AirM2M

AT Commands for Luat 4G Modules

Models: Air720 series

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1 Introduction

1.1 Scope of the document

This document specifies a profile of AT Commands for the AirM2MGPRS module.

1.2 Conventions

Terminal Equipment (TE) controls Mobile Termination (MT) functions and GSM/UMTS network services through Terminal Adaptor (TA).

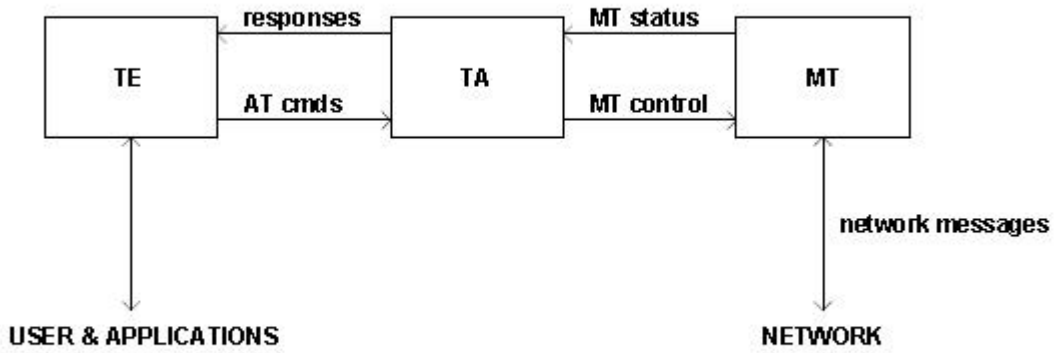

Figure 1

The commands described in the present document may be observed on the link between the TE and the TA. However,most of the commands retrieve information about the MT, not about the TA.

1.3 Definitions

For the purposes of the present document, the following syntactical definitions apply:

<CR>	Carriage return character, which value is specified with command S3
<LF>	Linefeed character, which value is specified with command S4
<...>	Name enclosed in angle brackets is a syntactical element. Brackets themselves do not appear in

	the command line.
[...]	Optional subparameter of a command or an optional part of TA information response is enclosed in square brackets. Brackets themselves do not appear in the command line. When subparameter is not given in *parameter type* commands, new value equals to its previous value. In *action type* commands, action should be done on the basis of the recommended default setting of the subparameter
underline	Underlined defined subparameter value is the recommended default setting of this subparameter. In *parameter type* commands, this value should be used in factory settings which are configured by V.250 command &F0. In *action type* commands, this value should be used when subparameter is not given.

1.4 Abbreviations

AT	ATtention; this two-character abbreviation is always used to start a command line to be sent from TE to TA
BCD	Binary Coded Decimal
DCE	Data Circuit terminating Equipment
DTE	Data Terminal Equipment
IMEI	International Mobile station Equipment Identity
ICCID	Integrate circuit card identity
IRA	International Reference Alphabet (ITU-T T.50)
ME	Mobile Equipment(=wireless module in this doc)
MT	Mobile Termination(=wireless module in this doc)
SIM	Subscriber Identity Module
TA	Terminal Adaptor, e.g. a GSM data card (equal to DCE)
TE	Terminal Equipment, e.g. a computer (equal to DTE)
URC	Unsolicited Reslut Code
NTP	Network Time Protocol
NITZ	Network Identity and Time Zone

1.5 AT command syntax

The "AT" or "at" prefix must be set at the beginning of each Command line. To terminate a Command line enter <CR>.
Commands are usually followed by a response that includes."<CR><LF><response><CR><LF>". Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

The AT Command set in this document is a combination of GSM07.05, GSM07.07 and ITU-T recommendation V.25ter and the proprietary AT commands developed by AirM2M.

Note: Only enter AT Command through serial port after module is powered on and Unsolicited Result Code "RDY" is received from serial port. And unsolicited result code "+CPIN: NOT INSERTED" indicates SIM card isn't present. If autobauding is enabled, the Unsolicited Result Codes "RDY" and so on are not indicated when you start up the ME until an "AT" is input.

All these AT commands can be split into three categories syntactically: "basic", "S parameter", and "extended". These are as follows:

1.5.1 Basic syntax

These AT commands have the format of "AT<x><n>", or "AT&<x><n>", where "<x>"is the Command, and "<n>"is/are the argument(s) for that Command. An example of this is "ATE<n>", which tells the DCE whether received characters should be echoed back to the DTE according to the value of "<n>". "<n>" is optional and a default will be used if missing.

1.5.2 S Parameter syntax

These AT commands have the format of "ATS<n>=<m>", where "<n>" is the index of the Sregister to set, and "<m>"is the value to assign to it. "<m>" is optional; if it is missing, then adefault value is assigned.

1.5.3 Extended Syntax

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

Table 1: Types of AT commands and responses

Type of Command	Syntax	Description
Test Command	AT+<x>=?	to test the existence of the command and to give information about the type of its subparameters.
Read Command	AT+<x>?	to check the current values of subparameters
Set Command	AT+<x>=<…>	to set the user-definable parameter values
Action Command	AT+<x>	*Action type* commands do not store the values of any of their possible subparameters, and therefore do not have a read command.

