SM5100B-D AT Command

Revision history

Version	Date	Author	Review	Update description
1.0.0	20081225	Buddy	Steven	Create

IMPORTANT NOTICE

Contents

1. Introduction

1.1 Scope of this document

This document presents the AT Command Set for Sendtrue® cellular engine SM5100B-D.

1.2 Correlative documents

(1) SM5100B-D Datasheet
(2) SM5100B-D HW Spec
(3) SM5100B-D-EVB User's Guide

1.3 Correlative standards

This interface of this document refers to these document criterions below:

[1] ETSI GSM 07.05:
Digital cellular telecommunications system (Phase 2+);
Use of Data Terminal Equipment - Data Circuit terminating
Equipment (DTE - DCE) interface for Short Message Service (SMS) and
Cell Broadcast Service (CBS)
(GSM 07.05 version 7.0.1 Release 1998)

[2] ETSI GSM 07.07:
Digital cellular telecommunications system (Phase 2+);
AT command set for GSM Mobile Equipment (ME)
(GSM 07.07 version 7.5.0 Release 1998)

[3] ITU-T Recommendation V.25 ter:
Serial asynchronous automatic dialing and control

[4] ETSI GSM 03.40:
Digital cellular telecommunications system (Phase 2+);
Technical realization of the Short Message Service (SMS);
(GSM 03.40 version 7.4.0 Release 1998)

[5] ETSI GSM 03.38:
Digital cellular telecommunications system (Phase 2+);
Alphabets and language-specific information
(GSM 03.38 version 7.2.0 Release 1998)

[6] ETSI GSM 04.80:
Digital cellular telecommunications system (Phase 2+);
Mobile radio interface layer 3 supplementary services specification;
Formats and coding

(GSM 04.80 version 7.1.0 Release 1998)

1.4 Command format

1.4.1 The AT command format obeys the following principle

1) Every AT command starts with the character AT and ends with <CR>. (Note: Quite few comands start with "+")
2) The command line may have several AT commands, which are separated by semicolon as command delimiter.
3) Standard basic commands are refered to V.25ter.
4) GSM commands use syntax rules of the extended commands
5) Every extended command has a test command (trailing=?) to check the existence of the command and offer the type and range of its parameters.
6) The commands with parameters also have a read command to read the current values of parameters.
7) As write commands do not have parameters, therefore they do not have a read command.
8) Write commands (trailing=<para>) are used to set parameters and accomplish corresponding functions.
See figure below for the structure of AT command line:

AT CMD1 CMD2=12; +CMD1 ; +CMD2=,, 15; +CMD2?; +CMD2=? <CR>
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Figure 1 : structure of AT command line

①:Command line prefix
②:Basic command(no prefix)
③: Subparameter
④:Extended command(prefixed with +)
⑤:Extended commands are delimited with semicolon
⑥:Subparameters may be omitted
⑦:Read command for checking current subparameter values
⑧:Test command for checking possible subparameter values
⑨:Command line termination character

1.4.2 AT commands syntax

The AT command set implemented by SMSM5100B-D is a combination of GSM07.05, GSM07.07, ITU-T V.25ter and the AT commands developed by Sendtrue. All these AT commands can be split into two categories syntactically: "basic" and "extended".
1) Basic syntax
These AT commands have the format of "**AT<x><CR>**", where "**<x>**"is the

command, and **<CR>** is the end character.

Example: ATZ<CR>

2) Extended syntax

These commands can operate in several modes,as shown in the following table:

category	syntax	example
Test Command	AT+<x>=?	AT+CMEE=?
Read Command	AT+<x>?	AT+CMEE?
Write Command(with parameter)	AT+<x>=<…>	AT+CMEE=0
Write Command(without parameter)	AT+<x>	AT+CGSN

1.5 Information response and result codes

1.5.1 AT command result codes

1) The response of every executed command starts and ends with <CR><LF> and the ATQ1 commands (result code suppression). Except for the ATV0 DCE response format.

2) If command syntax is incorrect, an "ERROR" string will be returned.

3) If AT command syntax is correct but transmitted with wrong parameters, the +CME ERROR: <err> or +CMS ERROR:<err> strings will be returned.(SMS Command)。

4) If an AT command has been executed successfully，an "OK" string will be returned.

5) When receiving SMS, definite characters will be sent to terminal, refered to the following AT command introduction.

6) You can set different result codes by AT+CMEE=<…> when error message returns. Refered to the AT command introduction

Note: Related error code refered to appendix[14].

1.6 Definitions and Abbreviations

ACM	**Accumulated call meter**
APN	**Access Point Name**
BM	**ME short message storage**
DCE	**Data Communication Equipment**
DSP	**Digital Signal Processing**
DTE	**Data Terminal Equipment**
DTMF	**Dual Tone Multi Frequency**
GGSN	**Gateway GPRS Support Node**
GPRS	**General Packet Radio Service**
GSM	**Global System for Mobile Communications**
IMEI	**International Mobile Equipment Identity**
IMSI	**International Mobile Subscriber Identity**
MO	**Mobile Originated**
MT	**Mobile Terminated**

MS	**Mobile Station**
MSISDN	**Mobile Station International ISDN Number**
PDP	**Packet Data Protocol**
PDU	**Protocol Data Unit**
PS	**Protocol Stack**

2. Overview of AT commands

2.1 Overview of general control commands

number	command	description
1	AT	Check the module communication state
2	ATZ	Set all current parameters to user defined profile
3	ATE	Set command ECHO mode
4	ATS0	Set number or rings before automatically answering the call
5	ATQ	Set result code presentation code
6	ATV	Set result code format code
7	AT&W	Store current parameter to used defined profile
8	AT+CMEE	Report mobile equipment error
9	AT+CFUN	Set phone functionality
10	AT+CCLK	clock
11	AT+IPR	Set TE-TA fixed local rate
12	AT+CGSN	Request product serial number identification
13	AT+CGMM	Request model identification
14	AT+CGMR	Request TA revision identification of software release
15	AT+CGMI	Request manufacturer identification
16	AT+CPAS	Mobile equipment activity status
17	AT+CCID	Show ICCID
18	AT+CIMI	Request the IMST
19	AT+CBC	Battery charge
20	AT+CPOF	Stop the machine
21	AT+CSCS	Select TE character set
22	AT+SAC	Stop network searching and supplementary services
23	AT+SBCM	Manage the process of battery charge and set the parameters of battery charge
24	+SBCI	Indicate the current status and voltage of the battery
25	AT+IFC	Set TE-TA local data flow control
26	AT+CFGRI	Indicate RI when using URC
27	AT+ARMSLEEP	Set ARM sleep or not
28	AT+ASSERTMODE	Set assert mode
29	AT+AUTOPOWERON	Set auto-poweron enable or not
30	AT+ADCM	Read the voltage of ADC1
31	AT+SLOG	Set output log enable or not
32	AT+ISC	Configure the interval for checking SIM card

2.2 Overview of networking service commands

number	command	description
1	AT+COPS	Operator selection
2	AT+CSQ	Signal quality
3	AT+CCED	Get the status of current service cell and nearby ones or report the RSSI of current cell automatically
4	AT+CREG	Network registration

2.3 Overview of call control commands

number	command	description
1	ATD	Mobile originated call to specified number
2	ATA	Answer a call
3	ATH	Disconnect existing connection
4	AT+VTD	Tone duration
5	AT+VTS	DTMF and tone generation
6	AT+ECHO	Configure the ECHO CANCELLATION function for voice calls
7	AT+CICB	Set the type of incoming calls, which is data, fax or speech.
8	AT+CIND	Indicator control

2.4 Overview of supplementary service commands

number	command	description
1	AT+CCFC	Call forwarding number and conditions control
2	AT+CCWA	Call waiting
3	AT+CHLD	Call hold and multiparty
4	AT+CLIP	Calling line identification presentation
5	AT+CLIR	Calling line identification restriction
6	AT+COLP	Connected line identification presentation
7	AT+COLR	Get the status of connected line identification restriction
8	AT+CLCK	Refers to segment 7.2.3
9	AT+CPWD	Refers to segment 7.2.2
10	AT+CACM	Accumulated call meter(ACM) reset or query
11	AT+CAMM	Accumulated all meter maximum set(ACMmax) or query
12	AT+CPUC	Price per unit and currency table
13	AT+CLCC	Give a list of all calls
14	AT+CUSD	Supplementary service notifications

15	AT+CSSN	Supplementary service notifications

2.5 Overview of security commands

number	command	description
1	AT+CPIN	PIN authentication
2	AT+CPWD	Change password
3	AT+CLCK	Facility lock
4	AT+XX	Get the remaining times of valid attempts for PIN and PUK

2.6 Overview of SMS commands

number	command	description
1	AT+CSMS	Select message service
2	AT+CSAS	Store settings of +CSAS and +CSMP to EEPROM or SIM card
3	AT+CRES	Restore the settings specified by AT+CSCA and AT+CSMP commands to EEPROM
4	AT+CSDH	Show SMS text mode parameters
5	AT+CPMS	Preferred SMS message storage
6	AT+CSCA	SMS service center address
7	AT+CMGF	Select SMS message format
8	AT+CMGL	List SMS message from preferred store
9	AT+CMGR	Read SMS message
10	AT+CMGS	Send short message
11	AT+CSMP	Set SMS text mode parameters
12	AT+CMGW	Write short message to memory
13	AT+CMSS	Send short message from storage
14	AT+CMGD	Delete short message
15	AT+CSCB	Select Cell Broadcast Message Indication
16	AT+CNMI	New short message indication
17	+CMTI	Indicate the MEM index location of received message(Enabled by AT+CNMI)
18	+CMT	Indicate the short message was sent to DTE directly after received
19	+CBM	Indicate that the cell broadcast message was sent to DTE device after received
20	AT+SMSC	Change the status of message stored in SIM card
21	AT+SUSS	Set REC UNREAD status of these messages which remain unchanged

2.7 Overview of phonebook commands

number	command	description
1	AT+CPBS	Select phonebook memory storage
2	AT+CPBR	Read from phonebook
3	AT+CPBF	Search phonebook with a name string
4	AT+CPBW	Write into phonebook
5	AT+CPBP	Search the phonebook for an item with the same phone number
6	AT+CPBN	Make a forward or backward move in the phonebook
7	AT+CNUM	Read own numbers
8	AT+SDCP	Delete all the calls
9	AT+CSVM	Set/get and enable/disable the voice mail number

2.8 Overview of STK commands

number	command	description
1	AT+STSF	Allow STK facilities to be activated, deactivated or configured
2	AT+STIN	Allow the user to identify the commands sent via SIM card
3	AT+STGI	Get the information of a command sent from the SIM
4	AT+STGR	Allow the application to select an item in the main menu or to answer command

2.9 Overview of GPRS commands

number	command	description
1	AT+CGDCONT	Define PDP context
2	AT+CGQREQ	Quality of service profile(requested)
3	AT+CGQMIN	Quality of service profile(minimum acceptable)
4	AT+CGPCO	Configure the PDP context parameters of PCO
5	AT+CGATT	Attach or detach GPRS services
6	AT+CGACT	PDP context activate or deactivate
7	AT+CGPADDR	Show PDP address
8	AT+CGDATA	Enter data state
9	AT+CGAUTO	Automatic response to a network for PDP context activation
10	AT+CGANS	Manual response to a network for PDP context activation

11	AT+CGCLASS	Set the GPRS type of MT
12	AT+CGEREP	GPRS event reporting
13	AT+CGREG	GPRS network registration status
14	AT+CGSMS	Select service for MO SMS messages
15	AT+CRC	Decide whether shows the supplementary information of incoming calls
16	AT+CR	Decide whether to present that this CONNECT is GPRS
17	AT+CEER	Extend the error report
18	Extension of ATD	Built the connections between terminal devices and networks
19	AT+SSST	Set the MS service type
20	AT+SATT	Attach or detach GPRS service
21	AT+SAUTOATT	Allow MT to perform auto attach operation
22	AT+SGPRSDATA	Specify the data length of GPRS data sent by MT
23	ATO	Switch from command mode to data mode
24	+++	Switch from data mode or PPP online mode to command mode

2.10 Overview of TCP/IP commands

number	command	description
1	AT+SDATACONF	Config the configure parameters of data sent by AT commands based on GPRS
2	AT+SDATASTART	Enable GPRS service
3	AT+SDATATSEND	Send the data specified by user in transparent mode.
4	AT+SDATATREAD	Read the received data and display in transparent mode.
5	AT+SDATASEND	Send the character string data specified by user
6	AT+SSTRSEND	Send the character strings specified by customer
7	AT+SDATAREAD	Read the received data from the buffer.
8	AT+SDATARXMD	Configure the display format and the mode when received data.
9	AT+SDATASTATUS	Require socket status
10	AT+TRT	Set network data resend times after failing to send data

2.11 Overview of AUDIO commands

number	command	description
1	AT+SSAM	Configure the sound mode
2	AT+SPEAKER	Config MIC and SPEAKER channels

3	AT+SDMUT	Mute the downlink voice
4	AT+CMUT	Mute control
5	AT+CRMP	Test ring of incoming calls
6	AT+STONE	Play sound in a certain frequency
7	AT+VGR	Tune the sound level of the speaker
8	AT+SDTMF	Play a DTMF tone on the current speaker
9	AT+SCDM	Select the specific ring melody
10	AT+ECHO	Configure the ECHO CANCELLATION function for voice calls
11	AT+SSAP	Config the parameter of audio gain
12	AT+STMF	Store and delete the file in MIDI format
13	AT+SEQT	Set the speaker equalizer type
14	AT+SSEA	Configure the sound parameters in project mode

2.12 Overview of special commands

number	command	description
1	AT+SMUX	Configure the multiplexing mode
2	AT+S32K	Allow or forbid entering of sleep mode
3	AT+SIND	Set some status of a system
4	AT+SBAND	Select the frequency of module
5	AT+SMGF	Manage files
6	AT+SMGD	Manage directory
7	AT+SSMP	Require ME be sent in maximum power
8	AT+SSGF	Configure GPIO direction
9	AT+SSGS	Set and query GPIO level
10	AT+SNVM	Manage the NVITEM data through NVITEM id

3. General control commands

The General Control Commands are to accomplish some communication control. These commands are designed according to the ITUT-T (International Telecommunication Union, Telecommunication sector) V2.5ter document.

3.1 Overview of general control commands

number	command	description
1	AT	Check the module communication state
2	ATZ	Set all current parameters to user defined profile
3	ATE	Set command ECHO mode
4	ATS0	Set number or rings before automatically answering the call
5	ATQ	Set result code presentation code
6	ATV	Set result code format code
7	AT&W	Store current parameter to used defined profile
8	AT+CMEE	Report mobile equipment error
9	AT+CFUN	Set phone functionality
10	AT+CCLK	clock
11	AT+IPR	Set TE-TA fixed local rate
12	AT+CGSN	Request product serial number identification
13	AT+CGMM	Request model identification
14	AT+CGMR	Request TA revision identification of software release
15	AT+CGMI	Request manufacturer identification
16	AT+CPAS	Mobile equipment activity status
17	AT+CCID	Show ICCID
18	AT+CIMI	Request the IMST
19	AT+CBC	Battery charge
20	AT+CPOF	Stop the machine
21	AT+CSCS	Select TE character set
22	AT+SAC	Stop network searching and supplementary services
23	AT+SBCM	Manage the process of battery charge and set the parameters of battery charge
24	+SBCI	Indicate the current status and voltage of the battery
25	AT+IFC	Set TE-TA local data flow control

26	AT+CFGRI	Indicate RI when using URC
27	AT+ARMSLEEP	Set ARM sleep or not
28	AT+ASSERTMODE	Set assert mode
29	AT+AUTOPOWERON	Set auto-poweron enable or not
30	AT+ADCM	Read the voltage of ADC1
31	AT+SLOG	Set output log enable or not
32	AT+ISC	Configure the interval for checking SIM card
33	AT+SSIMT	Query the SIM card type

3.2 Detailed description of general control commands

3.2.1 AT

AT: check the communication between the module/chip and any accessory	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT**
Return	OK
Reference	This command is used to check the communication between the module/chip and any accessory.
Example	

3.2.2 ATZ

ATZ: restore the configuration profile	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**ATZ**
Return	OK
Reference	This command is used to restore the configuration profile. Any call is released.
Example	

3.2.3 ATE

ATE: determine whether or not the DCE echoes characters received from the

DTE		
Test Command	**None**	
Return		
Read Command	**None**	
Return		
Write Command	**ATE<value>**	
Return	OK	
Reference	<value>	description
	0	DCE returns no character to DTE(Default Settings)
	1	DCE returns characters to DTE
Example	**ATE1** **OK**	

3.2.4 ATS0

ATS0: set the automatic answering feature of the DCE		
Test Command	**ATS0=?**	
Return	S0: (0-255) OK	
Read Command	**ATS0?**	
Return	<value> OK	
Write Command	**ATS0=<value>**	
Return	OK	
Reference	<value>	description
	0	Automatic answering is disabled
	1~255	Enable automatic answering on the ring number specifier.
Example	**ATS0=3** **OK**	

3.2.5 ATQ

ATQ: determine whether the mobile equipment sends result codes or not		
Test Command	**None**	
Return		
Read Command	**None**	
Return		
Write Command	**ATQ<value>**	
Return	OK / No String	
Reference	<value>	description
	0	DCE transmits result codes to DTE

	1	Result codes are not transmitted to DTE
Example	ATQ0 OK	

3.2.6 ATV

ATV: set the DCE response format		
Test Command	**ATV=?**	
Return	V(0,1) OK	
Read Command	**ATV?**	
Return	1 OK or: 0 0	
Write Command	**ATV<value>**	
Return	OK / none	
Reference	<value>	description
	0	Without head characters <CR><LF> and without the use of numeric result codes
	1	With head characters<CR><LF> and with the use of numeric result codes
Example	**ATV1** **OK**	

3.2.7 AT&W

AT&W: write the active configuration to non-volatile memory section		
Test Command	**None**	
Return		
Read Command	**None**	
Return		
Write Command	**AT&W**	
Return	**OK**	
Reference	The list of parameters stored to non-volatile memory section by AT&W	
	NUM	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 states	AT+SBCM
	6	Flag of echo character	ATE
	7	Mode of CREG	AT+CREG
	8	Flag of SIDE TONE	AT+SIDET
	9	Sequence num of incoming music	AT+SCDM
	10	Format of returned error	AT+CMEE
Example			

3.2.8 AT+CMEE

AT+CMEE: disable or enable the use of result code +CME ERROR		
Test Command	**AT+CMEE=?**	
Return	+CMEE: (0-2)	
	OK	
Read Command	**AT+CMEE?**	
Return	+CMEE: <value>	
	OK	
Write Command	**AT+CMEE=<value>**	
Return	OK	
Reference	<value>	description
	0	Deactivate +CME ERROR Returning code
	1	Activate +CME ERROR Returning code and use numeric error values
	2	Activate +CME ERROR Returning code and use verbose error description
Example		

3.2.9 AT+CFUN

AT+CFUN: activate or deactivate PS, or reboot module		
Test Command	**AT+CFUN=?**	
Return	+CFUN: (0-1),(0-1)	
	OK	
Read Command	**AT+CFUN?**	
Return	+CFUN: <value1>	
	OK	
Write Command	**AT+CFUN=<value1>,[<value2>]**	
Return	OK	
Reference	Value1	description
	0	Deactivate PS
	1	Activate PS

	Value2 description 0 Do not reboot module 1 Reboot module Notes: when reboot module,value1 will be ignored.
Example	**Reboot module:** **AT+CFUN=1，1** **OK** **Activate PS:** **AT+CFUN=1** **OK**

3.2.10 AT+CCLK

AT+CCLK: set or get the current date and time	
Test Command	**None**
Return	
Read Command	**AT+CCLK?**
Return	+CCLK: <current date and time> OK
Write Command	**AT+CCLK=<date and time string>**
Return	OK / +CME ERROR<err>
Reference	<date and time string>: “yy/mm/dd, hh:mm:ss”, total length is 17,users must input data according to this format,or it will return ERROR.
Example	**Set current time:** **AT+CCLK=”07/01/29,13:27:10”** **OK**

3.2.11 AT+IPR

AT+IPR: set or get the baudrate of DCE	
Test Command	**AT+IPR=?**
Return	+IPR: {1200,2400,4800,9600,19200,38400,57600,115200,230400,460800} OK
Read Command	**AT+IPR?**
Return	+IPR: <current BaudRate> OK
Write Command	**AT+IPR=<baudrate>**
Return	OK / ERROR
Reference	After setting the baudrate, respective tools, such as hyperterminal, must be modified according to it, or normal communication could not be performed. Default baud rate is 115200

Example

3.2.12 AT+CGSN

AT+CGSN: get the IMEI of DCE	
Test Command	**AT+CGSN=?**
Return	+CGSN: OK
Read Command	**None**
Return	
Write Command	**AT+CGSN**
Return	<sn> OK
Reference	
Example	**AT+CGSN** **332190700972650** **OK**

3.2.13 AT+CGMM

AT+CGMM: get the identification of DCE module	
Test Command	**AT+CGMM=?**
Return	+CGMM: OK
Read Command	**None**
Return	
Write Command	**AT+CGMM**
Return	<Module Identification> OK
Reference	
Example	**AT+CGMM** **V1.0.1-B7** **OK**

