	Return	Description
set	AT+CUSD=[<n>[,<str>[,<dcs>]]]	OK	N/A
		+CME ERROR: <err>	fail
test	AT+CUSD=?	+CUSD: (0-2)	N/A
read	AT+CUSD?	+CUSD: <n>	N/A

Parameter

<n>:

<n>	Description
0	Disable the indication presentation(default value)
1	Enable the indication presentation
2	Cancel USSD service (not applicable to Read Command response)

In case of enable indication presentation, it should be indicated with:

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

<m>:

<m>	Description
0	no further user action required
1	further user action required
2	Cancel USSD service (not applicable to Read Command response)

<dcs>:

<dcs>	Description
0	GSM 7 bit default alphabet; message preceded by language indication.(default value)
1	UCS2; message preceded by language indication.

Reference

3GPP TS 27.007

6.12 Supplementary service notifications +CSSN

Description

This command refers to supplementary service related network initiated notifications. The set command enables/disables the presentation of notification result codes from TA to TE.

When $<\text{n}>=1$ and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: $<\text{code1}>[,<\text{index}>]$ is sent to TE before any other MO call setup result codes. When several different $<\text{code1}>$ s are received from the network, each of them shall have its own +CSSI result code.

When $<\text{m}>=1$ and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, unsolicited result code +CSSU: $<\text{code2}>[,<\text{index}>[,<\text{number}>,<\text{type}>[,<\text{subaddr}>,<\text{satype}>]]]$ is sent to TE. In case of MT call setup, result code is sent after every +CLIP result code (refer command "Calling line identification presentation +CLIP") and when several different $<\text{code2}>$ s are received from the network, each of them shall have its own +CSSU result code.

Type	Command	Return	Description
set	AT+CSSN=[<n>[,<m>]]	OK	N/A
test	AT+CSSN=?	+CSSN: (0, 1), (0, 1)	N/A
read	AT+CSSN?	+CSSN: <n>, <m>	N/A

Parameter

$<\text{n}>$:

$<\text{n}>$	Description
0	Disable USSI
1	Enable USSI

$<\text{m}>$:

$<\text{m}>$	Description
0	Disable USSU
1	Enable USSU

$<\text{code1}>$:

$<\text{code1}>$	Description
0	Unconditional forwarding activated
1	Some conditional forwarding activated

<code1>	Description
2	Call has been forwarded
3	Call has been put on hold
4	Closed user groups with restricted access(CUG)
5	Outgoing calls are barred
6	Incoming calls are barred
7	CLIR rejected

<code2>:

<code2>	Description
0	Belong to call forwarding(MT)
1	Belong to Closed User Group (CUG)call
2	Call has been held
3	Call has been retrieved
4	Multiparty call entered
5	Call on held has been released
7	Call is being connected(alerting) with other remote party in multiparty conversation
8	Call has been connected with the other remote party in multiparty conversation

Reference

3GPP TS 27.007

6.13 Advice of charge +CAOC

Description

The command is used to inquire call counter(call accounting), open or close the function of inquiring call accounting.

Type	Command	Return	Description
execute	AT+CAOC[=<mode>]	+CME ERROR: <err>	N/A
		+CAOC: <ccm>	mode=0
test	AT+CAOC=?	+CAOC: (list of supported <mode>s)	N/A

Type	Command	Return	Description
read	AT+CAOC?	+CAOC: <mode>	N/A

Parameter

<mode>:

mode	Description
0	Inquire the value of CCM
1	Close CCM reporting
2	Activate CCM reporting

<ccm>: string type; three bytes of the current call meter value in hexadecimal format.

Example

AT+CAOC=0

Return:

+CAOC: <ccm>
OK

Reference

3GPP TS 27.007

7 Security Commands

7.1 Enter PIN +CPIN

Description

Set command sends to the ME a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken towards ME and an error message, +CME ERROR, is returned to TE.

If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM

Read command returns an alphanumeric string indicating whether some password is required or not.

Type	Command	Return	Description
Set	AT+CPIN=<pin> or AT+CPIN=<puk>, <newpin>	OK/+CME ERROR: <err>	N/A
Read	AT+CPIN?	+CPIN: <code> OK	N/A
Test	AT+CPIN=?	OK	N/A

Parameter

<pin>, <newpin>: string type values

<puk>: length is 8 digits.

<code>	Description
READY	MT is not pending for any password
SIM PIN	MT is waiting SIM PIN to be given
SIM PUK	ME is waiting SIM PUK to be given
PIN1_BLOCK_PUK1_BLOCK	PIN1 and PUK1 block
PIN1_OK_PUK1_BLOCK	PIN1 OK And PUK1 Block
PH-SIM PIN	SIM LOCK
PH-FSIM PIN	SIM LOCK

<code>	Description
PH-FSIM PUK	SIM LOCK
PH-NET PIN	SIM LOCK
PH-NET PUK	SIM LOCK
PH-NETSUB PIN	SIM LOCK
PH-NETSUB PUK	SIM LOCK
PH-SP PIN	SIM LOCK
PH-SP PUK	SIM LOCK
PH-CORP PIN	SIM LOCK
PH-CORP PUK	SIM LOCK
PH-INTEGRITY FAIL	SIM LOCK
PH-SIM PUK	SIM LOCK

Example

```
AT+CPIN?  
+CPIN: SIM PUK  
OK
```

```
AT+CPIN="12345678","2345" // PIN1 is modified to"2345"  
OK
```

```
AT+CPIN?  
+CPIN: SIM PIN  
OK
```

```
AT+CPIN="2345"  
OK
```

```
AT+CPIN?  
+CPIN: READY  
OK
```

Reference

3GPP TS 27.007

7.2 Change password +CPWD

Description

Action command sets a new password for the facility lock function defined by command Facility Lock +CLCK.

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

Type	Command	Return	Description
Set	AT+CPWD=<fac>, <oldpwd>, <newpwd>	OK/+CME ERROR: <err>	N/A
Test	AT+CPWD=?	+CPWD: (“PS”,8), (“SC”,8), (“AO”, 4), (“OI”, 4), (“OX”, 4), (“AI”, 4), (“IR”, 4), (“AB”, 4), (“AG”, 4), (“AC”, 4), (“P2”, 8), (“FD”,8), (“PN”, 8), (“PU”, 8), (“PP”, 8), (“PC”, 8) OK	N/A

Parameter

<fac>:

- “PS” SIM is locked, password is 8 digits
- “SC” PIN enabled/disabled
- “AO” Barr all outgoing calls
- “OI” Barr all outgoing international calls
- “OX” Barr all outgoing international calls, except to Home Country
- “AI” Barr all incoming calls
- “IR” Barr all calls. When roaming outside Home Country
- “AB” All barring service
- “AG” All outgoing barring service
- “AC” All incoming barring service
- “PN” Network lock with 8 digits password
- “PU” Network subset lock with 8 digits password
- “PP” Service provider lock with 8 digits password
- “PC” Corporate lock with 8 digits password
- “FD” SIM Fixed FDN Dialing lock, PIN2 is required as a password.
- “P2” PIN2 lock.

Example

```
AT+CPWD=“AI”, “1234”, “1111”
OK
```

Reference

3GPP TS 27.007

7.3 Facility lock +CLCK

Description

This command locks, unlocks, and negotiates the facilities between mobile and network.

Type	Command	Return	Description
Set	AT+CLCK=<fac>, <mode> [, <password> [, <class>]]	OK/+CME ERROR: <err>/+CLCK: <status> [, <class>] (when mode=2, it's in inquiry status.)	N/A
Read	AT+CLCK?	+CLCK (list all supported <fac>s, list corresponding <status>s) OK	N/A
Test	AT+CLCK=?	+CLCK (list all supported <fac>s)	N/A

Parameter

<fac>:

fac	Description
“PS”	SIM lock with a 6 to 16 digits password
“SC”	PIN enable/disable
“AO”	Bar all outgoing calls
“OI”	Bar all outgoing international calls
“OX”	Bar all outgoing international calls, except to Home Country
“AI”	Bar all incoming calls
“IR”	Bar all call, when roaming outside Home Country
“AB”	All barring services
“AG”	All outgoing barring services
“AC”	All incoming barring services
“PN”	Network lock with a 8 to 16 digits password
“PU”	Network subset lock with 8 to 16 digits password
“PP”	Service provider lock with a 8 to 16 digits password
“PC”	Corporate lock with a 8 to 16 digits password
“FD”	SIM fixed FDN dialing lock, PIN2 is required as a password

<mode>:

mode	Description
0	Unlock this facility
1	Lock this facility
2	Query status

<class>

class	Description
1	Voice (telephony)
2	Data(to all bear service)
4	Fax
8	Short message service
7	All classes, default value.

<status>:

- 0: deactivate
- 1: activate

<password>: (0-9)characters, the maximum length determined by command(AT+CPWD=?).

Reference

3GPP TS 27.007

7.4 Get the remaining times +XX

Description

This command is used to get the remaining times of valid attempts for PIN and PUK.

Type	Command	Return	Description
Set	AT+XX=<value>	+XX: <remaining_num> OK	N/A
Test	AT+XX=?	+XX:(0-3)	N/A

Parameter

value	Description
0	PIN 1
1	PIN 2
2	PUK 1
3	PUK 2

Example

```
AT+XX=0  
+XX: 3  
OK
```

Reference

3GPP TS 27.007

7.5 Input or modify PIN2 code +ECPIN2

Description

The command is used to input or modify PIN2 code.

Type	Command	Return	Description
Set	AT+ECPIN2=<pin2> or AT+ECPIN2=<puk2>, <new pin2>	OK +CME ERROR:<err>	N/A

Parameter

<pin2>: 4 - 8 numbers

<new pin2>: 4 – 8 numbers

<puk2>: 8 numbers

Example

```
AT+ECPIN2="12345678", "2345" //modify PIN2 to"2345"  
OK  
  
AT+ECPIN2="2345"
```

8 Short Message Commands

8.1 Select Message Service +CSMS

Description

Set command selects messaging service <service>. It returns the types of messages supported by the ME. If chosen service is not supported by the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned.

Read command returns supported message types along the current service setting. Test command returns a list of all services supported by the TA.

Type	Command	Return	Description
set	AT+CSMS=<service>	+CMS ERROR: <err>	N/A
		+CSMS: <mt>,<mo>,<bm> OK	N/A
read	AT+CSMS?	+CSMS:<service>,<mo>,<mt>,<bm> OK	N/A
test	AT+CSMS=?	+CSMS: (0-1) OK	N/A

Parameter

<service>:

- 0: SMS AT commands are compatible with GSM07.05 PHASE 2
- 1: SMS AT commands are compatible with GSM07.05 PHASE 2+

NOTE

GSM07.05 PHASE 2 and GSM07.05 PHASE 2+ are not distinguished.

<mo>: for mobile originated messages

- 0: type not supported
- 1: type supported

<mt>: for mobile terminated messages

- 0: type not supported
- 1: type supported

<bm>: for broadcast type messages

- 0: type not supported
- 1: type supported

Reference

3GPP 27005

8.2 Save Settings +CSAS

Description

Execution command saves active message service settings to a non-volatile memory. TA can contain several profiles of settings. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are saved. Certain settings may not be supported by the storage (e.g. (U)SIM SMS parameters) and therefore cannot be saved.

Type	Command	Return	Description
Execute	AT+CSAS	OK	N/A

BOOK NOTE

+CSCB configuration will not be saved in NV.

Reference

3GPP 27005

8.3 Restore Settings +CRES

Description

Execution command restores message service settings from non-volatile memory to active memory. A TA can contain several profiles of settings. Settings specified in commands Service Centre Address +CSCA, Set Message Parameters +CSMP and Select Cell Broadcast Message Types +CSCB (if implemented) are restored. Certain settings may not be supported by the storage (e.g. (U)SIM SMS parameters) and therefore cannot be restored.

Type	Command	Return	Description
Execute	AT+CRES	OK	N/A

BOOK NOTE

+CSCB configuration will not be saved in NV.

Reference

3GPP 27005

8.4 Show Text Mode Parameters +CSDH

Description

Set command controls whether detailed header information is shown in text mode result codes.

Test command returns supported values as a compound value.

Type	Command	Return	Description
Set	AT+CSDH=<show>	OK	N/A
Read	AT+CSDH?	+CSDH: <show>	N/A
Test	AT+CSDH=?	+CSDH: (0-1) OK	N/A

Parameter

show	Description
0	do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS-DELIVERs and SMS-SUBMITs in text mode; for SMS-COMMANDs in +CMGR result code, do not show <pid>, <mn>, <da>, <toda>, <length> or <cdata>
1	show the values in result codes

Reference

3GPP 27005

8.5 Preferred Message Storage +CPMS

Description

Set command selects memory storages <mem1>, <mem2> and <mem3> to be used for reading, writing, etc. If chosen storage is not appropriate for the ME (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned.

Test command returns lists of memory storages supported by the TA.

Type	Command	Return	Description
set	AT+CPMS=<mem1>[,<mem2>, [<mem3>]]	+CMS ERROR: <err>	N/A
		+CPMS:<used_1>,<total_1>, <used2>, <total2>, <used3>, <total3>, OK	N/A
read	AT+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK	N/A
test	AT+CPMS=?	+CPMS: ((“ME”, “SM”), (“ME”, “SM”), (“ME”, “SM”)) OK	N/A

Parameter

<mem1>: Memory for the messages which are read and deleted

<mem2>: Memory for the messages which are written and sent

<mem3>: Memory for the message which are received

<usedx>: the used space of <memx>

<totalx>: total space of <memx>

“SM” : SIM storage

“ME” : NV storage

BOOK NOTE

Currently support “SM” and “ME”, “sm”, “me”.

Example

```
AT+CPMS="ME"
```

Return:

```
+CPMS: 0,0,12,20,12,20
```

```
OK
```

Reference

3GPP 27005

8.6 Update SMSC address +CSCA

Description

Set command updates the SMSC address, through which mobile originated SMs are transmitted. In text mode, setting is used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero.

Type	Command	Return	Description
set	AT+CSCA=<sca>[,<tosca>]	OK	N/A
read	AT+CSCA?	+CSCA: <sca>, <tosca> OK	N/A
test	AT+CSCA=?	OK	N/A

Parameter

<sca>: 3GPP TS 24.011 [6] RP SC address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007 [9]); type of address given by <tosca>

<tosca>: 3GPP TS 24.011 [6] RP SC address Type-of-Address octet in integer format (default refer <toda>.service center address format, protocol (3GPP 24.011) uses 8-bit address integer).

Example

```
AT+CSCS="IRA"  
OK  
AT+CSCA?  
+CSCA: "+8613800230500", 145  
OK  
  
AT+CSCA="8613800230500"  
OK  
  
AT+CSCA=?  
OK  
  
AT+CSCS="HEX"  
AT+CSCA="2B38363133383030323330353030"  
OK
```

Reference

3GPP TS 27.007

8.7 Message Format +CMGF

Description

Set command tells the TA, which input and output format of messages to use. <mode> indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters). Text mode uses the value of parameter <chset> specified by command Select TE Character Set +CSCS to inform the character set to be used in the message body in the TA-TE interface.

Read command returns current setting value.

Test command returns supported modes as a compound value.

Type	Command	Return	Description
Set	AT+CMGF=<mode>	OK	N/A
Read	AT+CMGF?	+CMGF=<mode> OK	N/A
Test	AT+CMGF=?	+CMGF: (0, 1) OK	N/A

Parameter

mode	Description
0	PDU mode (default when implemented)
1	Text mode

Example

```
AT+CMGF?  
+CMGF: 0  
OK
```

```
AT+CMGF=1  
OK
```

Reference

3GPP 27005

8.8 List Messages +CMGL

Description

Execution command returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'. If listing fails, final result code +CMS ERROR: <err> is returned.

Test command shall give a list of all status values supported by the TA.

Type	Command	Return	Description
execute	AT+CMGL[=<stat>]	+CMGL: <index>, <stat>, <oa/da>, [<alpha>], [<scts>] [, <tooa/toda>, <length>] <CR><LF> <data>	Text mode: for SMS-SUBMIT
		+CMGL: <index>, <stat>, <da/oa>, [<alpha>], [<scts>] [, <tooa/toda>, <length>]<CR> <LF><data>	Text mode: for SMS-DELIVER
		+CMGL: <index>, <stat>, <fo>, <mr>, [<ra>], [<tora>], <scts>, <dt>, <st>	Text mode: for SMS-STATUS-REPORT
		+CMGL: <index>, <stat>, [<alpha>], <length>, <CR> <LF><pdu>	PDU mode
test	AT+CMGL=?	+CMGL: (list of supported <stat>s) OK	N/A

Parameter

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

<stat>: integer type in PDU mode (default 0), or string type in text mode (default "REC UNREAD"); indicates the status of message in memory; defined values:

<stat> Text mode	<stat> PDU mode	Description
"REC UNREAD"	0	Unread message
"REC READ"	1	read message
"STO UNSENT"	2	Stored and unsent message
"STO SENT"	3	Stored and sent message
"ALL"	4	All short message

<oa>: TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set; type of address given by <tooa>

<da>: TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set; type of address given by <toda>

<alpha>: string type alphanumeric representation of <da> or <oa> corresponding to the entry found in MT phonebook; implementation of this feature is manufacturer specific; used character set should be the one selected with command Select TE Character Set +CSCS

<scts>: TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

<tooa>: TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)

<toda>: TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<length>: integer type value indicating in the text mode (+CMGF=1) the length of the message body <data> (or <cdata>) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<data>: In the case of SMS: TP-User-Data in text mode responses;

<fo>: depending on the command or result code: first octet of SMS-DELIVER, SMS-SUBMIT (default 17), SMS-STATUS-REPORT, or SMS-COMMAND (default

<mr>: TP-Message-Reference in integer format

<ra>: TP-Recipient-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007 [9]); type of address given by <tora>

<tora>: TP-Recipient-Address Type-of-Address octet in integer format (default refer <toda>)

<scts>: TP-Service-Centre-Time-Stamp in time-string format (refer <dt>)

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

<st>: TP-Status in integer format

<pdu>: In sms: GSM 03.40 TPDU, HEX format, follow GSM 04.11 SC address. ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65)). When CBS, use hex GSM 03.41TPDU

Example

Set to PDU mode

```
AT+CMGF=0
OK
Show all short messages
AT+CMGL=4
+CMGL: 1,,47
0891683110304105F0000C915358103254760000000000000000002054747A0E4ACF41747419247E93F3A0B71944479741EDF27C1E3E975D
+CMGL: 2,,41
0891683110304105F011000C9153581032547600008F1E54747A0E4ACF41747419247E93F3A0B71944479741F2329C9D7701
OK
```

Set to text mode

```
AT+CMGF=1
OK
```

Set character set

```
AT+SCCS="IRA"
OK
```

Show all short messages

```
AT+CMGL="ALL"
+CMGL: 1,"REC READ","+358501234567",,"95/07/03,17:45:03+04"
```

This is the body of the message.

```
+CMGL: 2,"STO UNSENT","+358501234567",,
```

This is the body of the reply.

```
OK
```

Reference

3GPP 27005

8.9 Read Message +CMGR

Description

This command returns message with location value <index> from message storage <mem1> to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: <err> is returned.

Type	Command	Return	Description
set	AT+CMGR=<index>	+CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>	Text mode: for SMS- DELIVER only
		+CMGR:<stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data>	Text mode: for SMS-SUBMIT only
		+CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>	Text mode: for SMS- STATUS- REPORT
		+CMGR:<stat>,[<alpha>],<length>,<CR><LF><PDU>	PDU mode
test	AT+CMGR=?	+CMGR: (1-255) OK	N/A

Parameter

<index>: location in memory

<stat>: message status

<stat> Text mode	<stat> PDU mode	Description
“REC UNREAD”	0	Unread message
“REC READ”	1	read message
“STO UNSENT”	2	Stored and unsent message
“STO SENT”	3	Stored and sent message
“ALL”	4	All short message

<alpha>: character ; if alphanumeric mixed encoding mode, correspond to MT phonebook records ‘s item:
(<da> or <oa>), the application is related with Manufacturer , the character set is same as character set selected by command (+CSCS) .refer to the definition of 3GPP 27.007

<da>: destination address

<oa>: source address

<ra>: recipient-address

<scts>: service-centre-time-stamp

<tooa>: type of originating-Address

<fo>: depending on the command or result code

<pid>: protocol-Identifier

<dcs>: character set-type

<sca>: service center address

<tosca>: type of service center address

<length>: integer type value indicating the length of the message body <data>

<data>: text content

<vp>: validity period

<mp>: message reference

<dt>: discharge time

Example

```
AT+CMGF=1
OK
```

```
AT+CSCS="IRA"
OK
```

```
AT+CMGR=1
```

+CMGR: "REC READ","+358501234567",,"95/07/03,17:45:03+04"

This is the body of the message.

OK

AT+CSDH=1

OK

AT+CMGR=1

+CMGR: "REC READ","+358501234567",,"95/07/03,17:45:03+04",145,0,0,0,"+8613010314500",145,32

This is the body of the message.

OK

Reference

3GPP 27005

8.10 Send Message +CMGS

Description

This command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. If sending fails in a network or an ME error, final result code +CMS ERROR: <err> is returned.

Type	Command	Return	Description
set	AT+CMGS=<da>[,<toda>] <CR>text to send <ctrl-Z/ESC>	+CMGS:<mr>[,<scts>] OK	Text mode: Send success
		+CMS ERROR: <err>	Text mode:fail
	AT+CMGS=<length><CR> PDU to send<ctrl-Z/ESC>	+CMGS:<mr>[,<ackpdu>] OK	PDU mode and success
		+CMS ERROR: <err><PDU>	fail
test	AT+CMGS=?	OK	N/A

Parameter

<length>: the length of TPDU(bit)with a range of 7-164

PDU: It consists of <Service Center Id> (00 means no service center id) and <TPDU>. Its <Service Center Id > refers to GSM 04.11, and its <TPDU> to GSM 03.40. The 16 bit TPDU must be changed into two ASCII characters. For example, 0X2A is changed to 2 (ASCII 50) and A (ASCII 65)

<da>: destination address with a maximum length of 40

<tooa/toda>: type of destination address

- 128: Unknown numbering plan, unknown number
- 129: ISDN/telephony number plan, unknown number
- 145: ISDN/telephony number plan, international number
- 161: ISDN/telephony number plan, national number

<scts>: string type, reference GSM 03.40 TPService-Centre-Time-Stamp<dt>.

<mr>: integer type GSM 03.40 TP-Message-Reference

Example

PDU MODE

```
AT+CMGS=24
>                                         /*return an arrow*/
0891683108200105f031020b803119282071f30008ad0a00680065006c006c006f<ctrl-z>
+CMGS: 1
OK

08 - the length of service center id
91683108200105f0 - The service center id +8613800210500
```

TEXT MODE

```
AT+CMGF=1
AT+CSCS="IRA"
AT+CMGS=" 13888888888"
>                                         /*return an arrow*/
hello <ctrl-z>
+CMGS: 2
OK
```

Example of sending UCS2 characters

```
AT+CMGF=1
OK
AT+CSCS="UCS2"
OK
AT+CSMP=17,143,0,8
OK
AT+CMGS="00310033003900310038003900320038003000360036"
>                                         /*return an arrow*/
4F60597D<ctrl-Z>
+CMGS: 3
OK
```

Reference

3GPP 27005

8.11 Set Text Mode Parameters +CSMP

Description

Set command is used to select values for additional parameters needed when SM is sent to the network or placed in storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC with double quotes.

Type	Command	Return	Description
set	AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]	OK	N/A
		+CMS ERROR: <err>	fail
read	AT+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs>	N/A
test	AT+CSMP=?	+CSMP: (0-255), (0-255), (0-9, 11, 12,127), (0-255) OK	N/A

Parameters

<fo>: First Octet, code according to the Description below. The default value is 19.

b7	b6	b5	b4	b3	b2	b1	b0
RP	UDHI	SRR	VPF		RD	MTI	

RP : Reply path, invalid in text mode.

UDHI: User Data Header Information.

SRR : Status Report Request. b5=1, if a status report is requested.

VPF : Validity Period Format

- b4=0 & b3=0 → <vp> field is not present
- b4=1 & b3=0 → <vp> field is present in relative format

Other formats are not supported.

RD: Reject Duplicates, b2=1 to instruct the SC to reject an SMS-SUBMIT for and SM still held in the SC which has the same <mr> and the same <da> from the same <oa>.

MTI: Message type indicator

- b1=0 & b0=0 → SMS-DELIVER (in the direction SC to MS)
- b1=0 & b0=1 → SMS-SUBMIT (in the direction MS to SC)

<vp> validity period with a default value of 143

- 0 to 143: (VP + 1) x 5 minutes (the maximum period is 12 hours)

- 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

<pid> is used to indicate the higher layer protocol being used or indicates interworking of a certain type of telematic device. Its default value is 0.

- 0 implicit - device type is specific to this SC, or can be concluded on the basis of the address
- 1 telex (or teletex reduced to telex format)
- 2 group 3 telefax
- 3 group 4 telefax
- 4 voice telephone (i.e. conversion to speech)
- 5 ERMES (European Radio Messaging System)
- 6 National Paging system (known to the SC)
- 7 Videotex (T.100/T.101)
- 8 teletex, carrier unspecified
- 9 teletex, in PSPDN
- 11 teletex, in analog PSTN
- 12 teletex, in digital ISDN
- 7F SIM DOWNLOAD

Coding Description of <dcs> information with a default value of 0.

Example

```
AT+CSMP=17,143,0,0  
OK
```

```
AT+CSMP?  
+CSMP: 17, 143, 0, 0  
OK
```

Reference

3GPP 27005

8.12 Write Message to Memory +CMGW

Description

This command stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given. The entering of text is done similarly as specified in command Send Message +CMGS. If writing fails, final result code +CMS ERROR: <err> is returned.

Type	Command	Return	Description
Set	AT+CMGW=<length>[,<stat>]<CR> > /*return an arrow*/	+CMGW: <index> OK	If the SM format is PDU mode, PDU is given <ctrl-Z/ESC>.
	AT+CMGW="<oa/da>","[<tooa/toda>[,<stat>]]<CR> > /*return an arrow*/	+CMGW: <index> OK	If the SM format is TEXT mode, TEXT is given <ctrl-Z/ESC>

Parameter

<length>: the length of TPDU(bit) with a range of 7-164

<oa/da>: destination address with the maximum length of 40 bits.

<tooa/toda>: type of destination address

- 128: Unknown numbering plan, unknown number.
- 129: ISDN/telephony number plan, unknown number.
- 145: ISDN/telephony number plan, international number.
- 161: ISDN/telephony number plan, national number.

<stat> Text mode	<stat> PDU mode	Description
"REC UNREAD"	0	Unread message
"REC READ"	1	read message
"STO UNSENT"	2	Stored and unsent message
"STO SENT"	3	Stored and sent message
"ALL"	4	All short message

< index>: index id of <mem2>

<PDU>: same to AT+CMGS

<Text>: same to AT+CMGS

Example

```
AT+CMGF=1
OK
AT+CSCS="IRA"
OK
AT+CMGW="13918928088"
>                                /*return an arrow*/
TEST <ctrl-Z>
+CMGW: 16
OK
```

Reference

3GPP 27005

8.13 Send Message from Storage +CMSS

Description

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

Type	Command	Return	Description
Set	AT+CMSS=<index> [,,”<da>” [, <toda>]]	+CMSS: <mr> OK	N/A
Test	AT+CMSS=?	OK	N/A

Parameter

<index>: index num of SIM

<da>: destination address

<toda>

- 128: Unknown numbering plan, unknown number
- 129: ISDN/telephony number plan, unknown number
- 145: ISDN/telephony number plan, international number
- 161: ISDN/telephony number plan, national number

Example

```
AT+CSGS="IRA"
OK
AT+CMGF=1
OK
AT+CMGW="13918928088"
>
TEST <ctrl-Z>
+CMGW: 16
OK

AT+CMSS=16
+CMSS: 4
OK
```

Reference

3GPP 27005

8.14 Delete Message +CMGD

Description

This command deletes message from preferred message storage <mem1> location <index>. If <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, final result code +CMS ERROR: <err> is returned.

Test command shows the valid memory locations and optionally the supported values of <delflag>.

Type	Command	Return	Description
Set	AT+CMGD=<index>[, <delflag>]	OK/ERROR	N/A
Test	AT+CMGD=?	+CMGD: (1-255), (0-4) or (), (0-4) OK	N/A

Parameter

<index>: index num of chosen memory <mem1>, which should be less than the maximum num item of <mem1>.