1.5.4 Combining AT commands on the same Command line

You can enter several AT commands on the same line,in which case, you do not need to type the "AT" or "at" prefix before every command. Instead, you only need type "AT" or "or" at the beginning of the Command line.

Please Note to use a semicolon as Command delimiter.
Note: extended command is prefixed with a "+" and delimited with a semicolon.
For example:
ATE0V1S0=2;+CREG=2;&W

AT+CFUN=1;+CIMI;+VER

The Command line buffer can accept a maximum of 556 characters. If the characters enteredexceeded this number then none of the Command will be executed and TA will return "ERROR".

1.5.5 Entering successive AT commands on separate lines

When you need to enter a series of AT commands on separate lines, please Note that you need to wait the final response (for example OK, CME error, CMS error) of last AT Command you entered before you enter the next AT Command.

2 Commands for general purpose

2.1 Request Manufacturer Identificaton:AT+CGMI/GMI

Syntax:

Type of Command	Command	Possible response(s)
Execution command	AT+CGMI	<manufacturer> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<manufacturer>	ID of manufacturer Text shall not contain the sequence 0<CR> or OK<CR>	-	Defined by manufacturer

Examples:

Command(→) /Response(←)	AT Sequences	Description
→	AT+CGMI	Query the manufacturerID
←	ASR OK	Response information is returned

2.2 Request Module Identification:AT+CGMM/GMM

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CGMM	<model> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<model>	Information text of module. Text shall not contain the sequence 0<CR> or OK<CR>	-	Defined by manufacturer, one line or more lines.

Examples:

Command(→) /Response(←)	AT Sequences	Description
→	AT+CGMM	Query module identification
←	+CGMM: "Nezha_MIFI" OK	

2.3 Request Revision Identification:AT+CGMR/GMR

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CGMR	Revision: <revision> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<revision>	the version, revision level or date, or otherpertinent information of the MT	-	Defined by manufacturer of the MT

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+CGMR	Query firmware vesion or revision
←	Revision: 1.0 OK	

2.4 Request product serial number identification:AT+CGSN/GSN

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CGSN	<sn> OK
		+CME ERROR: <err>
Test Command	AT+CGSN=?	OK

Defined values:

Parameter	Definition	Value	Description
<sn>	IMEI (International Mobile Equipment Identification)	-	Composed of 15 digits

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CGSN	Query IMEI
←	359759002514931 OK	

2.5 Query the ICCID of SIM:AT+ICCID

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+ICCID	<ICCID> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<ICCID>	ICCID(Integrated circuit card identity)	-	Usually composed of 20 digits

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CCID	Query the ICCID of the SIM card
←	89860064091118004014 OK	

2.6 Request IMSI:AT+CIMI

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CIMI	<IMSI> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<IMSI>	IMSI(International Mobile Subscriber Identity）		Usually composed of 15 digits

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CIMI	Request IMSI
←	460001841426414 OK	

2.7 Request product information:ATI

Request manufacturer specific information about the TA.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATI	<module info> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
<module info>	Information about the module （manufacturer,revision）	-	Defined by manufacturer of the MT

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	ATI	Request the information about the module
←	AirM2M_V5295_AT_S OK	

2.8 Request Firmware Version:AT+VER

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+VER	<firmware ver> OK
		+CME ERROR: <err>

Defined values:

Parameter	Definition	Value	Description
< firmware ver >	The inner version of the module firmware	-	Defined by manufacturer

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+VER	Requset the inner version of the module firmware
←	AirM2M_720_V306_LTE_AT_NAND OK	

2.9 Request Hardware Version:AT^HVER

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT^HVER	^HVER:<hardversion> OK

2.10 Repeat previous command:A/

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	A /	Repeat previous command line ,and line does not need to end with [CR]

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CIMI	Request IMSI
←	460001841426414 OK	
→	A/	Repeat AT+CIMI
←	460001841426414 OK	

2.11 Write special serial number:AT+WISN

AT+WISN is for the customers to write a special/proprietary sn(serial number) in the module.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+WISN=<user_sn>	OK
		+CME ERROR: <err>
Read Command	AT+WISN?	<user_sn> OK

Defined values:

Parameter	Definition	Value	Description
<user_sn>	special SN	-	defined or provided by customers

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+WISN="1234567890"	write acumstomer SN
←	OK	
→	AT+WISN?	query the cumstomer SN
←	1234567890 OK	

2.12 Reset MT:AT+RESET

Reset MT.