3.2.14 AT+CGMR

AT+CGMR: get DCE software version	
Test Command	**AT+CGMR=?**
Return	+CGMR: OK

Read Command	**None**
Return	
Write Command	**AT+CGMR**
Return	<Version Number> OK
Reference	
Example	**AT+CGMR** **SW version:RIYUE_R1.8.7001.BL0005.BUILD0017** **OK**

3.2.15 AT+CGMI

AT+CGMI: get the identification of DCE manufacturer	
Test Command	**AT+CGMI=?**
Return	+CGMI: OK
Read Command	**None**
Return	
Write Command	**AT+CGMI**
Return	<manufacturer> OK
Reference	
Example	**AT+CGMI** **Sendtrue Technology Co.,Ltd** **OK**

3.2.16 AT+CPAS

AT+CPAS: get the status of DCE		
Test Command	**AT+CPAS=?**	
Return	+CPAS: <list supported value> OK	
Read Command	**None**	
Return		
Write Command	**AT+CPAS**	
Return	+CPAS: <code> OK	
Reference	code	description
	0	READY
	3	RINGING
	4	Call in progress

Example

3.2.17 AT+CCID

AT+CCID: read the EF-ICCID file on the SIM card	
Test Command	**AT+CCID=?**
Return	+CCID：
	OK
Read Command	**AT+CCID?**
Return	+CCID: ”SIM number”
	OK
Write Command	**AT+CCID**
Return	+CCID: ”SIM number”
Reference	
Example	**AT+CCID?**
	+CCID: “89860106120217281047”
	OK

3.2.18 AT+CIMI

AT+CIMI: get IMSI	
Test Command	**AT+CIMI=?**
Return	+CIMI:
	OK
Read Command	**None**
Return	
Write Command	**AT+CIMI**
Return	+CIMI: <IMSI string>
	OK
Reference	
Example	**AT+CIMI**
	+CIMI: “460012222952704”
	OK

3.2.19 AT+CBC

AT+CBC: indicate the battery connection status and the battery voltage	
Test Command	**AT+CBC=?**
Return	+CBC: (0-2),(0-4200)
	OK

Read Command	**None**
Return	
Write Command	**AT+CBC**
Return	+CBC: <bcs> ,<bcl> OK
Reference	bcs description 0 ME powered by battery(no charger connected) 1 ME has a battery connected, but it is powered by the charger 2 ME does not have a battery connected(not support in current) <bcl>:current battery voltage.
Example	

3.2.20 AT+CPOF

AT+CPOF: stop the machine	
Test Command	**AT+CPOF=?**
Return	+CPOF: OK
Read Command	**None**
Return	
Write Command	**AT+CPOF**
Return	OK
Reference	
Example	

3.2.21 AT+CSCS

AT+CSCS: tell DCE the set of characters which will be used next	
Test Command	**AT+CSCS=?**
Return	+CSCS: (“GSM”,”IRA”) OK
Read Command	**AT+CSCS?**
Return	+CSCS: <chest> OK
Write Command	**AT+CSCS=<chest>**
Return	OK
Reference	chset description “GSM” GSM default character set “IRA” International Reference Character set(ITU-T T.50) Note: At present, this function is not supported, the default value is “GSM”.
Example	

3.2.22 AT+SAC

AT+SAC: stop the network searching and supplementary services	
Test Command	**AT+SAC=?**
Return	OK
Read Command	**AT+SAC?**
Return	OK（system is not searching the network or doing additional services） or ERROR（system is searching the network or doing additional services）
Write Command	**AT+SAC**
Return	OK
Reference	Query command can find whether to search the network and do the supplementary services
Example	

3.2.23 AT+SBCM

AT+SBCM: manage the process of battery charge and set the parameters of battery charge	
Test Command	**AT+SBCM=?**
Return	+SBCM: (0-3),(0-1),(4000-5000),(2800-3800),(10-10000),(10-10000),(0-255) OK
Read Command	**None**
Return	
Write Command	**AT+SBCM=<mode>[,[<chargeInd>][,[<BattLevelMax>],[<BattLevelMin>],<TPulseIncharge>],[<TPulseOutCharge>],[<BattIntRes>]]]**
Return	OK / ERROR
Reference	mode description 0 Stop battery charging 1 Start battery charging 2 Get the current battery voltage 3 Set battery charge parameters Note: when <mode> equals 0 or 1, only parameter <ChargeInd> is valid, when <mode> equals 2, other parameters are invalid. ChargeInd description 0 Cancel +SBCM hint code 1 Activate +SBCM code BattLevelMax The maximum level of battery voltage. When reached, battery will stop charging. The allowed range is (4000-5000),default 4200mV.

	BattLevelMin	The minimum level of battery voltage. When reached, DCE will be shut off. The allowed range is (2800-3800),default 3300mV
	TPulseInCharge	Time space between pluses in charge: range(100-10000), default value: 100ms
	TPulseOutCharge	Send +SBCM time space: allowed value range (100-10000),default value:(5000ms)
	BattIntRes	Battery Interior Resistance: allowed value range (0-255mΩ), default value: 0 mΩ
Example		

3.2.24 +SBCI

+SBCI: indicate the current status and voltage of the battery	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**None**
Return	
Reference	+SBCI: <status>[,<level>] status description 0 Battery Voltage reached minimum 1 Battery Voltage reached maximum 2 Battery in charging 3 Battery out of charging Level: current voltage of battery
Example	

3.2.25 AT+IFC

AT+IFC: Set TE-TA local data flow control	
Test Command	**AT+ IFC =?**
Return	+IFC: (0-2),(0-2) OK
Read Command	**AT+IFC?**
Return	+IFC:<dce_by_dte>,<dte_by_dce> OK
write Command	**AT+IFC=**<dce_by_dte>[,<dte_by_dce>]
Return	OK / ERROR
Reference	<dce_by_dte>:integer;specifies the method will be used by TE at receive of data from TA

	<dte_by_dce>:integer;specifies the method will be used by TA at receive of data form TE <dce_by_dte>/<dte_by_dce> description 0 None 1 Software flow control 2 Hardware flow control(CTS/RTS) Note: Equality between <dce_by_dte> and <dte_by_dce> is supported currently.
Example	

3.2.26 AT+CFGRI

AT+CFGRI: Indicate RI when using URC	
Read Command	**AT+** CFGRI?
Return	+CFGRI:<status> OK
Write Command	**AT+CFGRI=<status>**
Return	OK / ERROR
Reference	<status> description 0 Off 1 On
Example	

3.2.27 AT+ARMSLEEP

AT+ ARMSLEEP: Set ARM sleep or not	
Test Command	**AT+** ARMSLEEP **=?**
Return	+ ARMSLEEP:(0-1) OK
Read Command	**AT+** ARMSLEEP**?**
Return	+ ARMSLEEP:<status> OK
write Command	**AT+** ARMSLEEP =<status>
Return	OK / ERROR
Reference	<status> description 0 Off 1 On
Example	

3.2.28 AT+ASSERTMODE

AT+ ASSERTMODE: Set assert mode		
Test Command	**AT+** ASSERTMODE=?	
Return	+ ASSERTMODE:(0-1) OK	
Read Command	**AT+** ASSERTMODE?	
Return	+ ASSERTMODE:<status> OK	
write Command	**AT+** ASSERTMODE =<status>	
Return	OK / ERROR	
Reference	<status>	description
	0	Off
	1	On
Example		

3.2.29 AT+AUTOPOWERON

AT+ AUTOPOWERON: Set auto-poweron enable or not		
Test Command	**AT+** AUTOPOWERON=?	
Return	+ AUTOPOWERON:(0-1) OK	
Read Command	**AT+** AUTOPOWERON?	
Return	+ AUTOPOWERON:<status> OK	
write Command	**AT+** AUTOPOWERON =<status>	
Return	OK / ERROR	
Reference	<status>	description
	0	Off
	1	On
Example		

3.2.30 AT+ADCM

AT+ ADCM: Read the voltage of ADC1	
Execution Command	**AT+** ADCM
Return	+ ADCM:<ADC1_Voltage> OK
Reference	<ADC1_Voltage>:the voltage of ADC1 with the range 0-5000

Example

3.3.31 AT+SLOG

AT+ SLOG: Set output log enable or not		
Test Command	**AT+** SLOG=?	
Return	+ SLOG:(0-1)	
	OK	
Read Command	**AT+** SLOG?	
Return	+ SLOG:<status>	
	OK	
write Command	**AT+** SLOG =<status>	
Return	OK / ERROR	
Reference	<status>	description
	0	Off
	1	On
Example		

3.2.32 AT+ISC

AT+ISC:Configure the interval for checking SIM card		
Test Command	**AT+** ISC=?	
Return	+ SLOG:(0,5-60)	
	OK	
Read Command	**AT+** ISC?	
Return	+ ISC:<interval>	
	OK	
write Command	**AT+** ISC =<interval>	
Return	OK / ERROR	
Reference	<interval>	description
	0	Disable checking SIM card
	5-60(s)	The range of interval
Example		

3.2.33 AT+SSIMT

AT+SSIMT: Query the type of SIM card	
Test Command	**AT+** SSIMT =?
Return	+ SSIMT:””

	OK
Execution Command	**AT+** SSIMT
Return	+ SSIMT:<cause>,<card_type> OK
Reference	<cause>:current card status. <cause> description 0 Success 1 Not ready 2 No SIM card 3 Failed <card_type>:current card type. < card_type > description 0 SIM card 1 UM card 2 Double model card 3 Invalid card
Example	

4. Networking service commands

Networking service commands are related to various network services, such as registering mobile communication, getting the information about the network and so on.

4.1 Overview of networking service commands

number	command	description
1	AT+COPS	Operator selection
2	AT+CSQ	Signal quality
3	AT+CCED	Get the status of current service cell and nearby ones or report the RSSI of current cell automatically
4	AT+CREG	Network registration

4.2 Detailed description of networking service commands

4.2.1 AT+COPS

AT+COPS: select and register mobile communication network		
Test Command	**AT+COPS=?**	
Return	+COPS:[list of supported(<stat>,long alphanumeric<oper>,short phanumeric <oper>s, numeric<oper>) s] OK	
Read Command	**AT+COPS?**	
Return	+COPS: <mode>[,<format>,<current oper>] OK	
Write Command	**AT+COPS=<mode>,[<format>[,<oper>]]**	
Return	OK / +CME ERROR: <err>	
Reference	mode	description
	0	Select automatically(oper is ignore)
	1	Select manually(oper should be present)
	2	Deregister the network
	3	Only used in setting mode
	4	Manually/automatically(if manual selection fails, select automatically)
	format	description
	0	Short format alphanumeric<oper>
	2	Num <oper>

stat	description
0	Unknown
1	Available
2	Currently used
3	Forbidden

<oper>: operands(MCC/MNC numeric codes which is used in network selection, such as 46000 is China Mobile Communication, 46001 is China Unicommunication）。

Notes: while commands are being set, if mode=3, in setting mode, this option is not available, because only digital mode is supported. And when mode=2, deregisters network. This function is not supported, for AT+CFUN command can do. If these above options are executed, ERROR will be returned.

Example	**AT+COPS=?** **+COPS: (1,"CMCC",,"46000"),(3,"CUCC",,"46001"),,(0-4),(0,2)** **OK** **AT+COPS?** **+COPS:1,2,46000** **OK** **Select network automatically:** **AT+COPS=0** **OK** **Search network manually:** **AT+COPS=1,2,46000** **OK**

4.2.2 AT+CSQ

AT+CSQ: get the signal strength indication of current service cell	
Test Command	**AT+CSQ=?**
Return	+CSQ: (0-31),(0-7,99） OK
Read Command	**None**
Return	
Write Command	**AT+CSQ**
Return	+CSQ: <rssi>,<ber> OK

Reference	rssi	description
	0	-110db
	1-30	..
	31	-48db
	ber	description
	0-7	RXQUAL Value（GSM）
	99	ineffective
Example	**AT+CSQ**	
	+CSQ: 23,99	
	OK	

4.2.3 AT+CCED

AT+CCED: get the status of current service cell and nearby ones or report the RSSI of current cell automatically		
Test Command	**AT+CCED=?**	
Return	+CCED: (0-2),(1,2,4,8) OK	
Read Command	**None**	
Return		
Write Command	**AT+CCED=<mode>[,<requested dump>]**	
Return	(1) get the status from the current cell and nearby ones: +CCED: <mcc>,<mnc>,<lac>,<Cellid>,<Bsic>,<Arfcn>,<Rxlev>,<Rxqual> OK (2) get the status of current service cell but no network is available +CCED: OK (3) get the timing advance +CCED: <timing advance > OK (4) get the RSSI of current cell: +CSQ: <rssi>,<Rxqual> OK	
Reference	mode	description
	0	One shot requested
	1	Automatical shots requested
	2	Stop automatic shots
	Requested dump	description
	1	Current service cell
	2	Nearby cell
	4	Timing advance

8	RSSI value of current cell

Note:

When get the status of current service cell and nearby ones, requested dump value is 1,2,4

When report the RSSI of current cell, requested dump value is 8

Mcc	Mobile Country Code
Mnc	Mobile Network Code
Lac	Location Area Code
Cell id	Id of cell
Bsic	Flag of main cell
Arfcn	Channel of BCCH
Rxlev	Strength indication of receiving signal(0-63)
Rxqual	Quality of receiving signal(0-7, 99 is an invalid value)

Example

Get the status of current service cell:

AT+CCED=0,1

+CCED: 460,01,4184,50861,27,109,31,99

OK

Get the status of nearby cells:

AT+CCED=0,2

+CCED:460,01,4184,33132,20,727,21,460,01,4198,36183,25,723,21,460,01,4184,56671,24,120,17,460,01,4184,50862,29,124,22,460,01,4184,33131,18,722,19

OK

Get the timing advance:

AT+CCED=0, 4

+CCED: 0

OK

Get the RSSI value of current service cell:

AT+CCED=0, 8

+CCED: 30, 99

OK

Report the RSSI value automatically:

AT+CCED=1, 8

OK

+CSQ: 30, 99

+CSQ: 30, 99

……

+CSQ: 30, 99

Stop report automatically:

	AT+CCED=0, 8 **OK**

4.2.4 AT+CREG

AT+CREG: set the state of automatic network report	
Test Command	**AT+CREG=?**
Return	+CREG: (0,1,2) OK
Read Command	**AT+CREG?**
Return	+CREG: <mode>,<state> OK
Write Command	**AT+CREG=<mode>**
Return	OK / ERROR
Reference	mode description 0 Deactivate the report of network registration report(default value) 1 Activate network registration report and return +CREG: <state> 2 Activate network registration report and location status report ,return +CREG: <state>,<lac>,<ci> mode description 0 No registered network, ME does not search new network 1 Register local network successfully 2 No registered network, ME is searching new network 3 Network registration is denied 4 unknown 5 Register roam network successfully <lac>: location id of cell <ci>: cell id
Example	**AT+CREG=1** **OK** **+CREG: 5** **AT+CREG=2** **OK** **+CREG: 5, 0x1830, 0x3091** **AT+CREG=0** **OK**

5. Call control commands

Call control commands are related to Mobile Originated (MO) calls and Mobile Terminated (MT) calls, such as calling, answering, volume setting and so on.

5.1 Overview of call control commands

number	command	description
1	ATD	Mobile originated call to specified number
2	ATA	Answer a call
3	ATH	Disconnect existing connection
4	AT+VTD	Tone duration
5	AT+VTS	DTMF and tone generation
6	AT+CICB	Set the type of incoming calls, which is data, fax or speech.
7	AT+CIND	Indicator control

5.2 Detailed description of call control commands

5.2.1 ATD

ATD: call remote user	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**ATD<dialing string>**
Return	OK(call connection succeeded) NO CARRIER(call connection failed or released by remote user) ERROR (error occur)
Reference	<dialing string>: {0-9,*,#,+,a,b,c}, the maximum length is 40,if dialing string end with "#",then the call number will be treat as a emergency call number. If the AT+SIND is used to set bits related to calling, when ATD <dialing string> is used, ME reports respective messages. Note: At present, call from phonebook is not supported.
Example	**Call 10086:** **ATD10086** **+SIND: 5,1** **+SIND:2** **+SIND:9**

OK

Supplementary service:
ATD61*00431234*11*5#**
OK

Emergency call:
ATD911,#
+SIND:5,1
+SIND:2
+SIND:9
OK

5.2.2 ATA

ATA: answer calls from remote users	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**ATA**
Return	OK
Reference	RING(incoming call), use this command to answer the incoming calls from remote users.
Example	

5.2.3 ATH

ATH: hang up all(one or several)connecting or connected calls	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**ATH**
Return	OK
Reference	
Example	

5.2.4 AT+VTD

AT+VTD: define DTMF tone duration when DTMF is sent over the GSM

network	
Test Command	**AT+VTD=?**
Return	+VTD: (0-255) OK
Read Command	**AT+VTD?**
Return	+VTD: <n> OK
Write Command	**AT+VTD=<n>**
Return	OK
Reference	<n>: (0-255) n*100ms
Example	

5.2.5 AT+VTS

AT+VTS: transmit DTMF after a successful call connection	
Test Command	**AT+VTS=?**
Return	+VTS: (0-9,*,#,A,B,C,D) OK
Read Command	**None**
Return	
Write Command	**AT+VTS=<Tone>[,<start>]**
Return	OK / +CME ERROR:<err>
Reference	start description 0 Stop DTMF 1 Start DTMF Tone: {0-9,*,#,A,B,C,D} Note: when using <start>= 0 to send a DTMF, users should use <start>=0 to stop DTMF operation. In this way, only one DTMF char could be sent in one times.
Example	**AT+VTS=2** **OK** **AT+VTS=6,1** **OK** **AT+VTS=6,0** **OK**

5.2.6AT+CICB

AT+CICB: set the type of incoming calls, which is data, fax or speech	
Test Command	**AT+CICB=?**

Return	+CICB: (0-2) OK
Read Command	**AT+CICB?**
Return	+CICB: 2 OK
Write Command	**AT+CICB=<value>**
Return	OK

Reference	Value	description
	0	Data
	1	Fax
	2	Speech

Example

5.2.7 AT+CIND

AT+CIND: indicate voltage of battery, strength of signal, availability of network, stillness, whether receive short messages, existence of a call, roam status and full status of SMS	
Test Command	**AT+CIND=?**
Return	+CIND: (0-5),(0-31),(0-1), (0-1), (0-1), (0-1), (0-1), (0-1), (0-1) OK
Read Command	**AT+CIND?**
Return	+CIND: <battery>, <signal level>, <service>, <sounder>, <message>, <call>, <roam>, <smsfull> OK
Write Command	**None**
Return	

Reference	<Descr>	description
	battery	Voltage of battery
	signal	Strength of signal (0-31)
	service	Availability of network (0-1) (value=1 means registered to network)
	sounder	Stillness (0-1) (1=mute)
	message	Whether receive short messages (0-1)
	call	Existence of a call (0-1)
	roam	Net status (0-1) (1=roam status)
	smsfull	Short message memory storage has become full(1), or memory locations are available(0)

Example

6. Supplementary service commands

Supplementay service commands are related to the services offered by the GSM network, such as call forwarding, call waiting and so on.