<delflag>:

delflag	Description
0	Delete the message specified in <index>
1	Delete all read messages from preferred message storage, leaving unread messages and 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.

NOTE

When <delflag> is between 1 and 4 and when <index> is omitted.

Reference

3GPP 27005

8.15 Cell Broadcast Message Types +CSCB

Description

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

Test command returns supported modes as a compound value.

Type	Command	Return	Description
Set	AT+CSCB=[<mode>[,<mids>[,<dcss>]]]	OK	N/A
Read	AT+CSCB?	+CSCB=<mode>, <mids>, < dcss>	N/A
Test	AT+CSCB=?	+CSCB: (0,1) OK	N/A

NOTE

This command is allowed in TEXT mode.

Parameter

<mode>:

<mode>	Description
0	message types specified in <mid> and <dcs> are accepted.
1	message types specified in <mid> and <dcs> are not accepted.

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

< dcss >: string type; 0~255 (default is empty string)

Reference

3GPP 27005

8.16 New Message Indications to TE +CNMI

Description

Set command selects the procedure, how receiving of new messages from the network is indicated to the TE when TE is active, e.g. DTR signal is ON. If TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in 3GPP TS 23.038 [2].

Type	Command	Return	Description
Set	AT+CNMI=[<mode>[,<mt>[,<cbm>[,<ds>[,<bfr>]]]]]	OK/ERROR	N/A
Read	AT+CNMI?	+CNMI: 3, 0, 0, 0, 0 OK	N/A
Test	AT+CNMI=?	+CNMI: (0-3), (0-3), (0-3), (0-2), (0-1) OK	N/A

Parameter

<mode> : controls the processing of unsolicited result codes specified within this command. Default value is 3.

mode	Description
3	Return result code to DTE

<mt>: set the indication format of MT message with a default value of 0

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	No indication No SMS-DELIBER	No indication No SMS-DELIBER	No indication No SMS-DELIBER	No indication No SMS-DELIBER
1	Auto-indication +CMTI: <mem>, <index>	Auto-indication +CMTI: <mem>, <index>	Auto-indication +CMTI:<mem>, <index>	Auto-indication +CMTI:<mem>, <index>
2	Direct indication +CMT: result code.	Direct indication +CMT: result code.	Direct indication +CMTI: <mem>, <index>	Direct indication +CMT: result code.
3	Auto-indication +CMTI:<mem>,<index>	Auto-indication +CMTI:<mem>,<index>	Auto-indication +CMTI:<mem>,<index>	Auto-indication +CMT: result code.

<cbm>: Configure the indication of cell broadcast message. Its default value is 0.

cbm	Description
0	No CBM indications are routed to the TE. The CBMS are stored.
1	The CBM is stored and an indication of the memory location is routed to the user
2	Reserved (at present, handling as defined in <cbm>=1)
3	Reserved (at present, handling as defined in <cbm>=1)

<ds>: Configure the indication for SM status report. Its default value is 0.

ds	Description
0	No SMS-STATUS-REPORTS are routed
1	SMS-STATUS-REPORTS are routed using +CDS:<length><CR><LF><pdu> (PDU mode enabled); or +CDS:<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (text mode enabled)
2	If SMS-STATUS-REPORT is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code: +CDSI:<mem>,<index>

<bfr> Its default value is 0.

bfr	Description
0	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes).
1	TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered.

Example

```
AT+CNMI=3, 0, 1, 1
OK
```

```
AT+CNMI?
+CNMI: 3, 0, 1, 1, 0
OK
```

Reference

3GPP 27005

8.17 Changes the status in SIM card +SMSC

Description

This command changes the status of message stored in SIM card.

Type	Command	Return	Description
Set	AT+SMSC=<loc>, <status>	OK/+CMS ERROR: <err>	N/A
Test	AT+SMSC=?	+SMSC: (1-max), (* if max is 30 in USIM/SIM, return: +SMSC: (1-30),) OK or +SMSC: (1-max), "REC UNREAD", "REC READ", "STO UNSENT", "STO SENT" OK	N/A

Parameter

<loc>: message sequence in SIM card

<status>: The new status to be changed can from unread to read(vice versa), or from unsent to sent(vice versa).

PDU MODE	TEXT MODE
0	REC UNREAD
1	REC READ
2	STO UNSENT
3	STO SENT

Example

```
AT+CMGF=1
OK
AT+SMSC=2, "REC READ"
OK

AT+CMGF=0
OK
AT+SMSC=2,1
OK
```

8.18 New Message Acknowledgement to ME/TA +CNMA

Description

This command confirms correct reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE (refer to command +CNMI tables).

This acknowledgement command (causing ME to send RP-ACK to the network) shall be used when +CSMS parameter <service> equals 1.

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.

Type	Command	Return	Description
Execute	AT+CNMA	OK	TEXT mode
Set	AT+CNMA [= <n>[, <length>[<CR> PDU is given<ctrl-Z/ESC>]]]	OK	PDU mode
Test	AT+CNMA=?	+CNMA: (0-2) OK	PDU mode

Parameter

<n>	DESCRIPTION
0	command operates similarly as defined for the text mode
1	send RP-ACK
2	send RP-ERROR

<length>: ACKPDU length(octet)

Reference

3GPP 27005

8.19 More Messages to Send +CMMS

Description

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

Test command returns supported values as a compound value.

Type	Command	Return	Description
Set	AT+CMMS=[<n>]	OK	N/A
Read	AT+CMMS?	+CMMS: <n> OK	N/A
Test	AT+CMMS=?	+CMMS: (0-2) OK	N/A

Parameter

<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).

Reference.

3GPP 27005

8.20 Send Command +CMGC

Description

The command is used to send short message.

Type	Command	Return	Description
set	AT+CMGC=<length><CR> PDU is given<ctrl-Z/ESC	+CMGC:<mr>[,<ackpdu>] OK	PDU mode success
		+CMSS ERROR: <err>	PDU mode fail
test	AT+CMGC=?	+ CMGC: OK	N/A

NOTE

Not support text mode.

Parameter

<length>: 8 bytes format TPDU (not include 8 bytes of SMSC address)

PDU: including <SMS center number><00 means the number using +CSCA set> + <TPDU>, and <SMS center number> follows the provisions of 3GPP TS 24.011, <TPDU> follows the provisions of 3GPP TS 23.040. The hexadecimal TPDU must change to two ASCII characters. EXP: 0x2A means to 2(ASCII 50) and A (ASCII 65)

Example

```
AT+CMGF=0
AT+CMGC=14
>
```

```
0001020101010b815109905944f500
+CMGC: 1
OK
```

Reference

3GPP 27005

8.21 5GS use of SMS over NAS +C5GUSMS

Description

The set command enables the UE to request the use of SMS over NAS in 5GS or to request stopping the use of SMS over NAS in 5GS. Additionally, the set command controls the presentation of the unsolicited result code +C5GUSMS: <sms_available>,<sms_allowed> when <n>=2 and SMS over NAS in 5GS allowed status information or SMS over NAS in 5GS availability status information is received from the network, for the UE (see 3GPP TS 24.501 [161] subclauses 5.4.4.3, 5.5.1.2.4 and 5.5.1.3.4).

The read command returns the current SMS over NAS in 5GS availability status for the UE and the current SMS over NAS in 5GS allowed status for the UE.

Command	Possible Response(s)
+C5GUSMS=[<n>[,<sms_requested>]]	+CME ERROR: <err>
+C5GUSMS?	+C5GUSMS: <sms_available>,<sms_allowed>
+C5GUSMS=?	+C5GUSMS: (list of supported <n>s),(list of supported <sms_requested>s)

Parameter

<n>: integer type

- 0: no change in current setting of <n>
- 1: disable unsolicited result code +C5GUSMS <sms_available>,<sms_allowed>
- 2: enable unsolicited result code +C5GUSMS: <sms_available>,<sms_allowed>

<sms_requested>: integer type; indicates the UE's request for SMS over NAS in 5GS.

- 0: triggers the UE to request the use of SMS over NAS in 5GS
- 1: triggers the UE to request stopping the use of SMS over NAS in 5GS

<sms_available>: integer type; indicates the current SMS over NAS in 5GS availability status for the UE in the network.

- 0: indicates that the SMS over NAS in 5GS availability status for the UE is unknown
- 1: indicates that SMS over NAS in 5GS is not available in the network for the UE (see 3GPP TS 24.501 [161] subclause 5.4.4.3)
- 2: indicates that SMS over NAS in 5GS is available in the network for the UE (see 3GPP TS 24.501 [161] subclause 5.4.4.3)

<sms_allowed>: integer type; indicates the current SMS over NAS in 5GS allowed status for UE in the network.

- 0: indicates that SMS over NAS in 5GS allowed status for the UE is unknown
- 1: indicates that the UE is not allowed by the network to use SMS over NAS in 5GS (see 3GPP TS 24.501 [161] subclauses 5.4.4.3, 5.5.1.2.4 and 5.5.1.3.4)
- 2: indicates that the UE is allowed by the network to use SMS over NAS in 5GS (see 3GPP TS 24.501 [161] subclauses 5.5.1.2.4 and 5.5.1.3.4)

8.22 Notify not receive or retrieve to receive SMS +SPSMSFULL

Description

This commands allows to notify modem not receive SMS when the storage full, or retrieve to receive SMS

When the storage has space.

Type	Command	Return	Description
Set	AT+SPSMSFULL=<n>	OK	N/A
Read	AT+SPSMSFULL?	OK	N/A
Test	AT+SPSMSFULL=?	+SPSMSFULL:(0,1) OK	N/A



This command is used such situation: only SMS is only stored in AP, not in SIM.

Parameter

<n>	Description
0	Notify modem that storage is not full at AP, can receive the SMS
1	Notify modem that storage is full at AP, not receive the SMS

9 SIM/STK Commands

9.1 Turn result to SIM after perform STK +SPUSATTERMINL

Description

Send USAT terminal response to the UICC as an answer to a preceding USAT proactive command sent from the UICC with unsolicited result code +SPUSATPROCMDIND: <proactive_command> (see +SPUSATPROCMDIND command description).

Type	Command	Return	Description
Set	AT+SPUSATTERMINAL=<terminal_response>	+SPUSATTERMINAL: <result> OK/+CME ERROR: <err>	N/A

NOTE

The following proactive command can be responded with AT+SPUSATTERMINAL=<terminal_response>.

- DISPLAY TEXT
- GET INKEY
- GET INPUT
- PLAY TONE
- SELECT ITEM
- SETUP EVENT LIST
- SETUP IDLE MODE TEXT
- SEND DATA
- RECEIVE DATA
- LAUNCH BROWSER
- OPEN CHANNEL
- CLOSE CHANNEL
- GET CHANNEL STATUS
- REFRESH
- SETUP_CALL
- SEND_SMS
- SEND_SS
- SEND_USSD
- SEND_DTMF
- SELECT_ITEM

- SETUP_MENU
- PROVIDE_LOCATION_INFO
- MORE_TIME(exclusive)
- RUN_AT_COMMAND

Parameter

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

<result>:

- 0: the terminal response is sent successfully.
- 1: the terminal response is sent unsuccessfully.

9.2 Set up call on STK +SPUSATCALLSETUP

Description

Send response to USAT proactive command with unsolicited result code +SPUSATSETUPCALL (see +SPUSATSETUPCALL command description) to refuse or accept the call.

Type	Command	Result	Description
set	AT+SPUSATCALLSETUP=<opt>	OK	N/A
		+CME ERROR: <err>	fail
test	AT+SPUSATCALLSETUP=?	+SPUSATCALLSETUP:(0-1)	N/A

Parameter

<opt>:

- 0: refuse the call
- 1: accept the call

9.3 ME Send EVENT to SIM +SPUSATENVECMD

Description

Send a USAT envelope command to the UICC.

Type	Command	Result	Description
set	AT+SPUSATENVECMD=<enve>	+SPUSATENVECMD: <result> OK	N/A

Type	Command	Result	Description
		+CME ERROR: <err>	fail

NOTE

The following STK commands are supported:

- MENU SELECTION
- USER ACTIVITY EVENT DOWNLOAD
- IDLE SCREEN AVAILABLE EVENT DOWNLOAD
- LANGUAGE SELECT EVENT DOWNLOAD
- BROWSER TERMINATION EVENT DOWNLOAD
- DATA AVAILABLE EVENT DOWNLOAD
- CHANNEL STATUS EVENT DOWNLOAD

Parameter

<enve>: the envelop command as defined in 3GPP TS 31.111.

<result>:

- 0: the command is sent successfully
- 1: the command is sent unsuccessfully.

9.4 ME supports STK feature +SPUSATPROFILE

Description

The command is used to inquire the terminal ability for STK.

Type	Command	Return	Description
Read	AT+SPUSATPROFILE?	+SPUSATPROFILE: <profile> OK	N/A

Parameter

<profile>: terminal profile data.

9.5 Check if STK is activated +SPUSATCAPREQ

Description

The command is used to inquire whether the STK is activated.

Type	Command	Return	Description
Read	AT+SPUSATCAPREQ?	+SPUSATCAPREQ:<result>	N/A
Test	AT+SPUSATCAPREQ=?	+SPUSATCAPREQ:(0,1)	N/A

Parameter

<result>:

- 0: STK is activated
- 1: STK is not activated

9.6 Notify CP that AP STK is ready or not +SPUSATAPREADY

Description

The command is used to notify CP that AP STK application is ready or not.

Type	Command	Result	Description
set	AT+SPUSATAPREADY=<flag>	OK	N/A
		+CME ERROR:<err>	fail
read	AT+SPUSATAPREADY?	+SPUSATAPREAD:<flag>	N/A
test	AT+SPUSATAPREADY=?	+SPUSATAPREAD:(0,1)	N/A

Parameter

<flag>: ready flag

- 0: STK function of AP is not ready.
- 1: STK function of AP is ready.

9.7 Generic SIM access +CSIM

Description

Directly send APDU command to SIM card that is installed in the currently selected card slot. The SIM information processing shall be within the frame specified by GSM/UMTS.

Type	Command	Result	Description
set	AT+CSIM=<length>, <command>	+CSIM:<length>, <response>	N/A

Type	Command	Result	Description
		+CME ERROR: <err>	fail
test	AT+CSIM=?	OK	N/A

NOTE

- Executing this command through the debug channel is not allowed.
- The response of this command depends on the SIM status in the currently selected card slot.
- Support instruction commands:

```
/* obtain data */
SIM_GET_RESPONSE

/* select files and get attribution of file */
SIM_SELECT
/* SIM polling */
SIM_STATUS

/*data management */
SIM_READ_BINARY
SIM_UPDATE_BINARY
SIM_READ_RECORD
SIM_UPDATE_RECORD
SIM_SEARCH_RECORD /*SIM_SEEK*/
SIM_INCREASE
/*authentication*/
SIM_AUTHENTICATE /*SIM_RUN_GSM_ALGO*/

/*logical channel management*/
SIM_MANEGE_CHANNEL
SIM_GET_CHALLENGE

/*file management*/
SIM_DEACTIVATE_FILE
SIM_ACTIVATE_FILE /*SIM_REHABILITATE*/

/* PIN code management */
SIM_VERIFY_PIN
SIM_CHANGE_PIN
SIM_DISABLE_PIN
SIM_ENABLE_PIN
SIM_UNBLOCK_PIN
```

```
/* USAT / STK */
SIM_TERMINAL_PROFILE
SIM_ENVELOPE
SIM_FETCH
SIM_TERMINAL_RESPONSE
```

Parameter

<length>: even integer; the length of APDU command to the UICC, between 8 and 522, or the length of the RPDU from the UICC

<command>: hexadecimal character format; the content of APDU command

<response>: hexadecimal character format; the response of the command from UICC

Example

File Selection

```
AT+CSIM=14, "a0a40000023f00"
```

Data Obtaining:

```
AT+CSIM=10, "a0c0000017"
```

SIM polling

```
AT+CSIM=10, "A0F2000016"
```

PIN 1 modification(Change PIN from 1234 to 5678)

```
AT+CSIM=42, "A02400011031323334FFFFFFF35363738FFFFFFF"
```

Reference

3GPP TS 27.007

9.8 Generic UICC logical channel access +CGLA

Description

Directly send APDU command to SIM card that is installed in the currently selected card slot. The SIM information processing shall be within the frame specified by GSM/UMTS.

Type	Command	Result	Description
set	AT+CGLA=<sessionid>, <length>, <command>	+CGLA:<length>, <response> OK	N/A
		+CME ERROR: <err>	fail
test	AT+CGLA=?	OK	N/A

NOTE

The response of this command depends on the SIM status in the currently selected card slot.

Parameter

<sessionid>: Integer; indicates which logical channel to send. Support channel 1 to 3.

<length>: even integer; the length of APDU command to the UICC, between 8 and 522, or the length of the RPDU from the UICC.

<command>: hexadecimal character format; the content of APDU command.

<response>: hexadecimal character format; the response of the command from UICC.

Reference

3GPP TS 27.007

9.9 Open logical channel +CCHO

Description

A channel number will be returned by execution of the command, A specified logical channel will be opened by selecting corresponding application using this command on the currently selected UICC.

Type	Command	Result	Description
set	AT+CCHO=<df-name>	+CCHO:<session id>	N/A
		OK	
		+CME ERROR: <err>	fail

NOTE

The response of this command is depends on the SIM status and/or the result of the DF selecting in the currently selected card slot.

Parameter

<df-name>: string, length from 2 to 32 bytes, all selectable applications in the UICC are referenced by a DF name coded on 1 to 16 bytes

<session id>: integer type; a session ID to be used in order to target a specific application on the UICC using logical channels mechanism.

Example

```
AT+CCHO="A000000871002FF86FFFF89FFFFFF"
```

Reference

3GPP TS 27.007

9.10 Close logical channel +CCHC

Description

This command closes a communication session with the active UICC. The previously opened logical channel will be closed.

Type	Command	Result	Description
set	AT+CCHC=<session id>	OK	N/A
		+CME ERROR: <err>	fail

NOTE

The response of this command is depends on the SIM status and/or the specified logic channel status in the currently selected card slot.

Parameter

<session id>: integer type; a session ID, from 1 to 3, to be closed, which previously opened and used in order to target a specific application on the UICC using logical channels mechanism.

Reference

3GPP TS 27.007

9.11 Query current sim card type - ^CARDMODE

Description

Query current sim card type in the currently selected card slot.

Type	Command	Result	Description
execute	AT^CARDMODE	^CARDMODE: <sim_type> OK	N/A
		+CME ERROR: <err>	fail

NOTE

The response of this command depends on the SIM status in the currently selected card slot.

Parameter

<sim_type>:

- 0: Unknown type
- 1: SIM card
- 2: USIM card
- 3: TEST_USIM_MODE
- 4: TEST_SIM_MODE

9.12 Authorize USIM/SIM - ^MBAU

Description

This command is used to do the authentication on USIM/SIM.

Type	Command	Return	Description
Set	AT^MBAU=<RAND>[,<AUTN/Ks_input>]	^MBAU: <status>[,<RES/AUTS>,<CK/KC>,<IK>] OK	N/A
Test	AT^MBAU=?	^MBAU:<rand>,<autn> (<rand>: 16 bytes, string type values, Hexadecimal, <autn>: 16 bytes ,string type values, Hexadecimal) OK	N/A

NOTE

The response of this command is depends on the SIM status and/or the calculation result in the currently selected card slot.

Parameter

<RAND>: RAND value

<AUTN/Ks_input>: AUTN for USIM, Ks_input for SIM.

<status>:

- 0: authentication success
- 1: unsupported security context
- 2: Invalid MAC
- 3: Synchronization failure
- 4: Other Error
- 255: other failure value

<RES/AUTS>:

- RES: return RES, if authentication success.
- AUTS: return AUTS, if synchronization failure.

<CK/KC>: Cipher Key or Kc, if authentication success.

<IK>: Integrated Key, if authentication success.

9.13 Restricted SIM access +CRSM

Description

This command has limited access to the SIM database. With required parameters to the modem, a response with actual SIM information parameters and response data will return. Error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Type	Command	Result	Description
set	AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]]	+CRSM:<sw1>,<sw2>[,<response>] OK	N/A
		+CME ERROR: <err>	fail
test	AT+CRSM=?	OK	N/A

NOTE

The response of this command is depends on the SIM status and/or the accessing result in the currently selected card slot.

Parameter

<command>: passed on by the modem to the SIM

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

<field>: integer type(0-65535); this is the identifier of a elementary data file on USIM/SIM. Mandatory for every command except STATUS

<P1>, <P2>, <P3>: integer type(0-255); Parameters passed to the SIM. P1、P2 Parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in 3GPP TS 51.011

<pathid>: string type; contains the path of an elementary file on the SIM in hexadecimal format as defined in ETSI TS 102 221 (e.g. "7F205F70" in SIM and UICC case). The <pathid> shall only be used in the mode "select by path from MF" as defined in ETSI TS 102 221

<data>: information which shall be written to the SIM (hexadecimal character format)

<sw1>, <sw2>: integer type; information from the SIM about the execution of the actual command. These Parameters are returned in both cases, on successful or failed execution of the command

<response>: response of a successful completion of the command previously issued (hexadecimal character format) <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command.

Example

```
AT+CRSM=176,12258,0,0,10,0,"3F00"
+CRSM: 144,0,989400202041000040F5
OK

AT+CRSM=192,28486,0,0,15,0,"3F007FFF"
+CRSM: 106,130
OK
```

Reference

3GPP TS 27.007

9.14 Restricted UICC logical channel access +CRLA

Description

This command has limited access to the SIM database. With required parameters to the modem, a response with actual SIM information parameters and response data will return. Error result code +CME ERROR may be returned when the command cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1> and <sw2> parameters.

Type	Command	Return	Description
Set	AT+CRLA=<sessionid>,<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]]	+CRLA: <sw1>,<sw2>[,<response>] OK	N/A
Test	AT+CRLA=?	OK	N/A

NOTE

The response of this command is depends on the SIM status and/or the accessing result in the currently selected card slot.

Parameter

<sessionid>: integer type; this is the identifier of the session to be used in order to send the APDU commands to the UICC. It is mandatory in order to send commands to the UICC when targeting applications on the smart card using a logical channel other than the default channel (channel "0").

<command>: passed on by the modem to the SIM

- 176: READ BINARY
- 178: READ RECORD
- 192: GET RESPONSE
- 214: UPDATE BINARY

- 220: UPDATE RECORD
- 242: STATUS

<field>: integer type(0-65535); this is the identifier of a elementary data file on USIM/SIM. Mandatory for every command except STATUS

<P1>, <P2>, <P3>: integer type(0-255); Parameters passed on by the DMT to the USIM/SIM. P1、 P2 Parameters are mandatory for every command, except GET RESPONSE and STATUS. The values are described in 3GPP TS 51.011

<pathid>: string type; contains the path of an elementary file on the SIM in hexadecimal format as defined in ETSI TS 102 221 (e.g. "7F205F70" in SIM and UICC case). The <pathid> shall only be used in the mode "select by path from MF" as defined in ETSI TS 102 221

<data>: information which shall be written to the SIM (hexadecimal character format)

<sw1>, <sw2>: integer type; information from the SIM about the execution of the actual command. These Parameters are returned in both cases, on successful or failed execution of the command

<response>: response of a successful completion of the command previously issued (hexadecimal character format) <response> is not returned after a successful UPDATE BINARY or UPDATE RECORD command.

Example

```
AT+CRLA=1,176,12258,0,0,10,0,"3F00"  
+CRLA: 144,0,989400202041000040F5  
OK
```

```
AT+CRLA=1,192,28486,0,0,15,0,"3F007FFF"  
+CRLA: 106,130  
OK
```

Reference

3GPP TS 27.007

9.15 Store or reset a given storage profiles +CUSATW

Description

Store or reset a given storage profiles.

Type	Command	Return	Description
Execute	AT+CUSATW	OK	N/A
Set	AT+CUSATW= <profile storage>[,<profile>]	OK / +CUSATW:<profile storage>,<conflict_profile> +CME ERROR: 3	N/A
Test	AT+CUSATW=?	+CUSATW: (list of supported <profile_storage>s) OK	N/A

Parameter

<profile_storage>: integer type.

- 0: TE
- 1: MT
- 5: Refers to a conflict between the TE profile and the list of MT only facilities.

<profile>: string type in hexadecimal character format.

<conflict_profile>: string type in hexadecimal character format.

Example

```
AT+CUSATW=0,"08E9731610D007C"  
OK
```

9.16 Inform a request from SIM card

+SPUSATPROCMDIND

Description

This command informs a request from SIM card to the application procedure and instructs that a proactive command occurred.

```
+SPUSATPROCMDIND:<string>
```

Parameter

<String> is the structure of the proactive command message, the definition refer to 102.223 protocol.

The following STK command is used here:

- SET UP MENU
- DISPLAY TEXT
- GET INKEY
- GET INPUT

- SETUP CALL
- PLAY TONE
- SELECT ITEM
- SETUP EVENT LIST
- SETUP IDLE MODE TEXT
- REFRESH
- SEND DATA
- RECEIVE DATA
- LAUNCH BROWSER
- OPEN CHANNEL
- CLOSE CHANNEL
- GET CHANNEL STATUS

9.17 Informs ME to setup call + SPUSATSETUPCALL

Description

The command informs ME to setup call.

+SPUSATSETUPCALL:<string>

Parameter

<String> is the structure of the proactive command message (SETUP CALL), the definition refer to 3GPP 102.223 protocol.

9.18 Informs a request from SIM + SPUSATDISPLAY

Description

This unsolicited command informs a request from SIM to the application procedure and instructs that a proactive command occurred.

+ SPUSATDISPLAY:<string>

Parameter

<String> is the structure of the proactive command message, the definition refer to 102.223 protocol.

The following STK command is used here :

- SEND SMS
- SEND USSD
- SEND DTMF

9.19 STK session ended Indication +SPUSATENDSESSIONIND

Description

The unsolicited command indicates to app that a STK session ended

+SPUSATENDSESSIONIND

Parameter

NONE

9.20 Report STK REFRESH operation result +SPUSATREFRESH

Description

The command is report STK REFRESH operation result which includes the type of REFRESH, the num of files updated and the path of files updated.

+SPUSATREFRESH: <refresh_result>, <file_num>, <file_path>, <aid_type>

Parameter

<refresh_result>: the type of STK REFRESH

index	Description
0	ATC_SIM_REFRESH_FILE_UPDATE
1	ATC_SIM_REFRESH_INIT
2	ATC_SIM_REFRESH_RESET
3	ATC_SIM_REFRESH_ERROR
4	ATC_SIM_REFRESH_UNKOWN,

<file_num>: the number of file which is required to update.(Note)

<file_path>: the path of file which is required to update. (Note)

BOOK NOTE

<file_num> and <file_path>:Only if and only <refresh_result> equals the followed value:.

- 0: ATC_SIM_REFRESH_FILE_UPDATE
- 1: ATC_SIM_REFRESH_INIT

<aid type>:

- SIM_APPLN_AID_TYPE_NONE (0, refresh without AID string)
- SIM_APPLN_AID_TYPE_USIM (1, AID string indicator USIM)
- SIM_APPLN_AID_TYPE_ISIM (2, AID string indicator ISIM)
- SIM_APPLN_AID_TYPE_CSIM (3 AID string indicator CSIM)

Unisoc Confidential For hiar

10 GPRS Commands

10.1 Define PDP context +CGDCONT

Description

The set command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

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

The settings will not be saved in MS after system reboot.

Command	Possible response(s)
+CGDCONT=?	+CGDCONT:(range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request_type>s),(list of supported <P- CSCF_discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s),(list of supported <NSLPI>s),(list of supported <securePCO>s),(list of supported <IPv4_MTU_discovery>s),(list of supported <Local_Addr_Ind>s),(list of supported <Non-IP_MTU_discovery>s),(list of supported <Reliable_Data_Service>s),(list of supported <SSC_mode>s),,(list of supported <Pref_access_type>s),(list of supported <RQoS_ind>s),(list of supported <MH6-PDU>s),(list of supported <Always-on_req>s) [<CR><LF>+CGDCONT:(range of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s),(list of supported <IPv4AddrAlloc>s),(list of supported <request_type>s),(list of supported <P- CSCF_discovery>s),(list of supported <IM_CN_Signalling_Flag_Ind>s),(list of supported <NSLPI>s),(list of supported <securePCO>s),(list of supported <IPv4_MTU_discovery>s),(list of supported <Local_Addr_Ind>s),(list of supported <Non-IP_MTU_discovery>s),(list of supported <Reliable_Data_Service>s),(list of supported <SSC_mode>s),,(list of supported <Pref_access_type>s),(list of supported <RQoS_ind>s),(list of supported <MH6-PDU>s),(list of supported <Always-on_req>s) [...]]