Syntax：

Type of Command	Command	Possible response(s)
Execution Command	AT+RESET	OK

2.13 Save/fetch dial-string:ATSO

Save/fetch dial-string.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+ASTO=<string>,<number>	OK
		+CME ERROR: <err>
Read Command	AT+ASTO?	+ASTO:<information text> OK
Test Command	AT+ASTO=?	+ASTO: (0-32),(64)

		OK

Defined values:

Parameter	Definition	Value	Description
<string>	name		
<number>	phone number		

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+ASTO=HELENA,188890065	
←	OK	
→	AT+ATSO?	
←	+ASTO: HELENA,188890065 OK	

2.14 Log Level Setup:AT+VDUMP

Set control log level. Store the log level to global variable. It can control log print to android log buffer and to file, log level less than the control log level will be print.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+VDUMP=<loglevel>	OK
Read Command	AT+VDUMP?	+VDUMP: <loglevel> OK
Test Command	AT+VDUMP=?	+VDUMP: (0-8) OK

Defined values:

Parameter	Definition	Value	Description
<loglevel>	the log level less than <loglevel >will be displayed	0	LOG_SILENT
		1	LOG_EMERG
		2	LOG_ALERT
		3	LOG_CRIT
		4	LOG_ERR
		5	LOG_WARNING
		6	LOG_NOTICE
		7	LOG_INFO

		8	LOG_DEBUG

2.15 Notify MT of MCU Sleep Status:AT*POWERIND

This proprietary AT command is used to notify MT of MCU sleep status. When MCU goes to sleep, MT will not send indication to MCU except MT call and SMS incoming.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*POWERIND=<n>	OK
Test Command	AT*POWERIND=?	*POWERIND:(0-1) OK

Defined values:

Parameter	Definition	Value	Description
<n>	MUC mode	0	is awake
		1	is asleep

2.16 Startup Information

Examples:

Scenarios	Startup information	Description
Scenario 1	UART Boot Completed RDY +CPIN: SIM REMOVED ^CARDMODE: 255 ^SIMST: 255,0	if SIM is not inserted,informaiton like this will be reported after module startup. ^CARDMODE:<sim_state> <sim_status>：SIM card status READY– SIM is detected and pin code is not open SIM PIN– SIM is detected and pin code is open SIM REMOVED– SIM is not detected
Scenario2	UART Boot Completed RDY ICCID: 98681071380130312410 ^SIMST: 0 +CPIN: READY	Now is a normal procedure. A SIM card is detected and no SIM PIN is required.

	^SIMST: 1 +MSTK: 11, D0818E010301250002028182050F8000550053 0049004D53615E9475280F0A01807CBE54C16 3A883500F06028077E597F30F0A03806C8390 1A884C8BC10F0A048053C280036D88606F0F 0A05808BED97F352A9624B0F0806806C83506 55EB70F0A07804FBF6C11670D52A10F0C088 0624B673A84254E1A53850F0A09806D4191CF 4E13533A0F0A0A80727960E0793C5305 +MSTK: 14	

3 Call Control Commands

Note: Commands in this chapter are not supported yet!

3.1 Select Type of Address:AT+CSTA

Set command selects the type of number for further dialling commands (D) according to GSM/UMTS specifications.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSTA=<type>	OK
Read Command	AT+CSTA?	+CSTA: <type> OK
Test Command	AT+CSTA=?	+CSTA: (list of supported values for <type>) OK

Defined values:

Parameter	Definition	Value	Description
<type>	type of address octet in integer format	129	Unknown **Note:Underline"_" marks the default value out.**
		145	International number. Diallingstring includes international access code character "+"
		161	National number
		177	Network specific number
		193	dedicated access, short code
		241	reserved for extersion

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CSTA=?	Query that if the +CSTA command is supported and the scope of the parameter values
←	+CSTA: (129,145,161,177,193,241) OK	
→	AT+CSTA?	Query the current <type>
←	+CSTA: 129	

	OK	
→	AT+CSTA=145	Set the <type> to 145
←	OK	

3.2 Originate a call:ATD

This command can be used to originate a voice/data call,it also serves to control supplementary services.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATD<dialling string>;	If successfully originated,response is: **OK** If successfully connected: **CONNECT** If no dial tone(ATX2 or ATX4) **NO DIALTONE** If busy(ATX3 or ATX4): **BUSY** If the call is hanged up: **NO CARRIER** If the remote station does not answer **NO ANSWER**
	ATD<dialling string>	Originate a data call. If successfully connected,the response is: **CONNECT**
Note	Emergency call 112 is supported whether or not the SIM card is inserted	

Defined values:

Parameter	Definition	Value	Description
<dialling string>	Dialed number	-	String of dialing digits and optionally V.25ter modifiers (dialling digits) in set of 0-9, * , #, +, A, B, C

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	ATD131623***98;	Initiate a call to 131623***98
←	OK	The called party accepts the call

	CONNECT	
→	AT+CHUP	Hang up the call
←	OK	

3.3 Redial last dialed number:ATDL

This Command redials the last voice or data call number.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATDL	If successfully originated,the response is: OK If successfully connected: **CONNECT** If no dial tone(ATX2 or ATX4) **NO DIALTONE** If busy(ATX3 or ATX4): **BUSY** If the call is hanged up: **NO CARRIER** If the remote station does not answer **NO ANSWER**
		Originate a data call. If successfully connected,the response is: **CONNECT**