6.1 Overview of supplementary service commands

number	command	description
1	AT+CCFC	Call forwarding number and conditions control
2	AT+CCWA	Call waiting
3	AT+CHLD	Call hold and multiparty
4	AT+CLIP	Calling line identification presentation
5	AT+CLIR	Calling line identification restriction
6	AT+COLP	Connected line identification presentation
7	AT+COLR	Get the status of connected line identification restriction
8	AT+CLCK	Refers to segment 7.2.3
9	AT+CPWD	Refers to segment 7.2.2
10	AT+CACM	Accumulated call meter(ACM) reset or query
11	AT+CAMM	Accumulated all meter maximum set(ACMmax) or query
12	AT+CPUC	Price per unit and currency table
13	AT+CLCC	Give a list of all calls
14	AT+CUSD	Supplementary service notifications
15	AT+CSSN	Supplementary service notifications

6.2 Detailed description of supplementary service commands

6.2.1 AT+CCFC

AT+CCFC: control call forwarding supplementary service		
Test Command	**AT+CCFC=?**	
Return	+CCFC: (0-5),(0-4),(128,129,145,161),(5-30) OK	
Read Command	**None**	
Return		
Write Command	**AT+CCFC=<reason>,<mode>,<number>,<type>,<time>**	
Return	OK / ERROR	
Reference	reason	description
	0	Unconditional

	1 Mobile busy 2 No reply 3 Not reachable 4 All call forwarding 5 All conditional call forwarding mode description 0 Deactivation 1 Activation 2 Query 3 Registration 4 Erasure type description 128 Unknown number type 129 ISDN number type(default) 145 International ISDN 161 National ISDN Number: forwarding number(numeric character) Time: time to wait (5-30) in seconds before call is forwarded.
Example	**AT+CCFC=3，3，“02154452248”，129** **OK** **AT+CCFC=3，1，“02154452248”，129** **OK** **AT+CCFC=3，2** **+CCFC: 1，0，“+862154452248”，145** **OK**

6.2.2 AT+CCWA

AT+CCWA: control the waiting supplementary service	
Test Command	**AT+CCWA=?**
Return	+CCWA: (0-1),(0-2),(1,2,4,128) OK
Read Command	**AT+CCWA?**
Return	+CCWA: <mode> OK
Write Command	**AT+CCWA=<n>[,<mode>[,<class>]]**
Return	OK or +CCWA: <status>,<class> (mode==2)

	OK	
Reference	n	description
	0	Disable
	1	Enable
	mode	description
	0	Disable
	1	Enable
	2	Query status
	class	description
	1	Voice service
	2	Data service
	4	Fax service (Currently,it is not supported)
	128	All service
Example		

6.2.3 AT+CHLD

AT+CHLD: manage supplementary services related with call, such as call hold and multiparty conversation		
Test Command	**AT+CHLD=?**	
Return	+CHLD: (0-3,11-17,21-27)	
	OK	
Read Command	**None**	
Return		
Write Command	**AT+CHLD=<n>**	
Return	OK	
Reference	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 call
	2	Hold all active calls and the waiting calls, activate all held calls
	2x	Disconnect a call from the conversation
	3	Add an held call to the conversation
Example		

6.2.4 AT+CLIP

AT+CLIP: set and query the calling line identification presentation service	
Test Command	**AT+CLIP=?**

Return	+CLIP: (0,1) OK	
Read Command	**AT+CLIP?**	
Return	+CLIP: <n>,<m> OK or ERROR	
Write Command	**AT+CLIP=<n>**	
Return	OK / ERROR	
Reference	n	description
	0	Disable +CLIP
	1	Enable +CLIP
	m	description
	0	CLIP not provisioned
	1	CLIP provisioned
	2	Unknown
Example		

6.2.5 AT+CLIR

AT+CLIR: allow the control of calling line identification restriction supplementary service		
Test Command	**AT+CLIR=?**	
Return	+CLIR: (0,1) OK	
Read Command	**AT+CLIR?**	
Return	+CLIR: <n>,<m> OK or ERROR	
Write Command	**AT+CLIR=<n>**	
Return	OK / ERROR	
Reference	n	description
	0	Disable CLIR
	1	Enable CLIR
	m	description
	0	CLIR not provisioned
	1	CLIR provisioned in permanent mode
	2	Unknown(e.g. no network)
	3	CLIR temporary mode presentation restricted
	4	CLIR temporary mode presentation allowed

Note: At present, write command is not supported by network
Example

6.2.6 AT+COLP

AT+COLP: allow control of connected line identification presentation supplementary service		
Test Command	**AT+COLP=?**	
Return	+COLP: (0,1) OK	
Read Command	**AT+COLP?**	
Return	+COLP: <n>,<m> OK or ERROR	
Write Command	**AT+COLP=<n>**	
Return	OK / ERROR	
Reference	n	description
	0	Deactive
	1	active
	m	description
	0	COLP not provisioned
	1	COLP provisioned
	2	Unknown(no network)
Example		

6.2.7 AT+COLR

AT+COLR: get the status of connected line identification restriction	
Test Command	**AT+COLR=?**
Return	+COLR: OK
Read Command	**AT+COLR?**
Return	+COLR: 0,<m> OK or ERROR
Write Command	**None**
Return	

Reference	m	description
	0	COLR not provisioned
	1	COLR provisioned
	2	Unknown(no network)
	Note: Currently, write command is not supported by network.	
Example		

6.2.8 AT+CLCK

This command refers to segment 7.2.3

6.2.9 AT+CPWD

This command refers to segment 7.2.2

6.2.10 AT+CACM

AT+CACM: reset the accumulated call meter value in SIM card	
Test Command	**AT+CACM=?**
Return	+CACM: OK
Read Command	**AT+CACM?**
Return	+CACM: <ACM> OK
Write Command	**AT+CACM=<PIN2>**
Return	OK / ERROR
Reference	ACM: accumulated call meter value
Example	

6.2.11 AT+CAMM

AT+CAMM: set the maximum of accumulated call meter	
Test Command	**AT+CAMM=?**
Return	+CAMM: (0-16777215) OK
Read Command	**AT+CAMM?**
Return	+CAMM: <ACMmax> OK
Write Command	**AT+CAMM=<ACMmax>,<PIN2>**
Return	OK / +CME ERROR: 16
Reference	When ACM reaches ACMmax, calls are prohibited.

Example

6.2.12 AT+CPUC

AT+CPUC: set the currency price per unit charged through calls	
Test Command	**None**
Return	
Read Command	**AT+CPUC?**
Return	+CPUC: ”<Currency>”,”<price>”
	OK
Write Command	**AT+CPUC=”<Currency>”,”<Price>”,<PIN2>**
Return	OK / +CME ERROR: <Err>
Reference	
Example	

6.2.13 AT+CLCC

AT+CLCC: give a list of all calls	
Test Command	**AT+CLCC=?**
Return	+CLCC:
	OK
Read Command	**None**
Return	
Write Command	**AT+CLCC**
Return	+CLCC (if no current calls are available)
	+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>,<number>
Reference	<idx>: call id <number>: MO/MT telephone number dir description 0 Mobile originated call(MO) 1 Mobile terminated call(MT) stat description 0 Activate 1 Hold 2 Dialing(MO) 3 Alerting(MO) 4 Incoming(MT) 5 Waiting(MT) mode description 1 Speech(call)

	2 Data(all services) 4 Fax 9 Unknown mpty description 0 Call is not one of multiparty call parties 1 Call is one of multiparty call parties
Example	**ATD02154452248** **+SIND: 5,1** **+SIND: 2** **AT+CLCC** **+CLCC:1,0,3,1,0,"02154452248"**

6.2.14 AT+CUSD

AT+CUSD: request users to enter sequences of numerical string(such as "*188"), in order to get the services provided by network	
Test Command	**AT+CUSD=?**
Return	+CUSD: (0-2),, OK
Read Command	**None**
Return	
Write Command	**AT+CUSD=<n>[,<str>[<dcs>]]**
Return	OK / ERROR
Reference	The network may reply a string, for display only, or for display plus request for the next sequence. This command is used to: 1、 enable or disable the indication presentation(when an incoming USSD is received) 2、 send and receive USSD strings set command parameter: n description 0 Disable the indication presentation 1 Enable the indication presentation 2 Cancel USSD service In case of enable indication presentation, it should be indicated with: +CUSD:<m>[,<str>,<dcs>] m description 0 No further user action required 1 Further user action required 2 USSD terminated by network

	4 Operation not supported <str>: text <dcs>: text format(such as UCS2) Sended or received USSD format: AT+CUSD=<n>[,<str>[,<dcs>]] Note: Users should initiate USSD services,AT+CUSD=1,"*188#",etc. Then network will response related information +CUSD: …….Users could select corresponding services to communication with network. Finally, users could use AT+CUSD=2 or AT+SAC to stop present USSD service (Former USSD service must be stopped, before initiating new USSD service.)
Example	

6.2.15 AT+CSSN

AT+CSSN: provide the control of supplementary service notification presentation	
Test Command	**AT+CSSN=?**
Return	+CSSN: (0,1)(0,1) OK
Read Command	**AT+CSSN?**
Return	+CSSN: <n>,<m>
Write Command	**AT+CSSN=<n>,<m>**
Return	OK / ERROR
Reference	When <n>=1 and a call is being originated, a supplementary service notification is sent. +CSSI: <code1>: n description 0 Enable 1 Disable When <m>=1 and a call is being received, corresponding supplementary service notification is sent. : <code2> m description 0 Enable 1 Disable code1 description 0 Unconditional forwarding activated 1 Some conditional forwarding activated 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	description
0	Belong to call forwarding(MT)
1	Belong to closed user group call(CUG)
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 other remote party in multiparty conversation

Example

7. Security commands

Security commands allow the external application to determine various security related settings, such as modifying or setting PIN, locking or unlocking or negotiating the facilities between mobile and network service provider.

7.1 Overview of security commands

number	command	description
1	AT+CPIN	PIN authentication
2	AT+CPWD	Change password
3	AT+CLCK	Facility lock
4	AT+XX	Get the remaining times of valid attempts for PIN and PUK

7.2 Detailed description of security commands

7.2.1 AT+CPIN

AT+CPIN: input or modify the PIN	
Test Command	**AT+CPIN=?**
Return	+CPIN: <PIN> OK
Read Command	**AT+CPIN?**
Return	+CPIN: <code> OK
Write Command	**AT+CPIN=<pin> / AT+CPIN=<puk>,<newpin>**
Return	OK / +CME ERROR:<err>
Reference	pin, new pin length is 4-8 digits; puk length is 8 digits code — description READY — PIN is not required SIM PIN — Enter PIN SIM PUK — Enter PUK while ME is waiting for SIM SIM PIN2 — Enter PIN2 while ME is waiting for SIM2 SIM PUK2 — Enter PUK2 while ME is waiting for SIM BLOCK — locked
Example	**AT+CPIN?** **+CPIN: SIM PUK** **AT+CPIN=12345678,1111 //PIN1 is modified to"1111"** **OK**

AT+CPIN?
+CPIN: SIM PIN
AT+CPIN=1111
OK

AT+CPIN?
+CPIN: READY

7.2.2 AT+CPWD

AT+CPWD: modify password		
Test Command	**AT+CPWD=?**	
Return	+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	
Read Command	**None**	
Return		
Write Command	**AT+CPWD=<fac>,<oldpwd>,<newpwd>**	
Return	OK / +CME ERROR:16	
Reference	fac	description
	PS	SIM is locked, password is 8 digits;
	SC	PIN enabled/disabled;
	AO	Bar all outgoing calls
	OI	Bar all outgoing international calls
	OX	Bar all outgoing international calls, expect to home country
	AI	Bar all incoming calls
	IR	Bar 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**	

7.2.3 AT+CLCK

AT+CLCK: lock,unlock,and negotiate the facilities between mobile and network	
Test Command	**AT+CLCK=?**
Return	+CLCK: (list all supported<fac>s)
Read Command	**AT+CLCK?**
Return	+CLCK: (list all supported<fac>s, list corresponding<status>s)
Write Command	**AT+CLCK=<fac>,<mode>[,<password>[,<class>]]**
Return	OK or +CME ERROR:<err> +CLCK: <status>[,<class>](when mode=2, it's in inquiry status)

Reference

fac	description
PS	SIM is locked, password is 8 digits;
SC	PIN enabled/disabled;
AO	Bar all outgoing calls
OI	Bar all outgoing international calls
OX	Bar all outgoing international calls, expect to home country
AI	Bar all incoming calls
IR	Bar 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

Note: Currently, "PS","PN","PU","PP","PC","FD" is not supported

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

class	description
1	Voice(telephony)
2	Data(to all beared services)
4	Fax
8	Short messages service
7	All classes, default value

	status description 0 Deactivate 1 Activate <password>: (0-9)characters, the maximum length determined by AT+CPWD=? command.
Example	**AT+CLCK=”AI”,1,1234** **OK** **AT+CLCK=”AI”,2** **+CLCK:1,0**

7.2.4 AT+XX

AT+XX: get the remaining times of valid attempts for PIN and PUK	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+XX=<value>**
Return	+XX: <remaining_num> OK
Reference	value description 0 PIN1 1 PIN2 2 PUK1 3 PUK2
Example	**AT+XX=0** **+XX: 3** **OK**

8. SMS commands

SMS commands are related to allow external application to use the short message service, such as sending messages, receiving messages, deleting messages and so on.

8.1 Overview of SMS commands

number	command	description
1	AT+CSMS	Select message service
2	AT+CSAS	Store settings of +CSAS and +CSMP to EEPROM or SIM card
3	AT+CRES	Restore the settings specified by AT+CSCA and AT+CSMP commands to EEPROM
4	AT+CSDH	Show SMS text mode parameters
5	AT+CPMS	Preferred SMS message storage
6	AT+CSCA	SMS service center address
7	AT+CMGF	Select SMS message format
8	AT+CMGL	List SMS message from preferred store
9	AT+CMGR	Read SMS message
10	AT+CMGS	Send short message
11	AT+CSMP	Set SMS text mode parameters
12	AT+CMGW	Write short message to memory
13	AT+CMSS	Send short message from storage
14	AT+CMGD	Delete short message
15	AT+CSCB	Select Cell Broadcast Message Indication
16	AT+CNMI	New short message indication
17	+CMTI	Indicate the MEM index location of received message(Enabled by AT+CNMI)
18	+CMT	Indicate the short message was sent to DTE directly after received
19	+CBM	Indicate that the cell broadcast message was sent to DTE device after received
20	AT+SMSC	Change the status of message stored in SIM card
21	AT+SUSS	Set REC UNREAD status of these messages which remain unchanged

8.2 Detailed description of SMS commands

8.2.1 AT+CSMS

AT+CSMS: inquire and set the classes of supported short message service

Test Command	**AT+CSMS=?**
Return	+CSMS: <service> OK
Read Command	**AT+CSMS?**
Return	+CSMS: <service>,<mo>,<mt>,<cb> OK
Write Command	**AT+CSMS=<service>**
Return	+CSMS=<mo>,<mt>,<cb> OK
Reference	service description 0 SMS AT commands are compatible with GSM07.05 PHASE 2 1 SMS AT commands are compatible with GSM07.05 PHASE 2+ mo description 0 Short message which don't supported mo 1 Short message which support mo mt description 0 Short message which don't support mt 1 Short message which support mt cb description 0 cb not provisioned 1 cb provisioned Note: Currently, GSM07.05 PHASE 2 and GSM07.05 PHASE 2+ are not distinguished
Example	

8.2.2 AT+CSAS

AT+CSAS: store settings of +CSAS and +CSMP to EEPROM or SIM card	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+CSAS**
Return	OK
Reference	
Example	

8.2.3 AT+CRES

AT+CRES: restore the settings specified by AT+CSCA and AT+CSMP commands to EEPROM	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+CRES**
Return	OK
Reference	
Example	

8.2.4 AT+CSDH

AT+CSDH: set the additional information on text mode result codes		
Test Command	**AT+CSDH=?**	
Return	+CSDH: (0-1)	
	OK	
Read Command	**AT+CSDH?**	
Return	+CSDH: <value>	
	OK	
Write Command	**AT+CSDH=<value>**	
Return	OK	
Reference	value	description
	0	Do not show additional information
	1	Show additional information
	Notes: Currently, additional information facility is not supported.	
Example		

8.2.5 AT+CPMS

AT+CPMS: select the short message storage area(for reading, writing, receiving, sending)	
Test Command	**AT+CPMS=?**
Return	+CPMS: ((“BM”,”SM”,”SR”),(“BM”,”SM”,”SR”))
	OK
Read Command	**AT+CPMS?**
Return	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>
	OK
Write Command	**AT+CPMS=<mem1>,<mem2>**

Return	+CPMS: <used1>,<total1>,<used2>,<total2> OK or ERROR
Reference	<mem1>: memory used to read and delete messages. ”SM”,”BM”,”SR” <mem2>: memory used to write messages: “SM”,”BM”, memory used to send messages: “SM” <usedx>: the used space of <memx> <totalx>: total space of <memx> “SM” SIM storage “BM” ME short message storage “SR” ME short message status report storage Note: Currently, only ”SM”,”BM” are supported.
Example	**AT+CPMS=”BM”,”SM”** **+CPMS: 0,200,5,50** **OK**

8.2.6 AT+CSCA

AT+CSCA: set and read the short message service center address	
Test Command	**AT+CSCA=?**
Return	+CSCA: OK
Read Command	**AT+CSCA?**
Return	+CSCA: <sca> OK
Write Command	**AT+CSCA=<sca>**
Return	OK
Reference	<sca>: short message service center address, {0-9,#,*,+,a,b,c}, its maximum length is 20
Example	**AT+CSCA?** **+CSCA: ”+8613800210500”,145** **OK** **AT+CSCA=”8613800210500”** **OK** **AT+CSCA=?** **+CSCA:** **OK**

8.2.7 AT+CMGF

AT+CMGF: set and read the format of short messages		
Test Command	**AT+CMGF?**	
Return	+CMGF: <mode> OK	
Read Command	**AT+CMGF?**	
Return	+CMGF: <mode> OK	
Write Command	**AT+CMGF=<mode>**	
Return	OK / ERROR	
Reference	mode	description
	0	PDU mode(default config)
	1	TEXT mode
	Note: the default value is 0	
Example	**AT+CMGF?** **+CMGF: 0** **OK** **AT+CMGF=1** **OK**	

8.2.8 AT+CMGL

AT+CMGL: list different status and all short messages	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+CMGL=<state>**
Return	Text mode return: +CMGL:<index>,<dcs>,<stat>,<da/oa>,<valid period>,<CR><LF> (for SMS-SUBMIT) +CMGL:<index>,<dcs>,<stat>,<da/oa>,<time stamp>,<CR><LF> (for SMS-DELIVER) +CMGL: <index>,<dcs>,<st>(for SMS-ATATUS-REPORT) PDU mode return： +CMGL: <index>,<stat>,<length>,<CR><LF> <pdu>(for SMS-DELIVER,SMS-SUBMIT, and SMS-ATATUS-REPORT)
Reference	Different result formats are corresponding to different types(SMS-DELIVER, SMS-SUBMIT, SMS-ATATUS-REPORT). SMS-STATUS-REPORT is treated

as ordinary MT short message.

<index> location in memory
<dcs> text types of short message content
0: default type
1: 8 BIT
2: UCS2(such as Chinese character)
<da/oa> destination/original addresses
<vp> vality period of short messages
<ts> transferring time of short messages
<st> status report
<stat> status of short messages
<data> text content

<stat> Text mode	<stat> PDU mode	description
“REC UNREAD”	0	Unread message
“REC READ”	1	Readed message
“STO UNSENT”	2	Stored and unsended message
“STO SENT”	3	Stored and sended message
“ALL”	4	All short message

Example

Set to PDU mode:
AT+CMGF=0
OK

Display all short messages:
AT+CMGL=4
+CMGL:1,2,,29
0891683110304105F0000D91683150221320F500007030825192610 00AC4A6F27AA42A832E28
+CMGL:2,2,,24
0891683108200305F0314A0B803118665868F50008AD0A00680065006C006C006F
+CMGL:3,1,,13
018000008000000000000000000000
OK

Set to TEXT mode:
AT+CMGF=1
OK

Display all short messages:
AT+CMGL=“ALL”
+CMGL: 1,2,"REC READ","10010","07/03/15,18:11:16+00"

900962E98054901A003100330030FF0C4EAB53D77CBE5F696BCF4E0059
2930026B228FCE52A05165

+CMGL: 2,2,"REC READ","10010","07/03/15,18:11:43+00"
6B228FCE52A051654E0A6D778054901AFF0C670065B04E1A52A163A883
50FF1A53D1003500310035

+CMGL: 3,2,"REC READ","10010","07/03/15,18:11:43+00"
5C0A656C76845BA26237FF0C6B228FCE60A852A051654E0A6D7780549
01A59275BB65EADFF0C8D76

+CMGL: 4,2,"REC READ","8254","07/03/27,11:22:33+00"
8054901A002277ED4FE198CE66B400225E74521D592756DE9988003A60A
85DF283B700334E2A62BD

+CMGL: 5,0,"REC READ","+8613052231025","07/03/28,15:29:16+00"
DMJWGTJA.P
OK

8.2.9 AT+CMGR

AT+CMGR: read some specified message	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+CMGR=<index>**
Return	text mode return: +CMGR:<stat>,<dcs>,<oa>,<ts>,<CR><LF> <data> (for SMS-DELIVER only) text mode return: +CMGR: <stat>,<dcs>,<da>,<ts>,<CR><LF> <data> (for SMS-SUBMIT only) text mode return: +CMGR: <stat>,<st> (for SMS-STATUS-REPORT only) PDU mode return: +CMGR: <stat>,<length>,<CR><LF><PDU> Note: Regard the status report as ordinary MT message.
Reference	For different types(SMS-DELIVER ,SMS-SUBMIT, SMS-ATATUS-REPORT) of message, there are different result types.