Parameter

<cid>: (PDP Context Identifier) integer, presents PDP context ID(Reference TS 27.007).

<pdp_type>: (Packet Data Protocol type), currently, only IP (Internet Protocol) is supported.

<APN>: (Access Point Name) character string, which is used to select GGSN or other data subnets. Please consult local network providers. China Telecom APN who serves Internet is “cmnet”, while the one who serves Wap is “cmwap”.

<pdp_address>: character string, specified PDP address. This string can be blank, because an address will be distributed by network dynamically.

<d_comp>: whether the PDP data should be compressed, 0: No compression, 1: Compression. This bit doesn't need to be filled, for its default value is 0. Currently, DMT data compression is not supported by any network.

<h_comp>: whether the PDP header should be compressed. 0: No compression, 1: Compression. This bit doesn't need to be filled, for its default value is 0.

Currently, data compression is not supported by any network.

<IPv4AddrAlloc>: integer type; controls how the MT/TA requests to get the IPv4 address information

- 0 IPv4 address allocation through NAS signalling
- 1 IPv4 address allocated through DHCP

<request_type>: integer type; indicates the type of PDP context activation request for the PDP context,

- 0 PDP context is for new PDP context establishment or for handover from a non-3GPP access network (how the MT decides whether the PDP context is for new PDP context establishment or for handover is implementation specific).
- 1 PDP context is for emergency (bearer) services.
- 2 PDP context is for new PDP context establishment.
- 3 PDP context is for handover from a non-3GPP access network.

<P-CSCF_discovery>: integer type; (not support)

<IM_CN_Signalling_Flag_Ind>: integer type; (not support)

<NSLPI>: integer type; (not support)

<securePCO>: integer type. (not support)

<IPv4_MTU_discovery>: integer type; (not support)

<Local_Addr_Ind>: integer type; indicates to the network whether or not the MS supports local IP address in TFTs (see 3GPP TS 24.301 [83] and 3GPP TS 24.008 [8] subclause 10.5.6.3).

- 0 indicates that the MS does not support local IP address in TFTs
- 1 indicates that the MS supports local IP address in TFTs

<Non-IP_MTU_Discovery>: integer type; (not support)

<Reliable_Data_Service>: integer type; (not support)

<SSC_mode>: integer type; indicates the session and service continuity (SSC) mode for the PDU session in 5GS, see 3GPP TS 23.501 [165].

- 0 indicates that the PDU session is associated with SSC mode 1
- 1 indicates that the PDU session is associated with SSC mode 2
- 2 indicates that the PDU session is associated with SSC mode 3

<S-NSSAI>: string type in hexadecimal character format. Dependent of the form, the string can be separated by dot(s) and semicolon(s). The S-NSSAI is associated with the PDU session for identifying a network slice in 5GS, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]. For the format and the encoding of S-NSSAI, see also 3GPP TS 23.003 [7]. This parameter shall not be subject to conventional character conversion as per +CSCS. The <S-NSSAI> has one of the forms:

- sst only slice/service type (SST) is present
- sst;mapped_sst SST and mapped configured SST are present
- sst.sd SST and slice differentiator (SD) are present
- sst.sd;mapped_sst SST, SD and mapped configured SST are present

- sst.sd;mapped_sst.mapped_sd SST, SD, mapped configured SST and mapped configured SD are present.

<Pref_access_type>: integer type; indicates the preferred access type for the PDU session in 5GS, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

- 0 indicates that the preferred access type is 3GPP access
- 1 indicates that the preferred access type is non-3GPP access

<RQoS_ind>: integer type; indicates whether the UE supports reflective QoS for the PDU session, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

- 0 indicates that reflective QoS is not supported for the PDU session
- 1 indicates that reflective QoS is supported for the PDU session

<MH6-PDU>: integer type; indicates whether the UE supports IPv6 multi-homing for the PDU session, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

- 0 indicates that IPv6 multi-homing is not supported for the PDU session
- 1 indicates that IPv6 multi-homing is supported for the PDU session

<Always-on_req>: integer type; indicates whether the UE requests to establish the PDU session as an always-on PDU session, see 3GPP TS 24.501 [161].

- 0 always-on PDU session is not requested
- 1 always-on PDU session is requested

Reference

3GPP TS 27.007

10.2 Quality of service profile (requested)+CGQREQ

Description

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

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQREQ command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

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

Type	Command	Return	Description
Set	AT+CGQREQ=<cid>,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]	OK/ERROR	N/A

Type	Command	Return	Description
Read	AT+CGQREQ?	+CGQREQ:<cid>, <precedence>, <delay>, <reliability>, <peak>, <mean><CR><LF> [+CGQREQ: <cid>, <precedence>, <delay>, <reliability>, <peak>, <mean><CR><LF> [...]]	N/A
Test	AT+CGQREQ=?	+CGQREQ: <pdp_type> (list of supported <precedence>s, <delay>s, <reliability>s, <peak>s, and <mean>s)	N/A

NOTE

If 3G (e.g. TD-SCDMA), AT+CGEQREQ is used to configure QOS Parameters, AT+CGEQREQ & AT+CGQREQ command is recommended to used at the same time.

Set Command

AT+CGQREQ=<cid>,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]

Return:

OK/ ERROR

Read Command

AT+CGQREQ?

Return:

+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF>
[+CGQREQ: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF> [...]]

Test Command

AT+CGQREQ=?

Return:

+CGQREQ: <pdp_type> (list of supported <precedence>s, <delay>s, <reliability>s, <peak>s, and <mean>s)

Parameter

<cid>: (PDP Context Identifier) integer, presents the PDP context ID(Reference TS 27.007)

<precedence>: presents the priority

<precedence>	Description
0	Subscribed (from network) value used
1	High priority
2	Normal priority

<precedence>	Description
3	Low priority

<delay>: presents the classes of delay; 4 - minimal delay, best performance, 1 - worst performance.

<delay>	Description
0	Subscribed (from network) value used
1-4	Delay class

<reliability>: presents dependability classes; 1 the best dependability, 3,6 the same class, 5 the worst one.

<reliability>	Description
0	Subscribed (from network) value used
1-6	Reliability class

<peak>: presents the throughput classes in peak.

<peak>	Description
0	Subscribed (from network) value used
1	Up to 1000 (8 kb/s)
2	Up to 2000 (16 kb/s)
3	Up to 4000 (32 kb/s)
4	Up to 8000 (64 kb/s)
5	Up to 16000 (128 kb/s)
6	Up to 32000 (256 kb/s)
7	Up to 64000 (512 kb/s)
8	Up to 128000 (1024 kb/s)
9	Up to 256000 (2048 kb/s)

<mean>: presents average throughout

<mean>	Description
0	Subscribed (from network) value used
1	100 (~0.22 bits/s)
2	200 (~0.44 bits/s)

<mean>	Description
3	500 (~1.1 bits/s)
4	1000 (~2.2 bits/s)
5	2000 (~4.4 bits/s)
6	5000 (~11.1 bits/s)
7	10000 (~22 bits/s)
8	20000 (~44 bits/s)
9	50000 (~111 bits/s)
10	100000 (~0.22 kb/s)
11	200000 (~0.44 kb/s)
12	500000 (~1.11 kb/s)
13	1000000 (~2.2 kb/s)
14	2000000 (~4.4 kb/s)
15	5000000 (~11.1 kb/s)
16	10000000 (~22 kb/s)
17	20000000 (~44 kb/s)
18	50000000 (~111 kb/s)

<pdp_type>: presents PDP type

<pdp_type>	Description
“IP”	Internet Protocol
“PPP”	Point-to-Point Protocol

Reference

3GPP TS 27.007

10.3 Quality of service profile (minimum acceptable)+CGQMIN

Description

This command allows the TE to specify a minimum acceptable profile which is checked by the MT against the negotiated profile returned in the Activate PDP Context Accept message.

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQMIN command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

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

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

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

Type	Command	Possible Response(s)
Set	+CGQMIN=<cid>,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]	OK/ERROR
Read	+CGQMIN?	+CGQMIN: <cid>,<precedence>,<delay>,<reliability>,<peak>,<mean> <CR><LF>[+CGQMIN:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF>[...]]]
Test	+CGQMIN=?	+CGQMIN: <pdp_type>, (list of supported <precedence>s, <delay>s, <reliability>s, <peak>s, and <mean>s)

NOTE

If 3G (e.g. TD-SCDMA), AT+CGEQREQ is used to configure QOS Parameters, AT+CGEQMIN & AT+CGQMIN command is recommended to used at the same time.

Parameter

<cid>: (PDP Context Identifier)integer, specifies the PDP context ID.

<precedence>: presents priority

<precedence>	Description
0	Subscribed (from network) value used
1	High priority
2	Normal priority
3	Low priority

<delay>: presents classes of delay

<delay>	Description
0	Subscribed (from network) value used
1-4	Delay class

<reliability>: presents classes of dependability, described in AT+CGQREQ.

<reliability>	Description
0	Subscribed (from network) value used
1-6	Reliability class

<peak>: presents classes of throughput in peak.

<peak>	Description
0	Subscribed (from network) value used
1	Up to 1000 (8 kb/s)
2	Up to 2000 (16 kb/s)
3	Up to 4000 (32 kb/s)
4	Up to 8000 (64 kb/s)
5	Up to 16000 (128 kb/s)
6	Up to 32000 (256 kb/s)
7	Up to 64000 (512 kb/s)
8	Up to 128000 (1024 kb/s)
9	Up to 256000 (2048 kb/s)

<mean>: defines average throughput

<mean>	Description
0	Subscribed (from network) value used
1	100 (~0.22 bits/s)
2	200 (~0.44 bits/s)
3	500 (~1.1 bits/s)
4	1000 (~2.2 bits/s)
5	2000 (~4.4 bits/s)
6	5000 (~11.1 bits/s)
7	10000 (~22 bits/s)
8	20000 (~44 bits/s)
9	50000 (~111 bits/s)
10	100000 (~0.22 kb/s)

<mean>	Description
11	200000 (~0.44 kb/s)
12	500000 (~1.11 kb/s)
13	1000000 (~2.2 kb/s)
14	2000000 (~4.4 kb/s)
15	5000000 (~11.1 kb/s)
16	10000000 (~22 kb/s)
17	20000000 (~44 kb/s)
18	50000000 (~111 kb/s)
30	RESERVED
31	BESTEFFORT

<pdp_type>: PDP type, described in AT+CGQREQ

<pdp_type>	Description
“IP”	Internet Protocol

Reference

3GPP TS 27.007

10.4 Configure the PDP context Parameters of PCO +CGPCO

Description

This command is used to configure the PDP context Parameters of PCO, when DMT is sending the activation message of PDP context. The settings will not be saved in MS after system reboot.

Type	Command	Return	Description
Set	AT+CGPCO=<type>,<user_name>,<passwd>,<pdp_id>[,<auth_type>]	OK/ERROR	N/A
Read	AT+CGPCO?	+ CGPCO: <type>,<user_name>,<passwd>,<pdp_id>,<auth_type><CR><LF>	N/A

Parameter

<type>

<type>	Description
0	User and password are code as ASCII character

<user_name>: The user name used by pco, which the max length is 64 bytes in ASCII character

<password>: The user password used by pco, which the max length is 64 bytes in ASCII character

< pdp_id >: (PDP Context Identifier) integer, specifies the PDP context ID.

<auth_type>:

- 0: NONE
- 1: PAP (Default)
- 2: CHAP
- 3: PAP & CHAP

10.5 PS attach or detach +CGATT

Description

The execution command is used to attach the MT to, or detach the MT from, the Packet Domain service. After the command has completed, the MT remains in V.250 command state. If the MT is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

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

The read command returns the current Packet Domain service state.

The test command is used for requesting information on the supported Packet Domain service states.

Type	Command	Return	Description
Set	AT+CGATT= <state>	OK/ERROR	N/A
Read	AT+CGATT?	+CGATT: <state>	N/A
Test	AT+CGATT=?	+CGATT: (list of supported <state>s)	N/A

Parameter

<state>

<state>	Description
0	Detach GPRS service
1	Attach GPRS service

Example

```
AT+CGATT=1 <cr>
OK
```

Reference

3GPP TS 27.007

10.6 PDP context activate or deactivate +CGACT

Description

The execution command is used to activate or deactivate the specified PDP context (s). After the command has completed, the MT remains in V.250 command state. If any PDP context is already in the requested state, the state for that context remains unchanged. If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the MT is not PS attached when the activation form of the command is executed, the MT first performs a PS attach and then attempts to activate the specified contexts. If the attach fails then the MT responds with ERROR.

If no <cid>s are specified the activation form of the command activates all defined contexts.

If no <cid>s are specified the deactivation form of the command deactivates all active contexts.

The read command returns the current activation states for all the defined PDP contexts.

The test command is used for requesting information on the supported PDP context activation states.

Type	Command	Return	Description
Set	AT+CGACT= <state>,<cid>	CONNECT	N/A
Read	AT+CGACT?	+CGACT: <cid>, <state> <CR> <LF> [+CGACT: <cid>, <state> <CR> <LF> [...]]	N/A
Test	AT+CGACT=?	+CGACT: (list of supported <state>s)	N/A

Parameter

<state>:

<state>	Description
0	Deactivate PDP context
1	Activate PDP context

<cid>: (PDP Context Identifier) integer, specifies the PDP context ID.

Example

```
AT+CGACT=1, 1 <cr>
CONNECT
AT+CGACT=0, 1 <cr>
OK
```

Reference

3GPP TS 27.007

10.7 Show PDP address(es) +CGPADDR

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.

Type	Command	Return	Description
Set	AT+CGPADDR= <cid>[,<cid>[...]]	+CGPADDR: <cid>,<pdp_addr><CR><LF>[+CGPADDR:<cid>,<pdp_addr><CR><LF>[...]]]	N/A
Test	AT+CGPADDR=?	+CGPADDR: (list of supported <cid>s)	N/A

Parameter

<cid>: (PDP Context Identifier), specifies PDP context id, If no specification, return all PDP context.

<pdp_address>: character string; PDP context address

Example

```
AT+CGPADDR=1 <cr>
+CGPADDR=1,"104.192.5.4"
OK

AT+CGPADDR=? <cr>
+CGPADDR: (1-11)
OK
```

Reference

3GPP TS 27.007

10.8 Enter data state +CGDATA

Description

The execution command causes the MT to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types. This may include performing a PS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

Type	Command	Return	Description
Execute	AT+CGDATA=<L2P>, <cid>,[<fall back cid>,[old pdu cid]]	CONNECT/ERROR	N/A

Parameter

<L2P>: specifies the Layer2 protocol between DTE and DMT. PPP is supported for 2G/3G product, M-ETHER for 4G product.

<cid>: (PDP Context Identifier), specifies PDP context id.

Example

```
AT+CGDATA="M-ETHER", 1 <cr>
CONNECT
```

Reference

3GPP TS 27.007

10.9 PDP context modify +CGCMOD

Description

The command modifies specified PDP context.

Type	Command	Return	Description
Set	AT+CGCMOD = cid	OK/ERROR	N/A
Test	AT+CGCMOD=?	+CGCMOD: (list of supported <cid>s)	N/A

Parameter

<cid>: (PDP contest Identifier), specify ID of PDP context and must specify <cid> currently.

Reference

3GPP TS 27.007

10.10 Automatic response to a network request for PDP context activation +CGAUTO

Description

The set command disables or enables an automatic positive response (auto-answer) to the receipt of a Request PDP Context Activation message from the network. It also provides control over the use of the V.250 basic commands 'S0', 'A' and 'H' for handling network requests for PDP context activation. The setting does not affect the issuing of the unsolicited result code RING or +CRING.

The test command returns the values of <n> supported by the MT as a compound value.

Type	Command	Return	Description
Set	AT+CGAUTO=<state>	OK/ERROR	N/A
Read	AT+CGAUTO?	+CGAUTO: <state>	N/A
Test	AT+CGAUTO=?	+CGAUTO: (list of supported <state>s)	N/A

Parameter

<state>	Description
0	Disable GPRS auto response, use AT+CGANS command to response to PDP context activation request manually, which is initiated by network terminal.
1	Enable GPRS auto response, automatically response to the PDP context activation request automatically.
2	automatic acceptance of GPRS network requests is controlled by the 'S0' command
3	automatic acceptance of both GPRS network requests and incoming circuit switched calls is controlled by the 'S0' command

Example

```
AT+CGAUTO=0 <cr>
OK
```

Reference

3GPP 27005 (Section 10.1.15)

10.11 Manual response to a network request for PDP context activation +CGANS

Description

The execution command requests the MT to respond to a network request for Packet Domain PDP context activation which has been signaled to the TE by the RING or +CRING: unsolicited result code. The <response> parameter allows the TE to accept or reject the request.

If <response> is 0, the request is rejected and the MT returns OK to the TE.

If <response> is 1, the following procedure is followed by the MT.

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

If the <L2P> parameter value is unacceptable to the MT, the MT shall return an ERROR or +CME ERROR response. Otherwise, the MT issues the intermediate result code CONNECT and enters V.250 online data state.

The detailed behavior 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. PDP context activation procedures shall take place prior to or during the PDP startup.

One or more <cid>s may be specified in order to provide the values needed for the context activation request.

During the PDP startup procedure the MT has the PDP type and the PDP address provided by the network in the Request PDP Context Activation message. The MT may also have some or all of the following information -

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

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

The TE may provide one or both of PDP type and PDP address to the MT in the PDP startup.

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

If one or more <cid> is given then an attempt shall be made to identify an appropriate context definition by matching the PDP type and PDP address in the network request with the PDP type and PDP address in each of the specified context definitions (in the order in which their <cid>s appear in the command) as follows -

The PDP type must match exactly.

The PDP addresses are considered to match if they are identical or if the address in the context definition is unspecified.

The context shall be activated using the values for PDP type and PDP address provided by the network, together with the other information found in the PDP context definition. An APN may or may not be required, depending on the application.

If no <cid> is given or if there is no matching context definition, the MT will attempt to activate the context using the values for PDP type and PDP address provided by the network, together with any other relevant information known to the MT. The other context parameters will 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.250 command state is re-entered and the MT returns the final result code OK.

In the event of an erroneous termination or a failure to startup, the V.250 command state is re-entered and the MT returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported. It is also an error to issue the +CGANS command when there is no outstanding network request.

Type	Command	Return	Description
Set	AT+CGANS=[<response>, [<L2P> ,[<cid>]]]	OK/ ERROR	N/A
Test	AT+CGANS=?	+CGANS: (list of supported <response>s), (list of supported <L2P>s)	N/A

BOOK NOTE

- This is not the same as if the MT issues a +CGDATA (or +CGACT) command after receiving a +CRING unsolicited result code. A +CGDATA (or +CGACT) does not command the MT to acknowledge the network request but rather to make a new request for context activation. The network request would be ignored..
- The test command returns the values of <response> and <L2P> supported by the MT as compound values.
- This command may be used in both normal and modem compatibility modes.

Parameter

<response>: data, presents how to respond, accept it or reject it.

- 0: refuse the PDP context requests initiated by network terminals.
- 1: accept it and initiate PDP CONTEXT activation

<L2P>: presents layer 2 protocol (refer to +CGDATA command).

<cid>: (PDP Context Identifier),specifies the PDP context id (refers to +CGDCONT).

Example

```
AT+CGANS=1 ,”PPP”,1<cr>
CONNECT
```

Reference

3GPP TS 27.007

10.12 GPRS mobile station class +CGCLASS

Description

The set command is used to set the MT to operate according to the specified mode of operation, see TS 23.060 [47]. If the requested mode of operation is not supported, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

The read command returns the mode of operation set by the TE, independent of the current serving cell capability and independent of the current serving cell Access Technology. If no value has been set by the TE previously, the return value shall be the highest mode of operation that can be supported by the MT.

The test command is used for requesting information on the supported MT mode of operation.

Type	Command	Return	Description
Set	AT+CGCLASS=<class>	OK/ERROR	N/A

Type	Command	Return	Description
Read	AT+CGCLASS?	+CGCLASS: <class>	N/A
Test	AT+CGCLASS=?	+CGCLASS: (list of supported <class>s)	N/A

Parameter

<class>: string type; indicates the mode of operation. The default value is manufacturer specific.

- A Class-A mode of operation (A/Gb mode), or CS/PS mode of operation (Iu mode) (highest mode of operation)
- B Class-B mode of operation (A/Gb mode), or CS/PS mode of operation (Iu mode)
- CG Class-C mode of operation in PS only mode (A/Gb mode), or PS mode of operation (Iu mode)
- CC Class-C mode of operation in CS only mode (A/Gb mode), or CS (Iu mode) (lowest mode of operation)

NOTE

Only support value B.

Example

```
AT+CGCLASS="B" <cr>
OK

AT+CGCLASS=?
+CGCLASS: ("B")
OK
```

Reference

3GPP TS 27.007

10.13 GPRS network registration status +CGREG

Description

The set command controls the presentation of an unsolicited result code +CGREG: <stat> when <n>=1 and there is a change in the MT's GPRS network registration status in GERAN/UTRAN, or unsolicited result code +CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>]] when <n>=2 and there is a change of the network cell in GERAN/UTRAN. The parameters <AcT>, <lac>, <rac> and <ci> are provided only if available. If the UE wants to apply PSM for reducing its power consumption, see +CPSMS command and 3GPP TS 23.682 [149], the set command controls the presentation of an unsolicited result code +CGREG: <stat>[,[<lac>],[<ci>],[<AcT>],[<rac>][,]]]. When.

The read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <lac>, <ci>, <AcT> and <rac>, if available, are returned only when <n>=2 and MT is registered in the network.

Type	Command	Return	Description
set	AT+CGREG=[<n>]	OK	N/A
		+CME ERROR<err>	N/A
read	AT+CGREG?	+CGREG: <n>,<stat>[,,[<lac>],[<ci>],[<AcT>],[<rac>][,<ca use_type>,<reject_cause>]]	when <n>=0, 1, 2 or 3 and command successful.
		+CGREG: <n>,<stat>[,,[<lac>],[<ci>],[<AcT>],[<rac>]]	when <n>=4 or 5 and command successful.
test	AT+CGREG=?	+CGREG: (list of supported<n>s)	N/A

Parameters

<n>: integer type

- 0 disable network registration unsolicited result code
- 1 enable network registration unsolicited result code +CGREG: <stat>
- 2 enable network registration and location information unsolicited result code
+CGREG: <stat>[,,<[lac>,<[ci>],[<AcT>],[<rac>]]]

<stat>: integer type; indicates the GPRS registration status

- 0 not registered, MT is not currently searching an operator to register to
- 1 registered, home network
- 2 not registered, but MT is currently trying to attach or searching an operator to
register to
- 3 registration denied
- 4 unknown (e.g. out of GERAN/UTRAN coverage)
- 5 registered, roaming
- 8 attached for emergency bearer services only
- 9 registered for "CSFB not preferred", home network (not applicable)
- 10 registered for "CSFB not preferred", roaming (not applicable)
- 11 attached for access to RLOS (not applicable)

<lac>: string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal).

<ci>: string type; four byte GERAN/UTRAN cell ID in hexadecimal format.

<AcT>: integer type; indicates the access technology of the serving cell.

- 0 GSM
- 1 GSM Compact
- 2 UTRAN
- 3 GSM w/EGPRS
- 4 UTRAN w/HSDPA
- 5 UTRAN w/HSUPA

- 6 UTRAN w/HSDPA and HSUPA
- 7 E-UTRAN (not applicable)
- 8 EC-GSM-IoT (A/Gb mode)
- 9 E-UTRAN (NB-S1 mode) (not applicable)
- 10 E-UTRA connected to a 5GCN (not applicable)
- 11 NR connected to a 5GCN (not applicable)
- 12 NG-RAN (not applicable)
- 13 E-UTRA-NR dual connectivity (not applicable)
- 15 UTRAN_w_HSPAPLUS
- 16 E_UTRAN_CA

<rac>: string type; one byte routing area code in hexadecimal format.

Reference

3GPP TS 27.007

10.14 Select service for MO SMS messages +CGSMS

Description

The set command is used to specify the service or service preference that the MT will use to send MO SMS messages.

The read command returns the currently selected service or service preference.

The test command is used for requesting information on the currently available services and service preferences.

Type	Command	Return	Description
Set	AT+CGSMS=[<service>]	OK/ERROR	N/A
Read	AT+CGSMS?	+CGSMS: <service>	N/A
Test	AT+CGSMS=?	+CGSMS: (list of currently available <service>s)	N/A

Parameter

<service>: Parameters, present service type.

- 0: GPRS
- 1: circuit switched
- 2: GPRS preferred (use circuit switched if GPRS not available)
- 3: circuit switched preferred (use GPRS if circuit switched not available)

NOTE

Currently, GPRS SMS is not supported by network.

Reference

3GPP TS 27.007

10.15 Build connections between terminal devices and networks - Extension of ATD

Description

This command builds the connections between terminal devices and networks, in order to send data.

While performing this command, if DMT hasn't performed GPRS attach and PDP CONTEXT ACTIVATION operation, these operations should be performed first; If not, build the connections between terminal device and network directly.

Type	Command	Return	Description
Execute	ATD*<GPRS_SC_IP>[***<cid>]#	CONNECT/ERROR	N/A

Parameter

<GPRS_SC_IP>: data string; GPRS service numbers are required (Its value is 99).

<cid>: (PDP Context Identifier), specifies PDP context id.

Example

```
ATD*99#<cr>
CONNECT
```

or

```
ATD*99***3#<cr>
CONNECT
```

10.16 3G quality of service profile (requested)+CGEQREQ

Description

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

The set command specifies a profile for the context identified by the (local) context identification parameter, <cid>. The specified profile will be stored in the MT and sent to the network only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGEQREQ command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.

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

Type	Command	Return	Description
Set	AT+CGEQREQ=<cid> [,<Traffic class> [,<Maximum bit rate UL> [,<Maximum bit rate DL> [,<Guaranteed bit rate UL> [,<Guaranteed bit rate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>[,<Source statistics descriptor>[,<Signalling indication>]]]]]]]]]]]]]	OK/ERROR	N/A
Read	AT+CGEQREQ?	+CGEQREQ: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority>,<Source statistics descriptor>,<Signalling indication><CR><LF> [+CGEQREQ: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay>,<Traffic handling priority>,<Source statistics descriptor>,<Signalling indication><CR><LF>[...]]	N/A
Test	AT+CGEQREQ=?	+CGEQREQ: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s), (list of supported <Maximum bit rate DL>s), (list of supported <Guaranteed bit rate UL>s), (list of supported <Guaranteed bit rate DL>s), (list of supported <Delivery order>s), (list of supported <Maximum SDU size>s), (list of supported <SDU error ratio>s), (list of supported <Residual bit error ratio>s), (list of supported <Delivery of erroneous SDUs>s), (list of supported <Transfer delay>s), (list of supported <Traffic handling priority>s), (list of supported < Source statistics descriptor >s), (list of supported < Signalling indication >s)	N/A

Parameter

<cid>: a numeric parameter which specifies a particular PDP context definition

<Traffic class>	Description
0	conversational
1	streaming
2	interactive
3	background
4	subscribed value

<Maximum bit rate UL>: a numeric parameter that indicates the maximum number of kb/s delivered to UMTS (up-link traffic) at a SAP.

<Maximum bit rate DL>: a numeric parameter that indicates the maximum number of kb/s delivered by UMTS (down-link traffic) at a SAP.

<Guaranteed bit rate UL>: a numeric parameter that indicates the guaranteed number of kb/s delivered to UMTS (up-link traffic) at a SAP.

<Guaranteed bit rate DL>: a numeric parameter that indicates the guaranteed number of kb/s delivered by UMTS (down-link traffic) at a SAP.

<Delivery order>	Description
0	no
1	yes
2	subscribed value

<Maximum SDU size>: a numeric parameter (1, 2, 3, [...]) that indicates the maximum allowed SDU size in octets. If the parameter is set to '0' the subscribed value will be requested.

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs.

Delivery of erroneous SDUs	Description
0	no
1	yes
2	no detect
3	subscribed value

<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

<Source Statistics Descriptor >: integer type; specifies characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as conversational or streaming (refer 3GPP TS 24.008 [8] subclause 10.5.6.5).

- 0: Characteristics of SDUs is unknown
- 1: Characteristics of SDUs corresponds to a speech source

<Signalling Indication >: integer type: indicates signalling content of submitted SDUs for a PDP context. This parameter should be provided if the Traffic class is specified as interactive

- 0: PDP context is not optimized for signalling
- 1: PDP context is optimized for signalling<PDP_type> (see +CGDCONT and +CGDSCONT commands).