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	ATD131623***98;	Call a phone number 131623***98
←	OK	
←(URC)	CONNECT	The called party accepts the call
→	AT+CHUP	Module hangs up the call
←	OK	
→	ATDL	Redial the phone number 131623***98
←	OK CONNECT	The call is connected

3.4 Accept a call:ATA

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATA	Response in case of voice call, if successfully connected: OK

Examples:

Command(→)/ Response(←)	AT Sequences	Description
←(URC)	RING	RING means there is an incoming call Note:RING is aURC（Unsolicited Result Code）
→	ATA	Answer the call
←	OK	OK means the call is connected

3.5 Hangup a call:AT+CHUP

This command hangs up all active and held calls.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CHUP	If call(s) are successfully hung up: OK

Examples:

Command(→)/Response(←)	AT Sequences	Description
←(URC)	RING	RING means that there is an incoming call Note:RING is a URC（Unsolicited Result Code）
→	ATA	Answer the call
←	OK	OK means the call is connected
→	AT+CHUP	Hang up the call
←	OK	

3.6 List current calls:AT+CLCC

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CLCC	[+CLCC:<id1>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>]][<CR><LF>+CLCC:<id2>,<dir>,<stat>,<mode>,<mpty>[,<number>,<type>[,<alpha>]][...]]]
Test Command	AT+CLCC=?	OK

Defined values:

Parameter	Definition	Value	Description
<idx>	Call id	-	Integer type ,as described in GSM 02.30 subclause4.5.5.1
<dir>	Call direction	0	Mobile originated call(MO call)
		1	Mobile terminated call(MT call)
<stat>	Call status	0	Active
		1	held
		2	dialing(MO call)
		3	alerting(MO call)
		4	incoming(MT call)
		5	waiting(MT call)
<mode>	Bearer/tele service	0	Voice
		1	Data
		2	Fax
<mpty>	If the call is one of multiparty call parties	0	call is not one of multiparty (conference) call parties
		1	call is one of multiparty (conference) call parties
<number>	Phone number	-	String type, quoted in "" and in format defined by <type>
<type>	Type of the <number>	-	Please refer to AT+CSTA
<alpha>	alphanumeric representation of <number>	-	Srting type

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	ATD10086;	Call a number 10086
←	OK	
→	AT+CLCC	Query the current call list
←	+CLCC: 1,0,2,0,0,"10086",129,"" OK	<stat>=2 means dialing
←	CONNECT	The called party answers the call
→	AT+CLCC	Query the current call list again
←	+CLCC: 1,0,0,0,0,"10086",129,"" OK	<stat>= 0 means the call is setup and active
→	AT+CHUP	Hang up the call
←	OK	

→	AT+CLCC	List the current calls
←	OK	Only OK, NO call is listed now

3.7 Select bearer service type:AT+CBST

Set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated (refer 3GPP TS 22.002).

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CBST=[<speed>[,<name>[,<ce>]]]	OK
Read Command	AT+CBST?	+CBST: <speed>,<name>,<ce> OK
Test Command	AT+CBST=?	+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s) OK

Defined values:

Parameter	Definition	Value	Description
<speed>	Speed	0	autobauding(automatic selection of the speed)
		7	9600 bps (V.32)
		71	9600 bps(V.110 or X.31 flag stuffing)
<name>	-	0	data circuit asynchronous (UDI or 3.1 kHz modem)
<ce>	-	1	non-transparent

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CBST=?	Query the scope of the values of all parameters
←	+CBST: (0-7,12,14,34,36,38,39,43,65,66,68,70,71,75),(0,2),(0,1) OK	
→	AT+CBST?	Query the current configuration
←	+CBST: 7,0,1 OK	

4 Commands for Configuration

4.1 Select TE character set:AT+CSCS

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

Type of Command	Command	Possible response(s)
Set Command	AT+CSCS=<chset>	OK
Read Command	AT+CSCS?	+CSCS: <chset> OK
Test Command	AT+CSCS=?	+CSCS: (list of supported <chset> s) OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
		"IRA"	International reference alphabet (ITU-T T.50)
		"UCS2"	16-bit universal multiple-octet coded character set
		“GSM”	GSM default alphabet (GSM 03.38 subclause 6.2.1)
		“HEX”	hex format **(Not supported yet)**

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+CSCS?	
←	+CSCS: "IRA" OK	
→	AT+CSCS=?	
←	+CSCS: ("IRA","UCS2","GSM") OK	

4.2 Set relevant parameters to user defined profile:ATZ

This command restores the configuration profile.
Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATZ	OK

4.3 Set all current parameters to manufacturer defaults:AT&F

This command reloads the factory-stored default configurations into active memory.
This commands is functionality the same as ATZ (reset).