	<stat> status of message <dcs> the content of message in text mode 0:default value 1:8 BIT 2:UCS2(such as Chinese character) <da/oa> destination/origination address <vp> validity period <ts> time of sending <st> status report <data> text content
Example	**AT+CMGR=5** **+CMGR:"REC READ",0,"+8613052231025","07/03/28,15:29:16+00"** **DMJWGTJA.P** **OK**

8.2.10 AT+CMGS

AT+CMGS: send short message	
Test Command	**AT+CMGS=?**
Return	+CMGS: ,(0,1) OK
Read Command	**None**
Return	
Write Command	**If the format of sending message is text(AT+CMGF=1) mode:** **AT+CMGS=<da>[,<moresms>]<CR>** **>TEXT (ctrl+z/ESC)** **If the format of sending message is PDU(AT+CMGF=0)mode:** **AT+CMGS=<length><CR>** **>PDU (ctrl+z/ESC)**
Return	+CMGS: <mr> OK
Reference	In text mode, to send UCS2 characters, dcs has to set to UC32 by AT+CSMP command, meanwhile hexadecimal UCS2 must be transferred to two ASCII characters. For example,0x2A is changed to 2 (ASCII 50) and A(ASCII 65). length: the length of TPDU(bit) with a range of 9-160. 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 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). The length range is 18-502. <da>: destination address with a maximum length of 40. <moresms>: flag determines whether sending message continuously. (if choose

	sending message continuously, it'll be more efficient, while connected line is not released.) Text: content ahead (0…9,A…F), if dcs(by AT+CSMP)is a 7bit ASCII character, its length range is 0-160; if dcs is a 8bit ASCII character, or its length range is 0-140; if dcs is a UCS2 character, or its length range is 0-140.
Example	**PDU MODE:** **AT+CMGS=16** **>0031020b803119282071f30008000a00680065006c006c006f (ctrl+z)** **00: no service center address** **<fo> 0x31** **<mr> (TP-MR)0x02** **<da> (TP-DA)0x0b0x800x310x190x280x200x710xf3(13918202173)** **<pid> (TP-PID)0x00** **<dcs> (TP-DCS)0x08** **<vp> 0x00** **<length> (TP-UDL) 0x0a** **TP-UD 0x00 0x68 0x00 0x65 0x00 0x6C 0x00 0x6C 0x00 0x6F(hello)** **AT+CMGS=24** **>0891683108200105f031020b803119282071f30008ad0a00680065006c006c0 06f (ctrl+z)** **08: the length of service center id** **The service center id +8613800210500** **TEXT MODE** **AT+CMGS="13916049104"** **>hello(ctrl+z)** **Examples of sending UCS2 characters** **AT+CMGF=1** **AT+CSMP=19,143,0,2(<dcs> is sent to UCS2)** **AT+CMGS="13916049104"** **>4F60597D (hello)** **OK**

8.2.11 AT+CSMP

AT+CSMP: set and read <vp>,<pid>, and <dcs> value	
Test Command	**AT+CSMP=?**
Return	+CSMP: (0-255),(0-255),(0-9,11,12,127),(0-2) OK
Read Command	**AT+CSMP?**
Return	+CSMP: <fo>,<vp>,<pid>,<dcs>
Write Command	**AT+CSMP=<fo>,<vp>,<pid>,<dcs>**

Return	OK / ERROR

Reference

<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

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

144-167：12 hours+(VP . 143) ×30 minutes)

168-196：(VP . 166) ×1 day

197-255：(VP . 192) ×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

10 teletex,in analog PSTN

11 teletex,in digital ISDN

7F SIM DOWNLOAD

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

dcs	description
0	Default alphabet
1	8 bit data
2	UCS2

Example	**AT+CSMP=19,143,0,0** **OK** **AT+CSMP?** **+CSMP: 19,143,0,0** **OK**

8.2.12 AT+CMGW

AT+CMGW: store a message in <mem2>	
Test Command	**AT+CMGW=?**
Return	+CMGW: , (0-4)
Read Command	**None**
Return	
Write Command	**If the SM format is PDU mode:** **AT+CMGW=<length>,[<stat>]<CR>** **>PDU is given(ctrl+z/ESC)** **If the SM format is TEXT mode:** **AT+CMGW="<da>",[<stat>]<CR>** **>TEXT is given(ctrl+z/ESC)**
Return	+CMGW: <index> OK
Reference	<length>: the length of TPDU(bit) with a range of 9-160 <da>: destination address with the maximum length of 40 bits <stat>: integer, if don't write this parameter, the default value is 2(unsent message) stat — description 0 — Unreaded message(MT) 1 — Readed message(MT) 2 — Unsent message(MO) 3 — Sent message(MO) <index>: index id of <mem2> PDU: same to AT+CMGS Text: same to AT+CMGS Note: when the space of SIM or ME is used, if <mem2>=SIM, return "+CMGW: SIM is full"; if <mem2>=ME, return "+CMGW: ME is full"
Example	**AT+CMGF=1** **OK** **AT+CMGW="13916049104"** **>TEST(ctrl+z)** **+CMGW: 16** **OK**

8.2.13 AT+CMSS

AT+CMSS: send a stored but unsent message	
Test Command	**AT+CMSS=?**
Return	+CMSS: (1-65535), OK
Read Command	**None**
Return	
Write Command	**AT+CMSS=<index>[,"<da>"]**
Return	+CMSS: <mr> OK
Reference	<index>: index num of SIM <da>: destination address with a maximum length of 40
Example	**AT+CMGF=1** **OK** **AT+CMGW="13916049104"** **>TEST <ctrl+z>** **+CMGW:16** **OK** **AT+CMSS=16** **+CMSS: 113** **OK**

8.2.14 AT+CMGD

AT+CMGD: delete one or all messages	
Test Command	**AT+CMGD=?**
Return	+CMGD: (1-65535),(0-4) OK
Read Command	**None**
Return	
Write Command	**AT+CMGD=<index>[,<DelFlag>]**
Return	OK / ERROR
Reference	<index>: index num of chosen memory <mem1>,which should be less than the maximum num item of <mem1> DelFlag description 0 Delete an message according to index 1 Delete all readed messages 2 Delete all readed or sent messages 3 Delete all readed or sent or unsent messages 4 Delete all messages Note: when <DelFlag> is between 1 and 4 and when <index> is valid, delete all

	fitted messages begin from <index>
Example	

8.2.15 AT+CSCB

AT+CSCB: select which types of messages are to received. This command is allowed in TEXT mode	
Test Command	**AT+CSCB=?**
Return	+CSCB: (0-1),(0-65535),(0-255) OK
Read Command	**AT+CSCB?**
Return	+CSCB=<mode>,<mids>,<dcs>
Write Command	**AT+CSCB=<mode>,<mids>,<dcs>**
Return	OK
Reference	mode description 0 DCE receive the message specified by <mid>,<dcs> 1 DCE doesn't receive the message specified by <mid>,<dcs> <mid>: value 0-65535 <dcs>: value 0-255 Note: Currently, cell broadcast is not supported
Example	

8.2.16 AT+CNMI

AT+CNMI: control the way of indicating DTE, after receiving MT messages	
Test Command	**AT+CNMI=?**
Return	+CNMI: (0-3),(0-3),(0-1),(0-1)
Read Command	**AT+CNMI?**
Return	+CNMI: 3,0,0,0, OK
Write Command	**AT+CNMI=<mode>,<mt>,<cbm>,<ds>**
Return	OK / ERROR

Reference	<mode>: indication mode, default value is 3. Currently only mode 3 is supported. Mode description 3 Return result code to DTE 1 DCE don't receive result code defined in <mid>,<dcs> <mt>: set the indication format of MT message with a default value of 0 mt description 0 No indication No SMS-DELIBER 1 Auto indication +CMTI: <mem>,<index> 3 Direct indication +CMT: result code <cbm>: config the indication of cell broadcast message. Its default value is 0. cbm description 0 No +CBM indications are routed to the DTE. The CBMs are stored. 1 The +CBM is stored and an indication of memory location is routed to the user. <ds>: config the indication for SM status report. Its default value is 0. ds description 0 No SMS-STATUS-REPORTs are routed to DTE 1 SMS-STATUS-REPORTs are routed to DTE by +CDS
Example	**AT+CNMI=3,0,1,1** **OK** **AT+CNMI?** **+CNMI: 3,0,1,1** **OK**

8.2.17 +CMTI

+CMTI: indicate the MEM index location of received message(Enabled by AT+CNMI)	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**None**
Return	

Reference	Indication format: +CMTI: <mem>,<index> Parameter: mem description "SM" SM message storage "ME" ME message storage <index>: index num of <mem>
Example	

8.2.18 +CMT

+CMT: indicate the short message was sent to DTE directly after received. (command AT+CNMI=3,3 should be set first)	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**None**
Return	
Reference	If short message is PDU mode (AT+CMGF=0) Indication format : +CMT:<length>,<CR><pdu> If short message is TEXT mode(AT+CMGF=1) Indication format : +CMT:<od<,<sc>,<time stamp>,<length>,<CR>,<text>
Example	

8.2.19 +CBM

+CBM: indicate that the cell broadcast message was sent to DTE device after received. Presetting by AT+CNMI command is required	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**None**
Return	
Reference	Format : +CBM:<mid>,<dcs>,<cr><lf> <text> <mid>: message id <dcs>: data coding format <text>: determined by the value of <dcs>
Example	

8.2.20 AT+SMSC

AT+SMSC: change the status of message stored in SIM card		
Test Command	**AT+SMSC=?**	
Return	+SMSC: (1-255)	
Read Command	**None**	
Return		
Write Command	**AT+SMSC=<loc>,<status>**	
Return	OK	perform successfully
	+CMS ERROR: 321	<loc> is incorrect
	+CMS ERROR: 302	<status> doesn't match
Reference	<loc>: message sequence in SIM card <status>: the new status to be changed can only from unreaded to readed, or from unsent to sent.	
	PDU MODE	TEXT MODE
	0	REC UNREAD
	1	REC READ
	2	STO UNSENT
	3	STO SENT
Example		

8.2.21 AT+SUSS

AT+SUSS: set REC UNREAD status of these messages which remain unchanged, after AT+CMGR and AT+CMGL command are performed		
Test Command	**AT+SUSS=?**	
Return	+SUSS: (0-1)	
Read Command	**AT+SUSS?**	
Return	+SUSS: <mode>	
Write Command	**AT+SUSS=<mode>**	
Return	OK	
Reference	MODE	description
	0	Status of message remains unchanged
	1	Status of message will be changed(default value)
Example		

9. Phonebook commands

Phonebook commands allow the external application to access the phonebook located in the phone memeory or on the attached Subscriber Identity Module (SIM), such as adding, deleting, and modifying and so on.

9.1 Overview of phonebook commands

number	command	description
1	AT+CPBS	Select phonebook memory storage
2	AT+CPBR	Read from phonebook
3	AT+CPBF	Search phonebook with a name string
4	AT+CPBW	Write into phonebook
5	AT+CPBP	Search the phonebook for an item with the same phone number
6	AT+CPBN	Make a forward or backward move in the phonebook
7	AT+CNUM	Read own numbers
8	AT+SDCP	Delete all the calls
9	AT+CSVM	Set/get and enable/disable the voice mail number

9.2 Detailed description of phonebook commands

9.2.1 AT+CPBS

AT+CPBS: select the types of phonebooks	
Test Command	**AT+CPBS=?**
Return	+CPBS: (“SM”,”FD”,”LD”,”MC”,”RC”,”ME”) OK
Read Command	**AT+CPBS?**
Return	+CPBS: <storage>(default value “SM”),<num used>,<num available>
Write Command	**AT+CPBS=<storage>**
Return	OK / ERROR
Reference	<num used>: the number of phonebook items already used <num available>: the available items storage description “SM” SIM card phonebook “FD” Fixed dialing phonebook “LD” Latest dialing phonebook “MC” Missed call phonebook

	"RC"	Received call phonebook
	"ME"	Mobile phone phonebook
Example		

9.2.2 AT+CPBR

AT+CPBR: return entries for a range of locations specified by entered parameters	
Test Command	**AT+CPBR=?**
Return	+CPBR: <list supported <index>s>,<nlength>,<tlength> OK
Read Command	**None**
Return	
Write Command	**AT+CPBR=<index1>[,<index2>]**
Return	+CPBR=<index1>,<number>,<type>,<text>,<CR>,<CF> …… <index2>,<number>,<type>,<text>,<CR>,<CF>
Reference	If the second parameter is default, only return the entries specified by the first parameter. <nlength>: maximum length of telephone number <tlength>: maximum length of name
Example	**AT+CPBR=1** **+CPBR: 1,"13916049104",129,"aa"** **OK** **AT+CPBR=1,2** **+CPBR: 1,"13916049104",129,"aa"** **+CPBR: 2,"13916976524",129,"bb"** **OK**

9.2.3 AT+CPBF

AT+CPBF: search phonebook with a name string	
Test Command	**AT+CPBF=?**
Return	+CPBF: <nlength>,<tlength> OK
Read Command	**None**
Return	
Write Command	**AT+CPBF=<name>**
Return	+CPBF: <index>,<number>,<type>,<name> or ERROR(not found)

Reference	<nlength>: maximum length of phonebook number <tlength>: maximum length of name
Example	**AT+CPBF=”aa”** **+CPBF: 1,”13916049104”,129,”aa”** **OK**

9.2.4 AT+CPBW

AT+CPBW: write the current phonebook in specified location<index>	
Test Command	**AT+CPBW=?**
Return	+CPBW(list supported <index>s),<nlength>,<list supported types>,<tlength> OK
Read Command	**None**
Return	
Write Command	**AT+CPBW=<index>[,”<number>”[,<type>[,”<name>”]]]**
Return	OK
Reference	If parameter <number> and <text> are default, erase item of <index> location. <index>: index id <number>: telephone number, its maximum length could not be larger than <nlength>. <type>: types of telephone number <name>: name, its maximum length could not be larger than <tlength> <nlength>: max length of telephone number <tlength>: max length of name
Example	**AT+CPBW=3** **OK** **AT+CPBW=3,”54452248”,129,”cc”** **OK** **When inputting UCS2 [<text>], users must enter ASCII strings begin with 80. For example:”804F60597D”(hello),”0x8000410042”(AB).** **AT+CPBW=3,”54452248”,129,”806797519B”** **OK**

9.2.5 AT+CPBP

AT+CPBP: search the phonebook for an item with the same phone number as that defined in the parameter	
Test Command	**AT+CPBP=?**
Return	+CPBP: <MaxRecord>,<MaxNumLength> OK

Read Command	**None**
Return	
Write Command	**AT+CPBP=<PhoneNumber>**
Return	+CPBP: <index>,<number>,<type>,<name>
Reference	
Example	**AT+CPBP=”54452248”** **+CPBP: 3,”54452248”,129,”cc”** **OK**

9.2.6 AT+CPBN

AT+CPBN: make a forward or backward move in the phonebook	
Test Command	**AT+CPBN=?**
Return	+CPBN: (0-5) OK
Read Command	**None**
Return	
Write Command	**AT+CPBN=<mode>**
Return	+CPBN: <index2>,<number>,<type>,<text>,<CR>,<CF>
Reference	Mode — description 0 — Display the first item 1 — Display the last item 2 — Display the next item 3 — Display the above item 4 — Display the latest readed item 5 — Display the latest written item
Example	**AT+CPBN=?** **+CPBN: (0-5)** **OK** **AT+CPBN=0** **+CPBN: 15, .+331290101.,145,.John.** **OK** **AT+CPBN=2** **+CPBN: 5, .+33147658987.,145,.Steven.** **OK** **AT+CPBN=2** **+CPBN: 6, .+331290302.,145,.Mary.** **OK** **AT+CPBN=3**

+CPBN: 5, .+33147658987.,145,.Steven.
OK

AT+CPBN=1
+CPBN: 6,.+331290302.,145,.Mary.
OK

AT+CPBN=2
+CPBP: 15,.+331290101.,145,.John.
OK

AT+CPBF=John
+CPBF: 15,.+331290101.,145,.John.
OK

AT+CPBN=2
+CPBN: 5,.+33147658987.,145,.Frank.
OK

AT+CPBF=John
+CPBF: 15,.+331290101.,145,.John.
OK

AT+CPBN=4
+CPBF: 15,.+331290101.,145,.John.
OK
AT+CPBW=1,.0146290800.,129,Windy
OK

AT+CPBN=4
+CPBF: 15,.+331290101.,145,.John.
OK

AT+CPBF=”Frank”
+CPBF: 5,.+33147658987.,145,.Frank.
OK

AT+CPBN=5
+CPBF: 15,.+331290101.,145,.John.
OK

9.2.7 AT+CNUM

AT+CNUM: read subscriber MSISDN	
Test Command	**AT+CNUM=?**
Return	OK
Read Command	**None**
Return	
Write Command	**AT+CNUM**
Return	OK
Reference	
Example	**AT+CNUM** **OK**

9.2.8 AT+SDCP

AT+SDCP: delete all the calls listed in ”LD” or ”MC” or ”RC”	
Test Command	**AT+SDCP=?**
Return	+SDCP: (“LD”,”MC”,”RC”) OK
Read Command	**AT+SDCP?**
Return	OK / ERROR
Write Command	**AT+SDCP=<calls phonebook>**
Return	OK / ERROR
Reference	<calls phonebook>:”LD”,”MC”,”RC”
Example	

9.2.9 AT+CSVM

AT+CSVM: set/get and enable/disable the voice mail number	
Test Command	**AT+CSVM=?**
Return	+CSVM:(0-1),<nlength>,(129,145) OK
Read Command	**AT+CSVM?**
Return	+CSVM: 0,” “,129 OK / ERROR
Write Command	**AT+CSVM=<mode>[,<number>[,<type>]]**
Return	OK / ERROR
Reference	<nlength>: max length of telephone number <mode>

	0: disable voice mail 1: enable voice mail <number>: (<nlength>) <type>: type of voice mail number
Example	**AT+CSVM=1,”13800210166”,129** **OK**

10. STK commands

10.1 Preface

SIM Application Toolkit is abbreviated to STK. It can be used by service providers to support a broad range of services, such as GO_TONE and MONTERNET supported by China Communication, etc. STK allows service providers to supply new services without changing mobile phones, because new services can be realized by developing new applications and downloaded them to the SIM.

STK refers to GSM 11.14. It introduces about 25 new commands for the SIM: CLASS1 offers a subset of commands, while CLASS3 offers the full range of command.

STK support：

- profile download
- proactive SIM
- data download into SIM
- menu selection
- call control by SIM

Currently, data download into SIM, call control by SIM are not supported.

Profile Download command is used to indicate which STK features the customer application supports. The AT command used for this operation is AT+STSF.

A proactive SIM provides a mechanism whereby certain actions can be performed. These actions include:

- display menus
- display given text
- get user input
- send a short message
- set up a call

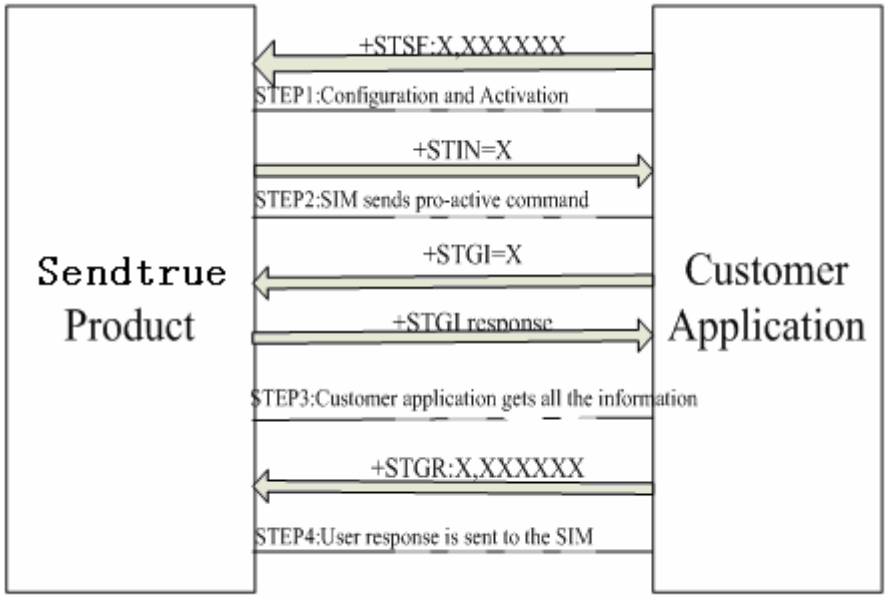
The commands used for this operation are:

+STIN (SIM Toolkit Indication),
+STGI (SIM Toolkit Get Information),
+STGR (SIM Toolkit Give Response).

Menu selection is a set of menu provided by STK. The menu selection command (AT+STGR) informs SIM which menu item is selected. The commands used for this operation are: +STIN, +STGI and +STGR.

10.2 The exchange procedure between STK user and STK

The following scheme shows how the STK user interacts with each other:



On the first step the STK user informs the SMSM5100B-D module which facilities are supported. The operation is performed with the AT+STSF command, which also activates or deactivates the STK functionality. If STK functionality is activated, while boosting, system sends +STIN: 0 to STK customers. If STK functionality is deactivated, when STK functionality is activated by AT+STSF command, system sends +STIN: 0 to STK customers.
On the second step, the SMSM5100B-D module sends +STIN: index to inform STK users which STK command should be performed. The last indication can be request by AT command AT+STIN? .
On the third step the STK user uses AT+STGI command to get STK information respective to +STIN: index
On the fourth step the STK user uses AT+STGR to its response to STK.
All facilities of the STK are realized by sequences of such operations.