Example

```
AT+CGEQREQ=1,1,64,64,64,64,0,100,"6E7","0E0",0,200,1,1,1 <cr>
OK
```

Reference

3GPP TS 27.007

10.17 3G quality of service profile (negotiated)+CGEQNEG

Description

The command is used to configure 3G QoS parameters while MT sends PDP context activation messages; if the PDP context has been activated and QoS parameters is greater than minimal acceptable QoS parameters, set by user, it will execute the procedure of modifying PDP context.

Type	Command	Return	Description
Set	AT+CGEQREQ=<cid>	+ CGEQNEG: <cid>, <Traffic class> ,<Maximum bitrate UL> ,<Maximum bitrate DL> ,<Guaranteed bitrate UL> ,<Guaranteed bitrate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority><CR><LF> OK/ERROR	N/A
Test	AT+CGEQNEG = ?	+CGEQNEG:(pdp_id_list)	N/A

Parameter

<cid>: (PDP context identifier) integer, specify ID of PDP context

<Traffic class>	Description
0	conversational
1	streaming
2	interactive
3	background
4	subscribed value

<Maximum bitrate UL>: Maximum upstream rate (kb/s)

<Maximum bitrate DL>: Maximum downstream rate (kb/s)

<Guaranteed bitrate UL>: Guaranteed upstream rate (kb/s)

<Guaranteed bitrate DL>: Guaranteed downstream rate (kb/s)

<Delivery order>	Description
0	no
1	yes
2	subscribed value

<Maximum SDU size>: (Bytes)

<SDU error ratio>: utilize mEe mode to express, 5E3 means $5 \cdot 10^{-3}$

<Residual bit error ratio>: utilize mEe mode to express, 5E3 means $5 \cdot 10^{-3}$

<Delivery of erroneous SDUs>	Description
0	no
1	yes
2	no detect
3	subscribed value

<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.

10.18 3G quality of service profile (minimum acceptable)+CGEQMIN

Description

This command allows the TE to specify a minimum acceptable profile, which is checked by the MT against the negotiated profile returned in the Activate/Modify PDP Context Accept message.

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

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

Type	Command	Return	Description
Set	AT+CGEQMIN=<cid> [,<Traffic class> [,<Maximum bit rate UL> [,<Maximum bit rate DL> [,<Guaranteed bit rate UL> [,<Guaranteed bit rate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>[,<Source statistics descriptor>[,<Signalling indication>]]]]]]]]]]]]]	OK/ERROR	N/A

Type	Command	Return	Description
Read	AT+CGEQMIN?	+CGEQMIN: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority>,<Source statistics descriptor>,<Signalling indication><CR><LF> [+CGEQMIN: <cid>, <Traffic class> ,<Maximum bit rate UL> ,<Maximum bit rate DL> ,<Guaranteed bit rate UL> ,<Guaranteed bit rate DL> ,<Delivery order> ,<Maximum SDU size> ,<SDU error ratio> ,<Residual bit error ratio> ,<Delivery of erroneous SDUs> ,<Transfer delay> ,<Traffic handling priority>,<Source statistics descriptor>,<Signalling indication><CR><LF>[...]]	N/A
Test	AT+CGEQMIN=?	+CGEQMIN: <PDP_type>, (list of supported <Traffic class>s) ,(list of supported <Maximum bit rate UL>s), (list of supported <Maximum bit rate DL>s), (list of supported <Guaranteed bit rate UL>s), (list of supported <Guaranteed bit rate DL>s),(list of supported <Delivery order>s) ,(list of supported <Maximum SDU size>s) ,(list of supported <SDU error ratio>s) ,(list of supported <Residual bit error ratio>s) ,(list of supported <Delivery of erroneous SDUs>s) ,(list of supported <Transfer delay>s) ,(list of supported <Traffic handling priority>s) , (list of supported < Source statistics descriptor >s), (list of supported < Signalling indication >s)	N/A

Set Command

```
AT+CGEQMIN=<cid> [,<Traffic class> [,<Maximum bit rate UL> [,<Maximum bit rate DL> [,<Guaranteed bit rate UL> [,<Guaranteed bit rate DL> [,<Delivery order> [,<Maximum SDU size> [,<SDU error ratio> [,<Residual bit error ratio> [,<Delivery of erroneous SDUs> [,<Transfer delay> [,<Traffic handling priority>[,<Source statistics descriptor>[,<Signalling indication>]]]]]]]]]]]]]]]
```

Return:

OK/ ERROR

Parameter

<cid>: a numeric parameter which specifies a particular PDP context definition.

<Traffic class>	Description
0	conversational
1	streaming
2	interactive
3	background
4	subscribed value

<Maximum bit rate UL>: a numeric parameter that indicates the maximum number of kb/s delivered to UMTS (up-link traffic) at a SAP.

<Maximum bit rate DL>: a numeric parameter that indicates the maximum number of kb/s delivered by UMTS (down-link traffic) at a SAP.

<Guaranteed bit rate UL>: a numeric parameter that indicates the guaranteed number of kb/s delivered to UMTS (up-link traffic) at a SAP.

<Guaranteed bit rate DL>: a numeric parameter that indicates the guaranteed number of kb/s delivered by UMTS (down-link traffic) at a SAP.

<Delivery order>	Description
0	no
1	yes
2	subscribed value

<Maximum SDU size>: a numeric parameter (1, 2, 3,...) that indicates the maximum allowed SDU size in octets. If the parameter is set to '0' the subscribed value will be requested.

<SDU error ratio>: a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous.

<Residual bit error ratio>: a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs.

<Delivery of erroneous SDUs>	Description
0	no
1	yes
2	no detect
3	subscribed value

<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.

Example

```
AT+CGEQMIN=1,1,64,64,64,64,0,100,"6E7","0E0",0,200,1,1,1 <cr>
OK
```

Reference

3GPP TS 27.007

10.19 Packet domain event reporting +CGEREP

Description

The command could enable or disable that MT sends non-request result code +CGEV: xxx to TE.

Type	Command	Return	Description
Set	AT+CGEREP = <MODE> [, <BFR>]	OK/ERROR: <err>	N/A
Read	AT+CGEREP?	+CGEREP: <mode>, <bfr> OK	N/A
Test	AT+CGEREP=?	+CGEREP: (<mode> value list), (<bfr>value list) OK	N/A

Parameter

Parameter	Value	Description
<mode>	0	Buff non-request result code in MT; if the buffer of MT result code is full, it will discard the oldest result code and not to forward to TE(not support).
	1	While saving MT-TE link (for example: online data mode), it will discard non-request result code; otherwise, directly forward to TE.
	2	While saving MT-TE link(online data mode), it will buff non-request result code in MT; while MT-TE link is available, it will write all result codes to TE; otherwise, directly forward to TE.
<bfr>	0	While parameter of <mode> is 1 or 2, it will delete the MT buffer of non-request result code defined by the command.
	1	While parameter of <mode> is 1 or 2, the MT buffer of non-request result code defined by the command will write to TE.(it must return OK, before writing result code).

Reference

3GPP TS 27.007

10.20 Traffic flow template +CGTFT

Description

This command allows the TE to specify a Packet Filter - PF for a Traffic Flow Template - TFT that is used in the GGSN and in the Packet GW for routing of packets onto different QoS flows towards the TE. The concept is further described in the 3GPP TS 23.060 [47], 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]. A TFT consists of from one and up to 16 Packet Filters, each identified by a unique <packet filter identifier>. A Packet Filter also has an <evaluation precedence index> that is unique within all TFTs associated with all PDP contexts that are associated with the same PDP address.

The set command specifies a Packet Filter that is to be added to the TFT stored in the MT and used for the context identified by the (local) context identification parameter, <cid>. The specified TFT will be stored in the GGSN, the Packet GW and UPF only at activation or MS-initiated modification of the related context. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGTFT command is effectively an extension to these commands. The Packet Filters consist of a number of parameters, each of which may be set to a separate value.

A special form of the set command, +CGTFT=<cid> causes all of the Packet Filters in the TFT for context number <cid> to become undefined. At any time there may exist only one PDP context with no associated TFT amongst all PDP contexts associated to one PDP address. At an attempt to delete a TFT, which would violate this rule, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command.

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

The test command returns values supported as compound values. If the MT supports several PDP types, the parameter value ranges for each PDP type are returned on a separate line. TFTs shall be used for PDP-type IP and PPP only. For PDP-type PPP a TFT is applicable only when IP traffic is carried over PPP. If PPP carries header-compressed IP packets, then a TFT cannot be used.

Type	Command	Return	Description
Set	AT+CGTFT=[<cid>,[<packet filter identifier>,<evaluation precedence index>[,<remote address and subnet mask>[,<protocol number (ipv4) / next header (ipv6)>[,<local port range>[,<remote port range>[,<ipsec security parameter index (spi)>[,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>[,<flow label (ipv6)>[,<direction>[,<local address and subnet mask>[,<QRI>[,<traffic_segregation>]]]]]]]]]]]]]]]	OK/ERROR: <err>	N/A

Type	Command	Return	Description
Read	AT+CGTFT?	<p>[+CGTFT: <cid>,<packet filter identifier>,<evaluation precedence index>,<remote address and subnet mask>,<protocol number (ipv4) / next header (ipv6)>,<local port range>,<remote port range>,<ipsec security parameter index (spi)>,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>,<flow label (ipv6)>,<direction>,<local address and subnet mask>,<QRI>,<traffic_segregation>]</p> <p>[<CR><LF>+CGTFT: <cid>,<packet filter identifier>,<evaluation precedence index>,<remote address and subnet mask>,<protocol number (ipv4) / next header (ipv6)>,<local port range>,<remote port range>,<ipsec security parameter index (spi)>,<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>,<flow label (ipv6)>,<direction>,<local address and subnet mask>,<QRI>,<traffic_segregation></p> <p>[...]] [...]]</p>	N/A

Type	Command	Return	Description
Test	AT+CGTFT=?	+CGTFT: <PDP_type>,(list of supported <packet filter identifier>s),(list of supported <evaluation precedence index>s),(list of supported <remote address and subnet mask>s),(list of supported <protocol number (ipv4) / next header (ipv6)>s),(list of supported <local port range>s),(list of supported <remote port range>s),(list of supported <ipsec security parameter index (spi)>s),(list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s),(list of supported <flow label (ipv6)>s),(list of supported <direction>s),(list of supported <local address and subnet mask>s),(range of supported <QRI>s),(list of supported <traffic_segregation>s) [<CR><LF>]+CGTFT: <PDP_type>,(list of supported <packet filter identifier>s),(list of supported <evaluation precedence index>s),(list of supported <remote address and subnet mask>s),(list of supported <protocol number (ipv4) / next header (ipv6)>s),(list of supported <local port range>s),(list of supported <remote port range>s),(list of supported <ipsec security parameter index (spi)>s),(list of supported <type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>s),(list of supported <flow label (ipv6)>s),(list of supported <direction>s),(list of supported <local address and subnet mask>s),(range of supported <QRI>s),(list of supported <traffic_segregation>s) [...]]	N/A

Parameter

<cid>: integer type. Specifies a particular PDP context definition (see the +CGDCONT and +CGDSCONT commands).

<PDP_type>: string type. Specifies the type of packet data protocol (see the +CGDCONT command).

For the following parameters, see also 3GPP TS 23.060 [47], 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]:

<packet filter identifier>: integer type. Value range is from 1 to 16.

<evaluation precedence index>: integer type. The value range is from 0 to 255.

<remote address and subnet mask>: string type. The string is given as dot-separated numeric (0-255) parameters on the form:

"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or

"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16", for IPv6.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the read form of +CGTFT.

<protocol number (ipv4) / next header (ipv6)>: integer type. Value range is from 0 to 255.

<local port range>: string type. The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".

<remote port range>: string type. The string is given as dot-separated numeric (0-65535) parameters on the form "f.t".

<ipsec security parameter index (spi)>: numeric value in hexadecimal format. The value range is from 00000000 to FFFFFFFF.

<type of service (tos) (ipv4) and mask / traffic class (ipv6) and mask>:

string type. The string is given as dot-separated numeric (0-255) parameters on the form "t.m".

<flow label (ipv6)>: numeric value in hexadecimal format. The value range is from 00000 to FFFFF. Valid for IPv6 only.

<direction>: integer type. Specifies the transmission direction in which the packet filter shall be applied.

- 0: Pre-Release 7 TFT filter (see 3GPP TS 24.008 [8], table 10.5.162)
- 1: Uplink
- 2: Downlink
- 3: Bidirectional (Up & Downlink)

<local address and subnet mask>: string type. (not support)

The string is given as dot-separated numeric (0-255) parameters on the form:

"a1.a2.a3.a4.m1.m2.m3.m4" for IPv4 or

"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16", for IPv6.

When +CGPIAF is supported, its settings can influence the format of this parameter returned with the read form of +CGTFT.

<QRI>: integer type. Identifies the QoS rule, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

<traffic_segregation>: integer type; (not support)

indicates to the network whether traffic segregation is requested or not, see 3GPP TS 24.501 [161].

- 0: traffic segregation is not requested
- 1: traffic segregation is requested

Reference

3GPP TS 27.007

10.21 Define secondary PDP context +CGDSCONT

Description

The set command specifies PDP context parameter values for a Secondary PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command.

In EPS the command is used to define traffic flows.

In 5GS the command is used to define QoS flows of non-default QoS rule.

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

The test command returns values supported as compound values.

Type	Command	Return	Description
Set	AT+ CGDSCONT =[<cid>,<p_cid>[,<d_comp>[,<h_comp>[,<IM_CN_Signalling_Flag_Ind>]]]]]	OK/ERROR	N/A
Read	AT+ CGDSCONT?	[+CGDSCONT: <cid>,<p_cid>,<d_comp>,<h_comp>,<IM_CN_Signalling_Flag_Ind> [<CR><LF>]+CGDSCONT: <cid>,<p_cid>,<d_comp>,<h_comp>,<IM_CN_Signalling_Flag_Ind> [...]] OK	N/A
Test	AT+ CGDSCONT=?	+ CGDSCONT: (1-15), (1-15), "IP", , , (0,1), (0,1)	N/A

Parameter

<cid>: PDP Context Identifier (integer) (range:1 – 15)

<p_cid>: PDP Context Identifier defined by CGDCONT

<d_comp>: integer type; controls PDP data compression (applicable for SNDCP only) (refer 3GPP TS 44.065 [61]).

- 0: off
- 1: on (manufacturer preferred compression)
- 2: V.42bis
- 3: V.44

<h_comp>: integer type; controls PDP header compression (refer 3GPP TS 44.065 [61] and 3GPP TS 25.323 [62]).

- 0: off

- 1: on (manufacturer preferred compression)
- 2: RFC 1144 [105] (applicable for SNDCP only)
- 3: RFC 2507 [107]
- 4: RFC 3095 [108] (applicable for PDCP only)

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

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

Reference

3GPP TS 27.007

10.22 Set GPRS data of specified length sending by MT +SGPRSDATA

Description

Set GPRS data of specified length sending by MT (2/3/4G).

Type	Command	Return	Description
Set	AT+SGPRSDATA=<data_len> [, <cid>, <data>]	OK/ERROR	N/A
Read	AT+SGPRSDATA?	support +SGPRSDATA	N/A
Test	AT+SGPRSDATA=?	+ SGPRSDATA: (1-5000000), (1-11)	N/A

Parameter

<data_len>: integer, the length of sending data.

<cid>: cid of specified data.

<data>: specify data transmitted.

NOTE

- The data of AT+SGPRSDATA command randomly generates, mainly for test, the command only belongs to SPREADTRUM.
- If not to specify parameter cid, it will directly utilize the activated cid while obtaining the number of activated cid is 1, or AT command directly return error and it need specified cid could operate while obtaining the number of activated cid is not 1.

Example

send 2000 datas

```
AT+SGPRSDATA=2000<cr>
```

OK

send specified data contents

AT+SGPRSDATA=100, 1, "1234"<cr>

OK

10.23 Attach or detach GPRS service +SATT

Description

Attach or detach GPRS service.

Type	Command	Return	Description
Set	AT+SATT=<state>[,<action_type>]	OK/ERROR	N/A
Read	AT+SATT?	+SATT: <state>	N/A
Test	AT+SATT=?	+SATT:(0-1), (0-2)	N/A

Parameter

<state>

- 1: attach
- 0: detach

<action_type>

- state = 1:
 - 0: GPRS attach, the same as "AT+CGATT=1"
 - 1: GPRS combine attach
- state = 0:
 - 0: GPRS detach, the same as "AT+CGATT=0"
 - 1: GPRS IMSI detach
 - 2: GPRS combine detach

Example

AT+SATT=1, 0<cr>

OK

10.24 PDP context read dynamic parameters +CGCONTRDP

Description

The execution command returns the relevant information for an active non secondary PDP context with the context identifier <cid>. If the MT indicates more than two IP addresses of P-CSCF servers or more than two IP addresses of DNS servers, multiple lines of information per <cid> will be returned.

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

 **NOTE**

Not support execute command.

Parameter

<cid>: specifies a particular non secondary PDP context definition. The parameter is local to the TEMT interface and is used in other PDP context-related commands (see the +CGDCONT and +CGDSCONT commands).

<bearer_id>: identifies the bearer, i.e. the EPS bearer in EPS and the NSAPI in UMTS/GPRS.

<apn>: a logical name that was used to select the GGSN or the external packet data network.

<local_addr and subnet_mask>: shows the IP address and subnet mask of the MT. The string is given as dot-separated numeric (0-255) parameters on the form:

- IPv4: "a1.a2.a3.a4.m1.m2.m3.m4" for IPv4
 - IPv6:"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16".

<gw_addr>: shows the Gateway Address of the MT. The string is given as dot-separated numeric (0-255) parameters.

<DNS_prim_addr>: shows the IP address of the primary DNS server.

<DNS_sec_addr>: shows the IP address of the secondary DNS server.

<P_CSCF_prim_addr>: shows the IP address of the primary P-CSCF server.

<P_CSCF_sec_addr>: shows the IP address of the secondary P-CSCF server.

<IM_CN_Signalling_Flag>: integer type; (not support)

<LIPA_indication>: integer type; (not support)

<IPv4_MTU>: integer type; (not support)

<WLAN_Offload>: integer type; (not support)

<Local_Addr_Ind >: integer type; indicates whether or not the MS and the network support local IP address in TFTs.

- 0: indicates that the MS or the network or both do not support local IP address in TFTs.
- 1: indicates that the MS and the network support local IP address in TFTs.

<Non-IP_MTU>: integer type; (not support)

<Serving_PLMN_rate_control_value>: integer type; (not support)

<Reliable_Data_Service>: integer type; (not support)

<PS_Data_Off_Support>: integer type; indicates whether the network supports PS data off or not, see 3GPP TS 24.301 [83] subclause 6.3.10 and 3GPP TS 24.501 [161] subclause 6.2.10.

- 0: indicates that the network does not support PS data off
- 1: indicates that the network supports PS data off

<PDU_session_id>: integer type; identifies the PDU session, see 3GPP TS 24.501 [161].

<QFI>: integer type; identifies the QoS flow, see 3GPP TS 24.501 [161].

<SSC_mode>: integer type; indicates the session and service continuity (SSC) mode for the PDU session in 5GS, see 3GPP TS 23.501 [165].

- 0: indicates that the PDU session is associated with SSC mode 1.
- 1: indicates that the PDU session is associated with SSC mode 2.
- 2: indicates that the PDU session is associated with SSC mode 3.

<S-NSSAI>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s) and semicolon(s). The S-NSSAI is associated with the PDU session for identifying a network slice in 5GS, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS.

<Access_type>: integer type; indicates the access type over which the PDU session is established in 5GS, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

- 0: indicates that the preferred access type is 3GPP access
- 1: indicates that the preferred access type is non-3GPP access

<RQ_timer>: integer type; indicates the timer for reflective QoS, see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161].

<Always-on_ind>: integer type; indicates whether the PDU session is an always-on PDU session, see 3GPP TS 24.501 [161].

- 0: indicates that the PDU session is not an always-on PDU session.
- 1: indicates that the PDU session is an always-on PDU session.

Reference

3GPP TS 27.007

10.25 Traffic flow template read dynamic parameters +CGTFRDP

Description

The execution command returns the relevant information about Traffic Flow Template for an active secondary or no secondary PDP context specified by <cid> together with the additional network assigned values when established by the network. If the parameter <cid> is omitted, the Traffic Flow Templates for all active secondary and non-secondary PDP contexts are returned. Parameters of both network and MT/TA initiated PDP contexts will be returned. The test command returns a list of <cid>s associated with active secondary and non-secondary contexts.

Type	Command	Return	Description
test	AT+CGTFRDP=?	+CGTFRDP: (list of <cid>s associated with active contexts)	N/A
set	AT+CGTFRDP=<cid>	[+CGTFRDP: <cid>,<packet filter identifier>,<evaluation precedence index>,<remote address and subnet mask>,<protocol number (ipv4) / next header (ipv6)>,<local port range>,<remote port range>,<ipsec security parameter index (spi)>,<type of service (tos) (ipv4) and mask /traffic class (ipv6) and mask>,<flow label(ipv6)>,<direction>,<NW packet filter Identifier>][<CR><LF> +CGTFRDP: <cid>,<packet filter identifier>,<evaluation precedence index>,<remote address and subnet mask>,<protocol number (ipv4) /next header (ipv6)>,<local port range>,<remote port range>,<ipsec security parameter index (spi)>,<type of service (tos) (ipv4) and mask /traffic class (ipv6) and mask>,<flow label(ipv6)>,<direction>,<NW packet filter Identifier>[...]]	N/A

NOTE

Not support execute command.

Parameter

<cid>: Specifies a particular secondary or non-secondary PDP context definition or Traffic Flows definition.

<packet filter identifier>: 1 to 16.

<evaluation precedence index>: 0 to 255.

<remote address and subnet mask>:

- IPV4: "a1.a2.a3.a4.m1.m2.m3.m4"
- IPv6:"a1.a2.a3.a4.a5.a6.a7.a8.a9.a10.a11.a12.a13.a14.a15.a16.m1.m2.m3.m4.m5.m6.m7.m8.m9.m10.m11.m12.m13.m14.m15.m16".

<protocol number (ipv4) / next header (ipv6)>: 0 to 255.

<local port range>: (0-65535) parameters on the form "f.t".

<remote port range>: (0-65535) parameters on the form "f.t".

<ipsec security parameter index (spi)>: The value range is from 00000000 to FFFFFFFF.

<type of service (tos) (ipv4) and mask traffic class (ipv6) and mask>: (0-255) parameters on the form "t.m".

<flow label (ipv6)>: The value range is from 00000 to FFFFF. Valid for IPv6 only.

<direction>:

- 0: Pre Release 7 TFT Filter (see 3GPP TS 24.008 [8], table 10.5.162)
- 1: Uplink
- 2: Downlink Bidirectional (Used for Uplink and Downlink)

<NW packet filter Identifier> 1 to 16.

Reference

3GPP TS 27.007

10.26 Define EPS quality of service +CGEQOS

Description

The set command allows the TE to specify the EPS Quality of Service When in UMTS/GPRS the MT applies a mapping function to UMTS/GPRS Quality of Service.

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

The test command returns the ranges of the supported parameters.

Type	Command	Return	Description
set	AT+CGEQOS=<cid>,<QCI>,<DL_GBR>,<UL_GBR>,<DL_MBR>,<UL_MBR>	OK	N/A
		+CME ERROR: <err>	N/A

Type	Command	Return	Description
Test	AT+CGEQOS=?	+CGEQOS: (range of supported <cid>s), (list of supported <QCI>s), (list of supported<DL_GBR>s), (list of supported <UL_GBR>s), (list of supported <DL_MBR>s), (list of supported <UL_MBR>s)	N/A
Read	AT+CGEQOS?	[+CGEQOS: <cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>]][<CR><LF> +CGEQOS: <cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][...]]	N/A

Parameter

<cid>: integer type; specifies a particular EPS Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS (see the +CGDCONT and +CGDSCONT commands).

<QCI>: integer type; specifies a class of EPS QoS (see 3GPP TS 24.301 [83]).

- 0: QCI is selected by network.
- [1 – 4]: value range for guaranteed bit rate Traffic Flows.
- 75: value for guaranteed bit rate Traffic Flows.
- [5 – 9]: value range for non-guaranteed bit rate Traffic Flows.
- 79: value for non-guaranteed bit rate Traffic Flows.
- [128 – 254]: value range for Operator-specific QCIs.

<DL_GBR>: integer type; indicates DL GBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<UL_GBR>: integer type; indicates UL GBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<DL_MBR>: integer type; indicates DL MBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<UL_MBR>: integer type; indicates UL MBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

NOTE

The QCI values 65, 67, 66, 69 and 70 are not allowed to be requested by the UE. If the TE requests a QCI parameter 65, 66, 67, 69 or 70, the MT responds with result code +CME ERROR: 181 (unsupported QCI value).

Reference

3GPP TS 27.007

10.27 EPS quality of service read dynamic parameters +CGEQOSRDP

Description

The execution command returns the Quality of Service parameters <QCI>, [<DL_GBR> and <UL_GBR>] and [<DL_MBR> and <UL_MBR>] of the active secondary or non-secondary PDP context associated to the provided context identifier <cid>.

If the parameter <cid> is omitted, the Quality of Service parameters for all secondary and non-secondary active PDP contexts are returned.

The test command returns a list of <cid>s associated with secondary or non-secondary active PDP contexts.

Parameters of both network and MT/TA initiated PDP contexts will be returned.

Type	Command	Return	Description
test	AT+CGEQOSRDP=?	+CGEQOSRDP: (list of <cid>s associated with active contexts)	N/A
set	AT+CGEQOSRDP[=<cid>]	[+CGEQOSRDP:<cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][,<DL_AMBR>,<UL_AMBR>]][<CR><LF>+CGEQOSRDP:<cid>,<QCI>,[<DL_GBR>,<UL_GBR>],[<DL_MBR>,<UL_MBR>][,<DL_AMBR>,<UL_AMBR>][...]]	N/A

Parameter

<cid>: specifies a particular Traffic Flows definition in EPS and a PDP Context definition in UMTS/GPRS.

<QCI>:

- 0 QCI is selected by network
- [1 – 4] value range for guaranteed bit rate Traffic Flows
- [5 – 9] value range for non-guaranteed bit rate Traffic Flows
- [128 – 254] value range for Operator-specific QCIs <DL_GBR>: integer type; indicates DL GBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<UL_GBR>: indicates UL GBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<DL_MBR>: indicates DL MBR in case of GBR QCI. The value is in kb/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<UL_MBR>: indicates UL MBR in case of GBR QCI. The value is in kbit/s. This parameter is omitted for a non-GBR QCI (see 3GPP TS 24.301 [83]).

<DL_AMBR>: indicates DL APN aggregate MBR (see 3GPP TS 24.301 [83]). The value is in kbit/s.

<UL_AMBR>: indicates UL APN aggregate MBR (see 3GPP TS 24.301 [83]). The value is in kbit/s.

Reference

3GPP TS 27.007

10.28 Define 5GS quality of service +C5GQOS

Description

The set command allows the TE to specify the 5GS Quality of Service parameters <cid>, <5QI>, [<DL_GFBR> and <UL_GFBR>] and [<DL_MFBR> and <UL_MFBR>] for a QoS flow (see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]).

A special form of the set command, +C5GQOS= <cid> causes the values for context number <cid> to become undefined.

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

The test command returns the ranges of the supported parameters as compound values.

Command	Possible Response(s)
+C5GQOS=[<cid>[,<5QI>[,<DL_GFBR>,<UL_GFBR>[,<DL_MFBR>,<UL_MFBR>]]]]]	+CME ERROR: <err>
+C5GQOS?	[+C5GQOS:<cid>,<5QI>[,<DL_GFBR>,<UL_GFBR>[,<DL_MFBR>,<UL_MFBR>]]] [<CR><LF>+C5GQOS:<cid>,<5QI>[,<DL_GFBR>,<UL_GFBR>[,<DL_MFBR>,<UL_MFBR>]] [...]]
+C5GQOS=?	+C5GQOS:(range of supported <cid>s),(list of supported <5QI>s),(list of supported <DL_GFBR>s),(list of supported <UL_GFBR>s),(list of supported <DL_MFBR>s),(list of supported <UL_MFBR>s)

Parameter

<cid>: integer type; specifies a particular QoS flow definition, EPS Traffic Flows definition and a PDP Context definition (see the +CGDCONT and +CGDSCONT commands).

<5QI>: integer type; specifies a class of 5GS QoS (see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]).