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT&F	OK

4.4 Enable command echo:ATE

This setting determines whether or not the TA echoes characters received from TE during command state.
Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATE<value>	OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<value>	Echo on or off	0	Echo off
		1	Echo on

4.5 Set result code presentation mode:ATQ

This command specifies whether or not the TA transmits any result code to the TE. Information text transmitted in response is not affected by this setting.
Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATQ<n>	OK

Defined values:

Parameter	Definition	Value	Description
<n>	If the result code (OK/ERROR) is transmitted to TE	0	Result code is routed to TE
		1	Result code is not routed to TE

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	ATQ1	<n>=1, Result code is not routed to TE
←		The result code OK does not appear
→	AT+CREG?	Query the network resignation information
←	+CREG: 0,1	The result code OK does not appear,but information text +CREG: 0,1is not affected at all.

4.6 Set the response format:ATV

This parameter setting determines the contents of the header and trailer transmitted with result codes and information responses. It also determines whether result codes are transmitted in a numeric form or an alphabetic (orverbose.) form. The textportion of information responses is not affected by this setting.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATV<value>	<value>=0,Response: 0
		<value>=1,Response: OK

Defined values:

Parameter	Definition	Value	Description
<value>	define the format of all the AT command responses	0	DCE transmits limited headers and trailers and numericresult code: <numeric code> <numeric code>: 0 for OK 4 for ERROR
		1	DCE transmits full headers and trailers and verbose result code: <verbose code> <verbose code>: OK or ERROR

Examples:

Command（→）	AT Sequences	Description

/Response（←）		
→	ATV0	<value>=0,then result code will be displayed as : Information response:< text><CR><LF> Short result code: <numeric code><CR>
←	0	0-OK
→	AT+CSCS?	
←	+CSCS: IRA 0	

4.7 Set CONNECT result code format and call monitoring:ATX

This parameter setting determines whether or not the TA detects the presence of dial tone and busy signal and whether or not TA transmits particular result codes.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATX<value>	OK

Defined values:

Parameter	Definition	Value	Description
< value >	Result code mode	0	CONNECT result code returned, dial tone and busy detection are both disabled
		1	CONNECT<text> result code returned, dial tone and busy detection are both disabled
		2	CONNECT<text> result code returned, dial tone detection is enabled, busy detection is disabled
		3	CONNECT<text> result code returned, dial tone detection is disabled, busy detection is enabled
		4	CONNECT<text> result code returned, dial tone and busy detectionare both enabled

4.8 Set number of rings before automatically answering the call:ATS0

This command specifies whether or not the TA will accept an incoming data / fax call without user intervention. <n> determines the number of rings to wait before the TA will automatically answer the call.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS0=<n>	OK
Read Command	ATS0?	<n> OK

Parameter saving mode	Parameters of this command can be saved to NVM by AT&W

Defined values:

Parameter	Definition	Value	Description
<n>	Number of rings	0	disables automatic answer mode
		1～255	enables automatic answering after specified number of rings

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	ATS0=3	<n>=3, means an incoming call will be answered automatically after 3 rings.
←	OK	
←（URC）	RING RING RING OK	The incoming call is answered after 3 rings.

4.9 Set command line termination character:ATS3

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS3=<n>	OK
Read Command	ATS3?	<n> OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<n>	The ASCII value of the termination character	13	Default value is13 and the corresponding character is <CR>(carriage return) . Only this value is supported!

4.10 Set response formatting character:ATS4

This parameter setting determines the charcter to terminate a line in result code and information text.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS4=<n>	OK
Read Command	ATS4?	<n> OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<n>	The ASCII value of the response formatting character	10	default:10(=<LF> ,line feed) Only this value is supported!

4.11 Set command line editing character:ATS5

This parameter setting determines the character recognized by TA as a request to delete the immediately preceding character from the command line

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS5=<n>	OK
Read Command	ATS5?	<n> OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<n>	The ASCII value of line editing character	8	default:8(=<BS>,Back Space) Only this value is supported!

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	ATS5?	Query the current editing character

←	008 OK	BackSpace

4.12 Set command line editing character:ATS6

Pause before blind dialing.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS6=<n>	OK
Read Command	ATS6?	<n> OK

Defined values:

Parameter	Definition	Value	Description
<n>	pause duration	2~10	unit: seconds

4.13 Set command line editing character:ATS7

Set the Number of seconds to establishend-to-end data.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS7=<n>	OK
Read Command	ATS7?	<n> OK

Defined values:

Parameter	Definition	Value	Description
<n>	number of seconds	1~255	unit: seconds

4.14 Set command line editing character:ATS8

Set the Number of seconds to pause when“,” is encountered in dial string.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	ATS8=<n>	OK

Read Command	ATS8?	<n> OK

Defined values:

Parameter	Definition	Value	Description
<n>	number of seconds	0~255	unit: seconds,default value is 2.

4.15 Set CDC function mode:AT&C

This parameter determines how the state of circuit 109(DCD) relates to the detection of received line signal from the distant end.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT&C[<value>]	OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<value>	DCD status	0	DCD is alwaysON
		1	DCD is ON in presence of the data carrier only

4.16 Set DTR function mode:AT&D

This command controls the Data Terminal Ready (DTR) signal. The <value> parameter determines how the TA responds when circuit 108/2 (DTR) is changed from ON to OFF during data mode.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT&D[<value>]	OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<value>	DTR 电路状态	0	TA ignores status on DTR.
		1	ON->OFF on DTR: Change to command mode while retaining the connected call.