10.3 Overview of STK commands

number	command	description
1	AT+STSF	Allow STK facilities to be activated, deactivated or configured
2	AT+STIN	Allow the user to identify the commands sent via SIM card
3	AT+STGI	Get the information of a command sent from the SIM
4	AT+STGR	Allow the application to select an item in the main menu or to answer command

10.4 Detailed description of STK commands

10.4.1 AT+STSF

AT+STSF: allow STK facilities to be activated, deactivated or configured	
Test Command	**AT+STSF=?**
Return	+STSF: (0-2),(160060C01F-5FFFFFFF7F),(1-255)
Read Command	**AT+STSF?**
Return	+STSF: <mode>[,<config>][,<Timeout>]
Write Command	**AT+STSF=<mode>[,"<config>"][,<Timeout>]**
Return	OK / ERROR
Reference	mode: description 0: Deactivate STK 1: Activate STK 2: Configures the STK functionalities 2、 configure STK The STK configuration will be effective immediately without system reboot. All parameters are saved in NV(The value is configured value after reboot) <Config>: give hex value for TERMIANAL PROFILE with a value range of (160060C01F-5FFFFFFF7F)(hex format) <Timeout>: set the maximum time the user has for reacting. If waiting time exceeds the value, STK handle as no user reacts. Its value range is 1-255(multiple of 10 seconds)
Example	

10.4.2 AT+STIN

AT+STIN: allow the user to identify the commands sent via SIM card.(such as GET INKEY)	
Test Command	**AT+STIN=?**
Return	+STIN: OK
Read Command	**AT+STIN?**
Return	+STIN: <CmdType> OK
Write Command	**None**
Return	
Reference	After system received, system will automatically send relative message (+STIN:<CmdType>) to user. AT+STIN? command can be used to receive the latest sent message.(This command can only be available after user

	application sends +STIN: and before user application respond with AT+STGI command) The format of respective message sent automatically by user +STIN:<CmdType> CmdType description 0 Setup Menu command has been sent from the SIM 1 Display Text command has been sent from the SIM 2 Get Inkey command has been sent from the SIM 3 Get Input command has been sent from the SIM 4 Setup Call command has been sent from the SIM 6 Setup Menu(Sel Item) subnet command has been sent from the SIM 9 Send SMS command has been sent from the SIM 99 End Session command has been sent from the SIM
Example	

10.4.3 AT+STGI

AT+STGI: get the information(text to display, Menu information)of a command sent from the SIM	
Test Command	**AT+STGI=?**
Return	+STGI: (0-11) OK
Read Command	**None**
Return	
Write Command	**AT+STGI=<CmdType>**
Return	OK / ERROR
Reference	The information of the return of AT+STGI write command is list below: When CmdType=0(Setup menu): <Alpha Idenitifier menu> Alpha identifier of the main menu(MONTERNET and GO_TONE,etc) <Idx>(1-255) number of items in the main menu <NbItems>(1-255) location of present item in the main menu <Alpha Idx Label> information of current item in the main menu <HelpInfo> HelpInfo description 0 No help information available 1 Help information available When CmdType=1(Display text)： <Prior>: priority Prior description 0 Normal priority of display

1	High priority of display

<Text>:text

<ClearMode>

Clear mode	description
0	Clear message after a 3 second delay
1	Waiting for user to clear message

When CmdType=2(Get Inkey):

<Format>:

format	description
0	Digit(0-9,*,#,and +)
1	SMS alphabet default
2	UCS2

<TextInfo>:

<HelpInfo>:

HelpInfo	description
0	No help information available
1	Help information available

When CmdType=3(Get Input):

<Format>:

format	description
0	Digit(0-9,*,#,and +)
1	SMS alphabet default
2	UCS2
3	Unpacked format
4	Packed format

<EchoMode>:

EchoMode	description
0	Echo off
1	Echo on

<SizeMin>(1-255): minimum length of input

<SizeMax>(1-255): maximum length of input

<TextInfo>:

<HelpInfo>:

HelpInfo	description
0	No help information available
1	Help information available

When CmdType=4(Setup Call):

<Type>:

type	description
0	Set up call but only if not currently busy on
1	Set up call but only if not currently busy on. Redial, if failed.

	2 Block current call, if busy, and set up a new call 3 Block current call, if busy, and set up a new call. Redial, if failed. 4 Disconnect current call, if busy, and set up a new call 5 Disconnect current call, if busy, and redial, if failed <CalledNb>: call number <SubAdress>: When CmdType=6(Sel Item): <Idx>(1-255): total number of submenus <NbItems>(1-255): location of current item <Alpha Idx Label>: location information of current item <HelpInfo>: help information HelpInfo description 0 No help information available 1 Help information available When CmdType=9(Send SMS) <TextInfo>: Note: In all returned information, if it begins with 0x80 then its format is UCS2 mode: such as 8079FB52A868A67F51(MONTERNET), or is SMS alphabet default mode.
Example	

10.4.4 AT+STGR

AT+STGR: allow the application to select an item in the main menu or to answer command	
Test Command	**AT+STGR=?**
Return	+STGR: (0,1,2,3,4,6,11,95,96,97,98,99),(0-2),(0-255)
Read Command	**None**
Return	
Write Command	**AT+STGR=<CmdType>[,<Result>,<Data>]** When CmdType=2(Get Inkey) or CmdType=3(Get Input) and character strings are required, user must enter. AT+STGR=<CmdType>[,<Result>]enter，system return>,users input character strings, then confirm by ctrl+z, give up by Esc
Return	OK / ERROR
Reference	The answer command is as follows: 1、GET INKEY 2、GET INPUT 3、SELECT ITEM 4、SETUP CALL

5、DISPLAY TEXT

It is also possible to terminate or backward the current command session with following parameters:

1、BACKWARD MOVE Process a backward move

2、NO RESPONSE No response from user

3、END SESSION Customer aborts

CmdType	description
0	User select an item in main menu
1	Response to Disp Text
2	Response to Get Inkey
3	Response to Get Input
4	Response to Setup call
6	Response to Sel Item
95	Backward move
98	No response from the user
99	User abort

When CmdType=0 (user selects an item in main menu):

<Result>:

result	description
1	Item in main menu selected by the user
2	Help information required by user

<Data>: user's option

When CmdType=1(response to Disp Text), there are no <Result>,<Data>

When CmdType=2(Get Inkey)

<Result>:

result	description
0	STK terminated by user
1	User input key

<Data>: the value of user input key

Note: For inputs in UCS2 format, the data are entered in ASCII format which begins with 0x80.Example: for "80597D"

When CmdType=3(Get Input)

<Result>:

result	description
0	STK aborted by user
1	Character string entered by user

<Data>: input character string

Note: For inputs in UCS2 format, the data are entered in ASCII format which begins with 0x80,Example:entered "804F60597D"(hello),"8000410042"(AB).

When CmdType=4(Setup call)

<Result>:

result	description
0	User refuses the call
1	User accepts the call

When CmdType=6(Select Item)

<Result>:

result	description
0	STK terminated by the user
1	Item selected by the user
2	Help information required by the user
3	User requires to backmove

<Data>:

send response to SIM:

when CmdType=95(backmove)

when CmdType=98(no response from user)

when CmdType=99(user aborts)

AT+STGR can be performed, only after AT+STGI has done

Example

11. GPRS commands

GPRS commands are related to GPRS Mobile Termination that set PDP、QOS parameters, set MT and response from network terminal.

11.1 Overview of GPRS commands

number	command	description
1	AT+CGDCONT	Define PDP context
2	AT+CGQREQ	Quality of service profile(requested)
3	AT+CGQMIN	Quality of service profile(minimum acceptable)
4	AT+CGPCO	Configure the PDP context parameters of PCO
5	AT+CGATT	Attach or detach GPRS services
6	AT+CGACT	PDP context activate or deactivate
7	AT+CGPADDR	Show PDP address
8	AT+CGDATA	Enter data state
9	AT+CGAUTO	Automatic response to a network for PDP context activation
10	AT+CGANS	Manual response to a network for PDP context activation
11	AT+CGCLASS	Set the GPRS type of MT
12	AT+CGEREP	GPRS event reporting
13	AT+CGREG	GPRS network registration status
14	AT+CGSMS	Select service for MO SMS messages
15	AT+CRC	Decide whether shows the supplementary information of incoming calls
16	AT+CR	Decide whether to present that this CONNECT is GPRS
17	AT+CEER	Extend the error report
18	Extension of ATD	Built the connections between terminal devices and networks
19	AT+SSST	Set the MS service type
20	AT+SATT	Attach or detach GPRS service
21	AT+SAUTOATT	Allow MT to perform auto attach operation
22	AT+SGPRSDATA	Specify the data length of GPRS data sent by MT
23	ATO	Switch from command mode to data mode
24	+++	Switch from data mode or PPP online mode to command mode

11.2 Detailed description of GPRS commands

11.2.1 AT+CGDCONT

AT+CGDCONT: configure the context parameters of PDP, when MT is sending the activation message of PDP context	
Test Command	**AT+CGDCONT=?**
Return	+CGDCONT: (range of supported <cid>s),<pdp_type>,(list of supported <d_comp>s and <h_comp>s) OK
Read Command	**AT+CGDCONT?**
Return	+CGDCONT:<cid>,<pdp_type>,<APN>,<pdp_addr>,<d_comp>,<h_comp>,<CR>,<LF> [+CGDCONT:<cid>,<pdp_type>,<APN>,<pdp_addr>,<d_comp>,<h_comp>,<CR>,<LF>[…..]] OK
Write Command	**AT+CGDCONT=[**<cid>[,<pdp_type>[,<APN>[,<pdp_addr>[,<d_comp>[,<h_comp>]]]]]]
Return	OK / ERROR
Reference	The settings will not be saved in MS after system reboot. <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID. <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 mobile Communication APN who services 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, This bit does not need to be filled, for its default value is 0. Currently, MT data compression is not supported by any network. 0: no compression 1: compression <h_comp>: whether the PDP header should be compressed, This bit does not need to filled, for its default value is 0. Currently, data compression is not supported by any network. 0: no compression 1: compression
Example	**AT+CGDCONT=1，“IP”，“cmnet”<cr>**

OK

AT+CGDCONT=1,”IP”,”cmnet”,,1,1
+CME ERROR: 4

AT+CGDCONT=4,”IP”,”cmnet”,”1.1.1.1”,0,0
OK

11.2.2 AT+CGQREQ

AT+CGQREQ: configure QOS parameter when MT is sending the activation message of PDP context	
Test Command	**AT+CGQREQ=?**
Return	+CGQREQ:<pdp_type>,(list of supported <precedence>s,<delay>s,<reliability>s,<peak>s,and <mean>s) OK
Read Command	**AT+CGQREQ?**
Return	+CGQREQ:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF> [+CGQREQ:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF>[…]] OK
Write Command	**AT+CGQREQ=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]]**
Return	OK / ERROR
Reference	If PDP has already been activated and any QOS values of QOS parameters are larger than the minimal value of acceptable QOS parameters, the regulations for PDP context must be modified. <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID. <precedence>: present the priotity precedence description 0 Subscribed(from network) value used 1 High priority 2 Normal priority 3 Low priority <delay>: present 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>: present reliability classes; 1 is the best reliability,3,6 is the same

class,5 is the worst one

reliability	description
0	Subscribed (from network) value used
1--6	reliability class

<peak>: present the throughput classes in peak

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

<mean>: present 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	1 000(~2.2 bits/s)
5	2 000(~4.4 bits/s)
6	5 000(~11.1 bits/s)
7	10 000(~22 bits/s)
8	20 000(~44 bits/s)
9	50 000(~111 bits/s)
10	100 000(~0.22 kbit/s)
11	200 000(~0.44 kbit/s)
12	500 000(~1.11 kbit/s)
13	1 000 000(~2.2 kbit/s)
14	2 000 000(~4.4 kbit/s)
15	5 000 000(~11.1 kbit/s)
16	10 000 000(~22 kbit/s)
17	20 000 000(~44 bits/s)
18	50 000 000(~111 bits/s)

<pdp_type>: present PDP type

pdp_type	description
“IP”	Internet Protocol
“PPP”	Point-to-Point Protocol

Example	**AT+CGQREQ=1,2,4,5,5,16<cr>** **OK**

11.2.3 AT+CGQMIN

AT+CGQMIN: set the minimal value of acceptable QOS parameters, when MT is sending the activation message of PDP context	
Test Command	**AT+CGQMIN=?**
Return	+CGQMIN: <pdp_type>,<reliability>s,<peak>s OK
Read Command	**AT+CGQMIN?**
Return	+CGQMIN:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF> [+CGQMIN:<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><CR><LF>[…]] OK
Write Command	**AT+CGQMIN=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>[,<mean>]]]]]]**
Return	OK / ERROR
Reference	MT initiates PDP context deactivation activity, if the value of negotiated QOS parameters in the accepted PDP context message is less than the least value of acceptable QOS parameters. The AT+CGQREQ,AT+CGQMIN command is the spread of AT+CGDCONT. <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID. <precedence>: present the priotity precedence Description 0 Subscribed(from network) value used 1 High priority 2 Normal priority 3 Low priority <delay>: present the classes of delay; delay description 0 Subscribed (from network) value used 1--4 Delay class <reliability>: present reliability classes; described in AT+CGQREQ. reliability description 0 Subscribed (from network) value used 1--6 reliability class <peak>: present the throughput classes in peak

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

<mean>: present 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	1 000(~2.2 bits/s)
5	2 000(~4.4 bits/s)
6	5 000(~11.1 bits/s)
7	10 000(~22 bits/s)
8	20 000(~44 bits/s)
9	50 000(~111 bits/s)
10	100 000(~0.22 kbit/s)
11	200 000(~0.44 kbit/s)
12	500 000(~1.11 kbit/s)
13	1 000 000(~2.2 kbit/s)
14	2 000 000(~4.4 kbit/s)
15	5 000 000(~11.1 kbit/s)
16	10 000 000(~22 kbit/s)
17	20 000 000(~44 bits/s)
18	50 000 000(~111 bits/s)

<pdp_type>: present PDP type

pdp_type	description
“IP”	Internet Protocol
“PPP”	Point-to-Point Protocol

Example	**AT+CGQMIN=1,2,4,5,5,16<cr>** **OK**

11.2.4 AT+CGPCO

AT+CGPCO: configure the PDP context parameters of PCO, when MT is sending the activation message of PDP context	
Test Command	**AT+CGPCO=?**
Return	+CGPCO: (0-1),,,(1-15) OK
Read Command	**AT+CGPCO?**
Return	+CGPCO: <type>,<user>,<password>,<cid><CR><LF> [+CGPCO: <type>,<user>,<password>,<cid><CR><LF>[…]] OK
Write Command	**AT+CGPCO=<type>,<user>,<password>,<cid>**
Return	OK / ERROR
Reference	<type> type description 0 User and password are code as ASCII character 1 User and password are code as PDU character <user>: The user name used by pco, which the max length is 64 bytes in ASCII character or max length is 128 bytes in PDU character. <password>: The user password used by pco, which the max length is 64 bytes in ASCII character or max length is 128 bytes in PDU character. <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID.
Example	**AT+CGPCO=0,"wap@cmnet.com","wap1",1** **OK** **AT+CGPCO?** **+CGPCO: 0,,,2** **+CGPCO: 0, "wap@cmnet.com","wap1",1** **OK**

11.2.5 AT+CGATT

AT+CGATT: Attach or detach GPRS services	
Test Command	**AT+CGATT=?**
Return	+CGATT: (list of supported <state>s) OK
Read Command	**AT+CGATT?**
Return	+CGATT: <state> OK
Write Command	**AT+CGATT=[<state>]**
Return	OK / ERROR
Reference	If MT has been in required status, the writting command is omitted and returns

	OK; If the required status can not be retrieved, returns ERROR. After MT deattaches GPRS services, any activated PDP CONTEXT deactives automatically. <state>: State description 0 Detach GPRS service 1 Attach GPRS service
Example	**AT+CGATT=1<cr>** **OK**

11.2.6 AT+CGACT

AT+CGACT: activate or deactivate specified PDP context	
Test Command	**AT+CGACT=?**
Return	+CGACT: (list of supported <state>s) OK
Read Command	**AT+CGACT?**
Return	+CGACT: <cid>,<state><CR><LF>[+CGACT: <cid>,<state><CR><LF>[…]] OK
Write Command	**AT+CGACT=[<state>[,<cid>[,<cid>[,…]]]]**
Return	OK / ERROR
Reference	If MT has been in required status, the writting command is omitted and returns OK; If the required status can not be retrieved, returns ERROR. While performing activate specified PDP context operation, MT performs GPRS ATTACH first, if GPRS ATTACH has not been performed yet. If GPRS ATTACH operation failes, return ERROR. <state>: state description 0 Deactivate PDP context 1 Activate PDP context <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID. In default case, AT+CGACT=1 and AT+CGACT=1,1 indicates activate PDP context , AT+CGACT=0 indicates deactivates all the activated PDP context.
Example	**AT+CGACT=1,1<cr>** **OK** **AT+CGACT=0,1<cr>** **OK**

11.2.7 AT+CGPADDR

AT+CGPADDR: return specified PDP CONTEXT address

Test Command	**AT+CGPADDR=?**
Return	+CGPADDR: (list of supported <cid>s) OK
Read Command	**None**
Return	
Write Command	AT+CGPADDR=[<cid>[,<cid>[,…]]]
Return	+CGPADDR: <cid>,<pdp_addr><CR><LF> [+CGPADDR: <cid>,<pdp_addr><CR><LF>[…]] OK
Reference	<cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID. If no specification, return all PDP context. <pdp_address>: character string; PDP context address
Example	**AT+CGPADDR=1<cr>** **+CGPADDR: 1,0.0.0.0** **OK** **AT+CGPADDR=?<cr>** **+CGPADDR: (1-15)** **OK**

11.2.8 AT+CGDATA

AT+CGDATA: make terminal device and network into connection status	
Test Command	**AT+CGDATA=?**
Return	+CGDATA: (list of supported <L2P>s) OK
Read Command	**None**
Return	
Write Command	**AT+CGDATA=[<L2P>,[<cid>[,<cid>[,...]]]]**
Return	CONNECT / ERROR
Reference	This process includes one GPRS attach process and one or more than one PDP CONTEXT activation process. If the value of cid has not been defined in MT, return ERROR, otherwise return CONNECT. <L2P>: specifies the Layer2 protocol between TE and MT. Currently, only PPP is supported。 <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID.
Example	**AT+CGDATA=”PPP”,1<cr>** **CONNECT**

11.2.9 AT+CGAUTO

AT+CGAUTO: whether or not MT automatically respond to the PDP context

activation request initiated by network terminal	
Test Command	**AT+CGAUTO=?**
Return	+CGAUTO: (list of supported <state>s) OK
Read Command	**AT+CGAUTO?**
Return	+CGAUTO: <state> OK
Write Command	**AT+CGAUTO=[<state>]**
Return	OK / ERROR
Reference	<state>: 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 'SO' command 3: Automatic acceptance of both GPRS network requests and incoming circuit switched calls is controlled by the 'SO' command
Example	**AT+CGAUTO=0<cr>** **OK**

11.2.10 AT+CGANS

AT+CGANS: configure MT to respond to the request of PDP context(which has already been notified TE by RING and CRING) from network terminal	
Test Command	**AT+CGANS=?**
Return	+CGANS: (list of supported <response>s),(list of supported <L2P>s) OK
Read Command	**None**
Return	
Write Command	**AT+CGANS=[<response>,[<L2P>,[<cid>]]]**
Return	OK / ERROR
Reference	<response>: data, presents how to respond, accept it or reject it response: description 0: Refuse the PDP context requests initiated by network terminals 1: Accept it and initiate PDP CONTEXT activation <cid>: (PDP Context Identifier)interger(range, 1--15), presents PDP context ID.
Example	**+CRING:GPRS"IP","104.156.74.8"**

	AT+CGANS=1<cr> **OK**

11.2.11 AT+CGCLASS

AT+CGCLASS: set the GPRS type of MT	
Test Command	**AT+CGCLASS=?**
Return	+CGCLASS: (list of supported <class>s) OK
Read Command	**AT+CGCLASS?**
Return	+CGCLASS: <class> OK
Write Command	**AT+CGCLASS=[<class>]**
Return	OK / ERROR
Reference	<class>: present GPRS type Class description 0 class B 1 class C in circuit switched only mode(lowest) If MT is in GPRS attach status, and set the GPRS type of MT to CC, MT will initiate GPRS detach process.
Example	**AT+CGCLASS="CC"<cr>** **OK** **AT+CGCLASS="A"<cr>** **ERROR**

11.2.12 AT+CGEREP

AT+CGEREP: set whether MT sends response initiatively	
Test Command	**AT+CGEREP=?**
Return	+CGEREP: <mode>,<bfr> OK
Read Command	**AT+CGEREP?**
Return	+CGEREP: <mode>,<bfr> OK
Write Command	**AT+CGEREP=[<mode>[,<bfr>]]**
Return	OK / ERROR

Reference	<mode>: mode description 0 Stores echoed characters in MT cache 1 If MT-TE link is not available, discard initiative echo characters, Otherwise send them to TE directly 2 If MT-TE link is not available, store echo character to cache and echo it when it's available. Otherwise send them directly to TE. <bfr>: bfr description 0 Clear echo characters in MT cache(effective to 1 and 2 mode) 1 Send the content in MT cache to TE(effective to 1 and 2 mode)
Example	**AT+CGEREP=0,1 <cr>** **OK** **AT+CGEREP=2,0 <cr>** **OK**

11.2.13 AT+CGREG

AT+CGREG: allow MT to echo network register status and location message	
Test Command	**AT+CGREG=?**
Return	+CGREG: (list of supported <n>s) OK
Read Command	**AT+CGREG?**
Return	+CGREG: <n>,<stat>[,<lac>,<ci>] or +CME ERROR:<err>
Write Command	**AT+CGREG=[<n>]**
Return	N=1 +CGREG: <stat> N=2 +CGREG: <stat>[,<lac>,<ci>]
Reference	<n>: n description 0 Disable the auto echo of network register status 1 Enable the auto echo of network register status. +CGREG:<stat> 2 Enable the auto echo of network register status and the location message . +CREG:<stat>[,<lac>,<ci>] <stat>: stat description 0 Not register and no attempt of ME 1 Registered local network 2 Not register and ME is attemptting to do 3 Registration rejected 4 Network registration unknown

	5 Registered and roam <lac>: two bytes, location coding, hex format, for example ”00C3” is equal to 195 <ci>: two bytes, Cell ID, hex format
Example	**AT+CGREG=1<cr>** **+CGREG: <stat>** **AT+CGREG=2<cr>** **+CGREG: <stat>[,<lac>,<ci>]**

11.2.14 AT+CGSMS

AT+CGSMS: select the service type of SMS sending	
Test Command	**AT+CGSMS=?**
Return	+CGSMS: (list of currently available <service>s) OK
Read Command	**None**
Return	
Write Command	**AT+CGSMS=[<service>]**
Return	OK / ERROR
Reference	<service>: parameters, present service type service description 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.
Example	