- 0 5QI is selected by network
- [1 – 4] value range for guaranteed bit rate QoS flows
- 65, 66, 67 values for guaranteed bit rate QoS flows
- [71 – 76] value range for guaranteed bit rate QoS flows
- [5 – 9] value range for non-guaranteed bit rate QoS flows
- 69, 70, 79, 80 values for non-guaranteed bit rate QoS flows
- [82 – 85] value range for delay critical guaranteed bit rate QoS flows
- [128 – 254] value range for Operator-specific 5QIs

<DL_GFBR>: integer type; indicates DL GFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<UL_GFBR>: integer type; indicates UL GFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<DL_MFBR>: integer type; indicates DL MFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<UL_MFBR>: integer type; indicates UL MFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

10.29 5GS quality of service read dynamic parameters +C5GQOSRDP

Description

The execution command returns the Quality of Service parameters <5QI>, [<DL_GFBR> and <UL_GFBR>], [<DL_MFBR> and <UL_MFBR>], [<DL_SAMBR> and <UL_SAMBR>] and <Averaging_window> of the QoS flow associated to the provided context identifier <cid>.

If the parameter <cid> is omitted, the Quality of Service parameters for all QoS flows are returned.

The test command returns a list of <cid>s associated with all QoS flows (not support currently).

Parameters of both network and MT/TA initiated QoS flows will be returned.

Command	Possible Response(s)
+C5GQOSRDP[=<cid>]	[+C5GQOSRDP:<cid>,<5QI>[,<DL_GFBR>,<UL_GFBR>[,<DL_MFBR>,<UL_MFBR>[,<DL_SAMBR>,<UL_SAMBR>[,<Averaging_window>]]]]] [<CR><LF>+C5GQOSRDP:<cid>,<5QI>[,<DL_GFBR>,<UL_GFBR>[,<DL_MFBR>,<UL_MFBR>[,<DL_SAMBR>,<UL_SAMBR>[,<Averaging_window>]]]]] [...]]
+C5GQOSRDP=?	+C5GQOSRDP: (list of <cid>s associated with QoS flows)

Parameter

<cid>: integer type; specifies a particular QoS flow definition, Traffic Flows definition and a PDP Context definition (see the +CGDCONT and +CGDSCONT commands).

<5QI>: integer type; specifies a class of 5GS QoS (see 3GPP TS 23.501 [165] and 3GPP TS 24.501 [161]).

- 0 5QI is selected by network
- [1 – 4] value range for guaranteed bit rate QoS flows
- 65, 66, 67 values for guaranteed bit rate QoS flows
- [71 – 76] value range for guaranteed bit rate QoS flows
- [5 – 9] value range for non-guaranteed bit rate QoS flows
- 69, 70, 79, 80 values for non-guaranteed bit rate QoS flows
- [82 – 85] value range for delay critical guaranteed bit rate QoS flows

- [128 – 254] value range for Operator-specific 5QIs

<DL_GFBR>: integer type; indicates DL GFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<UL_GFBR>: integer type; indicates UL GFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<DL_MFBR>: integer type; indicates DL MFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<UL_MFBR>: integer type; indicates UL MFBR in case of GBR 5QI. The value is in kbit/s. This parameter is omitted for a non-GBR 5QI (see 3GPP TS 24.501 [161]).

<UL_AMBR>: integer type; indicates the UL session AMBR (see 3GPP TS 24.501 [161]). The value is in kbit/s.

<DL_AMBR>: integer type; indicates the DL session AMBR (see 3GPP TS 24.501 [161]). The value is in kbit/s.

<Averaging_window>: integer type; indicates the averaging window (see 3GPP TS 24.501 [161]). The value is in milliseconds.

10.30 Secondary PDP context read dynamic parameters +CGS CONTRD P

Description

The execution command returns <p_cid>, <bearer_id>, <IM_CN_Signalling_Flag>, <WLAN_Offload>, <PDU_session_id> and <QFI> for an active secondary PDP context or a QoS flow of non-default QoS rule with the context identifier <cid>.

If the parameter <cid> is omitted, the <cid>, <p_cid>, <bearer_id>, <IM_CN_Signalling_Flag>, <WLAN_Offload>, <PDU_session_id> and <QFI> are returned for all active secondary PDP contexts or all QoS flows of non-default QoS rule.

In EPS, the Traffic Flow parameters are returned.

NOTE

Parameters for UE initiated and network initiated PDP contexts are returned.

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

Command	Possible response(s)
+CGS CONTRD P[=<cid>]	[+CGS CONTRD P:<cid>,<p_cid>,<bearer_id>[,<IM_CN_Signalling_Flag>[,<WLAN_Offload>[,<PDU_session_id>,<QFI>]]]] [<CR><LF>+CGS CONTRD P:<cid>,<p_cid>,<bearer_id>[,<IM_CN_Signalling_Flag>[,<WLAN_Offload>[,<PDU_session_id>,<QFI>]]]] [...]]
+CGS CONTRD P=?	+CGS CONTRD P: (list of <cid>s associated with active contexts)
NOTE: The syntax of the AT Set Command is corrected to be according to ITU-T Recommendation V.250 [14]. Older versions of the specification specify incorrect syntax +CGS CONTRD P=[<cid>].	

Parameter

<cid>: integer type; specifies a particular active secondary PDP context or Traffic Flows definition. The parameter is local to the TE-MT interface and is used in other PDP context-related commands (see the +CGDCONT and +CGDSCONT commands).

<p_cid>: integer type; specifies a particular PDP context definition or default EPS context Identifier which has been specified by use of the +CGDCONT command. The parameter is local to the TE-MT interface (see the +CGDSCONT command).

<bearer_id>: integer type; identifies the bearer, EPS Bearer and NSAPI.

<IM_CN_Signalling_Flag>: integer type;(not support)

<WLAN_Offload>: integer type. (not support)

<PDU_session_id>: integer type; identifies the PDU session, see 3GPP TS 24.501 [161].

<QFI>: integer type; identifies the QoS flow, see 3GPP TS 24.501 [161].

10.31 PS data off status +CPSDO

Description

The set command enables the UE to specify the PS data off UE status to the network during UE-requested PDP context activation and UE-requested PDP context modification procedure.

The PS data off UE status may be activated or deactivated.

Command	Possible response(s)
AP+CPSDO=[<PS_Data_Off_Status>]	+CME ERROR: <err>
AP+CPSDO?	+CPSDO: <PS_Data_Off_Status>

Parameter

<PS_Data_Off_Status>: integer type; indicates the PS data off UE status, see 3GPP TS 24.008 [8], subclause 4.7.1.10, 3GPP TS 24.301 [83], subclause 6.3.10, and 3GPP TS 24.501 [161], subclause 6.2.10.

- 0: indicates to the network that PS data off UE status is deactivated.
- 1: indicates to the network that PS data off UE status is activated.

10.32 Initial PDP context activation +CIPCA

Description

The set command controls whether an initial PDP context shall be established automatically following an attach procedure when the UE is attached to GERAN or UTRAN RATs and whether the UE is attached to E-UTRAN with or without a PDN connection.

For 5GS, the command controls whether an initial PDU session shall be established automatically following initial registration.

For $<\text{n}> \neq 0$, deactivating the last (active) PDP context can lead to a (re)establishment of the initial PDP context. Changing setting of $<\text{n}>$ from 0 to 1 will cause an immediate attempt to (re)establish the initial PDP context if no PDP context is active. Changing $<\text{n}>$ from 0 to 2 will if not roaming cause an immediate attempt to (re)establish the initial PDP context if no other PDP context is active. The value of $<\text{n}>=3$ applies to E-UTRAN or NG-RAN RATs and does not change the setting of PDP context activation in GERAN or UTRAN RATs. Changing $<\text{n}>$ will never cause a PDP context deactivation.

Command	Possible response(s)
AT+CIPCA=[<n>[,<AttachWithoutPDN>]]	OK/CME ERROR: <err>
AT+CIPCA?	+CIPCA: <n>[,<AttachWithoutPDN>]
AT+CIPCA=?	+CIPCA: (list of supported <n>s),(list of supported <AttachWithoutPDN>s)

Parameter

$<\text{n}>$: integer type. Activation of PDP context upon attach.

- 0: Do not activate
- 1: Always activate
- 2: Activate when not roaming
- 3: No change in current setting

$<\text{AttachWithoutPDN}>$: integer type. EPS Attach with or without PDN connection.

- 0: EPS Attach with PDN connection
- 1: EPS Attach without PDN connection

10.33 Updating the default configured NSSAI +C5GNSSAI

Description

The set command enables updating the default configured NSSAI stored at the MT (see 3GPP TS 24.501 [161] subclause 4.6.2.2). If $<\text{default_configured_nssai_length}>$ has a value of zero and $<\text{default_configured_nssai}>$ consists of an empty string, the default configured NSSAI stored at the MT, if any, shall be deleted by the MT. If the MT has previously received a default configured NSSAI from the network via NAS signalling as specified in 3GPP TS 24.501 [161], the default configured NSSAI stored at the MT is not updated and an error message, +CME ERROR, is returned to TE. Refer subclause 9.2 for possible $<\text{err}>$ values.

Command	Possible response(s)
+C5GNSSAI=<default_configured_nssai_length>, <default_configured_nssai>	OK/CME ERROR: <err>
+C5GNSSAI?	+C5GNSSAI:[<default_configured_nssai_length>,<default_configured_nssai>]

Parameter

<default_configured_nssai_length>: integer type; indicates the length in octets of the default configured NSSAI to be stored at the MT. If the value is zero, no default configured NSSAI is stored at the MT.

<default_configured_nssai>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI to be stored by the MT. The <default_configured_nssai> is coded as a list of <S-NSSAI>s separated by colons. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS. If the value is an empty string (""), no default configured NSSAI is stored at the MT.

10.34 Return NSSAIs +C5GNSSAIRDP

Description

The execution command returns the default configured NSSAI, rejected NSSAI for 3GPP access and rejected NSSAI for non-3GPP access stored at the MT, if any, as well as the configured NSSAI, allowed NSSAI for 3GPP access and allowed NSSAI for non-3GPP access stored at the MT, if any for the PLMN identified by <plmn_id>.

If the parameter <plmn_id> is omitted, the NSSAIs for all PLMNs for which the MT has stored NSSAI information are returned.

Command	Possible response(s)
+C5GNSSAIRDP=<nssai_type>[,<plmn_id>]	[+C5GNSSAIRDP: [<default_configured_nssai_length>,<default_configured_nssai>[,<rejected_nssai_3gpp_length>,<rejected_nssai_3gpp>[,<rejected_nssai_non3gpp_length>,<rejected_nssai_non3gpp>]]] [<CR><LF>+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]] [<CR><LF>+C5GNSSAIRDP: <plmn_id>[,<configured_nssai_length>,<configured_nssai>[,<allowed_nssai_3gpp_length>,<allowed_nssai_3gpp>,<allowed_nssai_non3gpp_length>,<allowed_nssai_non3gpp>]] [...]]]]

Parameter

<nssai_type>: integer type; specifies the type of NSSAI to be returned.

- 0: return stored default configured NSSAI only
- 1: return stored default configured NSSAI and rejected NSSAI(s)
- 2: return stored default configured NSSAI, rejected NSSAI(s) and configured NSSAI(s)
- 3: return stored default configured NSSAI, rejected NSSAI(s), configured NSSAI(s) and allowed NSSAI(s)

<plmn_id>: string type; indicates the MCC and MNC of the PLMN to which the NSSAI information applies. For the format and the encoding of the MCC and MNC, see 3GPP TS 23.003 [7]. This parameter shall not be subject to conventional character conversion as per +CSCS.

<default_configured_nssai_length>: integer type; indicates the length in octets of the default configured NSSAI stored at the MT.

<default_configured_nssai>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI stored at the MT for the PLMN. The <default_configured_nssai> is coded as a list of <S-NSSAI>s separated by colons. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS.

<rejected_nssai_3gpp_length>: integer type; indicates the length in octets of the rejected NSSAI associated with 3GPP access stored at the MT for the serving PLMN.

<rejected_nssai_3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with 3GPP access stored at the MT for the serving PLMN. The <rejected_NSSAI_3gpp> is coded as a list of rejected S-NSSAIs separated by colon. For the format and the encoding of S-NSSAI, see also 3GPP TS 23.003 [7]. This parameter shall not be subject to conventional character conversion as per +CSCS.

The rejected S-NSSAI has one of the forms:

- sst#cause: only slice/service type (SST) and reject cause are present.
- sst.sd#cause: SST and slice differentiator (SD) and reject cause are present

where cause is a cause value is according to 3GPP TS 24.501 [161] table 9.11.3.46.1.

<rejected_nssai_non3gpp_length>: integer type; indicates the length in octets of the rejected NSSAI associated with non-3GPP access stored at the MT for the serving PLMN.

<rejected_nssai_non3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), colon(s) and hash(es). This parameter indicates the list of rejected S-NSSAIs associated with non-3GPP access stored at the MT for the serving PLMN. The <rejected_NSSAI_non3gpp> is coded as a list of rejected S-NSSAIs separated by colon. For the format and the encoding of S-NSSAI, see also 3GPP TS 23.003 [7]. This parameter shall not be subject to conventional character conversion as per +CSCS.

The rejected S-NSSAI has one of the forms:

- sst#cause: only slice/service type (SST) and reject cause are present.
- sst.sd#cause: SST and slice differentiator (SD) and reject cause are present

where cause is a cause value is according to 3GPP TS 24.501 [161] table 9.11.3.46.1.

<configured_nssai_length>: integer type; indicates the length in octets of the configured NSSAI stored at the MT for the PLMN identified by <plmn_id>.

<configured_nssai>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of configured S-NSSAIs stored at the MT for the PLMN identified by <plmn_id>. The <configured_nssai> is coded as a list of <S-NSSAI>s separated by colons. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS.

<allowed_nssai_3gpp_length>: integer type; indicates the length in octets of the allowed NSSAI associated with 3GPP access stored at the MT for the PLMN identified by <plmn_id>.

<allowed_nssai_3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with 3GPP access stored at the MT for the PLMN identified by <plmn_id>. The <allowed_nssai_3gpp> is coded as a list of <S-NSSAI>s separated by colons. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS.

<allowed_nssai_non3gpp_length>: integer type; indicates the length in octets of the allowed NSSAI associated with non-3GPP access stored at the MT for the PLMN identified by <plmn_id>.

<allowed_nssai_non3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of allowed S-NSSAIs associated with non-3GPP access stored at the MT for the PLMN identified by <plmn_id>. The <allowed_nssai_non3gpp> is coded as a list of <S-NSSAI>s separated by colons.

10.35 Specifies the preferred NSSAI +C5GPNSSAI

Description

The set command specifies the preferred NSSAI as a list of S-NSSAIs matching the preference of the TE. The preferred NSSAI is coded as a list of HPLMN values of S-NSSAIs. Its content is independent of the selected or registered PLMNs. MT takes the preferred NSSAI into account when selecting the requested NSSAI.

Command	Possible response(s)
+C5GPNSSAI=[<Preferred_NSSAI_3gpp_length>,[<Preferred_NSSAI_3gpp>],[<Preferred_NSSAI_non3gpp_length>,[<Preferred_NSSAI_non3gpp>]]]	OK/+CME ERROR: <err>

Parameter

<Preferred_NSSAI_3gpp_length>: integer type; indicates the length in octets of the <Preferred_NSSAI_3gpp> to be stored in the MT. If the value is zero, no preferred NSSAI for 3GPP access is stored in the MT.

<Preferred_NSSAI_3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of preferred S-NSSAIs for 3GPP access. The <Preferred_NSSAI_3gpp> is coded as a list of S-NSSAIs separated by colons. The TE includes the HPLMN values of the S-NSSAIs; therefore, no mapped S-NSSAIs are included. Refer parameter <S-NSSAI> in subclause 10.1.1. This parameter shall not be subject to conventional character conversion as per +CSCS. If the value is an empty string (""), no preferred NSSAI for 3GPP access is stored in the MT.

<Preferred_NSSAI_non3gpp_length>: integer type; indicates the length in octets of the <Preferred_NSSAI_non3gpp> to be stored in the MT. If the value is zero, no preferred NSSAI for non-3GPP access is stored in the MT.

<Preferred_NSSAI_non3gpp>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of preferred S-NSSAIs for non-3GPP access. The <Preferred_NSSAI_non3gpp> is coded as a list of S-NSSAIs separated by colons. The TE includes the HPLMN values of the S-NSSAIs; therefore, no mapped S-NSSAIs are included

Unisoc Confidential For hiar

11 A-GPS Related Commands

11.1 Mobile originated location request +CMOLR

Description

Set command initiates a mobile originated location request (MO-LR).

Type	Command	Return	Description
Set	AT+CMOLR=<enable>[,<method>[,<hor-acc-set>[,<hor-acc>[,<ver-req>[,<ver-acc-set>[,<ver-acc>[,<vel-req>[,<rep-mode>[,<timeout>[,<interval>[,<shape-rep>[,<plane>[,<NMEA>[,<third-party-address>]]]]]]]]]]]]]]]]]]]]]	N/A	AT+CMOLR = 0, it means end the mo location request.

Parameter

<enable>: integer type. Enables and disables reporting location as a result of a MO-LR.

<enable>	description
0	Disables reporting and positioning
1	Enables reporting of NMEA strings
2	Enables reporting of GAD shapes
3	Enables reporting of NMEA strings and GAD shapes

<method> integer type. Method for MO-LR

<method>	description
0	Unassisted GPS
1	Assisted GPS
2	Assisted GANSS
3	Assisted GPS and GANSS
4	Basic self location
5	Transfer to third party

<hor-acc-set>: integer type.

<hor-acc-set>	description
0	Horizontal accuracy not set/specified
1	Horizontal accuracy set in parameter

<hor-acc>: integer type. Requested accuracy as horizontal uncertainty exponent

<ver-req>: integer type.

<ver_req>	description
0	Vertical coordinate (altitude) is not requested
1	Vertical coordinate (altitude) is requested

<ver-acc-set>: integer type.

<ver-acc-set>	description
0	Vertical accuracy not set/specifyed.
1	Vertical accuracy set/specifyed in parameter

<ver-acc>: integer type. Requested accuracy as vertical uncertainty exponent

<vel-req>:

<vel-req>	description
0	Velocity not requested.
1	Horizontal velocity requested.
2	Horizontal velocity and vertical velocity requested.
3	Horizontal velocity with uncertainty requested.
4	Horizontal velocity with uncertainty and vertical velocity with uncertainty requested.

<rep-mode>: integer type. Reporting mode. The default value is implementation specific.

<rep-mode>	description
0	Single report, the timeout for the MO-LR response request is specified by <timeout>.
1	Periodic reporting, by <timeout> and <internal>

<shape-rep>: integer type. This parameter is a sum of integers each representing a certain GAD shape that will be accepted in the unsolicited result code <location_parameters>.

<shape-rep>	description
1	Ellipsoid point
2	Ellipsoid point with uncertainty circle
4	Ellipsoid point with uncertainty ellipse
8	Polygon
16	Ellipsoid point with altitude
32	Ellipsoid point with altitude and uncertainty ellipsoid
64	Ellipsoid arc

<plane>: integer type. The parameter specifies whether the control plane or SUPL will be used for MO-LR.

<plane>	description
0	Control plane.
1	Secure user plane (SUPL).

<NMEA-rep>: string type.

<third-party-address>: string type.

11.2 Mobile terminated location request disclosure allowance +CMTLRA

Description

Allows or disallows disclosure of the location to the TE as a result of MT-LR by the parameter <is_accept>.

Type	Command	Return	Description
Set	AT+CMTLRA=<is_accept>,<handle_id>	OK/CME ERROR: 0	N/A

Parameter

<is_accept>:

<is_accept>	description
0	Reject MTLR

<is_accept>	description
1	Accept MTLR

<handle_id>:

<handle_id>	description
0~255	integer type. ID associated with each MT-LR used to distinguish specific request in case of multiple requests.

12 Extend Commands

12.1 Set sleep mode +S32K

Description

This command is used to set whether the terminal can enter to sleep mode.

Type	Command	Return	Description
set	AT+S32K=<mode>	OK	N/A
		+CME ERROR<err>	N/A
read	AT+S32K?	+ S32K: <mode>	N/A
test	AT+S32K=?	+S32K: (0-1)	N/A

Parameter

mode	Description
0	enable sleep mode
1	disable sleep mode

NOTE

<mode> is not saved in NV, when terminal is power on, the default value is 0.

12.2 Set/read frequency +SBAND

Description

This command is used to set the frequency of terminal.

Type	Command	Return	Description
set	AT+SBAND=1,<rat>,<band>	OK	N/A
		+CME ERROR<err>	
read	AT+SBAND=0,<rat>[,<band>]	+SBAND:<rat>, <current band >	N/A

Type	Command	Return	Description
test	AT+SBAND=2,<rat>[,<band>]	+SBAND: rat[,list_band]	N/A

Parameter

Parameter	Description
<mode>	<ul style="list-style-type: none"> • 1: set • 0: read • 2: test, get all GSM support band, get partly support WCDMA and LTE band.
<rat>	<ul style="list-style-type: none"> • 12: LTE(at can use but function is not support) • 13: GSM • 14: WCDMA
<band>	0-46

Band: 0-40

< band >	frequency
0	GSM900 / auto WCDMA band
1	DCS1800 / WCDMA band1/LTE band1
2	PCS1900 / WCDMA band2/ LTE band2
3	GSM850 / LTE band3
4	GSM900 and DCS1800/ LTE band4
5	GSM850 and GSM900 / WCDMA band5/ LTE band5
6	GSM850 and DCS1800
7	GSM850 and PCS1900 / LTE band7
8	GSM900 and PCS1900 / WCDMA band8
9	GSM850, GSM900 and DCS1800
10	GSM850, GSM900 and PCS1900
11	DCS1800 and PCS1900
12	GSM850, DCS1800 and PCS1900
13	GSM900, DCS1800 and PCS1900
14	GSM850, GSM900,DCS1800 and PCS1900
38	LTE band38
39	LTE band39

<band>	frequency
40	LTE band40

Example

Lock GSM band3

```
AT+SBAND=1,13,3
```

NOTE

- When rat is LTE, band should be 1-8, 8-41.
- When rat is GSM, band should be 0-14.
- When rat is WCDMA, band should be 0, 1, 2, 5, 8.

12.3 Open/close sim/protocol +SFUN

Description

Close protocol stack or SIM.

Type	Command	Return	Description
set	AT+SFUN=<oper>	OK	N/A
		+CME ERROR<err>	N/A

Parameter

oper	Description
1	Open SIM, not initialize phone book.
2	Open SIM, and initialize phone book.
3	Close SIM
4	Open protocol stack
5	Close protocol stack

12.4 Disable all unsolicited reporting ^CURC

Description

Control to enable or disable all unsolicited reporting from modem. It can be used with command SPAURC.

Type	Command	Return	Description
set	AT^CURC=<switch>	OK	N/A
		+CME ERROR<err>	N/A
test	AT^CURC=?	^CURC: (0-1)	N/A
read	AT^CURC?	^CURC: <switch>	N/A

Parameter

<switch>	Description
0	Close all active reporting
1	Open active reporting

12.5 Control single URC +SPSURC

Description

Set switch of single URC.

Type	Command	Return	Description
set	AT+SPSURC=<name>,<state>	OK	N/A
		+CME ERROR<err>	N/A
test	AT+SPSURC=?	+SPSURC: (0-1) OK	N/A

Parameter

<switch>	Description
<name>	the name of URC in table of SPAURC, such as "+sperror", "+specc".
<state>	<ul style="list-style-type: none"> • 0: close the URC • 1: open the URC

Example

```
AT+SPSURC="+sperror",0
```

Indicates closing active reporting of "sperror"

12.6 Set/read IMEI +SPIMEI

Description

Set and read IMEI.

Type	Command	Return	Description
set	AT+ SPIMEI=<card_id>,<imei>	OK	N/A
		+CME ERROR<err>	N/A
read	AT+ SPIMEI?	imei_string	N/A

Parameter

parameter	Description
card_id	<ul style="list-style-type: none"> • 0: sim1 • 1: sim2
imei	string type, 15 IMEI characters.

Example

```
AT+SPIMEI =0,“867400020316612”
OK
```

12.7 Report the flag of cell information +CCED

Description

Report the flag of cell information.

Type	Command	Return	Description
set	AT+CCED=<report_type>[,<oper_type>]	OK	N/A
		+CME ERROR<err>	N/A
		[+CCED:<cell information>]	N/A

Parameter

Parameter	Description
<report_type>	<ul style="list-style-type: none"> • 0: respond once immediately • 1: automatically output • 2: stop to automatically output
<oper_type>:	<ul style="list-style-type: none"> • 1: report main cell information • 2: report temporary cell information(multiple) • 4: report time adv information • 8: report semaphore indication of main cell (+CESQ/+CSQ)

12.8 GPRS of current SIM enforces detachment +SGFD

Description

GPRS of current SIM enforces detachment in order to easily achieve switching operation for protocol between different SIM.

Type	Command	Return	Description
execute	AT+SGFD	OK	N/A
		+CME ERROR<err>	N/A

12.9 USIM DRIVER LOG +SPUSIMDRVLS

Description

The command is used to open or close USIM DRIVER LOG.

Type	Command	Return	Description
set	AT+SPUSIMDRVLS = < value >	OK	N/A
		+CME ERROR<err>	N/A
read	AT+ SPUSIMDRVLS?	+SPUSIMDRVLS: <value>	N/A

NOTE

Set command will write switch status to NV.

Parameter

<value>	Description
0	Close USIM DRIVER LOG
1	Open USIM DRIVER LOG

12.10 Device information +SGMR

Description

Read device information.

Type	Command	Return	Description
set	AT+SGMR=<dual_sys>,<op>,<type>[,<rat>]	OK	N/A
		+CME ERROR<err>	N/A

Parameter

<dual_sys>: card id. range is 0-3.

<op>: operation mode

op	Description
0	Read
1	Write

<type>: operation type

Type	Description
1	IMEI read(AT+SGMR=dual_sys,0,1) IMEI write(AT+SGMR=dual_sys,1,1,"IMEI_str")
2	SV read(AT+SGMR=dual_sys,0,2) SV write(AT+SGMR=dual_sys,1,2,"sv_str") (sv_str is two number, for example "05")
3	CALI (calibration information)(only read)
4	CALI_VAL (calibration value) (read/write)
5	PHASE_CHECK (only read)

<rat>

- 0: GSMTD
- 1: WCDMA
- 2: CDMA2000(not support now)
- 3: LTE

Example

AT+SGMR=0,0,3,1

Return:

```
Calibration Info
BIT0:BAND1 Not Pass
BIT1:BAND2 Not Pass
BIT2:BAND5 Not Pass
BIT3:BAND8 Not Pass
BIT4:BAND19 Not Pass
BIT5:BAND6 Not Pass
BIT6:BAND4 Not Pass
BIT12:Final Test Not Pass
OK
```

AT+SGMR=0,0,3,3

Return:

```
Calibration Info
BIT0:TDD LTE AFC Not Pass
BIT1:TDD LTE AGC Not Pass
BIT2:TDD LTE APC Not Pass
BIT3:FDD LTE AFC Not Pass
BIT4:FDD LTE AGC Not Pass
BIT5:FDD LTE APC Not Pass
BIT12:TDD LTE Final Test Not Pass
BIT13:TDD LTE Antenna Test Not Pass
BIT14:FDD LTE Final Test Not Pass
BIT15:FDD LTE Antenna Test Not Pass
OK
```

12.11 CUST TYPE +SPCUSTTYPE

Description

Set/read CUST TYPE.

Type	Command	Return	Description
set	AT+SPCUSTTYPE= cust_type	OK	N/A
		+CME ERROR<err>	N/A

Type	Command	Return	Description
read	AT+SPCUSTTYPE?	+SPCUSTTYPE: cust_type	N/A

BOOK NOTE

When set command, should power off, then power on.

Parameter

cust_type	Value
EM_CUST_DEF_TYPE_NORMAL	0
EM_CUST_DEF_TYPE_ASP	11
EM_CUST_DEF_TYPE_AFP	12
EM_CUST_DEF_TYPE_C	30
EM_CUST_DEF_TYPE_DFP	41
EM_CUST_DEF_TYPE_F	50
EM_CUST_DEF_TYPE_D	40

12.12 Size of ring +CRSL

Description

Read or set the size of ring.

Type	Command	Return	Description
set	AT+CRSL=<sound level>	OK	N/A
		+CME ERROR<err>	N/A
read	AT+CRSL?	+CRSL:cust_sound level	cust_sound level:0~15

Parameter

<level>: integer type value with manufacturer specific range

12.13 Request model identification +GMM

Description

Request model identification.