4.17 Real time clock:AT+CCLK

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CCLK=<time>	OK
Read Command	AT+CCLK?	+CCLK: <time> OK
Test Command	AT+CCLK=?	OK
Parameter saving mode	Auto save to NVM	

Defined values:

Parameter	Definition	Value	Description
<time>	time	-	String type(quoted in “”) in format yy/MM/dd,hh:mm:ss±zz" where characters indicate year (two last digits), month, day, hour, minutes, seconds and time zone (in units of1/4 hour；range: -47...+48)

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CCLK?	Query the current time
←	+CCLK: "11/01/01,00:12:58-00" OK	
→	AT+CCLK="12/08/07,13:28:29+32"	Set to the right time
←	OK	
→	AT+CCLK?	Query again
←	+CCLK: "12/08/07,13:28:38+32" OK	

4.18 Report mobile equipment error:AT+CMEE

Set command disables or enables the use of result code +CME ERROR: <err>as an indication of an error relating tothe functionality of the MT. When enabled, MT related errors cause +CME ERROR: <err>final result code insteadof the regular ERROR final result code. ERROR is returned normally when error is related to syntax, invalid parameters,or TA functionality.
Test command returns values supported as a compound value
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMEE=[<n>]	OK

Read Command	AT+CMEE?	+CMEE :<n> OK
Test Command	AT+CMEE=?	+CMEE:(list of supported values of <n>) OK
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<n>	Mdoe of Result code reporting	0	disable result code (only 'ERROR' will be displayed)
		1	Enable + CME ERROR: <err>,with <err> in numeric format
		2	Enable + CME ERROR: <err>,with <err> in verbose format

4.19 Report Mobile Termination Error:+CME ERROR:<err>

<err> code in + CME ERROR: <err> :

Numeric <err> values	Verbose <err> values
0	phone failure
1	no connection to phone
2	phone-adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long

25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
30	no network service
31	network timeout
32	network not allowed - emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
48	hidden key required
50	Invalid Param
100	unknown
103	Illegal MS
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	service option not supported
133	requested service option not subscribed
134	service option temporarily out of order
148	unspecified GPRS error
149	PDP authentication failure
150	invalid mobile class
151	AT command timeout
300	ME failure
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	(U)SIM not inserted
311	(U)SIM PIN required
312	PH-(U)SIM PIN required
313	(U)SIM failure
314	(U)SIM busy
315	(U)SIM wrong

316	(U)SIM PUK required
317	(U)SIM PIN2 required
318	(U)SIM PUK2 required
320	memory failure
321	invalid memory index
322	memory full
330	SMSC address unknown
331	no network service
332	network timeout
340	no +CNMA acknowledgement expected
500	unknown error
501	WIFI labtool reture error
502	BT labtool reture error
503	FM labtool reture error
504	MRD file already exist

4.20 Extended Error Report:AT+CEER

Execution command causes the TA to return one or more lines of information text <report>, determined by the MT manufacturer, which should offer the user of the TA an extended report of the reason for
- the failure in the last unsuccessful call setup (originating or answering) or in-call modification,
- the last call release,
- the last unsuccessful GPRS attach or unsuccessful PDP context activation,
- the last GPRS detach or PDP context deactivation.

Typically, the text will consist of a single line containing the cause information given by GSM network in textual format.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CEER	TA responses the reason for the last call release: +CEER: <report> OK
Test Command	AT+CEER=?	OK

Defined values:

Parameter	Definition	Value	Description
<report>	Error report	-	String type

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	ATD139********;	Make a voice call
←	OK	
		The called party answers the call and then hang up it
→	AT+CEER	Query the reason for the call release
←	+CEER: Network ended call OK	

5 Commands for Network Services

5.1 Request signal quality:AT+CSQ

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CSQ	+CSQ: <rssi>,<ber> OK
Test Command	AT+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported<ber>s) OK

Defined values:

Parameter	Definition	Value	Description
<rssi>	received signal strength indication	0	-113 dBm or less
		1	-111dBm
		2~30	-109～-53dBm
		31	-51 dBm or greater
		99	unknown or not detectable
<ber>	bit error rate	0~7	RXQUAL value defined in GSM 05.08 subclause8.2.4
		99	unknown or undetectable

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CSQ	Query the signal strength and quality when module is in idle mode
←	+CSQ: 15,99 OK	<rssi>=15 <ber>=99
→	ATD131****9873;	Make a voice phone call
←	OK	
→	AT+CSQ	Query again when the call has not yet connected
←	+CSQ: 10,99 OK	<ber>=99
←(URC)	CONNECT	The call is answered
→	AT+CSQ	Query again
←	+CSQ: 10,6 OK	<ber>=6

5.2 Received signal quality:AT+CESQ

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

Test command returns values supported as compound values.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CESQ	+CESQ: <rxlev>,<rxqual >,<rscp>,<ecno>,<rsrq>,<rsrp> OK