11.2.15 AT+CRC

AT+CRC: decide whether shows the supplementary information of incoming calls	
Test Command	**AT+CRC=?**
Return	+CRC: (list of supported <n>s) OK
Read Command	**AT+CRC?**
Return	+CRC: [<n>] OK
Write Command	**AT+CRC=[<n>]**
Return	OK / ERROR

Reference	After this function has been set, the indication of incoming calls is not RING, but +CRING: <type>(such as +CRING:voice) <n>: present the validity of this command n description 0 Invalid 1 valid Note: Currently, <type> only support voice
Example	**AT+CRC=1 <cr>** **OK**

11.2.16 AT+CR

AT+CR: decide whether to present that this CONNECT is GPRS, before send "CONNECT", which shows the connection is successful	
Test Command	**AT+CR=?**
Return	+CR: (list of supported <n>s) OK
Read Command	**AT+CR?**
Return	+CR: [<n>] OK
Write Command	**AT+CR=[<n>]**
Return	OK / ERROR
Reference	<n>: present whether to show the GPRS type of this connect n description 0 Invalid 1 Valid
Example	**AT+CR=1<cr>** **OK**

11.2.17 AT+CEER

AT+CEER: extend the error report	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+CEER**
Return	Error cause id. Please refer to the error message description in this document 1.5 +CEER: Error<XXX>
Reference	It reads last failed connection or the reason why the Attach of GPRS and

	Activate PDP context are failed.
Example	**AT+CEER** **+CEER: Error 3** **OK**

11.2.18 Extension of ATD

Extension of ATD: built the connections between terminal devices and networks, in order to send data	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**ATD *<GPRS_SC_IP>[***<cid>]#**
Return	CONNECT / ERROR
Reference	While performing this command, if MT has not perform GPRS attach and PDP CONTEXT ACTIVATION operation, these operations should be performed first; if not, build the connections between terminal device and network directly. <GPRS_SC_IP>: data string, GPRS service numbers are required(its value is 99) <cid>: (PDP Context Identifier),integer (range 1--15), presents PDP context ID. This value can be blank, with a default value of 1.
Example	**ATD*99#<cr> or ATD*99***1#<cr>]** **CONNECT**

11.2.19 AT+SSST

AT+SSST: set the MS service type	
Test Command	**AT+SSST=?**
Return	+SSST: <service_type> OK
Read Command	**AT+SSST?**
Return	+SSST: <service_type> OK
Write Command	**AT+SSST=[<service_type>]**
Return	OK / ERROR

Reference	<service_type>: service_type description 0 Services unavailable for customers 1 Customers can only choose GSM service 2 Customers can choose GSM and GPRS service at the same time Note: Command AT+SSST is SENDTRUE's specific.
Example	

11.2.20 AT+SATT

AT+SATT: attach or detach GPRS service	
Test Command	**AT+SATT=?**
Return	+SATT: <state>, <action_type> OK
Read Command	**AT+SATT?**
Return	+SATT: <state> OK
Write Command	**AT+SATT=[<state>[,<action_type>]]**
Return	OK / ERROR
Reference	<state>: state description 0 Detach 1 Attach <action_type>: When state=1: action_type description 0 GPRS attach; same as "AT+CGATT=1" 1 GPRS combine attach When state=0: action_type description 0 GPRS detach; same as "AT+CGATT=0" 1 GPRS IMSI detach 2 GPRS combine detach Note: Command AT+SATT is SENDTRUE's specific.
Example	**AT+SATT=1,0<cr>** **OK**

11.2.21 AT+SAUTOATT

AT+SAUTOATT: allow MT to perform auto attach operation	
Test Command	**AT+SAUTOATT=?**

Return	+SAUTOATT: <state> OK
Read Command	**AT+SAUTOATT?**
Return	+SAUTOATT: <state> OK
Write Command	**AT+SAUTOATT=[<state>]**
Return	OK / ERROR
Reference	<state>: state description 0 Set to auto attach 1 Set to manual attach(cancel auto attach) Note: Command AT+SAUTOATT is SENDTRUE's specific.
Example	**AT+SAUTOATT=1<cr>** **OK**

11.2.22 AT+SGPRSDATA

AT+SGPRSDATA: specify the data length of GPRS data sent by MT	
Test Command	**AT+SGPRSDATA=?**
Return	+SGPRSDATA: (0-10000) OK
Read Command	**AT+SGPRSDATA?**
Return	support +SGPRSDATA OK
Write Command	**AT+SGPRSDATA=[<data_len>]**
Return	OK / ERROR
Reference	<data_len>: integer,the length of sent data with the range 0-10000 Note: The data used in the command AT+SGPRSDATA is generated randomly.They are mainly used in test.This command is SENDTRUE's specific.
Example	**Send 2000 data:** **AT+SGPRSDATA=2000<cr>** **OK**

11.2.23 ATO

ATO: Switch from command mode to data mode	
Execution Command	**ATO**
Return	CONNECT/NO CARRIER
Reference	

Example

11.2.24 +++

+++: Switch from data mode or PPP online mode to command mode	
Execution Command	+++
Return	OK
Reference	This Command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to cancel the data flow over the AT interface and switch to Command mode. This allows you to enter AT Command while maintaining the data connection to the remote server or, accordingly, the GPRS connection. To prevent the +++ escape sequence from being misinterpreted as data, it should comply to following sequence: 1. No characters entered for T1 time (0.5 seconds) 2. "+++" characters entered with no characters in between 3. No characters entered for T1 timer (0.5 seconds) 4. Switch to Command mode, otherwise go to step 1. Note: To return from Command mode back to data or PPP online mode: Enter **ATO**
Example	

12.TCP/IP commands

TCP/IP commands are relate to network communication that set TCP/IP parameters, configure network relative parameters.

12.1 Overview of special commands

number	command	Description
1	AT+SDATACONF	Config the configure parameters of data sent by AT commands based on GPRS
2	AT+SDATASTART	Enable GPRS service
3	AT+SDATATSEND	Send the data specified by user in transparent mode.
4	AT+SDATATREAD	Read the received data and display in transparent mode.
5	AT+SDATASEND	Send the character string data specified by user
6	AT+SSTRSEND	Send the character strings specified by customer
7	AT+SDATAREAD	Read the received data from the buffer.
8	AT+SDATARXMD	Configure the display format and the mode when received data.
9	AT+SDATASTATUS	Require socket status
10	AT+TRT	Set network data resend times after failing to send data

12.2 Detailed description of TCP/IP commands

12.2.1 AT+SDATACONF

AT+SDATACONF: config the configure parameters of data sent by AT commands based on GPRS	
Test Command	**AT+SDATACONF=?**
Return	+SDATACONF: <connect_id>,<connect_type>,,<server_port>,<self_port> OK
Read Command	**AT+SDATACONF?**
Return	+SDATACONF:[<connect_id>,<connect_type>,<server_port>,<server_ip_addr><self_port>] [<connect_id>,<connect_type>,<server_port>,<server_ip_addr>,<self_port>] ……. [<connect_id>,<connect_type>,<server_port>,<server_ip_addr>,<self_port>]
Write Command	**AT+SDATACONF=[<connect_id>,<connect_type>,<server_ip_addr/server**

	_DSN>,<server_port>[,<self_port>]]
Return	OK / ERROR
Reference	After configuration, AT+SDATASTART command builds the lower data links between GPRS and networks. If the link is built successfully, user can send specified data by AT+SDATASEND and receive data by AT+SDATAREAD. <connect_id>: integer; range 1-10, used in connection built by local identification. <connect_type>: character string; Currently, ”UDP” and ”TCP” are supported. <server_ip_addr>: character string; presents server ip addresses <server_DSN>:character string; presents server DNS <server_port>: integer; presents server port id <self_port>: integer; present port id of itself Note: Command AT+SDATACONF is SENDTRUE’s specific.
Example	The command sequence below checks whether PDP context has been activated, then config the parameter of GPRS data service and send UDP data: **AT+CGACT=1,1<cr>** **OK** **AT+SDATACONF=1,”UDP”,”211.144.193.27”,7000<cr>** **OK** **AT+SDATASTART=1,1<cr>** **OK** **AT+SSTRSEND=1,” FROM SENDTRUE”<cr>** **OK** The command sequence below checks whether PDP context has been activated, then config the parameter of GPRS data service and send TCP data: **AT+CGACT=1,1<cr>** **OK** **AT+SDATACONF=1,”TCP”,”202.106.182.230”,110<cr>** **OK** **AT+SDATASTART=1,1<cr>** **OK** **AT+SDATAREAD=1<cr>** **<+OK 16614.1112663146@sina.com>** **OK**

12.2.2 AT+SDATASTART

AT+SDATASTART: enable GPRS service, after configures parameters. It refers to AT+SDATACONF command	
Test Command	**AT+SDATASTART=?**
Return	+SDATASTART: <connect_id>,<state> OK

Read Command	**AT+SDATASTART?**
Return	+SDATASTART: [<connect_id>,<state>] [<connect_id>,<state>] ……. [<connect_id>,<state>] OK
Write Command	**AT+SDATASTART=[<connect_id>,<state>]**
Return	OK / ERROR
Reference	<connect_id>: integer, range 1-10, used in connection built by local identification. <state>: State description 0 Deactivate UDP/TCP connection 1 Activate UDP/TCP connection Note: Command AT+SDATASTART is SENDTRUE's specific.
Example	**AT+SDATASTART=1,1<cr>** **OK**

12.2.3 AT+SDATATSEND

AT+SDATATSEND: send the data specified by user. Refer to AT+SDATACONF	
Test Command	**AT+SDATATSEND=?**
Return	+SDATATSEND: <connect_id>,<data_len> OK
Read Command	**None**
Return	
Write Command	**AT+SDATATSEND=[<connect_id>,<data_len><cr>** **> <data> <ctrl+z/ESC>]**
Return	OK / ERROR
Reference	<connect_id>: integer, range 1-10, used in connection built by local identification. <data_len>: integer, presents the length of sent data. The max length is 1460. At any time, the length should be equal to or less than the MAX length, or sending data will be failed. <data>: send the data.
Example	

12.2.4 AT+SDATATREAD

AT+SDATATREAD:

Test Command	**AT+SDATATREAD=?**
Return	+SDATATREAD: <connect_id> OK
Read Command	**None**
Return	
Write Command	**AT+SDATAREAD=[<connect_id>]**
Return	Display the received data according to the type . ASCII type: +SSTR:<connect_id>,< data in ASCII type >
Reference	<connect_id>: integer with a range of 1-10, used in connection built by local identification
Example	

12.2.5 AT+SDATASEND

AT+SDATASEND: send the character string data specified by user. Refer to AT+SDATACONF	
Test Command	**AT+SDATASEND=?**
Return	+SDATASEND: <connect_id>, OK
Read Command	**None**
Return	
Write Command	**AT+SDATASEND=[<connect_id>,<length><cr>** **> <data> <ctrl+z/ESC>]** **Or** **AT+SDATASEND=<connect_id>,<length>,<data><cr>**
Return	OK / ERROR
Reference	<connect_id>: integer, range 1-10, used in connection built by local identification. <length>: integer, presents the length of sent data. The max length is 1000. At any time, the length should be equal to or less than the MAX length, or sending data will be failed. <data>: send the data. Note: Command AT+SDATASEND is SENDTRUE's specific.
Example	**AT+SDATASEND=1,4<cr>** **>44454647 <ctrl+z>** **OK**

12.2.6 AT+SSTRSEND

AT+SSTRSEND: send the character strings specified by customer. It refers to command AT+SDATACONF

Test Command	**AT+SSTRSEND=?**
Return	+SSTRSEND: <connect_id>, OK
Read Command	**None**
Return	
Write Command	**AT+SSTRSEND=[<connect_id>,<data>]**
Return	OK / ERROR
Reference	<connect_id>: integer with a range of 1-10, used in connection built by local identification <data>: character string type, data needed to be sent by users, with a length of (1-1000) Note: Command AT+SSTSEND is SENDTRUE's specific.
Example	**AT+SSTRSEND=1,"Sendtrue"<cr>** **OK**

12.2.7 AT+SDATAREAD

AT+SDATAREAD: Read the received data from buffer and display the data in the format of the command AT+SDATARXMD setting.	
Test Command	**AT+SDATAREAD=?**
Return	+SDATAREAD: <connect_id> OK
Read Command	**None**
Return	
Write Command	**AT+SDATAREAD=[<connect_id>]**
Return	Display the received data according to the type . ASCII type: +SSTR:<connect_id>,< data in ASCII type > HEX type: +SDATA:<connect_id>,<data_length>,< data in HEX type> The context of the data in ASCII type or in HEX type will be empty if there has no data received.
Reference	<connect_id>: integer with a range of 1-10, used in connection built by local identification Note: Command AT+SDATAREAD is SENDTRUE's specific.
Example	

12.2.8 AT+SDATARXMD

AT+SDATARXMD: Configure the display format of the received data, set the mode of the module when received the data.	
Test Command	**AT+SDATARXMD=?**

Return	+SDATARXMD: <connect_id>,<state>,<mode> OK
Read Command	**AT+SDATARXMD?**
Return	All connect_id status, format as follows: +SDATARXMD:<connect_id>,<state>,<mode><cr> OK
Write Command	**AT+SDATARXMD=[<connect_id>,<state>,[<mode>]]**
Return	OK / ERROR
Reference	<connect_id>: integer with a range of 1-10, used in connection built by local identification <state>: State: 0 (default value) — The received data accord to HEX character string State: 1 — The received data accord to ASCII character string <mode>: Mode: 0 (default value) — UDP: module echoes the received data in unsolicited mode, user can also to use the command AT+SDATAREAD to read data again. TCP: module notifies the user with +STCPD:<connect_id> in unsolicited mode to indicate there are TCP data received in the connect_id. User should use command AT+SDATAREAD to read TCP data. In addition, module will send unsolicited message +STCPC:<connect_id> to indicate that the peer entity closed the TCP connect(socket disconnect unconventionally will not send unsolicited notification) Mode: 1 — UDP: module do not echo UDP data when received data. TCP: module do not send the notification to user when received TCP data or connection closed by the peer entity. Note: Command AT+SDATARXMD is SENDTRUE's specific.
Example	

12.2.9 AT+SDATASTATUS

AT+SDATASTATUS: Query sockets status and every socket communication information.	
Test Command	**AT+** SDATASTATUS **=?**
Return	+SDATASTATUS: (0-10) OK
Execution	**AT+SDATASTATUS**

Command	
Return	+SOCKETSTATUS: <id>,<flag>,<status>,<send_data_counter>,<acked_data_counter>,<recv_data_counter><CRF>,<LF> [+SOCKETSTATUS: <id>,<flag>,<status>,<send_data_counter>,<acked_data_counter>,<recv_data_counter><CRF>,<LF>[…..]] OK
Write Command	**AT+SDATASTATUS=<id>**
Return	+SOCKETSTATUS: <id>,<flag>,<status>,<send_data_counter>,<acked_data_counter>,<recv_data_counter><CRF>,<LF> OK / ERROR
Reference	<id>:integer; the id of the socket with the range 0-10 <id> description 0 Clear all the data counters. 1-10 The id of the socket. <flag>:integer;this is online flag <flag> description 0 The socket is out of line. 1 The socket is online. <status>:integer;current status of the socket <send_data_counter>:integer;send data counter for the socket <acked_data_counter>:integer; acked data counter for the socket <recv_data_counter>:integer;recevice data counter for the socket
Example	

12.2.10 AT+TRT

AT+ TRT: Set network data resend times after failing to send data	
write Command	**AT+**TRT=<data_resend_times>
Return	OK / ERROR
Reference	<data_resend_times>:data resend times with the range 1-12
Example	

13. AUDIO commands

AUDIO commands are relate to the control and the parameters of the audio partment.

13.1 Overview of AUDIO commands

number	command	description
1	AT+SSAM	Configure the sound mode
2	AT+SPEAKER	Config MIC and SPEAKER channels
3	AT+SDMUT	Mute the downlink voice
4	AT+CMUT	Mute control
5	AT+CRMP	Test ring of incoming calls
6	AT+STONE	Play sound in a certain frequency
7	AT+VGR	Tune the sound level of the speaker
8	AT+SDTMF	Play a DTMF tone on the current speaker
9	AT+SCDM	Select the specific ring melody
10	AT+ECHO	Configure the ECHO CANCELLATION function for voice calls
11	AT+SSAP	Config the parameter of audio gain
12	AT+STMF	Store and delete the file in MIDI format
13	AT+SEQT	Set the speaker equalizer type
14	AT+SSEA	Configure the sound parameters in project mode

13.2 Detailed description of AUDIO commands

13.2.1 AT+SSAM

AT+SSAM: configure the sound mode		
Test Command	**AT+SSAM=?**	
Return	+SSAM: (0-2)	
	OK	
Read Command	**AT+SSAM?**	
Return	+SSAM: <current value>	
	OK	
Write Command	**AT+SSAM=<mode>**	
Return	OK	
Reference	<mode>:	
	mode	description
	0	Hand hold mode
	1	Earphone mode

Example

13.2.2 AT+SPEAKER

AT+SPEAKER: config MIC and SPEAKER channels	
Test Command	**AT+SPEAKER=?**
Return	+SPEAKER: (0-1),(0-1) OK
Read Command	**AT+SPEAKER?**
Return	+SPEAKER: <mic_mode>,<spk_mode> OK
Write Command	**AT+SPEAKER=<mic_mode>,<spk_mode>**
Return	OK / ERROR
Reference	After setting audio mode through AT+SSAM command, user should set MIC and SPEAKER channel again if necessary. <mic_mode>: mic_mode description 0 MIC mode 1 MIC aux mode <spk_mode> mode description 0 SPEAKER mode 1 SPEAKER aux mode Default setting: MIC and SPEAKER channels are set to master channel
Example	

13.2.3 AT+SDMUT

AT+SDMUT: mute the downlink voice	
Test Command	**AT+SDMUT=?**
Return	+SDMUT: <supported value> OK
Read Command	**AT+SDMUT?**
Return	+SDMUT: <mode> OK
Write Command	**AT+SDMUT=<mode>**
Return	OK / ERROR
Reference	<mode>: 0: downlink voice mute off 1: downlink voice mute on

Example

13.2.4 AT+CMUT

AT+CMUT: mute the microphone	
Test Command	**AT+CMUT=?**
Return	+CMUT: <supported value> OK
Read Command	**AT+CMUT?**
Return	+CMUT: <mode> OK
Write Command	**AT+CMUT=<mode>**
Return	OK / ERROR
Reference	mode description 0 Microphone mute off 1 Microphone mute on Note: currently, write command is not be supported.
Example	

13.2.5 AT+CRMP

AT+CRMP: test ring of incoming calls			
Test Command	**AT+CRMP=?**		
Return	+CRMP: (0-3),(0-65535),(0-47) OK		
Read Command	**None**		
Return			
Write Command	**AT+CRMP=<call type>[,<num>,<index>]**		
Return	OK		
Reference	Call type description 0 Receive data 1 Receive fax 2 Receive short messages num description 0 Keep on playing until user stops it(default value) 1-65536 Play <num> time/times index (<call type）=0,1,2) (<call type>=4) 0 Stop playing ring music 0 Stop playing short message melody		

		1-15	The manufacture defined melody in module	1-4	Types of short message melody
		16-47	Downloaded melodies by users	>4	The index of short message is equal to 1
Example	**Play ring melody:** **AT+CRMP=0, 1, 5** **+CRMP: 5** **OK** **Play short message melody:** **AT+CRMP=3, 1, 4** **+CRMP: 4** **OK**				

13.2.6 AT+STONE

AT+STONE: play sound in a certain frequency. Frequency and volume and duration can all be set	
Test Command	**AT+STONE=?**
Return	+STONE: (0,1),(0-3400),(0-50) OK
Read Command	**AT+STONE?**
Return	OK / ERROR
Write Command	**AT+STONE=<mode>,[<freq>,<duration>]**
Return	OK / ERROR
Reference	mode description 0 Stop playing 1 Begin playing Freq: speaker(1-3400Hz) Buzzer (1-3400Hz) Duration: (0-50), unit 100ms.0 is default value, time is infinite. Playing can be stopped by AT+STONE=0.
Example	

13.2.7 AT+VGR

AT+VGR: tune the sound level of the speaker	
Test Command	**AT+VGR=?**
Return	+VGR: (1-9) OK

Read Command	**AT+VGR?**
Return	+VGR: <current value> OK
Write Command	**AT+VGR=<value>**
Return	OK
Reference	<value>: the value of speaker, value range 1-9
Example	

13.2.8 AT+SDTMF

AT+SDTMF: play DTMF tone on the current speaker	
Test Command	**AT+SDTMF=?**
Return	+SDTMF: (0-1),(0-9,*,#,A,B,C,D),(0-50) OK
Read Command	**None**
Return	
Write Command	**AT+SDTMF=<mode>[,<dtmf>,<duration>]**
Return	OK / +CME ERROR:<err>
Reference	mode description 0 Stop sending keyboard tone 1 Send keyboard tone <dtmf>: {-9,*,#,A,B,C,D}Character Set <duration> : (0-50) unit 100ms.0 is default value, time is infinite. Playing can be stopped by AT+STONE=0.
Example	