Type	Command	Return	Description
execute	AT+GMM	version OK	N/A
test	AT+GMM=?	+GMM: OK	N/A

12.14 Select card id +SPACTCARD

Description

Set global variables, specify which SIM card is activated.

Type	Command	Return	Description
set	AT+SPACTCARD=<card ID>	OK	N/A
		+CME ERROR<err>	
read	AT+SPACTCARD?	+SPACTCARD:card ID	N/A
Test	AT+SPACTCARD=?	+SPACTCARD:(list of card)	N/A

12.15 UE modes of operation for EPS +CEMODE

Description

The set command is used to set the MT to operate according to the specified mode of operation for EPS, see 3GPP TS 24.301 [83]. If the requested mode of operation is not supported, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. Refer sub clause 9.2 for possible <err> values.

The read command returns the mode of operation set by the TE, independent of the current serving cell capability and independent of the current serving cell Access Technology.

The test command is used for requesting information on the supported MT mode of operation.

Type	Command	Return	Description
set	AT+CEMODE=[<mode>]	OK	N/A

Type	Command	Return	Description
		+CME ERROR: <err>	N/A
read	AT+CEMODE?	+CEMODE: <mode>	N/A
test	AT+CEMODE=?	+CEMODE: (list of supported <mode>s)	N/A

Parameter

<mode>: integer type; indicates the mode of operation. The default value is manufacturer specific.

- 0: PS mode 2 of operation
- 1: CS/PS mode 1 of operation
- 2: CS/PS mode 2 of operation
- 3: PS mode 1 of operation

NOTE

The definition for UE modes of operation can be found in 3GPP TS 24.301 [83].

Reference

3GPP TS 27.007

12.16 Primary notification event reporting +CPNER

Description

This command enables and disables reporting of primary notification events when received from the network with unsolicited result code +CPNERU: <message_identifier>, <serial_number>, <warning_type>.

Primary notification events are used for public warning systems like ETWS (Earthquake and Tsunami Warning Systems). When <reporting>=1, duplicate primary notifications will be discarded by the UE.

Type	Command	Return	Description
set	AT+CPNER=[<reporting>]	OK	N/A
		+CME ERROR: <err>	N/A
read	AT+CPNER?	+CPNER:<reporting>	N/A
test	AT+CPNER=?	+CPNER: (list of supported <reporting>s)	N/A

Parameter

<reporting>: integer type, controlling reporting of primary notification events

- 0: Disable primary notification events.
- 1: Enable reporting of primary notification events without security information.

Reference

3GPP TS 27.007

12.17 Service specific access control restriction status +CSSAC

Description

This command refers to SSAC (Service Specific Access Control) related information which is used by MMTEL application (see 3GPP TS 24.173 [87]). The command provides the current status of the parameters for SSAC,<BFVoice>,<BFVideo>,<BTVoice> and <BTVideo>. The AT command has no effect on the execution of SSAC.

Type	Command	Return	Description
execute	AT+CSSAC	+CSSAC: <BFVoice>,<BFVideo>,<BTVoice>,<BTVideo>	N/A
test	AT+CSSAC=?	OK	N/A

Reference

3GPP TS 27.007

12.18 UE's usage setting for EPS +CEUS

Description

The set command is used to set the MT to operate according to the specified UE's usage setting for EPS (see 3GPP TS 24.301 [83]).

The read command returns the usage setting set by the TE.

The test command is used for requesting information on the supported MT setting(s).

Type	Command	Return	Description
set	AT+CEUS=[<setting>]	OK	N/A
		+CME ERROR: <err>	N/A
Test	AT+CEUS=?	+CEUS: (list of supported <setting>s)	N/A
Read	AT+CEUS?	+CEUS: <setting>	N/A

Parameter

<setting>: integer type; indicates the usage setting of the UE. The default value is manufacturer specific.

- 0: voice centric

- 1: data centric

NOTE

The definition for UE's usage setting can be found in 3GPP TS 24.301 [83].

Reference

3GPP TS 27.007

12.19 Mobile termination event reporting +CMER

Description

This command enables or disables sending of unsolicited result codes from TA to TE in the case of key pressings, display changes, and indicator state changes.

Type	Command	Return	Description
set	AT+CMER=<mode>[,<keyp>][,<disp>],<ind>[,<bfr>]	OK	N/A
		+CME ERROR: <err>	N/A

Parameter

Parameter	Value
<mode>	1: enable
<keyp>	0-2
<disp>	0-2
<ind>	0-2
<bfr>	0-1

Reference

3GPP TS 27.007

12.20 Power off +CPOF

Description

Device will be switched off (power down mode). Do not send any command after this command.

Type	Command	Return	Description
execute	AT+CPOF	OK	N/A
test	AT+CPOF=?	+CPOF	N/A

NOTE

Only for feature phone product.

12.21 Test system function +SPTEST

Description

This command is used to test system function, include a lot of function.

Type	Command	Return	Description
set	AT+SPTEST=45,enable,timer	OK	Set modem assert timer, enable=1/0
set	AT+SPTEST=42,1/0	OK	Open or close CS function

12.22 Set network mode +SPTESTMODEM

Description

The command is used to set test mode for UNISOC's product. It should be set before the modem stack is started by AT+SFUN=4. The set command is set dual sim network mode; and this command only used.

Type	Command	Return	Description
set	AT+SPTESTMODEM=<test_mode1>,<test_mode2>[,<multi_card>]	OK	N/A
		+CME ERROR: <err>	

Parameter

<testmode1>: integer type, Sim1 network mode.

<testmode2>: integer type, Sim2 network mode.

Sim network mode as follows:

- 1: TD LTE_ONLY
- 2: LTE FDD ONLY
- 3: TD-LTE&FDD LTE Dual Mode

- 4: LTE FDD/W/GSM
- 5: TD LTE/W/GSM
- 6: TD LTE/LTE FDD/W/GSM //four mode
- 7: TD LTE/TD/GSM //three mode
- 8: TD LTE/LTE FDD/TD/GSM
- 9: TD LTE/LTE FDD/TD/W/GSM //Five mode
- 10: GSM ONLY
- 11: W ONLY
- 12: TD ONLY
- 255: TG Dual Mode/WG Dual Mode
- 13: TG Dual Mode
- 14: WG Dual Mode
- 21: LTE and GSM
- 24: LTE and WCDMA
- 128: SA only
- 131: SA/NSA/FDD-LTE/TDD-LTE
- 134: SA/NSA/FDD-LTE/TD-LTE/WCDMA/GSM
- 135: SA/NSA /FDD-LTE/TD-LTE/TD/GSM
- 137: SA/NSA /FDD-LTE/TD-LTE/TD/WCDMA/GSM

<multi_card>: integer type.; (is must parameter when only single NR product)

- 0: sim1 is primary card (support NR)
- 1: sim2 is primary card (support NR)

12.23 Set dual sim network mode +SPTESTMODE

Description

The set command is set dual sim network mode and reboot PS if need.

Type	Command	Return	Description
set	AT+SPTESTMODE=<test_mode1>,<test_mode2>[,<multi_card>]		N/A

Parameter

<testmode1>: integer type, Sim1 network mode

<testmode2>: integer type, Sim2 network mode

Sim network mode as follows:

- 1: TD LTE_ONLY

- 2: LTE FDD ONLY
 - 3: TD-LTE&FDD LTE Dual Mode
 - 4: LTE FDD/W/GSM
 - 5: TD LTE/W/GSM
 - 6: TD LTE/LTE FDD/W/GSM //four mode
 - 7: TD LTE/TD/GSM //three mode
 - 8: TD LTE/LTE FDD/TD/GSM
 - 9: TD LTE/LTE FDD/TD/W/GSM //Five mode
 - 10: GSM ONLY
 - 11: W ONLY
 - 12: TD ONLY
 - 255: TG Dual Mode/WG Dual Mode
 - 13: TG Dual Mode
 - 14: WG Dual Mode
 - 21: LTE and GSM
 - 24: LTE and WCDMA
 - 128: SA only
 - 131: SA/NSA/FDD-LTE/TDD-LTE
 - 134: SA/NSA/FDD-LTE/TD-LTE/WCDMA/GSM
 - 135: SA/NSA /FDD-LTE/TD-LTE/TD/GSM
 - 137: SA/NSA /FDD-LTE/TD-LTE/TD/WCDMA/GSM
- <multi_card>: integer type.; (is must parameter when only single NR product)
- 0: sim1 is master card(support NR)
 - 1: sim2 is master card(support NR)

12.24 Set/Read UE capability +SPCAPABILITY

Description

The command used to set/read UE capability.

Type	Command	Return	Description
set	AT+SPCAPABILITY=param1,param2,param3		N/A

Example

set product mode command

```
AT+spcapability=51,1,132      //single card support SA+NSA
AT+spcapability=51,1,260      //single card support NSA
```

```
AT+spcapability=51,1,516 //single card support SA
```

read product mode command

```
AT+spcapability=51,0
+spcapability: 51,0,66 //single card support SA+NSA
+spcapability: 51,0,130 //single card support NSA
+spcapability: 51,0,258 //single card support SA
```

12.25 Obtain ATR of SIM card +SPATR

Description

Obtain ATR of SIM card in the currently selected card slot.

Type	Command	Return	Description
read	AT+SPATR?	+SPATR: <atr_string> OK	N/A

NOTE

The response of this command depends on the SIM status in the currently selected card slot.

Example

```
AT+SPATR?
+SPATR: 3B9C940068868D0A86980256C2000500
OK
```

12.26 Auto attach +SAUTOATT

Description

Set “auto attach” operation of MT.

Type	Command	Return	Description
set	AT+SAUTOATT=[<state>]	OK/ERROR	N/A
read	AT+SAUTOATT?	+SAUTOATT: <state>	N/A
test	AT+SAUTOATT=?	+SAUTOATT: (0,1)	N/A

Parameter

<state>:

<state>	Description
1	Auto attach
0	Manual attach(cancel auto attach)

12.27 Get the IP fall back cause value +SPACTFB

Description

Get the IP fall back cause value.

Type	Command	Return	Description
read	AT+ SPACTFB?	+ SPACTFB: <cause>	N/A

Parameter

Parameter	Value
<cause>	0: default value 50: PDN type IPv4 only allowed 51: PDN type IPv6 only allowed 52: single address bearers only allowed ...

12.28 Detach PS domain and re-attach again +SPITYPECHANGE

Description

The command local forces detach PS domain and re-attach again. Usually used for APN change of default bearer of LTE, or IP address type change.

Type	Command	Return	Description
execute	AT+SPITYPECHANGE=1	OK	N/A

12.29 Listening MT call +SPAUTO

Description

This command is used to set listening MT call automatically or not, including voice call and video call.

Type	Command	Return	Description
set	AT+SPAUTO=<mode>	OK	N/A
		CME ERROR:<err>	
read	AT+SPAUTO?	+SPAUTO: mode	N/A
test	AT+SPAUTO=?	+SPAUTO: (0,1)	N/A

Parameter

mode	Description
0	Manual
1	Auto

12.30 MT CSFB +SCSFB

Description

The command will be used whether accept or reject the MT CSFB call.

Type	Command	Return	Description
set	AT+SCSFB=<callid>,<accept_flag>	OK	N/A
		CME ERROR:<err>	
test	AT+SCSFB=?	+SCSFB:(1-7),(0,1)	N/A

Parameter

<call id>: 1 - 7

<accept_flag>:

- 1: accept MT CSFB Call
- 0: reject MT CSFB Call

12.31 Handle reset or deactive PS +RESET

Description

Handle reset or deactive PS, but not need power off SIM card.

Type	Command	Return	Description
Set	AT+RESET=<value>	OK/+ERROR<err>	N/A

<value>

- 0: deactive PS, but not need power off SIM card.
- 1: Handle reset
- 2: Rest MCU

NOTE

If a reset don't finish, then receive another reset, it will directly return ERROR.

12.32 Downlink mute voice +SDMUT

Description

The command is used to enable or cancel downlink mute voice.

Type	Command	Return	Description
set	AT+SDMUT=<mode>	OK//ERROR	N/A
read	AT+SDMUT?	+ SDMUT: <mode> OK	N/A

Parameter

<mode>:

- 0: cancel downlink mute
- 1: enable downlink mute voice

12.33 Read/modify tmsi +SPTMSI

Description

Read and modify tmsi.

Type	Command	Return	Description
Set	AT+ SPTMSI= <tmsi>	OK	N/A
Read	AT+ SPTMSI?	+ SPTMSI: tmsi OK	N/A

Parameter

<tmsi>: string type , set tmsi, such as "44556677"

12.34 SIM lock status +SPSMNW

Description

Set parameters of SIM Lock.

Type	Command	Return	Description
Set	AT+SPSMNW =<fac>, <key>, <lock_oper>, [mcc], [mnc], [mnc_number], [subset1], [subset2], [sp], [corporate], [imsi], [reserved]	OK/+CME ERROR: <err>	N/A
Test	AT+ SPSMNW =?	+SPSMNW: (1-6), ,(1-4), (0-1000), (0-1000), (2-3), (0-9), (0-9), (0-255), (0-255), ,(0-255)	N/A

Parameter

Parameter	Description
fac	(1-6) <ul style="list-style-type: none"> • 1: PS • 2:PN • 3:PU • 4:PP • 5:PC • 6:all(only ock_oper is 4 to use)
key	String , length: 6-16
ock_oper	<ul style="list-style-type: none"> • 1: read • 2: write • 4: delete

Parameter	Description
mcc mnc mnc_number	0-1000, PLMN parameters 2-3
Subset1\2	0-9
sp	0-255
corporate	0-255
imsi	“FFFFFF” length: 8
reserved	0-255

12.35 Check W/G Ciphering +SPFDDCIPHER

Description

This command is used to check whether WCDMA/GSM has ciphering or not.

Type	Command	Return	Description
Set	AT+SPFDDCIPHER=domain	N/A	N/A

Parameter

<domain>:

- 0: CS
- 1: PS

12.36 REF function +SPREF

Description

The command is used to realize REF function, now only include auto download.

Type	Command	Return	Description
Set	AT+SPREF=<string>	OK	N/A
Test	AT+SPREF=?	+SPREF: AUTODLOADER OK	N/A

Parameter

<string>	Description
“AUTODLOADER”	With a USB line connect PC and ME, the UE will enter download mode.

12.37 Audio frequency loopback test +SPVLOOP

Description

Audio frequency loopback test.

Type	Command	Return	Description
Set	AT+ SPVLOOP=[<cmd>[,<mode>[,<volume>[,<loopbacktype>[,<voiceformat>[,<delaytime>[,<outdevice>[,<indevice>]]]]]]]]]	OK	N/A

Parameter

<cmd>:

cmd	Description
0	DISABLE
1	EABLE
2	SETMODE
3	SETVOLUME
4	SETDEVICE

<mode>: Optional mode exists 0-7.

- 0: handheld
- 1: handfree
- 2: earphone

<volume>: the size of volume.

<loopbacktype>:

- 0: AD->DA loop
- 1: AD->ul_process->dl_process->DA loop
- 2: AD->ul_process->encoder->decoder->dl_process->DA loop

<voiceformat>: (1-3)

- 1: EFS vocoder
- 2: HR Vocoder
- 3: AMR Vocoder

<delaytime>: (0-1000) ms

<outdevice>:

- 1: ear
- 2: spk
- 4: hp

<indevice>:

- 1: mic_0
- 2: mic_1
- 4: mic_hp

12.38 Report L2 data rate +SPRATEMODE

Description

Report L2 data rate to AP

Parameter

<mode>:

- 0: low rate
- 1: middle rate
- 2: high rate

<max rate>: max data rate

<current rate>: current data rate

12.39 Update or retrieve information to/from SIM card+SPCARDINFO

Description

General command to update or retrieve information to / from SIM card, MT configuration information settings.

Type	Command	Return	Description
Set	+SPCARDINFO=<cmd_type>,<P2>,<P3>	OK/+CME ERROR	N/A

Parameter

<cmd_type>:

- 0: read command
- 1: write command
- 2: control command

<P2>,<P3>:

cmd_type	P2	P3
0	Read type	Content ID
	0: Read SIM file	0: EF DIR Others: reserved
	1: Read SIM function	0: Store MEID Others: reserved
	Others: reserved	
1	Write type	Content ID
	0: Store MEID	0: store MEID during SIM initialization 1: do not store MEID during SIM initialization
	Others: reserved	
2	Control type	Control value
	0: UICC CLF (Terminal Capability)	0: Not Support 1: Support
		0: open market 1: CMCC 2: CUCC
		Others: reserved
	2: Automatic power on SIM by MT	0: none, not auto power on SIM 1: auto power on SIM0 2: auto power on SIM1 3: auto power on SIM0 and SIM1
		Others: reserved
		0: none, Normal, not test 1: GCF test
		Others: reserved

cmd_type	P2	P3
	Others: reserved	

Example

```
AT+SPCARDINFO=2,0,1
OK
```

12.40 Inform voice call with the IMS available or not +CAVIMS

Description

Informs the MT whether the UE is currently available for voice call with the IMS.

Type	Command	Return	Description
Set	AT+CAVIMS=<n>	OK/+CME ERROR: <err>	N/A
Read	AT+CAVIMS?	+CAVIMS: <n> OK	N/A

Parameter

<n>:

- 0: voice calls with IMS are not available
- 1: voice calls with the IMS are available

12.41 Boot up IMS registration +IMSEN

Description

This command is used to boot up IMS registration. After finished all related setting, such as instance id\domain.

Type	Command	Return	Description
Set	AT+IMSEN=<val>	OK/+CMS ERROR: <err>	N/A
Read	AT+IMSEN?	+IMSEN: <val> OK	N/A

Parameter

<val>:

1: start IMS registration

Example

```
AT+IMSEN=1
```

12.42 Return parameters of primary PDP contexts +SIPCONTEXT

Description

This command use to return parameters of all AP defined primary PDP contexts.

Type	Command	Return	Description
Read	AT+SIPCONTEXT?	+SIPCONTEXT: <cid>, <active_stat>, <apn>, <pdp_type>, <request_apn> OK	N/A

Parameter

<cid>: int type 1~15

<active_stat>:

- 1: active
- 0: deactive

<apn>: string_type

<pdp_type>:

- 1: IPv4
- 2: IPv6
- 3: IPv4v6

<request_apn>: string_type

12.43 Detach then reattach +SPREATTCH

Description

This command is used to detach and then reattach.

Type	Command	Return	Description
Execute	AT+SPREATTACH	OK/ERROR	N/A

12.44 Set associate_plmn nssai info +SPSETNSSAI

Description

This command is used to set associate_plmn nssai info.

Type	Command	Return	Description
Set	AT+SPSETNSSAI= <plmn_id>, <nssai_info>	OK/ERROR	N/A

Parameter

<plmn_id>: int type

<nssai_info>: string type in hexadecimal format. Dependent of the form, the string can be separated by dot(s), semicolon(s) and colon(s). This parameter indicates the list of S-NSSAIs included in the default configured NSSAI to be stored by the MT.

12.45 Enable/disable NR +SP5GRAN

Description

The set command is used to enable/disable NR.

Command	Possible response(s)
+SP5GRAN=[<flag>]	OK/ERROR

Parameter

<flag>: integer type.

- 0: Disable NR
- 1: Enable NR

12.46 Get CA info +SPCAINFO

Description

This command use to get CA info.

Type	Command	Return	Description
Read	AT+SPCAINFO?	+ SPCAINFO: rat, ca_flag OK	N/A

Parameter

<rat>:

- 7: LTE
- other: invalid value

<ca_flag>:

- 0: not support CA
- 1: support CA

12.47 Active reporting control switch ^CURC

Description

Active reporting control switch of all modem (single operation is valid).

Type	Command	Return	Description
Set	AT^CURC=<switch>	OK	NA
Test	AT^CURC=?	^CURC: (0-1) OK	NA
Read	AT^CURC?	^CURC: <switch> OK	NA

Parameter

<switch>:

switch	Description
0	Close all active reporting
1	Open active reporting

12.48 Inquire status of SIM card +EUICC

Description

Inquire related status of SIM card.

Type	Command	Return	Description
Read	AT+EUICC?	+EUICC: <sim>,<pin>,<type>	NA

Parameter

<sim>:

sim	Description
0	sim ready
1	Sim not inserted
2	Sim not ready

<pin>:

pin	Description
0	no PIN required
1	PIN1 needed
2	PIN2 needed
3	PIN1 locked, need to input PUK1
4	PIN2 locked, need to input PUK2
22	PUK1 locked
23	PUK2 locked
25	PIN status unknown

<type>:

type	Description
0	SIM
1	USIM
255	UNKNOWN

12.49 Report Error +SPERROR

Description

Report error.

+SPERROR: <item_class>, <cause>, <mcc>, <mnc>

Parameter

< item_class >:

item_class	Description
0	LOCATION_UPDATE_FAIL
1	GPRS_ATTACH_FAIL
2	RAU_COMRAU_FAIL
3	PDP_ACTIVATION_REJECT
4	SS_SERVICE_REJECT
5	RADIO_LINK_FAIL
6	MM_AUTH_FAIL
7	PS_SECURITY_FAIL
8	NW_CS_AUTH_REJECT
9	NW_CS_AUTH_REJECT
10	NW_PS_AUTH_REJECT
11	SMS_REJECT
12	SMS_REJECT_CP
13	SMS_REJECT_RP
14	DROP_NETWORK

<cause>:

cause	Description
0x00	MN_MM_CAUSE_NONE
0x02	MN_MM_IMSI_UNKNOWN_IN_HLR
0x03	MN_MM_ILLEGAL_MS
0x04	MN_MM_IMSI_UNKNOWN_IN_VLR
0x05	MN_MM_IMEI_NOT_ACCEPTED

0x06	MN_MM_ILLEGAL_ME
0x07	MN_MM_GPRS_NOT_ALLOWED
0x08	MN_MM_GPRS_NON_GPRS_NOT_ALLOWED
0x09	MN_MM_MS_ID_NOT_DERIVED_BY_NW
0x0a	MN_MM_IMPLICIT_DETACH
0x0b	MN_MM_PLMN_NOT_ALLOWED
0x0c	MN_MM_LOCATION_AREA_NOT_ALLOWED
0x0d	MN_MM_ROAMING_AREA_NOT_ALLOWED
0x0e	MN_MM_GPRS_NOT_ALLOWED_IN_PLMN
0x0f	MN_MM_NO_SUITABLE_CELL_IN_LA
0x10	MN_MM_MSC_TEMP_NOT_REACHABLE
0x11	MN_MM_NETWORK_FAILURE
0x13	MN_MM_ESM_FAILURE
0x14	MN_MM_MAC_FAILURE
0x15	MN_MM_SYNC_FAILURE
0x16	MN_MM_CONGESTION
0x17	MN_MM_GSM_AUTH_UNACCEPTABLE
0x20	MN_MM_SERV_OPTION_NOT_SUPPORTED
0x21	MN_MM_REQ_SERV_OPTION_NOT_SUBSCRIBED
0x22	MN_MM_SERV_OPTION_TEMP_OUT_OF_ORDER
0x26	MN_MM_CALL_CANNOT_BE_IDENTIFIED
0x28	MN_MM_NO_PDP_CONTEXT_ACTIVATED
0x30	MN_MM_RETRY_UPON_ENTRY_INTO_NEWCELL_MIN
0x3f	MN_MM_RETRY_UPON_ENTRY_INTO_NEWCELL_MAX
0x5f	MN_MM_SEMANITICALLY_INCORRECT_MSG
0x60	MN_MM_INVALID_MM_MAND_INFO
0x61	MN_MM_MSG_TYPE_NON_EXISTENT
0x62	MN_MM_MSG_TYPE_INCOMPAT_WITH_PROTO_STATE
0x63	MN_MM_IE_NOT_IMPLEMENTED
0x64	MN_MM_CONDITIONAL_MM_IE_ERROR
0x65	MN_MM_MSG_NOT_COMPAT_WITH_PROTO_STATE
0x6f	MN_MM_PROTO_ERROR_UNSPECIFIED

0x70	MN_MM_FORBIDDEN_PLMN
0x71	MN_MM_ACCESS_CLASS_BARRED
0x72	MN_MM_NO_COVERAGE
0x73	MN_MM_GPRS_SERV_NOT_ALLOWED
0x74	MN_MM_TIMER_EXPIRY
0x75	MN_MM_SIM_INSERTED
0x76	MN_MM_SIM_REMOVED
0x77	MN_MM_SIM_ABSENT
0x78	MN_MM_SIM_INVALID_FOR_PS
0x79	MN_MM_SIM_INVALID_FOR_CS
0x7a	MN_MM_SIM_INVALID_FOR_CS_AND_PS
0x7b	MN_MM_LOW_LAYER_FAIL
0x7c	MN_MM_PLMN_SEARCH_ABORT_DUE_TO_MT_CALL
0x7d	MN_MM_PLMN_SEARCH_ABORT_DUE_TO_PS_PAGING
0x7e	MN_MM_CELL_INVALID_FOR_CS
0x7f	MN_MM_CELL_INVALID_FOR_CS_AND_PS
0x80	MN_MM_PLMN_SEL_ABORT_DUE_TO_ACTIVE_CALL
0x81	MN_MM_NO_COVERAGE_LIMITED_SERVICE
0x82	MN_MM_PLMN_SEL_ABORT_DUE_TO_AS_UNREADINESS
0x83	MN_MM_BAND_SEL_ABORT_DUE_TO_ACTIVE_CALL
0x84	MN_MM_BAND_SEL_ABORT_DUE_TO_SIM_FAILURE
0x96	MN_MM_LTE_PDN_REJECT

when item_class is 3, Corresponding cause is as follows:

- OPERATOR_BARRED(0x08) /* no retry */
 - NAS_SIGNALLING(0x0E)
 - LLC_SNDCP(0x19)
 - INSUFFICIENT_RESOURCES(0x1A)
 - MISSING_UNKNOWN_APN(0x1B) /* no retry */
 - UNKNOWN_PDP_ADDRESS_TYPE(0x1C) /* no retry */
 - USER_AUTHENTICATION(0x1D) /* no retry */
 - ACTIVATION_REJECT_GGSN(0x1E) /* no retry */
 - ACTIVATION_REJECT_UNSPECIFIED(0x1F)
 - SERVICE_OPTION_NOT_SUPPORTED(0x20) /* no retry */

- SERVICE_OPTION_NOT_SUBSCRIBED(0x21) /* no retry */
- SERVICE_OPTION_OUT_OF_ORDER(0x22)
- NSAPI_IN_USE(0x23) /* no retry */
- REGULAR_DEACTIVATION(0x24) /* possibly restart radio based on config */
- QOS_NOT_ACCEPTED(0x25)
- NETWORK_FAILURE(0x26)
- UMTS_REACTIVATION_REQ(0x27)
- FEATURE_NOT_SUPP(0x28)
- TFT_SEMANTIC_ERROR(0x29)
- TFT_SYNTAX_ERROR(0x2A)
- UNKNOWN_PDP_CONTEXT(0x2B)
- FILTER_SEMANTIC_ERROR(0x2C)
- FILTER_SYNTAX_ERROR(0x2D)
- PDP_WITHOUT_ACTIVE_TFT(0x2E)
- ONLY_IPV4_ALLOWED(0x32) /* no retry */
- ONLY_IPV6_ALLOWED(0x33) /* no retry */
- ONLY_SINGLE_BEARER_ALLOWED(0x34)
- ESM_INFO_NOT_RECEIVED(0x35)
- PDN_CONN_DOES_NOT_EXIST(0x36)
- MULTI_CONN_TO_SAME_PDN_NOT_ALLOWED(0x37)
- MAX_ACTIVE_PDP_CONTEXT_REACHED(0x41)
- UNSUPPORTED_APN_IN_CURRENT_PLMN(0x42)
- INVALID_TRANSACTION_ID(0x51)
- MESSAGE_INCORRECT_SEMANTIC(0x5F)
- INVALID_MANDATORY_INFO(0x60)
- MESSAGE_TYPE_UNSUPPORTED(0x61)
- MSG_TYPE_NONCOMPATIBLE_STATE(0x62)
- UNKNOWN_INFO_ELEMENT(0x63)
- CONDITIONAL_IE_ERROR(0x64)
- MSG_AND_PROTOCOL_STATE_UNCOMPATIBLE(0x65)
- PROTOCOL_ERRORS(0x6F) /* no retry */
- APN_TYPE_CONFLICT(0x70)
- INVALID_PCSCF_ADDR(0x71)
- INTERNAL_CALL_PREEMPT_BY_HIGH_PRIO_APN(0x72)
- EMM_ACCESS_BARRED(0x73)
- EMERGENCY_IFACE_ONLY(0x74)
- IFACE_MISMATCH(0x75)
- COMPANION_IFACE_IN_USE(0x76)
- IP_ADDRESS_MISMATCH(0x77)
- IFACE_AND_POL_FAMILY_MISMATCH(0x78)
- EMM_ACCESS_BARRED_INFINITE_RETRY(0x79)
- AUTH_FAILURE_ON_EMERGENCY_CALL(0x7A)

12.50 Achieve Fast Dormancy *FDY

Description

Achieve Fast Dormancy function, and release connection for energy-saving while no data to be transported.