13.2.9 AT+SCDM

AT+SCDM: select the specific ring melody	
Test Command	**AT+SCDM=?**
Return	+SCDM: (0-47) OK
Read Command	**AT+SCDM?**
Return	+SCDM: <melody> OK
Write Command	**AT+SCDM=<melody>**
Return	OK
Reference	melody description 0 No ring melody, the default value; 1…15 The manufacturer defined melody in module

	16…47 Downloaded melodies by users(if do not have downloaded melodies, it will be wrong when you set.)
Example	

13.2.10 AT+ECHO

AT+ECHO: configure the ECHO CANCELLATION function for voice calls	
Test Command	**None**
Return	
Read Command	**AT+ECHO?**
Return	+ECHO: <status>, <Algold>, <param1>, <param2>, <param3>, <param4>, <param5>, <param6> OK
Write Command	AT+ECHO= <mode>, <Algold>, <param1>, <param2>, <param3>, <param4>, <param5>, <param6>
Return	OK / ERROR
Reference	mode description 0 Deactivate ECHO 1 Activate ECHO Algold description 0 1 Echo Cancellation 1 3 Echo Cancellation Echo Cancellation 1 : (4 parameters) 1 <Volout> 0: 31db(default) 1：29db 2: 27db … 15: 1db 2 <step> 0: 1db 1: 2db 2: 3db 3: 4db(default) 3 <PcmThRel>: [0…31] (10 by default) 4 <PcmThMax>: [0…31] (7 by default) Echo Cancellation 3: (3 parameters) 1 <AlgoParam>: [0…63] (30 by default) 2 <NoiseThres>: [0…32767] (8000 by default) 3 <NmbTaps>: [64…256] (256 by default) Status description 0 Echo Deactivated 1 Echo Activated for Mic/Spk one 2 Echo Activated for Mic/Spk two 3 Reset the product Note: currently, this command is not be supported.
Example	

13.2.11 AT+SSAP

AT+SSAP: config the parameter of audio gain	
Test Command	**AT+SSAP=?**
Return	+SSAP: (0-2),(0-1),(0-11),(0-32767) OK
Read Command	**AT+SSAP?**
Return	+SSAP: <mode>,<UL_PGA_gain>,< UL_digital_gain >,< DL_PGA_gain >,< DL_digital_gain ><CR><LF> [+SSAP: <mode>,<UL_PGA_gain>,< UL_digital_gain >,< DL_PGA_gain >,< DL_digital_gain ><CR><LF>] [[+SSAP: <mode>,<UL_PGA_gain>,< UL_digital_gain >,< DL_PGA_gain >,< DL_digital_gain ><CR><LF>]] OK
Write Command	**AT+SSAP=<mode>,<type>,<PGA_gain>,<digital_gain>**
Return	OK
Reference	The settings will not be saved in MS after system reboot. <mode>: mode description 0 Set HANDHOLD gain parameter 1 Set HANDFREE gain parameter 2 Set EARPHONE gain parameter <type> type description 0 Set downlink gain parameter 1 Set uplink mode gain parameter <PGA_gain>: the range of PGA_gain is between 0 and 11, which is setting the stimulant gain <digital_gain>: the range of digital_gain is between 0 and 32767, which is setting the digital gain
Example	**AT+SSAP?** **+SSAP: 0,7,12288,0,4096** **+SSAP: 1,6,32767,2,4096** **+SSAP: 2,6,4595,2,5785** **OK**

13.2.12 AT+STMF

AT+STMF: store and delete the file in MIDI format	
Test Command	**AT+STMF=?**
Return	+STMF: (16-47),(1-1024),(1-500) OK

Read Command	**AT+STMF?**
Return	+STMF: <remain_size>,<total_size> OK
Write Command	**AT+STMF=<index>,<block_num>,<block_length> >midi_data (ctrl+z)**
Return	**OK**
Reference	Users input file information via termianal, input Ctrl+Z store or input Esc to give up storing all input data. They can use this command continuously to store more than one block_num(successfully) blocks in the same index. index: 16-47(1-15 are module configured MIDI) block_num: 0-255 block num of input files(0: delete respective midi) block_length: the length of 1-500 files remain_size: 0-192k(space left to store midi) total_size: 192k, maximum space of file to store midi
Example	**Write the first data block** **AT+STMF=16,1,20** **>45D678F3E8F9D34249A9(ctrl+z)** **OK** **Write the second data block** **AT+STMF=16,2,20** **>87D675F3E8F9C34249A9(ctrl+z)** **OK** **Get the size of file 16** **AT+STMF=16** **+STMF:40** **OK** **Delete MIDI file 16** **AT+STMF=16,0** **OK**

13.2.13 AT+SEQT

AT+SEQT: set the speaker equalizer type	
Test Command	**AT+SEQT=?**
Return	+SEQT: (0-3) OK
Read Command	**AT+SEQT?**
Return	+SEQT: <type> OK

Write Command	**AT+SEQT=<type>**
Return	OK / ERROR
Reference	<type>: Type description 0 Normal type 1 BASS type 2 ALT type 3 Special effect Default setting: Speaker is set to normal type in default. Note: SM5100B-D module does not support this function
Example	

13.2.14 AT+SSEA

AT+SSEA: configure the sound parameters in project mode	
Test Command	**AT+SSEA=?**
Return	+SSEA: (0-11) OK
Read Command	**None**
Return	
Write Command	**AT+SSEA=<mode><CR>** **> DATA (ctrl+z/ESC)**
Return	OK / ERROR
Reference	The sound parameters are gain via AT command by inputting DATA confirmed by crtl+z (given by pressing ESC), after command AT+SSEA=<mode><CR> (setting parameters) is performed. <mode>: configured parameters Type description 0 Set sidetone digital gain parameter 1 Set hand hold gain 1 parameter 2 Set free hand digital gain 1 parameter 3 Set hand hold analog gain parameter 4 Set free hand analog gain parameter 5 Set main MIC equalizer parameter 6 Set supplementary MIC equalizer parameter 7 Set main SPEAKER equalizer parameter 8 Set supplementary SPEAKER equalizer parameter 10 Set hand hold digital gain 2 parameter 11 Set free hand digital gain 2 parameter DATA are parameter values of upload an downloaded transfer. It is in AUTO_TEST_DATA_T ASCII mode and in the same row with

AUDIO_TEST_DATA. If UL_equalizer_coeff[0]=0x54F2 is going to be set, DATA must begin with "54F2…" with a total length of 352(reserved must be also be filled.

```
Typedef_struct
 {
        int16 UL_equalizer_coeff[33];
        int16 DL_equalizer_coeff[33];

        int16 UL_PGA_gain;
        int16 DL_PGA_gain;

        int16 UL_digital_gain;
        int16 DL_digital_gain;
        int16 UL_digital_scale;
        int16 DL_digital_scale;

        int16 midi_PGA_gain_base;
        int16 Digital_sidetone_gain;

        int16 DL_IIR1_coeff[6];
        int16 DL_IIR2_coeff[6];

        int16 reserved[2];
}AUDIO_TEST_DATA_T;
```

Example

14. Special commands

Special commands are related to set and query serial link handler, MIC, SPEAKER, GPIO, NV and so on.

14.1 Overview of special commands

number	command	description
1	AT+SMUX	Configure the multiplexing mode
2	AT+S32K	Allow or forbid entering of sleep mode
3	AT+SIND	Set some status of a system
4	AT+SBAND	Select the frequency of module
5	AT+SMGF	Manage files
6	AT+SMGD	Manage directory
7	AT+SSMP	Require ME be sent in maximum power
8	AT+SSGF	Configure GPIO direction
9	AT+SSGS	Set and query GPIO level
10	AT+SNVM	Manage the NVITEM data through NVITEM id

14.2 Detailed description of GPRS commands

14.2.1 AT+SMUX

AT+SMUX: configure the multiplexing mode, but the default mode will be used, after the product reboot	
Test Command	**AT+SMUX=?**
Return	+SMUX: <mode> OK
Read Command	**AT+SMUX?**
Return	+SMUX: <mode> OK
Write Command	**AT+SMUX=<mode>**
Return	OK / ERROR
Reference	The multiplexing mode refers to the applendix 16.1 <mode>: mode: description 0: Multiplexing mode disabled. AT commands should not be used, while the module is transferring data 1: Multiplexing mode enabled. AT commands could be used, while the module is transferring data

Example

14.2.2 AT+S32K

AT+S32K: allow or forbid entering of sleep mode	
Test Command	**AT+S32K=?**
Return	+S32K: (0-1) OK
Read Command	**AT+S32K?**
Return	+S32K: <mode> OK
Write Command	**AT+S32K=<mode>**
Return	OK / ERROR
Reference	<mode>: mode description 0 Forbid to enter into sleep mode 1 Allow to enter into sleep mode Note: <mode> can not be saved to NV. The default value is 0 at each time system reboots
Example	

14.2.3 AT+SIND

AT+SIND: set some status of a system which sends indication automatically	
Test Command	**AT+SIND=?**
Return	+SIND: (0-1023) OK
Read Command	**AT+SIND?**
Return	+SIND: <IndLevel> OK
Write Command	**AT+SIND=<IndLevel>**
Return	OK / ERROR
Reference	The status as follows: -------Indication status of the SIM card -------Indication status of the call -------Indication status of the AT command <IndLevel>: Indlevel description 1(bit-0) SIM card Insert/Remove indications 2(bit-1) Calling party alert indication 4(bit-2) Indication that product is ready(except for phonebooks, AOC, SMS), but still in emergency mode

8(bit-3)	Indication that the product is ready to process all AT commands
16(bit-4)	Indication that a new call identifier has been created
32(bit-5)	Indication that a call has been released
64(bit-6)	Network service available indication
128(bit-7)	Network lost indication
256(bit-8)	Audio on indication
512(bit-9)	SIM phonebook status indication

If <IndLevel>=0(default value), no indication +SIND:<IndNb>will be sent. Above value is available. The value range is 0<=IndLevel<=1023. Value set by AT+SIND command will be stored in FLASH automatically. Indication format: +SIND: <event>[,<idx>]

<idx>: call id

If the indication is about SIM card phonebook:

+SIND: <event>,<phonebook>,<status>,.,<phonebook>,<status>

<phonebook>: SIM phonebook () (.SM., .FD., .LC., .MC.)

<status>:

status	description
0	Not load from SIM
1	loaded from SIM

<event>:

Event	description
0	SIM card removed
1	SIM card inserted
2	Ring melody
3	AT module is partially ready
4	AT module is totally ready
5	ID of released calls
6	Released call whose ID=<idx>
7	The network service is available for an emergency call
8	The network is lost
9	Audio ON
10	Show the status of each phonebook after init phrase
11	Registered to network

Example

14.2.4 AT+SBAND

AT+SBAND: select the frequency of module(such as GSM900)	
Test Command	**AT+SBAND=?**
Return	+SBAND: (0-10) OK

Read Command	**AT+SBAND?**
Return	+SBAND: <current value> OK
Write Command	**AT+SBAND=<value>**
Return	OK
Reference	value:0-10

value	description
0	GSM900
1	DCS1800
2	PCS1900
3	GSM850
4	GSM900&DCS1800
5	GSM850&GSM900
6	GSM850&DCS1800
7	GSM850&PCS1900
8	GSM900&PCS1900
9	GSM850&GSM900&DCS1800
10	GSM850&GSM900&PCS1900

Example

14.2.5 AT+SMGF

AT+SMGF: manage files. Users can use this command more than once to store more than (continuous) data blocks of block_num in the same <file_name>	
Test Command	**AT+SMGF=?**
Return	+SMGF: (0-5),,(0-65535),(1-1024),(0-65535), OK
Read Command	**AT+SMGF?**
Return	+SMGF: (free space),(used space) OK
Write Command	**AT+SMGF=<mode>,[“<filename>”,<block_num>,<block_length>,<block_total>,”<new file name>”]**
Return	OK / ERROR
Reference	<mode>:

mode	description
0	Read a file
1	Read the size of a file
2	Delete a file
3	Add a file
4	Replace a file
5	Rename a file

<block_num>: 1-65535 of transferred files, the first block must be block_num=1.

	<block_length>: the length of the downloaded data block(its max value is 1024), which must be consistent with the length of transferred data. <block_total>: total number of downloaded data block with a range of 1-65535。 <file_name>: the name in HEX style(includes direct path) <new file name>: modified file name in HEX style(includes direct path)
Example	**read file "FILE/PIC/PHOTO.GIF":** **AT+SMGF=0,"46494C452F5049432F47462E474946",0** **+SMGF: <total_num>,<block_ID>,<block_size>,data** **OK** **read the size of file "FILE/PIC/PHOTO.GIF":** **AT+SMGF=1,"46494C452C5049432F47462E474946"** **+SMGF: <file size>** **OK** **Delete file "FILE/PIC/ PHOTO.GIF":** **AT+SMGF=2,"46494C452C5049432F47462E474946"** **OK** **Add a new file "FILE/PIC/ PHOTO.GIF":** **AT+SMGF=3,"46494C452C5049432F47462E474946",1,10,10** **>A5b7d7089<ctrl+z>** **OK** **AT+SMGF=3, "46494C452C5049432F47462E474946",2,10,10** **>A5b7d7089<ctrl+z>** **OK** **Replace file "FILE/PIC/ PHOTO.GIF"(if it is the first time, <block_ID> must be 1):** **AT+SMGF=4, "46494C452C5049432F47462E474946",1,10,10** **>A5b7d7089<ctrl+z>** **OK** **Rename file "FILE/PIC/OLD.GIF" to "FILE/PIC/NEW.GIF":** **AT+SMGF=5, "46494C452F5049432F4F4C442E474946",0,1,0,"46494C452F5049432F4E5572E474946"** **OK**

14.2.6 AT+SMGD

AT+SMGD: manage directory	
Test Command	**AT+SMGD=?**

Return	+SMGD: (0-3),, OK
Read Command	**None**
Return	
Write Command	**AT+SMGD=<mode>,"<dir name>",["<new dir name>"]**
Return	OK / ERROR
Reference	<mode>: Mode description 0 Query a directory 1 Add a directory 2 Delete a directory 3 Rename a directory <dir_name>: directory name in HEX style(includes direct path)
Example	**Query directory "FILE/PIC":** **AT+SMGD=0,"46494C452F504943"** **+SMGD:128,22129664,FILE/PIC** **OK** **Add directory "FILE/PIC":** **AT+SMGD=1,"46494C452F504943"** **OK** **Delete directory "FILE/PIC":** **AT+SMGD=2,"46494C452F504943"** **OK** **Rename directory "FILE/PIC" to "FILE/MIDI":** **AT+SMGD=3,"46494C452F504943","46494C452F4D494449"** **OK**

14.2.7 AT+SSMP

AT+SSMP: require ME be sent in maximum power	
Test Command	**None**
Return	
Read Command	**None**
Return	
Write Command	**AT+SSMP**
Return	OK / ERROR
Reference	
Example	

14.2.8 AT+SSGF

AT+SSGF: configure GPIO direction	
Test Command	**AT+SSGF=?**
Return	+SSGF: (0-255),(0-1),(0-1) OK
Read Command	**None**
Return	
Write Command	**AT+SSGF=<gpio_id>,<type>,<value>**
Return	[+SSGF: <value>] OK or ERROR
Reference	<gpio_id>: the max range of gpio_id is between 0 and 255. The available id number is determined by the chip type. <type>: Type description 0 Set GPIO direction 1 Get GPIO direction <value>: this parameter is invalid when the type set to 1 Type description 0 Set the GPIO to input direction when type=0 1 Set the GPIO to output direction when type=1 Note: this command will change GPIO function, and inappropriate setting will cause system exception.
Example	**Set GPIO 6 to output direction:** **AT+SSGF=6,0,1** **OK** **Get GPIO 6 direction setting:** **AT+SSGF=6,1** **+SSGF:1** **OK**

14.2.9 AT+SSGS

AT+SSGS: set and query GPIO level. The operation will fail when the appointed gpio direction does not set to output direction	
Test Command	**AT+SSGS=?**
Return	+SSGF: (0-255),(0-1),(0-1) OK
Read Command	**None**

Return	
Write Command	**AT+SSGS=<gpio_id>,<type>,<value>**
Return	+SSGS: [<value>] OK or ERROR
Reference	<gpio_id>: the max range of gpio_id is between 0 and 255. The available id number is determined by the chip type. <type>: Type description 0 Set GPIO level 1 Get GPIO level <value>: this parameter is invalid when the type set to 1 Type description 0 Set the GPIO level to low(0) when type=0 1 Set the GPIO level to hign(1) when type=1
Example	**AT+SSGS=7,0,1** **Ok** **AT+SSGS=7,0,0** **OK** **AT+SSGS=7,1** **+SSGS: 0** **OK**

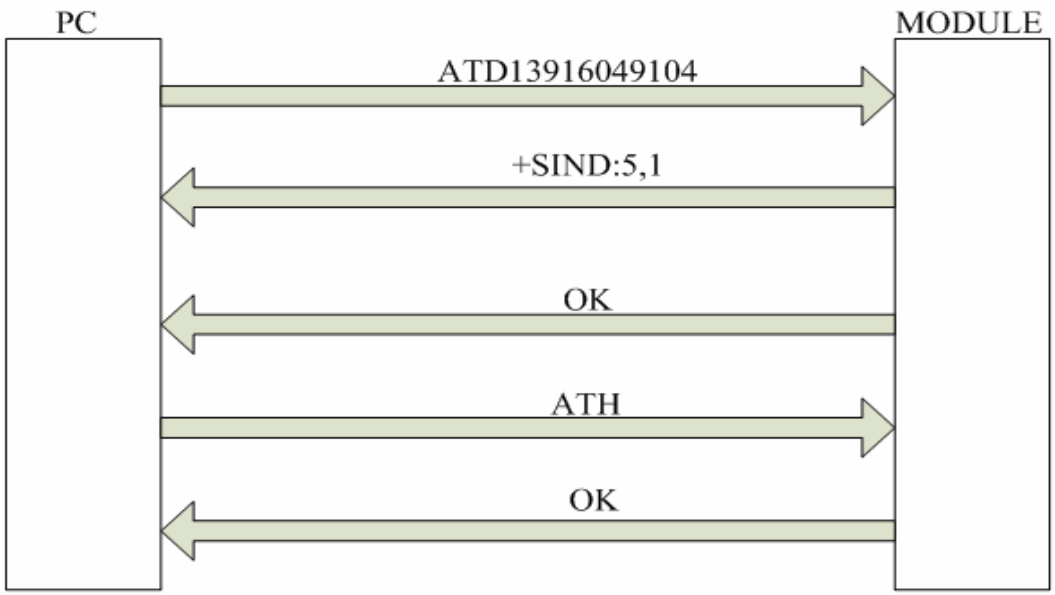
14.2.10 AT+SNVM

AT+SNVM: manage the NVITEM data through NVITEM id	
Test Command	**AT+SNVM=?**
Return	+SNVM: (0-4),(0-1199),(0-1199)
Read Command	**None**
Return	
Write Command	**AT+SNVM=<type>,<nvitem_id>[,<nvitem_id_end>]**
Return	OK / ERROR
Reference	This function is only supported by the module production, and the total nvitem data size is determined according to the type of module. <type>: <type>=0 means to read the appointed NEITEM id's data and the data will be output as HEX format. The output of this command as the following: +SNVM: <length>,<HEX_DATA>

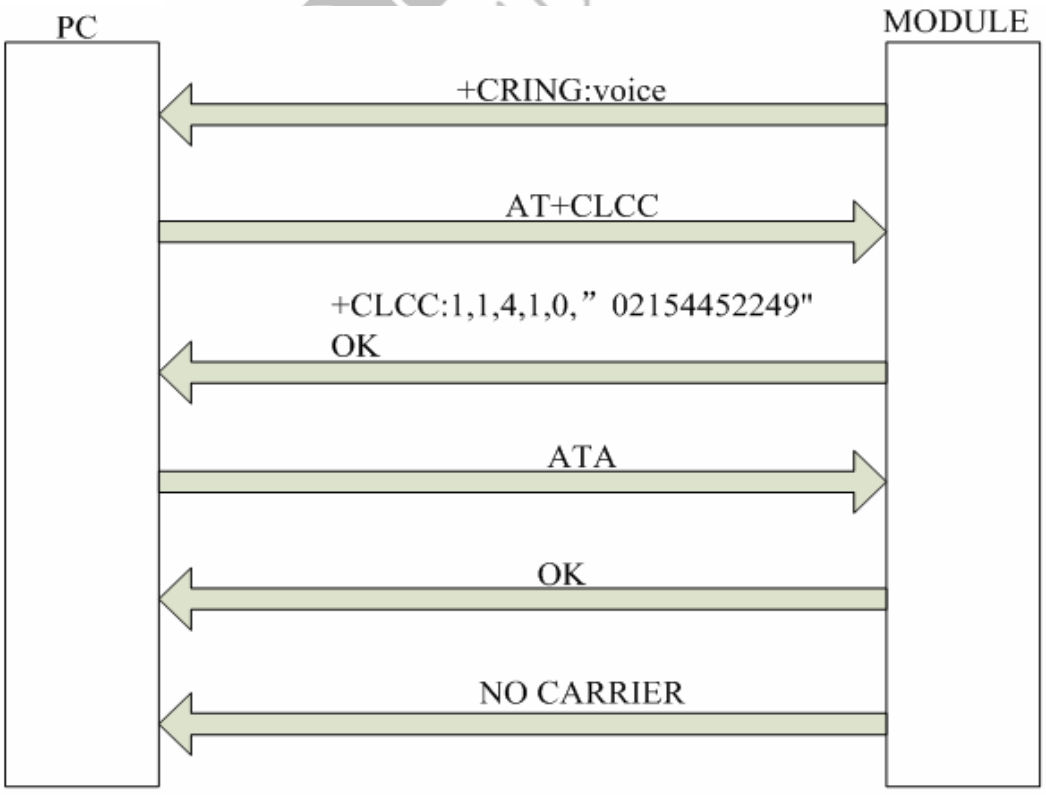
	OK Which the <length> indicates the NVITEM data size in binary. <type>=1 means to write NVITEM id's data into module and the original data will be erased if existing without any prompt. This command will output ">" as a hint for input data. Using <ctrl+z> as the terminater character of input or <ESC> to cancel the input data. The data length of a NVITEM id will not exceed 512 bytes in binary. <type>=2 means to replace the appointed NVITEM id's data. This command will write data into module if the destination NVITEM id is unoccupied and will erase the data if appointed NVITEM id's data exists already. This command will output ">" as a hint for input data. Using <ctrl+z> as the terminater character of input or <ESC> to cancel the input data. The data length of a NVITEM id will not exceed 512 bytes in binary. <type>=3 means to query the appointed NVITEM id's data size and the output format as the following: +SNVM: <length> OK <type>=4 means to delete the appointed NVITEM id range data. The NVITEM id range from <nvitem_id> to <nvitem_id_end>, and if <nvitem_id_end> is absence, then only the <nvitem_id> will be erased. <nvitem_id>: indicates the current operate NVITEM id。The <NVITEM_ID> range is from 0 to 1199. <nvitem_id_end>: This parameter is valid only when parameter <type>=4, and will be discard in others case. When <type>=4, this command will delete NVITEM data from <nvitem_id> to <nvitem_id_end>. If <nvitem_id_end> is absence, then only <nvitem_id> will be deleted. The parameter <nvitem_id_end> should equal or lager than <nvitem_id> if avaliable。
Example	**AT+SNVM=1,6** **>30313233343536<ctrl+z>** **OK**

15. MSC illustration

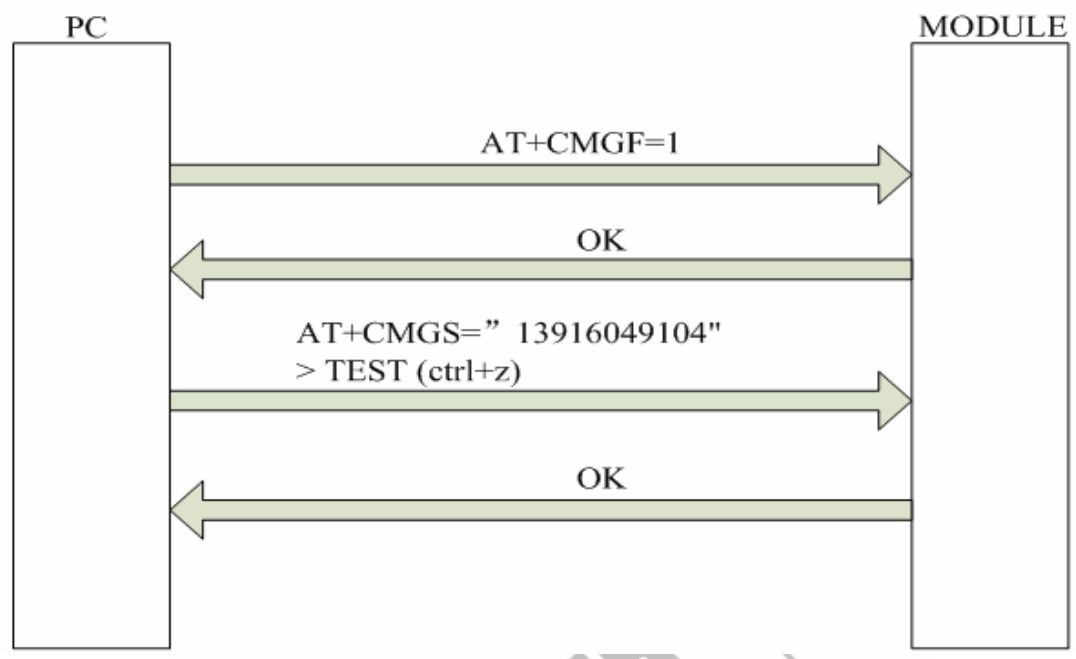
15.1 MO call



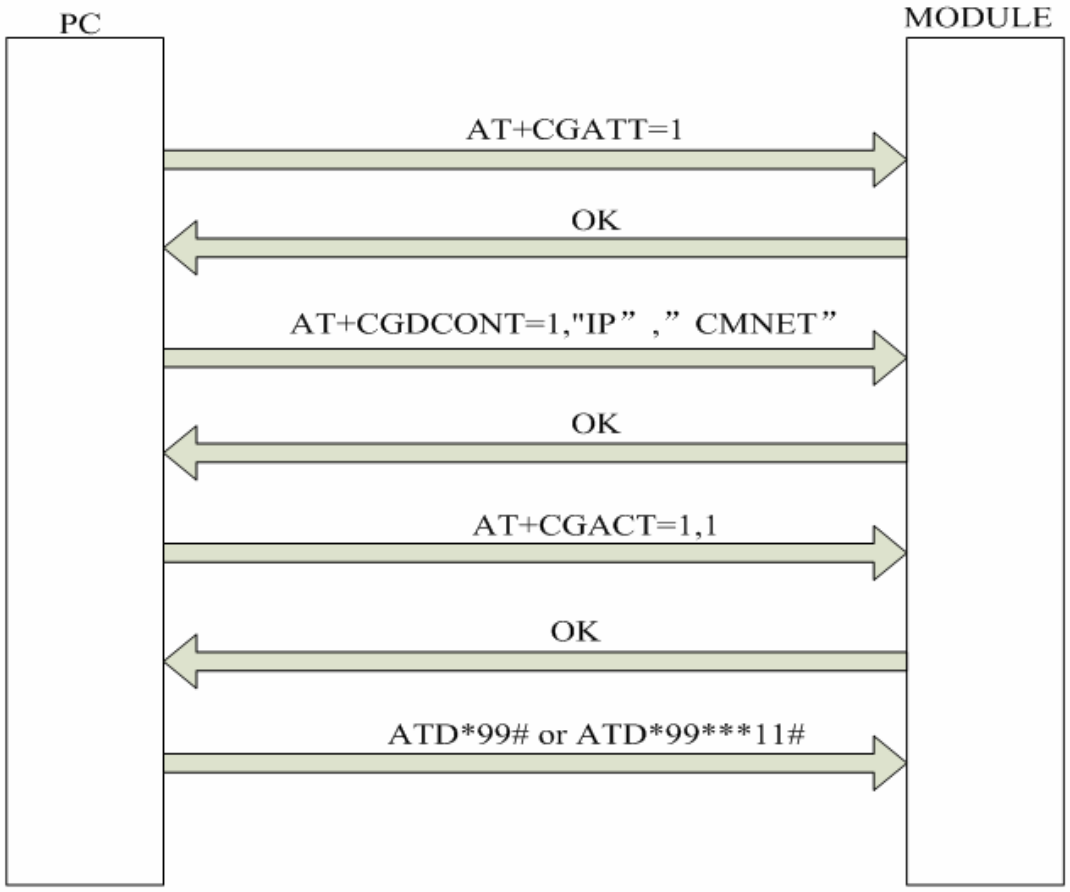
15.2 MT call



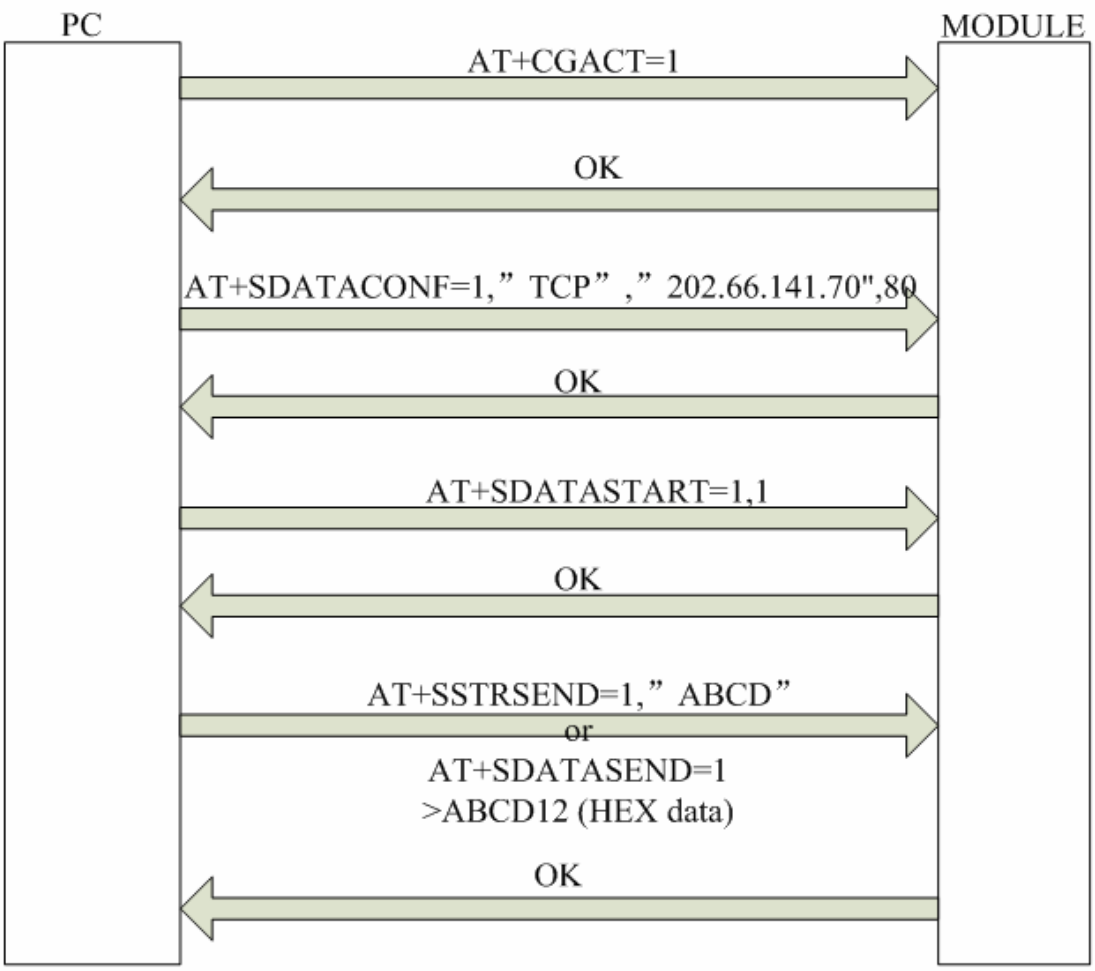
15.3 SMS



15.4 GPRS connect



15.5 Send GPRS data manually



16. Appendix

16.1 Multiplexing protocol

16.1.1 Introduction

The Sendtrue multiplexing protocol operates between a DCE(Data Communication Equipment:the product) and a DTE(Data Terminal Equipment). It allows a double session over a serial interface: one for AT commands and one for DATA communications.
When AT+SMUX=1, activate the multiplexing mode. AT commands DATA communications are encapsulated into packets confirming to the protocol. The header of these packets allows to recognize whether it is a DATA packet or an AT command packet. AT+SMUX=0 deactivates multiplexing protocol. This appendix presents how the multiplexing mode deals with AT commands and data flow. It also describes the format of DATA and AT command packets.

16.1.2 AT commands packets

An AT command is encapsulated into a packet with a header which allows to separate it from DATA packets. This command is formed by a header(3 BYTE), the AT command itself ans a CHECKSUM(1 BYTE):

B7 B6 B5 B4 B3 B2 B1 B0
Start pattern,0Xaa
AT command length LSB
AT command pattern,0x1D | AT command length MSB
AT command
Checksum

The first byte(0xAA) is used to identify the packet.
The second byte represents the 8 LSB(Low Significant Bits) bits of the length of the AT commands.
The third byte consists of two parts: the 3 LSB bits are the 3 MSB(Most Significant Bit) bits of the length of AT command; the 5 MSB(0xE8)are used to indetify an AT command(the maximum possible length of AT command is 2047 bytes. Currently, the system supports the maximum length of AT command is 1100 bytes).
CHECKSUM is the addition of all the bytes.

16.1.3 Data packets

Header and data together can identify AT commands. The packet is composed of header (3 BYTE), data and CHECKSUM (1 BYTE):

B7 B6 B5 B4 B3 B2 B1 B0
Start pattern,0XDD
Data packet length LSB
Data packet type length LSB | Data packet
Data Bytes
Checksum

The first byte(0xDD) is used to identify the packet.
The second byte represents the 8 LSB(Low Significant Bits) bits of the length of the data field.
The third byte consists of two parts: the 3 LSB bits are the 3 MSB bits of the length of data field; the 5 MSB represents the packet type(the maximum possible length of data package is 2047 bytes. Currently, the system supports the maximum length of data package is 1600 bytes).
The value of data is according to the type of packet:

0--data packet: contains the data to be transmit

1--status packet: includes SA,SB,X bits(1)and breaks condition codes as follows:

S	S	X	BR	R	Spar	Spar	Spar
A	B		K	I	e	e	e

2--READY packet: the packet indicates that the target is ready to receive data.

3--BUSY packet: the packet indicates that the target is busy and can not receive data.

Currently, other values are not used.

CHECKSUM is addition of all the transmitted bytes.

16.2 Result code

If the returned value indicates something wrong, different results can be achieved by AT+CMEE=<value>. The table below lists the possible values of returned wrong numeric error code and their description (except those corresponding with short messages):

number	numeric error code	detailed 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
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 personalisation PIN required
32	+CME ERROR:41	+CME ERROR: network personalisation PUK required
33	+CME ERROR:42	+CME ERROR: network subset personalisation PIN required
34	+CME ERROR:43	+CME ERROR: network subset personalisation PUK required
35	+CME ERROR:44	+CME ERROR: service provider personalisation PIN required
36	+CME ERROR:45	+CME ERROR: service provider personalisation PUK required
37	+CME ERROR:46	+CME ERROR: corporate personalisation PIN required
38	+CME ERROR:47	+CME ERROR: corporate personalisation PUK required
39	+CME ERROR:60	+CME ERROR: AT command discarded
40	+CME ERROR:62	+CME ERROR: SIM card reject by network
41	+CME ERROR:63	+CME ERROR: SIM card service not available
42	+CME ERROR:64	+CME ERROR: SIM card PIN uninitialized
43	+CME ERROR:65	+CME ERROR: SIM card PIN blocked
44	+CME ERROR:66	+CME ERROR: SIM card PUK blocked
45	+CME ERROR:100	+CME ERROR: unknown
46	+CME ERROR:103	+CME ERROR: Illegal MS
47	+CME ERROR:106	+CME ERROR: Illegal ME
48	+CME ERROR:107	+CME ERROR: GPRS services not allowed
49	+CME ERROR:111	+CME ERROR: PLMN not allowed
50	+CME ERROR:112	+CME ERROR: Location area not allowed

51	+CME ERROR:113	+CME ERROR: Roaming not allowed in this location area
52	+CME ERROR:132	+CME ERROR: Service option not supported
53	+CME ERROR:133	+CME ERROR: Requested service option not subscribed
54	+CME ERROR:134	+CME ERROR: Service option temporarily out of order
55	+CME ERROR:149	+CME ERROR: PDP authentication failure
56	+CME ERROR:533	+CME ERROR: Missing or unkown APN

The table below lists the possible numeric error code detailed description in SMS:

num	numeric error code	detailed description
1	+CMS ERROR: 301	+ CMS ERROR: SMS ME reserved
2	+CMS ERROR: 302	+ CMS ERROR: Operation not allowed
3	+CMS ERROR: 303	+ CMS ERROR: Operation not supported
4	+CMS ERROR: 304	+ CMS ERROR: Invalid PDU mode
5	+CMS ERROR: 305	+ CMS ERROR: Invalid text mode
6	+CMS ERROR: 310	+ CMS ERROR: SIM not inserted
7	+CMS ERROR: 311	+ CMS ERROR: SIM PIN required
8	+CMS ERROR: 312	+ CMS ERROR: SIM failure
9	+CMS ERROR: 313	+ CMS ERROR: SIM PUK required
10	+CMS ERROR: 316	+ CMS ERROR: SIM PIN2 required
11	+CMS ERROR: 317	+ CMS ERROR: SIM PUK2 required
12	+CMS ERROR: 318	+ CMS ERROR: SIM failure
13	+CMS ERROR: 321	+ CMS ERROR: Invalid memory index
14	+CMS ERROR: 322	+ CMS ERROR: SIM memory full
15	+CMS ERROR: 330	+ CMS ERROR: SMSC address unknown
16	+CMS ERROR: 334	+ CMS ERROR: no +CNMA acknowledgement expected

The table below lists the possible numeric error code detailed description in call or GPRS service:

num	numeric error code	detailed description
1	+CEER: Error 0	+ CEER ERROR: no detail information
2	+CEER: Error 1	+ CEER ERROR: unassigned number
3	+CEER: Error 3	+ CEER ERROR: no route to destination
4	+CEER: Error 6	+ CEER ERROR: unacceptable channel
5	+CEER: Error 8	+ CEER ERROR: operator determinate barring
6	+CEER: Error 16	+ CEER ERROR: normal clearing
7	+CEER: Error 17	+ CEER ERROR: user busy
8	+CEER: Error 18	+ CEER ERROR: no user responding
9	+CEER: Error 19	+ CEER ERROR: alerting no answer
10	+CEER: Error 21	+ CEER ERROR: call rejected

11	+CEER: Error 22	+ CEER ERROR: number changed
12	+CEER: Error 26	+ CEER ERROR: nonselect user clearing
13	+CEER: Error 27	+ CEER ERROR: destination out of order
14	+CEER: Error 28	+ CEER ERROR: invalid number format
15	+CEER: Error 29	+ CEER ERROR: facility rejected
16	+CEER: Error 30	+ CEER ERROR: response to status query
17	+CEER: Error 31	+ CEER ERROR: normal unspecified
18	+CEER: Error 34	+ CEER ERROR: no circuit channel available
19	+CEER: Error 38	+ CEER ERROR: net out of order
20	+CEER: Error 41	+ CEER ERROR: temporary failure
21	+CEER: Error 42	+ CEER ERROR: switch congestion
22	+CEER: Error 43	+ CEER ERROR: access information discarded
23	+CEER: Error 44	+ CEER ERROR: request circuit channel unavailable
24	+CEER: Error 47	+ CEER ERROR: resources unavailable
25	+CEER: Error 49	+ CEER ERROR: QOS unavailable
26	+CEER: Error 50	+ CEER ERROR: request facility not subscribe
27	+CEER: Error 55	+ CEER ERROR: CUG incoming barred
28	+CEER: Error 57	+ CEER ERROR: bear capability not authorization
29	+CEER: Error 58	+ CEER ERROR: bear capability unavailable
30	+CEER: Error 63	+ CEER ERROR: service unavailable
31	+CEER: Error 65	+ CEER ERROR: bear service not implement
32	+CEER: Error 68	+ CEER ERROR: ACM equal or great ACMMAX
33	+CEER: Error 69	+ CEER ERROR: request facility not implement
34	+CEER: Error 70	+ CEER ERROR: only restrict digital available
35	+CEER: Error 79	+ CEER ERROR: service option not implement
36	+CEER: Error 81	+ CEER ERROR: invalid ti
37	+CEER: Error 87	+ CEER ERROR: user not in CUG
38	+CEER: Error 88	+ CEER ERROR: incompatibility destination
39	+CEER: Error 91	+ CEER ERROR: invalid transit net
40	+CEER: Error 95	+ CEER ERROR: invalid message semantic
41	+CEER: Error 96	+ CEER ERROR: mandatory IE error
42	+CEER: Error 97	+ CEER ERROR: message nonexistent
43	+CEER: Error 98	+ CEER ERROR: message uncompatibility error
44	+CEER: Error 99	+ CEER ERROR: IE nonexistent
45	+CEER: Error 100	+ CEER ERROR: invalid condition IE
46	+CEER: Error 101	+ CEER ERROR: message incompatibility state
47	+CEER: Error 102	+ CEER ERROR: recover on timer
48	+CEER: Error 111	+ CEER ERROR: protocol error
49	+CEER: Error 127	+ CEER ERROR: interworking
50	+CEER: Error 150	+ CEER ERROR: authentication rejected
51	+CEER: Error 151	+ CEER ERROR: emergency call only
52	+CEER: Error 152	+ CEER ERROR: IMSI detach
53	+CEER: Error 153	+ CEER ERROR: T3230 expiry

54	+CEER: Error 154	+ CEER ERROR: connection error
55	+CEER: Error 171	+ CEER ERROR: no network service
56	+CEER: Error 172	+ CEER ERROR: emergency call only
57	+CEER: Error 173	+ CEER ERROR: normal disconnect
58	+CEER: Error 174	+ CEER ERROR: remote disconnect
59	+CEER: Error 175	+ CEER ERROR: low failure
60	+CEER: Error 176	+ CEER ERROR: network reject
61	+CEER: Error 177	+ CEER ERROR: no cell
62	+CEER: Error 202	+ CEER ERROR: supplement not provide