Type	Command	Return	Description
Set	AT*FDY=<flag>,<time>	OK	N/A
Read	AT*FDY?	*FDY: (0, 1), (1, 65535) OK	N/A

Parameter

<flag>:

<flag>	Description
0	close energy-saving mode
1	Open energy-saving mode

<time>: integer, how long releases connection after no data transport, unit: second.

NOTE

For WCDMA / GSM dual mode productions, < time> set to 255 stand for switch off fast dormancy, i.e. AT*FDY= 0 is equal to AT*FDY=1,255.

13 Phonebook Commands

13.1 Select phonebook memory storage +CPBS

Description

Set command selects phonebook memory storage <storage>, which is used by other phonebook commands. If setting fails in an MT error, +CME ERROR: <err> is returned.

Read command returns currently selected memory, and when supported by manufacturer, number of used locations and total number of locations in the memory.

Test command returns supported storages as compound value.

Type	Command	Return	Description
Set	AT+CPBS=<storage>	OK/ERROR	N/A
Read	AT+CPBS?	+CPBS: <storage> (default value: "SM") [,<num used>, < num available>] OK	N/A
Test	AT+CPBS=?	+CPBS: ("SM", "FD", "LD", "AP", "SN", "ON", "NV", "EN") OK	N/A

NOTE

Only for feature phone.

Parameter

<num used>: integer type value indicating the number of used locations in selected memory

<num available>: integer type value indicating the total number of locations in selected memory

<storage>	Description
"SM"	USIM/SIM phonebook
"FD"	SIM/USIM fix dialing number
"LD"	SIM/USIM last number dialing phonebook
"AP"	USIM: ADN in DFusim/DFphonebook
"SN"	SIM: Service Dialing Number phonebook
"ON"	SIM: MSISDN

<storage>	Description
“NV”	NV phonebook
“EN”	Emergency Call phonebook

13.2 Read phonebook entries +CPBR

Description

Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS (Support “FD”, “ON”, “SN”, “LD” and “EN”). If <index2> is left out, only location <index1> is returned.

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number>, <text>, <group>, <secondtext> and <email> fields.

+CME ERROR: <err> may return if listing fails.

Type	Command	Return	Description
Set	AT+CPBR=<index1>[,<index2>]	+CPBR=<index1>,<number>,<type>,<text><CR>,<CF> ... <index2>,<number>,<type>,<text><CR>,<CF> OK	N/A
Test	AT+CPBR=?	+CPBR: <list supported <index>s>,<nlength>,<tlength> OK	N/A

NOTE

Only for feature phone.

Parameter

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

<number>: the phone number in the format of <type>

<type>: type of address octet in integer format

<text>: the character text field with the max size of <tlength>

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

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

Example

```
AT+CPBR=1
+CPBR: 1,"13918928056", 129, "Steven"
OK
```

```
AT+CPBR=1,2
+CPBR: 1, "13918928056", 129, "Steven"
+CPBR: 2, "13980563798", 129, "Mary"
OK
```

13.3 Write phonebook entry +CPBW

Description

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS (Support “FD” and “ON” storage). Entry fields written are phone number <number> (in the format <type>), text <text> associated with the number.

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, the maximum length of <text> field.

+CME ERROR: <err> may return, if writing fails.

Type	Command	Return	Description
Set	AT+CPBW=<index> [<number> [<type> [<text>]]]	OK	N/A
Test	AT+CPBW=?	+CPBW (list supported <index>s), <nlength>, <list supported types>, <tlength> OK	N/A

NOTE

Only for feature phone

Parameter

<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

- 128: Unknown numbering plan, unknown number
- 129: ISDN/telephony number plan, unknown number
- 145: ISDN/telephony number plan, international number
- 161: ISDN/telephony number plan, national number

<text> : string type field of maximum length <tlength>

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

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

Example

```
AT+CPBW=3
OK

AT+CPBW=3,"88086666", 129,"John"
OK

AT+CPBW=3, "88086666", 129, "806797519B"
OK
```

13.4 Find phonebook entries +CPBF

Description

Execution command returns phonebook entries (“SM” storage only) which alphanumeric field start with string <findtext>. Entry fields returned are location number <indexn>, phone number stored there <number> (of format <type>), text <text> associated with the number.

+CME ERROR: <err> may return, if listing fails.

Type	Command	Return	Description
Set	AT+CPBF=<findtext>	+CPBF: <index>, <number>, <type>, <name>/ERROR (not found). OK	N/A
Test	AT+CPBF=?	+CPBF: <nlength>, <tlength> OK	N/A

NOTE

Only for feature phone

Parameter

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

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

<findtext>: string type field of maximum length <tlength>

Example

```
AT+CPBF="Mary"
+CPBF:2, "13980563798", 129, "Mary"
OK
```

13.5 Subscriber number +CNUM

Description

Action command returns the MSISDNs related to the subscriber.

Type	Command	Return	Description
Execute	AT+CNUM	+CNUM:[<alpha1>],<number1>,<type1><CR><LF> +CNUM:[<alpha2>],<number2>,<type2>[...] OK	N/A
Test	AT+CNUM=?	OK	N/A

NOTE

Only for feature phone

Parameter

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

<typex>: type of address octet in integer format

<alphax>: optional alphanumeric string associated with <numberx>

Example

```
AT+CNUM  
+CNUM: Phone, "13918928056", 129  
OK
```

14 Engineering Mode Commands

14.1 Set SM Timer prohibit Cell Reselection to UTRAM +SMTIMER

Description

This command is used to set SM Timer prohibit Cell Reselection to UTRAN.

Type	Command	Return	Description
execute	AT+SMTIMER	+SMTIMER: timer	N/A
set	AT+SMTIMER = timer	+SMTIMER: previous_timer, timer	N/A

14.2 Set NR PHY common command +NRPHY

Description

This command is used to set NR PHY common command.

Type	Command	Return	Description
set	AT+NRPHY=p1...p6	OK	N/A
		+CME ERROR: <err>	N/A

Parameter

Parameter	Value
p1...p6	Int32, NR PHY used

14.3 Get system timer +SPTIMEINFO

Description

This command is used to get system timer.

Type	Command	Return	Description
get	AT+SPTIMEINFO=0,0	OK	N/A
		+SPTIMEINFO: 0,0,timer	N/A

14.4 Open/close arm log +ARMLOG

Description

This command is used to open or close arm log.

Type	Command	Return	Description
set	AT+ARMLOG=[<n>]	OK	N/A
		+CME ERROR: <err>	N/A
read	AT+ARMLOG?	+ARMLOG: [<n>]; com debug: num	N/A

Parameter

Parameter	Value
<n>	present open or close arm log • 0:close, com debug is 0x14 • 1:open, com debug is 0x14 • 2: reserve • 3: reserve

14.5 Lock plmn +SPPLMNLIST

Description

This command is used to lock plmn.

Type	Command	Return	Description
set	AT+ARMLOG=type,[plmn,plmn...]	OK	N/A
		+CME ERROR: <err>	N/A

Parameter

Parameter	Value
Type	<ul style="list-style-type: none"> • 0: in no sim, clear plmn locked. • 1: in no sim, lock plmn. • 2: clear lock lte • 3: set lte lock

14.6 Set CFT mode +SPCFT

Description

This command is used to Set CFT mode.

Type	Command	Return	Description
set	AT+SPCFT=cft_mode, cali_mode, cali_rat[,band,freq]	OK	N/A
		+CME ERROR: <err>	N/A

Parameter

Parameter	Value
cft_mode	<ul style="list-style-type: none"> • 0: CFT_MODE_INVALID • 1: CFT_MODE_CALIBRATION • 2: CFT_MODE_CALIBRATION_POST • 3: CFT_MODE_NORMAL
cali_mode	<ul style="list-style-type: none"> • 0: CALI_MODE_INVALID • 1: CALI_MODE_TG • 2: CALI_MODE_WG
cali_rat	<ul style="list-style-type: none"> • 0: CALI_RAT_INVALID • 1: CALI_RAT_3G • 2: CALI_RAT_2G

14.7 RF power param +SPMAXRF

Description

Set parameters to control maximum launch power of GSM/TD/W/LTE.

Type	Command	Return	Description
set	AT+SPMAXRF=<band>,<is_switch>,<dbm>,<freq>,<bandw>,<dbm_flag>	OK	N/A
		+CME ERROR: <err>	N/A
test	AT+SPMAXRF=?	+SPMAXRF:(band),(is_switch),(dbm),(freq),(bandw),(dbm_flag) OK	N/A

Parameter

Parameter	Description
band	<ul style="list-style-type: none"> • 1: GSM850 (arfcn = 25) • 2: EGSM900 (arfcn = 600) • 3: DCS1800 (arfcn = 600) • 4: PCS1900 (arfcn = 128) • 5: TD1.9 (tdd_freq = 10054) • 6: TD2.1 (tdd_freq = 9404) • 7: WCDMA band1 (2100MHZ)(arfcn = 10693) • 8: WCDMA band2 (1900MHZ) (arfcn = 9875) • 9: WCDMA band5 (850MHZ) (arfcn = 4450) • 10: WCDMA band8 (900MHZ) (arfcn = 3012) • 38: TDD band 38 • 39: TDD band 39 • 40: TDD band 40 • 41: TDD band 41 • 42: FDD band 1 • 43: FDD band3 • 44: FDD band5 • 45: FDD band7 • 46: FDD band8 • 47: FDD band20
Is_switch	<ul style="list-style-type: none"> • GSM/WCDMA: 0: stop 1 :start • LTE: 2: start 3: stop
dbm	dbm value
freq	Frequency: refer band column, other frequency which correspond to the band also be OK.

Parameter	Description
bandw	Band width
dbm_flag	<ul style="list-style-type: none"> • 0: means the dbm value is positive • 1: means the dbm value is negative

14.8 Band info scan +SPBANDSCAN

Description

This command is used to scan WCDMA and GSM frequency and report the most powerful 10 result to AP. The command only is available in RRC idle status.

Type	Command	Return	Description
execute	AT+SPBANDSCAN	OK	N/A
		+SPBANDSCAN:<para1>,<para2>,<freq1>,<rxlev1>,<freq2>,<rxlev2>,...<freq10>,<rxlev10>	N/A

NOTE

- WCDMA frequency please refer to protocol 3GPP TS 25.101 chapter 5.4.3.
- Please note make stack is activated before band scan, otherwise protocol stack will return +SPBANDSCAN: 255.
- If manual test and device without SIM card, please send AT+SFUN=4 to activate protocol stack in advance.

Parameter

Parameter	Value
<para1>	<ul style="list-style-type: none"> • 0: GSM • 1: WCDMA
<para2>	<ul style="list-style-type: none"> • GSM BAND: 1: ESM 900 2: DCS 1800 3: PCS 1900 4: GSM 850 • WCDMA BAND: 1; 2; 5; 8

Example

```
AT+SPBANDSCAN<CR>
+SPBANDSCAN: 0,1,906.1,-73,895.0,-74,890.2,-78,890.4,-81,903.4,-85,906.2,-86,907.3,-86,895.1,-89,903.0,-89,890.3,-90,2,1720.5,-74,1754.5,-80,1756.4,-80,1752.3,-81,1755.4,-81,1753.2,-81,1757.3,-81
```

+SPBANDSCAN: 1,1,2142.2,-79,2142.1,-79,2141.4,-79,2141.3,-80,2142.4,-80,2142.0,-80,2143.1,-80,2143.0,-80,2141.2,-80,2146.4,-80,8,951.4,-70,951.2,-71,952.3,-71,952.1,-71,952.2,-71,951.0,-72,953.0,

14.9 Control the log level +SPLOGLEVEL

Description

This command is used to control the log level (0-5).

Type	Command	Return	Description
Set	AT+SPLOGLEVEL=<Mode>,<LOG_LEVEL>,<TRACE_MODULE_LIST>,<MSG_SAP_LIST>	OK	N/A
		+SPLOGLEVEL: value	N/A
		+CME ERROR: <err>	

Parameter

Parameter	Value
<Mode>	1: Set all the modules and SAPs.in the case, LOG_LEVEL is numeric, TRACE_MODULE_LIST and MSG_SAP_LIST are string.
	2: Get the single setting of module or sap independently.
	3: In the case, other parameter are numeric.
<LOG_LEVEL>	0/1/2/3/4/5. -1: mean close log. 0: means the just print the very import 400k logs. 5: means print all the logs.

<TRACE_MODULE_LIST>:

128 bits to present most 128 module, please note that the first character corresponding to the first 4 module.

TRACE_MODULE_LIST	BIT
_TSC_GLOBAL	0
_TSC_MOD_SDI	1
_TSC_MOD_SIM	2
_TSC_MOD_TL1	3
_TSC_MOD_TL2	4
_TSC_MOD_RRCC	5
_TSC_MOD_RRCD	6

TRACE_MODULE_LIST	BIT
_TSC_MOD_RRCA	7
_TSC_MOD_CC	8
_TSC_MOD_MM	9
_TSC_MOD_NAS_SWTH	10
_TSC_MOD_PLM	11
_TSC_MOD_RABM	12
_TSC_MOD_SM	13
_TSC_MOD_SMS	14
_TSC_MOD_SS	15
_TSC_MOD_MN_AL	16
_TSC_MOD_MNC	17
_TSC_MOD_MNM	18
_TSC_MOD_ATC	19
_TSC_MOD_GAS	20
_TSC_MOD_GL1	21
_TSC_MOD_BT	22
_TSC_MOD_LNAS	23
_TSC_MOD_LRRC	24
_TSC_MOD_LL2	25
_TSC_MOD_DSM	26
_TSC_MOD_WL1_DRV	27
_TSC_MOD_WL1_GKI	28
_TSC_MOD_WL1_HAL	29
_TSC_MOD_WL1_MEAS_RPT	30
_TSC_MOD_WL1_WL1C	31
_TSC_MOD_WPS_WL2	32
_TSC_MOD_WPS_WRCC	33
_TSC_MOD_WPS_WRRC	34
_TSC_MOD_L1IT	35
_TSC_MOD_SIP	36
_TSC_MOD_ISI	37

TRACE_MODULE_LIST	BIT
_TSC_MOD_VPR	38
_TSC_MOD_CSM	39
_TSC_MOD_SUPSRV	40
_TSC_MOD_CSM_CALL	41
_TSC_MOD_MC	42
_TSC_MOD_SAPP	43
_TSC_MOD_ROHC	44
_TSC_MOD_NRPHY	45
_TSC_MOD_NRHAL	46
_TSC_MOD_PHY_COMMON	47
_TSC_MOD_LRRCA	48
_TSC_MOD_PHY_GGE	49
_TSC_MOD_HAL	50
_TSC_MOD_PHYLTE_UL	51
_TSC_MOD_PHYLTE_COMMON	52
_TSC_MOD_PHYLTE_SYME	53
_TSC_MOD_PHYLTE_SLEEP	54
_TSC_MOD_PHYLTE_SCH	55
_TSC_MOD_PHYLTE_PAL	56
_TSC_MOD_PHYLTE_DL	57
_TSC_MOD_PHYLTE_RFS	58
_TSC_MOD_PHY_TDS	59
_TSC_MOD_PHY_ES	60
_TSC_MOD_FAKE_LAYER	61
_TSC_MOD_NGMM	62
_TSC_MOD_UPM	63
_TSC_MOD_NRUL_MAC_TX	64
_TSC_MOD_NR_L2_OTHER	65
_TSC_MOD_NRUL_SDAP_TX	66
_TSC_MOD_NRUL_RA	67
_TSC_MOD_NRUL_PDCP_TX	68

TRACE_MODULE_LIST	BIT
_TSC_MOD_NR_SDAP_RX	69
_TSC_MOD_NR_MAC_RX	70
_TSC_MOD_NR_PDCP_RX	71
_TSC_MOD_NR_RLC_RX	72
_TSC_MOD_NRUL_RLC_TX	73
_TSC_MOD_EAP	74
_TSC_MOD_MAX	75

<MSG_SAP_LIST>:

256 bit present most 256 sap.

MSG_SAP_LIST	BIT
"INVALID_SAP",	0
"SM_TIMER_SAP"	1
"GMM_TIMER_SAP"	2
"MM_TIMER_SAP"	3
"SIM_TIMER_SAP"	4
"CC_TIMER_SAP"	5
"SS_TIMER_SAP"	6
"SMS_TIMER_SAP"	7
"PLM_TIMER_SAP"	8
"MNM_TIMER_SAP"	9
"SAT_TIMER_SAP"	10
"ATPP_TIMER_SAP"	11
"CBMC_TIMER_SAP"	12
"CL_TIMER_SAP"	13
"RR_RRC_SAP"	14
"DM_CPHY_SAP"	15
"L1SIM_MPAL_SAP"	16
"SNDCP_TIMER_SAP"	17
"LLC_TIMER_SAP"	18
"GPRS_RLC_TIMER_SAP"	19

MSG_SAP_LIST	BIT
"RRM_TIMER_SAP"	20
"RMP_C_TIMER_SAP"	21
"GPRS_MAC_TIMER_SAP"	22
"LAPDM_TIMER_SAP"	23
"MPAL_TIMER_SAP"	24
"CSRR_TIMER_SAP"	25
"TDT_TIMER_SAP"	26
"RLP_TIMER_SAP"	27
"L2R_TIMER_SAP"	28
"DSM_TIMER_SAP"	29
"RABM_TIMER_SAP"	30
"RRCD_TIMER_SAP"	31
"RRCC_TIMER_SAP"	32
"RRC_TIMER_SAP"	33
"RLC_TIMER_SAP"	34
"MAC_TIMER_SAP"	35
"PDCP_TIMER_SAP"	36
"L1SIM_TIMER_SAP"	37
"TCRLC_TIMER_SAP"	38
"DUMMY_SPCH_APP_TIMER_SAP"	39
...	...
"NR_SAP"	249
"IMS_SAP"	250
"SIGNAL_APP_MN_SAP"	251
"TD_LTE_SAP"	252
"WCDMA_SAP"	253
"GSM_CMN_SAP_II"	254
"GSM_CMN_SAP"	255

Read Command

AT+SPLOGLEVEL?

Test command

```
AT+SPLOGLEVEL=?
```

Example

```
AT+SPLOGLEVEL=1,0,"FFFFFFFFFFFFFF","FFFFFFFFFFFFFFFFFFFFFFFFFF"
```

return:

OK

```
AT+SPLOGLEVEL=2,0,"MOD_SIM",
```

```
+SPLOGLEVEL: 1
```

OK

```
AT+SPLOGLEVEL=3,5,"MOD_SIM",
```

```
+SPLOGLEVEL: 1
```

OK

14.10 Report RAU +SPREPORTRAU

Description

This command is used to control modem report or not when RAU happened and success.

When need report, CP send unsolicited +SPREPORTRAU: RAU SUCCESS.

When AP need this unsolicited report, AP should send AT+SPREPORTRAU=1 to CP when power on every time.

Type	Command	Return	Description
set	AT+SPREPORTRAU=0 / 1	OK	N/A
read	AT+SPREPORTRAU?	0/1	N/A

14.11 HSUPA & HSDPA +SPHSPA

Description

This command is used to enable or disable the HSUPA & HSDPA.

Type	Command	Return	Description
read	AT+SPHSPA=0	+SPHSPA: HSUPA_state, HSDPA_state	N/A
set	AT+SPHSPA=<mode>[,<HSUPA_state>,<HSDPA_state>]	OK	N/A
		+CME ERROR: <err>	
test	AT+SPHSPA=?	OK	N/A

Type	Command	Return	Description
execute	AT+SPHSPA	OK	N/A

Parameter

Parameter	Description
<mode>	0: means read 1: means write If mode=0, HSUPA_state and HSDPA_state are no use; if mode=1, HSUPA_state or HSDPA_state must be exist.
<HSUPA_state>	0: means disable 1: means enable
<HSDPA_state>	0: means disable 1: means enable

Example

Enable HSUPA only

AT+SPHSPA=1,0,1

Read the state

AT+SPHSPA=0
+SPHSPA: 0,1

14.12 Mange the background paging +SPBPM

Description

Manage the background paging for multi sys device.

Type	Command	Return	Description
read	AT+ SPBMP?	+ SPBMP: <n>	N/A
set	AT+ SPBMP= <n>	OK	N/A
		+CME ERROR: <err>	

Parameter

Parameter	Description
<n>	0: disable receiving the background paging during in connecting status for both master card and vice card. 1: only enable receiving the background paging during in connecting status for vice card. 2: only enable receiving the background paging during in connecting status for master card. 3: enable receiving the background paging during in connecting status for both master card and vice card.

14.13 Frequency scan +SPFREQSCAN

Description

This command is used to do frequency scan, only available in RRC idle status.

Type	Command	Return	Description
set	AT+SPFREQSCAN=rat,"[band_list]", "[freq_list]"	OK	No network found
		+SPFREQSCAN: 255	No network found
		+CME ERROR: <err>	N/A
		+SPFREQSCAN:[0-cell_num-cid,uarfcn,bsic,rssi,mcc,mnc,mnc_digit,lac- ...] [1-cell_num-cid,uarfcn,psc,rssi,ecio,mcc,mnc,mnc_digit,lac-][2-cell_num-cid,uarfcn,psc,rssi,rscp,mcc,mnc,mnc_digit,lac- ...][3-cell_num-cid,pcid,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...]	Note: result is difference according to search result. GSM: 0-cell_num-cid,uarfcn,bsic,rssi,mcc,mnc,mnc_digit,lac- ... WCDMA: 1-cell_num-cid,uarfcn,psc,rssi,ecio,mcc,mnc,mnc_digit,lac- ... TD: 2-cell_num-cid,uarfcn,psc,rssi,rscp,mcc,mnc,mnc_digit,lac- ... LTE: 3-cell_num-cid,pcid,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...

Parameter

Parameter	Description
rat	<ul style="list-style-type: none"> • 2G • 3G • 4G • NR
band_list	Numeric string, for example, "38, 39, 40". Band list number between 0-10.
freq_list	Numeric string, for example, " 10, 14, 20,512". freq_list number Between 0-10. Band_list and freq_list must be exist at the same time.

Example

search fail:

```
+SPFREQSCAN: 255
```

success:

GSM:

```
+SPFREQSCAN: 0-cell_num-cid,uarfcn,bsic,rssi,mcc,mnc,mnc_digit,lac- ...
```

WCDMA:

```
+SPFREQSCAN: 1-cell_num-cid,uarfcn,psc,rscp,ecio,mcc,mnc,mnc_digit,lac- ...
```

TD:

```
+SPFREQSCAN: 2-cell_num-cid,uarfcn,psc,rssi,rscp,mcc,mnc,mnc_digit,lac- ...
```

LTE:

```
+SPFREQSCAN: 3-cell_num-cid,pcid,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...
```

NR:

```
++SPFREQSCAN: 4-cell_num-cid,pci,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...
```

If you want to get GSM and LTE network information.

```
AT+SPFREQSCAN=1,"", "",3, "", ""
```

Both band_list and freq_list number can be 10.

Rat:

- 1: 2G
- 2: 3G (WCDMA and TD)
- 3: 4G
- 4: 5G

Band Info:

- GSM BAND:
 - 0: GSM
 - 1: DCS
 - 3: PCS
 - 4: GSM850
- WCDMA/LTE BAND: BAND1 is 1
- TD BAND:
 - 0: A BAND
 - 1: F BAND

14.14 P scan in RRC idle +SPSCAN

Description

This command is used to do p scan, only available in RRC idle status, the command can execute.

Type	Command	Return	Description
set	AT+SPSCAN=rat,"[band_list]", "[freq_list]", "[plmn_list]"	OK	No network found
		+SPSCAN: 255	No network found
		+CME ERROR: <err>	N/A
		+SPSCAN:[0-cell_num-cid,uarfcn,bsic,rssi,mcc, mnc,mnc_digit,lac- ...] [1-cell_num-cid,uarfcn,psc,rssi,ecio, mcc,mnc,mnc_digit,lac- ...] [2-cell_num-cid,uarfcn,psc,rssi,rscp, mcc,mnc,mnc_digit,lac- ...] [3-cell_num-cid,pcid,arfcn,rsrp,rsrq, mcc,mnc,mnc_digit,tac- ...]	Note: result is difference according to search result. GSM: 0-cell_num-cid,uarfcn,bsic,rssi,mcc,mnc,mnc_digit,lac- ... WCDMA: 1-cell_num-cid,uarfcn,psc,rssi,ecio,mcc,mnc,mnc_digit,lac- ... TD: 2-cell_num-cid,uarfcn,psc,rssi,rscp,mcc,mnc,mnc_digit,lac- ... LTE: 3-cell_num-cid,pcid,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...

Parameter

Parameter	Description
rat	<ul style="list-style-type: none"> • 1: 2G • 2: 3G • 3: 4G
band_list	Numeric string, for example,"38, 39, 40". Band list number between 0-10.
freq_list	Numeric string, for example," 10, 14, 20,512". freq_list number Between 0-10. Band_list and freq_list must be exist at the same time.
Plmn_list	Plmn format,for example"46001,46002",plmn number can be 20

Example

search fail

```
+SPSCAN: 255
```

search success

GSM:

```
+SPSCAN: 0-cell_num-cid,uarfcn,bsic,rssi,mcc,mnc,mnc_digit,lac- ...
```

WCDMA

```
+SPSCAN: 1-cell_num-cid,uarfcn,psc,rscp,ecio,mcc,mnc,mnc_digit,lac- ...
```

TD

```
+SPSCAN: 2-cell_num-cid,uarfcn,psc,rssi,rscp,mcc,mnc,mnc_digit,lac- ...
```

LTE

```
+SPSCAN: 3-cell_num-cid,pcid,arfcn,rsrp,rsrq,mcc,mnc,mnc_digit,tac- ...
```

14.15 Enquire 5G NCELL+SPQ5GNCELLEX

Description

This command is to enquire 5G NCELL.

Type	Command	Return	Description
Execute	AT+SPQ5GNCELLEX	<pre>+SPQ5GNCELLEX: NR_ARFCN, PCI, ssRsrp, ssRsrq, ssSinr, csiRsrp, csiRsrq, csiSinr [NR_ARFCN, PCI, ssRrsrp, ssRsrq, ssSinr, csiRsrp, csiRsrq, csiSinr]... OK</pre>	N/A

14.16 Cell frequency locking +SPFRQ

Description

The command is used for cell frequency locking operation.

Type	Command	Return	Description
Set	AT+SPFRQ=<operation>,<index>,<frequency>[,<cell-id1>[,<cell-id2>[,<cell-id3>]]]	OK	N/A
Read	AT+SPFRQ?	+SPFRQ: <frequency1>, <cell-id11>, <cell-id12>, <cell-id13> <CR> <LF> [[[+SPFRQ: <frequency2>,<cell-id21>, <cell-id22>, <cell-id23> <CR> <LF>] [[+SPFRQ: <frequency3>,<cell-id31>, <cell-id32>, <cell-id33> <CR> <LF>] [+SPFRQ: <frequency4>, <cell-id41>, <cell-id42>, <cell-id43> <CR> <LF>]] OK	N/A
Test	AT+SPFRQ=?	+SPFRQ: (0-1), (0-6), (0-16777215), (0-512), (0-512), (0-512) OK	N/A

NOTE

cell-id: cell scrambling code.

Parameter

<operation>:

<operation>	Description
0	Frequency locking operation
1	Frequency unlocking operation

<index>:

<index>	Description
0	Frequency points 0
1	Frequency points 1

<index>	Description
2	Frequency points 2
3	Frequency points 3
4	Lock LTE Frequency points 1
5	Lock LTE Frequency points 2
6	Lock NR Frequency and cell

Example

Lock frequency point: 10088

```
AT+SPFRQ=0,0,10088<CR>
OK
```

Lock LTE frequency point: 12345

```
AT+SPFRQ=0,4,12345<CR>
OK
```

Lock LTE frequency range: 12345~23456

```
AT+SPFRQ=0,4,12345<CR>
OK
AT+SPFRQ=0,5,23456<CR>
OK
```

NOTE

After setting, it needs flight on, and then flight off.

Lock 5G frequency and cell

```
AT+SPFRQ = 0, 6, freq, cell_1, cell_2, cell_3
```

Unlock 5G frequency and cell

```
AT+SPFRQ = 1, 6
```

NOTE

- If need lock cell_3, must be set cell_1 and cell_2.
- After setting, it needs flight on, and then flight off.

14.17 Lock the LTE band +SPLBAND

Description

This command is used to lock the LTE band of terminal.

Set Command

LTE

AT+SPLBAND=<mode>,<band_tdd_49_64>,<band_tdd_33_48>,<band_fdd_17_32>,<band_fdd_1_16>,<band_fdd_65_80>

NOTE

- <mode>: 0 means read, 1 means write.
- <band_tdd_49_64>,<band_fdd_17_32>,<band_fdd_1_16>: range 0-65535, every bit map one band
- <band_tdd_33_48>,<band_fdd_65_80>: range 0-65535, every bit map one band

Return:

OK

5G LOCK

AT+SPLBAND=2, band_value_1, band_value_2, band_value_3

5G UNLOCK

AT+SPLBAND=2, 0, 0, 0

NOTE

band_value_1, band_value_2 are fdd band, currently the fdd band is not support, so band 1 and 2 need to set 0. band_value_3 is support ,each bit means different band, as follow:

band_value_3	Lock band	UL Frequency range	DL Frequency range	Duplex Mode
bit0	n34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
bit1	n38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
bit2	n39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
bit3	n40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
bit4	n41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
bit5	n50	1432 MHz – 1517 MHz	1432 MHz – 1517 MHz	TDD ¹
bit6	n51	1427 MHz – 1432 MHz	1427 MHz – 1432 MHz	TDD
bit7	n77	3300 MHz – 4200 MHz	3300 MHz – 4200 MHz	TDD
bit8	n78	3300 MHz – 3800 MHz	3300 MHz – 3800 MHz	TDD
bit9	n79	4400 MHz – 5000 MHz	4400 MHz – 5000 MHz	TDD

Currently chip only support TDD n41, n78, n79, so band_value_3 can only set parameter as follow:

Input parameters	Lock band
lock_band_param.lock_band_info_01 = 0; lock_band_param.lock_band_info_02 = 0; lock_band_param.lock_band_info_03 = 256;	band 78
lock_band_param.lock_band_info_01 = 0; lock_band_param.lock_band_info_02 = 0; lock_band_param.lock_band_info_03 = 128;	band 77

Input parameters	Lock band
lock_band_param.lock_band_info_01 = 0; lock_band_param.lock_band_info_02 = 0; lock_band_param.lock_band_info_03 = 16;	band 41

Read Command

LTE

AT+SPLBAND=<mode>

Return:

+ SPLBAND: <current LTE band_tdd_49_64>,<current LTE band_tdd_33_48>,<current LTE band_fdd_17_32>,<current LTE band_fdd_1_16>,<band_fdd_65_80>
OK

Get all supported LTE band

AT+SPLBAND=5

Return:

+ SPLBAND: < supported LTE band_tdd_49_64>,< supported LTE band_tdd_33_48>,< supported LTE band_fdd_17_32>,< supported LTE band_fdd_1_16>,<band_fdd_65_80>
OK

Parameter

<band_tdd_49_64>:

< band_tdd_49_64 (unsigned int16) >	frequency
bit0	LTE band 49
bit1	LTE band 50
...	...
bit15	LTE band 64

<band_tdd_33_48>:

< band_tdd_33_48 (unsigned int16) >	frequency
bit0	LTE band 33
bit1	LTE band 34
...	...
bit15	LTE band 48

<band_fdd_17_32>:

< band_fdd_17_32 (unsigned int16) >	frequency
bit0	LTE band 17
bit1	LTE band 18
...	...
bit15	LTE band 32

<band_fdd_1_16>:

< band_fdd_1_16 (unsigned int16) >	frequency
bit0	LTE band 1
bit1	LTE band 2
...	...
bit15	LTE band 16

<band_fdd_65_80>:

< band_fdd_65_80 (unsigned int16) >	frequency
bit0	LTE band 65
bit1	LTE band 66
...	...
bit15	LTE band 80

5G READ

AT+SPLBAND=3

Return:

+SPLBAND: band_1, band_2, band_3

Example

Lock LTE band 38&40&3

AT+SBLAND=1, 0, 160, 0, 4, 0

Get band

AT+SPLBAND=0

Return:

```
+SPLBAND:tdd_33_64(high 16 bit), tdd_33_64( low 16 bit), fdd_1_32(high 16 bit), fdd_1_32(low 16 bit),
fdd_65_80
```

14.18 DUAL RF select +SPDUALRFSEL

Description

Set/Get the RF status (dual RF, main RF, auxiliary RF).

Type	Command	Return	Description
set	AT+SPDUALRFSEL=[LTE_rf_opt],[W_rf_opt], [G_rf_opt], [NR_rf_opt]	OK	N/A
		CME ERROR	
read	AT+SPDUALRFSEL?	+SPDUALRFSEL: LTE_rf_opt,W_rf_opt, G_rf_opt, NR_rf_opt	N/A

Parameter

Parameter	Description
LTE_rf_opt	Before Design <ul style="list-style-type: none"> • 0: Main RF • 1: dynamic Aux RF • 3: Aux RF
NR_rf_opt	<ul style="list-style-type: none"> • 0: means normal • 1: means RX ant: ant 0 is open, ant1/2/3 is close; TX ant: use ant 0. • 2: means RX ant: ant 1 is open, ant0/2/3 is close; TX ant: use ant 0. • 3: means RX ant: ant 2 is open, ant0/1/3 is close; TX ant: use ant 0. • 4: means RX ant: ant 3 is open, ant0/1/2 is close; TX ant: use ant 0. • 5: means RX ant: ant 1/2/3/4 is open, TX ant: use ant 0 for normal. • 6: means RX ant: ant 1/2/3/4 is open, TX ant: use ant 1 for normal. • 7: means RX ant: ant 1/2/3/4 is open, TX ant: use ant 0 for SRS. • 8: means RX ant: ant 1/2/3/4 is open, TX ant: use ant 1 for SRS.
W_rf_opt	<ul style="list-style-type: none"> • 0: Main RF • 1: Dual RF (main RF and Aux RF) • 17: Aux RF
G_rf_opt	<ul style="list-style-type: none"> • 0: Main RF • 1: dynamic Aux RF • 3: Aux RF

14.19 Power back off +SPPOWERBFCOM

Description

This command is common AT to implement the power back off.

Type	Command	Return	Description
Set	AT+SPPOWERBFCOM=<rat>, <ser_type>, <swich>, <value1>, <value2>	N/A	N/A

Parameter

<rat>:

- 0: GSM
- 1: WCDMA
- 2: TD-SCDMA
- 16: LTE
- 32: 5G

<ser_type>:

- 0: GSM_SETA
- 1: GSM_SETB
- 2: GSM_GRIP
- 11: W_OTA_POWER
- 31: LTE_OTA_POWER

<swich>:

- 0: close
- 1: open

<value1>, <value2>: reserved; it will have different meanings depending on different feature

NOTE

- If rat=5G, the format is AT+SPPOWERBFCOM=5G_rate,band_1_value,band_1_rssi...band_n_value,band_n_rssi.
- Band_num and rssi_num can be 8.

14.20 Lock/unlock band of G/W/L+SPCOMMLOCKFRQ

Description

The AT is used to lock/unlock band of gsm/w/td/lte, and the command need do flight on/off by user.

Type	Command	Return	Description
Set	AT+SPCOMMLOCKFRQ=<set/get>,<r at>[,<lock/unlock>[,<v1>[,<v2>[,<v3>[,<v4>[,<v5>[,<v6>]]]]]]]	N/A	N/A

Parameter

<set/get>:

- 1: lock/unlock frequency/cell
- 0: read frequency/cell info

<rat>:

- 13: GSM
- 14: WCDMA
- 15: TD-SCDMA
- 12: LTE
- 16: 5G

<lock/unlock>:

- 1: lock
- 0: unlock

<v1> a> When the <rat> is GSM, it stands for GSM freq.
 b> When the <rat> is WCDMA/TD, it stands for index, and the range is 0-3.
 c> When the <rat> is LTE, it stands for LTE freq.

<v2> d> When the <rat> is GSM, it stands for GSM freq.
 e> When the <rat> is WCDMA/TD, it stands for w/td freq.
 f> When the <rat> is LTE, it stands for LTE cell.

<v3> g> When the <rat> is GSM, it stands for GSM freq.
 h> When the <rat> is WCDMA/TD, it stands for w/td cell.
 i> When the <rat> is LTE, it stands for LTE cell.

<v4> j> When the <rat> is GSM, it stands for GSM freq.
 k> When the <rat> is WCDMA/TD, it stands for w/td cell.
 l> When the <rat> is LTE, it stands for LTE cell.

<v5> m> When the <rat> is GSM, it stands for GSM freq.
 n> When the <rat> is WCDMA/TD, it stands for w/td cell.
 o> When the <rat> is LTE, it is invalid.

<v6> p> When the <rat> is GSM, it stands for GSM freq.

- q> When the <rat> is WCDMA/TD, it is invalid.
- r> When the <rat> is LTE, it is invalid.

Example

Lock W Frequency 123

```
AT+SPCOMMLOCKFRQ=1,14,1,0,123
```

Inquire the current W FRQ/CELL information

```
AT+SPCOMMLOCKFRQ=0,14
+SPCOMMLOCKFRQ: 0,14,123,512,512,512
```

Lock 5G

```
AT+SPCOMMLOCKFRQ=1,16,1 ,freq_1, freq_2
```

Unlock 5G

```
AT+SPCOMMLOCKFRQ=1,16,0
```

14.21 Set AP Card mode +SMMSWAP

Description

This command is used to set AP card mode.

Type	Command	Return	Description
set	AT+SMMSWAP= parameter	OK	N/A
		+CME ERROR: <err>	N/A
read	AT+SMMSWAP?	+SMMSWAP: 0-1	0: no signal mode 1: signal mode

Parameter

Parameter	Value
parameter	AP sim version <ul style="list-style-type: none"> • 0: dual sim • 1: triple sim • 2: quad sim

14.22 Change sim card as data card +SPSWDATA

This command is used to change a sim card as data card.

Type	Command	Return	Description
execute	AT+SPSWDATA	OK	N/A
		+CME ERROR: <err>	N/A

14.23 LAS function +SPLASDUMMY

Description

This command is used to set and get LAS function.

Type	Command	Return	Description
set	AT+ SPLASDUMMY =string[,p1-p6]	OK	When string means get parameter from LAS. the command will return + SPLASDUMMY: string, p1-p6.
		+CME ERROR: <err>	N/A

Parameter

string	Value
“set timer”	Set las local release timer, value come from p1, range is 0-255.
“set las signal rule”	Set las unsolicited result about signal rule, the command affect +CESQ and +CSQ. p1= hysteresisMs p2= hysteresisDb p3= thresholdsDbm number p4= thresholdsDbm arrary
“set las sar”	Set las powerrollback p1= enable p2= las band number p3= rollback_value
“get timer”	Get las local release timer, value come from p1, range is 0-255, the command will return: +SPLASDUMMY: get timer, value.

14.24 NAS function +SPNASDUMMY

Description

This command is used to set and get NAS function.

Type	Command	Return	Description
set	AT+SPNASDUMMY =string[,p1-pn]	OK	When string means get parameter from NAS, the command will return: +SPNASDUMMY:string,p1-p6
		+CME ERROR: <err>	N/A

Parameter

string	Value
"set nas code stream"	Set code stream to nasp
"set ngmm code stream"	Set code stream to ngmm
"set nas rat priority"	Set rat priority. GSM 0, WCDMA 1, LTE 16, NR 32.
"get nas rat priority"	Get rat priority. GSM 0, WCDMA 1, LTE 16, NR 32.
"set nas local release timer"	Set local release timer. p1: local_release_timer_value, timer value range is 0-255 (s). p2: is_save_to_nv <ul style="list-style-type: none">• 1: save to nv• 0: not save to nv.
"get nas local release timer"	Get local release timer value, the value is not from nv
"set enable nr"	p1= vote_5g_state
"set oos timer"	Set oos timer, value come from p1, range is 0-255.
"get oos timer"	Get oos timer, value come from p1, range is 0-255, the command will return: +SPNASDUMMY: get oos timer, value.
"set limited timer"	Set limited timer, value come from p1, range is 0-255.
"get limited timer"	Get limited timer, value come from p1, range is 0-255, the command will return: +SPNASDUMMY: get limited timer, value.

14.25 GAS function +SPGASDUMMY

Description

This command is used to set and get GAS function.

Type	Command	Return	Description
set	AT+SPGASDUMMY =string[,p1-pn]	OK	When string means get parameter from GAS, the command will return: +SPGASDUMMY:string,p1-p6
		+CME ERROR: <err>	N/A

Parameter

string	Value
“set gas signal rule”	Set gas unsolicited result about signal rule, the command affect +CESQ and +CSQ. p1= hysteresisMs, p2= hysteresisDb p3= thresholdsDbm number p4= thresholdsDbm arrary
“set gas sar”	set gas power back value p1= operation p2= type p3= idx p4= value

14.26 Set output port of DSP +SPDSPPOP

Description

This command is to set output port of DSP.

Type	Command	Return	Description
set	AT+SPDSPPOP=<mode>	OK	N/A
read	AT+SPDSPPOP?	+SPDSPPOP: mode	N/A
test	AT+SPDSPPOP=?	+SPDSPPOP: (0-2)	N/A

Parameter

Parameter	Value
mode	<ul style="list-style-type: none"> • 0: Disable • 1: COM1 // Output the log from URAT port • 2: ARM COM DEBUG // transform the log to AP

14.27 Open /Forbid a frequency band of FDD +SPFDBAND

Description

Open or forbid a frequency band of FDD

Type	Command	Return	Description
set	AT+SPFDBAND= oper, band[,mode]	OK	When oper = 0, mode can be ignore and the command will return. +SPFDBAND: oper, band, mode
		CME ERROR	
		+SPFDBAND: oper, band, mode	
read	AT+ SPFDBAND?	OK	N/A
test	AT+ SPFDBAND=?	+SPFDBAND: (0,1),(1,2,5,8),(0-1)	N/A

Parameter

<oper>: integer

oper	Description
0	Read parameter
1	Set parameter

<band>: integer

band	Description
1,2,5,8	Frequency band information using by FDD

<mode>: integer

mode	Description
0	Forbid the Specified frequency band of <band>
1	Open the Specified frequency band of <band>

14.28 Set nas scri +CNMPsd

Description

This command is used to set nas scri.

Type	Command	Return	Description
set	AT+CNMPsd	OK	Refer to 3GPP TS 34.123-1
		+CME ERROR: <err>	N/A

14.29 5G operation +SP5GCMDS

Description

The command is used 5G operation.

Type	Command	Return	Description
set	AT+SP5GCMDS=function_string[, p1...p6]	OK	N/A
		+CME ERROR: <err>	

Parameter

function_string	Description
"lock nr cell"	Lock/unlock NR cell. When p1=1 means lock NR cell.p2=arfccn, p3=cell_num, p4=cell_1, p5=cell_2, p6=cell_3. when 0 means unlock NR cell . when p1=0, p2-p6 is no use.
"nr prefer"	Set UE priority to host LTE mode. p1= 0 or 1
"set_nr_log"	Set NR log level. p1= log_level

function_string	Description
"set nr power_control"	Set NR power control. p1means NR PA trigger temperature control ,p2 ranger as follow 0 exit temperature control mode Value means how many db. p1=1, means NR modem trigger temperature control, p2 ranger as follow: <ul style="list-style-type: none">• 0 exit temperature mode• 1 entry temperature mode
"set_nr_push_256qam_enable"	p1=1 means enable, 0 means disable
"set nr test mode"	Set NR test mode. p1=mode, p2=value

14.30 Clean history ba info +SPCLEANINFO

Description

This command is used to clean history ba info for all rat.

Type	Command	Return	Description
Set	AT+SPCLEANINFO=<type>	N/A	N/A

Parameter

<type>:

- 1: GSM
- 2: WCDMA
- 4: LTE
- 7: GSM+W+LTE
- 8: 5G

14.31 No more PS data +CNMPSD

Description

This command indicates that no application is expected to exchange data.

When in UTRAN, if further conditions defined in 3GPP TS 25.331 [74] are met, this can cause transmission of a SIGNALLING CONNECTION RELEASE INDICATION message with the cause "UE Requested PS Data session end".

When in E-UTRAN or E-UTRA connected to a 5GCN (see NOTE 2), if further conditions defined in 3GPP TS 36.331 [86] are met, this can cause transmission of a UE Assistance Information message with power PrefIndication set to "lowPowerConsumption" to the network. For BL UEs or NB-IoT UEs, if further conditions defined in 3GPP TS 36.321 [158] and 3GPP TS 36.331 [86] are met, this can cause triggering of the Release Assistance Indication.

Command	Possible Response(s)
+CNMPSD	OK/CME ERROR: <err>
+CNMPSD=?	OK

14.32 Enable or disable the ATRouter +SPTTYROUTER

Description

Set command to set enable or disable the ATRouter function. Read command to get the current switch state.

Type	Command	Return	Description
Set	AT+SPTTYROUTER=<mode>	OK/ ERROR	NA
Read	AT+SPTTYROUTER?	+SPTTYROUTER:<mode> OK	NA

Parameter

<mode>	Description
0	Enable ATRouter
1	Disable ATRouter

NOTE

ATRouter tty_lte20 Indication link id: 21

14.33 Set power back off +SPTPPB

Description

This command is used to set power back off.

Command	Possible Response(s)
+SPTPPB=<tp_state>	OK/CME ERROR: <err>

Parameter

< tp_state >: integer

Indicates the state of current thermal protection according to the temperature of the PA

< tp_state >	Description
0	normal state
X	mitigation state, power back-off by X dB. X range: 1-30
255	emergency state

14.34 Set rf max power +SPMAXPOWER

Description

This command is used to set rf max power.

Command	Possible Response(s)
+SPMAXPOWER=<rat>,<switch>	OK/CME ERROR: <err>

Parameter

< rat >:

< rat >	Description
0	GSM
1	WCDMA

< switch >:

< switch >	Description
0	close
1	open

NOTE

- Set GSM or WCDMA max rf power , need to execute two AT Commands in sequence:

- AT+SPTESTMODE=<>,<>
- AT+SPMAXPOWER=<rat>,<switch>
- If set LTE max rf power, could use AT+SPLTEDSPPM command.

14.35 Set black cell info +SPBLACKCELL

Description

This command is used to set black cells info.

Command	Possible Response(s)
+SPBLACKCELL=<rat>,<num>,<black_cell_info>	OK/CME ERROR: <err>

Parameter

<rat>:

< rat >	Description
0	GSM
1	WCDMA
2	LTE
3	NR

<num>:

< num >	Description
0 ~ 15	Num of black cell list

<black_cell_info>:

< black_cell_info >	Description
“param1, param2, ...”	uint32 param1; /* frequency */ uint32 param2; /* GSM: BSIC; W:PSC; LTE:PCI */

Example

Set 2 LTE black cell, frequency₁ 1250 PCI₁ 511, frequency₂ 3800 PCI₂ 127,

```
AT+SPBLACKCELL=2, 2, "1250, 511, 3800, 127"
```

14.36 Check whether SD card existed or not +SPCHKSD

Description

This command is used to check whether SD card is existed or not.

Command	Possible Response(s)
+SPCHKSD	+SPCHKSD: <is_exist_sd_card> OK

Parameter

<is_exist_sd_card>	Description
0	SD card is not existed
1	SD card is existed

15 VSIM Commands

15.1 SIM slot type setting +VIRTUALSESIMINIT

Description

SIM slot type setting, must be set when current SIM slot in power off state.

Type	Command	Return	Description
Set	AT+VIRTUALSESIMINIT=<type>[,<nv_write>]	OK/+CME ERROR: <err>	NA
Read	AT+VIRTUALSESIMINIT?	+VIRTUALSESIMINIT: <type> OK	NA

Parameters

<type>: integer (0-3), the type of the current SIM slot

- 0: Real SIM card
- 1: Cloud SIM card
- 2: Soft SIM card
- 3: VSIM card type, NV must be record this type.

<nv_write>: integer, optional parameter, indication of NV written

- 0: Do not record the type in NV
- 1: Record the type in NV

Note: If it is not indicated, Record the type in NV.

Example

```
AT+VIRTUALSESIMINIT=3 // set SIM1 slot to VSIM type  
OK
```

15.2 VSIM authentication setting +SPVSIMAUTHSET

Description

This function use to set vsim authentication sim card id and suspend the AS connection of current card.

Type	Command	Return	Description
Set	AT+SPVSIMAUTHSET=<card_id>	OK/+CME ERROR: <err>	NA

Parameters

<card_id>: card id that will be used for authentication.

15.3 Response for the request from modem +RSIMRSP

Description

VSIM configuration or the response for the request from modem by using "%RSIMREQ"

Type	Command	Return	Description
Set	AT+RSIMRSP=<cmd_type>[,<param2>[,<param3>[,<param4>[,...[<paramN>]]]]]	OK/+CME ERROR: <err>	NA

Parameters

< cmd_type >, string type, indicates the response command type:

- "VSIM": VSIM configurations
- "CRSM": VSIM restrict access
- "MBAU": SIM authentication command
- "EPDT": Force de-attach from LTE
- "CUPF": Add/remove FPLMN list from APP
- "CSIM": VSIM generic access, for APDU exchange
- "LNCL": Update neighboring cell information
- "IMEI": Update IMEI;
- "ERRO": Indicate the error from APP
- "TEST": Set VSIM to test mode.

< param2 > to < paramN >:

"VSIM"

< param2 >		< param3 >
0	VSIM deactivate	NA
1	VSIM activate	NA
2	VSIM ATR setting	hexadecimal character format; ATR content

"CRSM"

< param2 >	< param3 >	< param4 >
SW1	SW2	ADPU

"MBAU"

< param2 >	< param3 >	< param4 >	< param5 >
Authentication status	RES	CK	IK

"EPDT"

NONE

"CUPF"

NONE

"CSIM"

	Description
< param2>	integer type; length of the characters that response (two times the actual length)
< param3>	hexadecimal character format; response to the command "%RSIMREQ: "CSIM":"

"LNCL"

< param2> to < param10 >	Description
param2	earfcn list number
param3	earfcn list 1
...	...
param10	earfcn list 8

"IMEI"

param2 --- IMEI string

"ERRO"

< param2>	Description
1	APP crash or the socket disconnected
2	APP pre power off VSIM
3	Reserved

"TEST"

< param2 >		< param3 >		< param4 >	
0	VSIM authentication test mode	0	Test mode switch	0	Test mode off
				1	Test mode on
1	VSIM inter-modem communication test mode	0	Test mode switch	0	test mode off
				1	test mode on
		1	Communication link ID	2,3 for card1;5,6 for card2	

Example

```
AT+RSIMRSP="VSIM", 1 // power on VSIM on SIM1 slot
OK
+ECIND: 3, 100
```

```
AT+RSIMRSP="VSIM", 0
OK
```

15.4 Send the Request to VSIM - %RSIMREQ

Description

Unsolicited command, send the request or the control signal to the VSIM.

```
%RSIMREQ: <cmd_type> : [<param2>[,<param3>[,<param4>[,...[<paramN>]]]]]
```

Parameters

< cmd_type >: string type, indicates the request command type.

Ref to [15.3 Response for the request from modem +RSIMRSP](#).

< param2> to < paramN >:

"VSIM"

< param2 >	
0	VSIM power off request
1	VSIM power on request (Reserved)
2	VSIM reset request
3	Query VSIM request
4 to 255	Reserved

"CRSM"

< param2 >	< param3 >	< param4 >	< param5 >	< param6 >	< param7 >	< param8 >
command	field	P1	P2	P3	data	path

"MBAU"

< param2 >	< param3 >	< param4 >
RAND	AUTH	Autn cause

"CUFP"

< param2 >	< param3 >
Is_delete_item	Plmn id

"CSIM"

	Description
< param2 >	integer type; length of the characters that send (two times the actual length)
< param3 >	hexadecimal character format; command passed on to the VSIM

All PDUs exchanges and VSIM control signals, which coded with prefix "%RSIMREQ" and "+RSIMRSP" are transmitting on a specific channels as below:

- TX channel: Send TPDU and control signal to VSIM

```
#define ATC_VSIM_TX_LINK_ID 19
```

Corresponding to the channel 18 for TTY.

- RX channel: Receive RPDU and ATR from VSIM

```
#define ATC_VSIM_RX_LINK_ID 20
```

Corresponding to the channel 19 for TTY.

Example

//request reset for ATR to VSIM

```
[19<-]%RSIMREQ: "VSIM": 2  
[20->]AT+RSIMRSP="VSIM",2,"3B0509434F53FF"  
[20->]OK
```

//PDU exchange with VSIM

```
[19<-]%RSIMREQ: "CSIM": 14,"00A40004023F00"  
[20->]AT+RSIMRSP="CSIM",94,"622B8202382183023F00A5038001718C0210908A0105C61590014095010883010195010883018195010883011  
19000"  
[20->]OK  
[19<-]%RSIMREQ: "CSIM": 14,"00A4000C023F00"  
[20->]AT+RSIMRSP="CSIM",4,"9000"  
[20->]OK  
...  
...  
[19<-]%RSIMREQ: "CSIM": 14,"00A40004026F5B"  
[20->]AT+RSIMRSP="CSIM",54,"62178202012183026F5B8B036F06038A010588010F800200069000"  
[20->]OK  
[19<-]%RSIMREQ: "CSIM": 22,"00D6000006F00000F00000"  
[20->]AT+RSIMRSP="CSIM",4,"9000"
```

//report power off to VSIM

```
[19<-]%RSIMREQ: "VSIM": 0
```

//VSIM response time-out

```
[19<-]%RSIMREQ: "CSIM": 14,"00A40004023F00"
```

... [1500ms]

```
[19<-]%RSIMREQ: "VSIM": 0
```

...

```
[19<-]%RSIMREQ: "VSIM": 2
```

... [1500ms]

```
[19<-]%RSIMREQ: "VSIM": 0
```

16 Appendix

The following list is the android STK Function list.

Feature	Support	Implemented by
PROFILE DOWNLOAD	YES	Baseband
SET UP MENU	YES	ME
SELECT ITEM	YES	ME
GET INPUT	YES	ME
GET INKEY	YES	ME
DISPLAY TEXT	YES	ME
SET UP IDLE MODE TEXT	YES	ME
SEND SHORT MESSAGE	YES	Baseband – ME
SEND SS	YES	Baseband – ME
SEND USSD	YES	Baseband – ME
SEND DTMF	YES	Baseband – ME
LAUNCH BROWSER	YES	ME
SET UP CALL	YES	Baseband – ME
PLAY TONE	YES	ME
POLL INTERVAL	YES	Baseband
POLLING OFF	YES	Baseband
TIMER MANAGEMENT	YES	Baseband
MORE TIME	YES	Baseband
PROVIDE LOCAL INFORMATION (MCC, MNC, LAC, Cell ID & IMEI)	YES	Baseband
PROVIDE LOCAL INFORMATION (NMR)	YES	Baseband
PROVIDE LOCAL INFORMATION (Timing Advance)	YES	Baseband
PROVIDE LOCAL INFORMATION (battery state)	YES	Baseband
PROVIDE LOCAL INFORMATION (IMEISV)	YES	Baseband
PROVIDE LOCAL INFORMATION (NMR(UTRAN))	YES	Baseband
PROVIDE LOCAL INFORMATION (Search Mode change)	YES	Baseband
REFRESH	YES	ME

Feature	Support	Implemented by
SET UP EVENT LIST	YES	Baseband – ME
Event: MT call	YES	Baseband
Event: Call connected (all modes)	YES	Baseband
Event: Call disconnected (all modes)	YES	Baseband
Event: Idle screen available	YES	ME
Event: Browser termination	YES	ME
Event: Location status	YES	Baseband
Event: Data available	YES	ME
Event: Channel status	YES	ME
Event: Access Technology changed	YES	Baseband
Event: Network Search Mode Change	YES	Baseband
GET READER STATUS	NO	N/A
POWER ON CARD	NO	N/A
POWER OFF CARD	NO	N/A
PERFORM CARD ADPU	NO	N/A
RUN AT COMMAND	NO	N/A
OPEN CHANNEL	YES	ME
CLOSE CHANNEL	YES	ME
RECEIVE DATA	YES	ME
SEND DATA	YES	ME
GET CHANNEL STATUS	YES	ME
CALL CONTROL BY SIM	YES	Baseband
SMS-PP data download	YES	Baseband
SMS-CB data download	YES	Baseband