Defined values:

Parameter	Definition	Value	Description
<rxlev>	interger type; received signal strength level (see 3GPP TS 45.008 subclause 8. 1.4)	0	rssi < -110 dBm
		1	-110 dBm ≤ rssi < -109 dBm
		2	-109 dBm ≤ rssi < -108 dBm
		…	…
		61	-50 dBm ≤ rssi < -49 dBm
		62	-49 dBm ≤ rssi < -48 dBm
		63	-48 dBm ≤ rssi
		99	not known or not detectable
<rxqual >	as RXQUAL values in the table in 3GPP TS 45.008 subclause 8. 2.4	0	BER <0.2 % Assumed value = 0.14 %
		1	0.2 %<BER<0.4 %Assumed value = 0.28 %
		2	0.4 %<BER<0.8 % Assumed value = 0.57 %
		3	0.8 %<BER<1.6 % Assumed value = 1.13 %
		4	1.6 %<BER<3.2 % Assumed value = 2.26 %
		5	3.2 %<BER<6.4 % Assumed value = 4.53 %
		6	6.4 %<BER<12.8 %Assumed value = 9.05 %
		7	12.8 %<BER Assumed value = 18.10 %
		99	not known or not detectable
<rscp>	integer type, received signal code power(see 3GPP TS 25.133subclause 9.1 .1.3 and 3GPP TS 25.123subclause 9.1 .1.1.3)	0	rscp < -120 dBm
		1	-120 dBm ≤ rscp < -119 dBm
		2	-119 dBm ≤ rscp < -118 dBm
		...	...
		94	-27 dBm ≤ rscp < -26 dBm
		95	-26 dBm ≤ rscp < -25 dBm
		96	-25 dBm ≤ rscp
		255	not known or not detectable

<ecno>	integer type, ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133 subclause)	0	Ec/Io < -24 dB
		1	-24 dB ≤ Ec/Io < -23.5 dB
		2	-23.5 dB ≤ Ec/Io < -23 dB
		…	…
		47	-1 dB ≤ Ec/Io < -0.5 dB
		48	-0.5 dB ≤ Ec/Io < 0 dB
		49	0 dB ≤ Ec/Io
		255	not known or not detectable
<rsrq>	integer type, reference signal received quality (see 3GPP TS 36.133 subclause 9.1.7)	0	rsrq < -19.5 dB
		1	-19.5 dB ≤ rsrq < -19 dB
		2	-19 dB ≤ rsrq < -18.5 dB
		…	…
		32	-4 dB ≤ rsrq < -3.5 dB
		33	-3.5 dB ≤ rsrq < -3 dB
		34	-3 dB ≤ rsrq
		255	not known or not detectable
<rsrp>	integer type, reference signal received power (see 3GPP TS 36.133 subclause 9.1.4)	0	rsrp < -140 dBm
		1	-140 dBm ≤ rsrp < -139 dBm
		2	-139 dBm ≤ rsrp < -138 dBm
		…	…
		95	-46 dBm ≤ rsrp < -45 dBm
		96	-45 dBm ≤ rsrp < -44 dBm
		97	-44 dBm ≤ rsrp
		255	not known or not detectable

5.3 Enable CSQ Indicator:AT*CSQ

This is a generic AT command used to enable or disable CSQ Indicators.
CSQ indicators are as follows:

+CSQ:<rssi>,<ber>
+CESQ:<rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp>
***CESQ: <rxlev>,<ber>,<rscp>,<ecno>,<rsrq>,<rsrp>,<sinr>**

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT*CSQ=<n>	OK
Read Command	AT*CSQ?	*CSQ:<n> OK
Test Command	AT*CSQ=?	*CSQ = (list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>		0	CSQ Indicator is disabled
		1	CSQ Indicator is enabled
<rssi>,<ber>	please refer to AT+CSQ		
<rxlev>,<rscp>,<ecno>,<rsrq>,<rsrp>	please refer to AT+CESQ		
<sinr>	signal to interference plus noise ratio		

5.4 Network registration information:AT+CREG

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the MT network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

Read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <lac> and <ci> are returned only when <n>=2 and MT is registered in the network.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CREG=[<n>]	OK
Read Command	AT+CREG?	<n>=0（default）or 1: +CREG: <n>,<stat> OK <n>=2: +CREG: <n>,<stat>,<lac>,<ci> OK
Test Command	AT+CREG=?	+CREG: (list of supported <n> values) OK
URC report	+CREG: <stat>	If <n>=1,when the network registration status changes ,a URC（unsolicited result code）as this will be reported
	+CREG: <stat>[<lac>,<ci>]	If <n>=2,when the network registration status or CI changes ,a URC（unsolicited result code）as this will be reported
Parameter saving mode	Parameters of this command can be saved to NVM by AT&W	

Defined values:

Parameter	Definition	Value	Description
<n>	URC Reported status	0	Disable network registration unsolicited result code
		1	Enable network registration unsolicited result code +CREG: <stat>
		2	Enable network registration and location information unsolicited result code +CREG:<stat>[,<lac>,<ci>]
<stat>	Network registration status	0	Not registered, MT is not currently searching for a new operator to register to
		1	Registered to home network.
		2	Not registered, but MT is currently searching for a new operator to register to
		3	Registration denied.
		4	Unknown
		5	Registered, roaming
<lac>	Location Area Code	-	string type, two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	Cell Id	-	String type , two byte cell ID in hexadecimal format

Examples:

Command（→） / Response（←）	AT Sequences	Description
→	AT+CREG=?	Query the scope of the <n>
←	+CREG:(0-2) OK	
→	AT+CREG?	Query the registration status
←	+CREG: 0,1 OK	<n>=0 <stat>=1 （Registered to home network）
→	AT+CREG=1	Insert a nonlocal SIM card,power on and set <n>=1
←	OK	
→	AT+CREG?	Query the registration status
←	+CREG: 1,5 OK	<n>=1 <stat>=5 （Registered, roaming）
←（URC）	+CREG:0	Unplug the antenna or go into the zero signal area,a URC like this will be reported
←（URC）	+CREG:5	Plug the antenna or go back to a signal covered area,a URC like this will be reported
→	AT+CREG=2	Set <n>=2
←	OK	
→	AT+CREG?	Query the registration status
←	+CREG: 2,5,"18be","9351"	When <n>=2, the Lac(0x9191) and cell ID(0x2E50) is reported. <n>=0,<stat>=5,<lac>=18be,<ci>=9351

	OK	
←（URC）	+CREG: 5,"18be","9363"	Move the module to a different place until the ci changes ,then a URC like this will be reported

5.5 EPS network registration status in E-UTRAN:AT+CEREG

The set command controls the presentation of an unsolicited result code +CEREG: <stat> when <n>=1 and there is a change in the MT's EPS network registration status in E-UTRAN, or unsolicited result code +CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]] when <n>=2 and there is a change of the network cell in E-UTRAN. The parameters <AcT>, <tac> and <ci> are sent only if available.The value <n>=3 further extends the unsolicited result code with [,<cause_type>,<reject_cause>], when available, when the value of <stat> changes.

NOTE1 : If the EPS MT in GERAN/UTRAN/E-UTRAN also supports circuit mode services and/or GPRS services, the +CREG command and +CREG: result codes and/or the +CGREG command and +CGREG: result codes apply to the registration status and location information for those services.

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

Test command returns values supported as a compound value.

Type of Command	Command	Possible response(s)
Set Command	AT+CEREG=<n>	OK
Read Command	AT+CEREG?	+CEREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>[,<cause_type>,<reject_cause>]]] OK
Test Command	AT+CEREG=?	+CEREG: (list of supported <n>s) OK
URC report	+CEREG: <stat>	when<n>=1 and there is a change in the MT's EPS network registration status in E-UTRAN ,a URC（unsolicited result code）as this will be reported
	+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>]]	when <n>=2 and there is a change of the network cell in E-UTRAN or a change in <stat>
	+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>][,<cause_type>,<reject_cause>]]	when <n>=2 and there is a change of the network cell in E-UTRAN or a change in <stat>

Defined values:

Parameter	Definition	Value	Description

<n>	URC Reported status	0	Disable network registration unsolicited result code
		1	Enable network registration unsolicited result code +CEREG: <stat>
		2	Enable network registration and location information unsolicited result code +CREG:<stat>[,<lac>,<ci>]
		3	enable network registration, location information and EMM cause value information unsolicited result code +CEREG: <stat>[,[<tac>],[<ci>],[<AcT>][,<cause_type>,<reject_cause>]]
<stat>	Network registration status	0	Not registered, MT is not currently searching for a new operator to register to
		1	Registered to home network.
		2	Not registered, but MT is currently searching for a new operator to register to
		3	Registration denied
		4	Unknown(e.g. out of E-UTRAN coverage)
		5	Registered, roaming
		6	registered for “SMS only”, home network (not applicable)
		7	registered for “SMS only”, roaming (not applicable)
		8	attached for emergency bearer services only (See NOTE 2)
		9	registered for “CSFB not preferred”, home network (not applicable)
		10	registered for “CSFB not preferred”, roaming (not applicable)
		11	emergency bearer services only
<tac>	tracking Area Code	-	string type, two byte tracking area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	Cell Id	-	String type , four byte E-UTRAN cell ID in hexadecimal format
<AcT>	integer type; indicates the access technology of the serving cell	0	GSM (not applicable)
		1	GSM Compact (not applicable)
		2	UTRAN (not applicable)

		3	GSM w/EGPRS (see NOTE 3) (not applicable)
		4	UTRAN w/HSDPA (see NOTE 4) (not applicable)
		5	UTRAN w/HSUPA (see NOTE 4) (not applicable)
		6	UTRAN w/HSDPA and HSUPA (see NOTE 4) (not applicable)
		7	E-UTRAN
		8	UTRAN HSPA+
<cause_type>	integer type; indicates the type of <reject_cause>	0	Indicates that <reject_cause> contains an EMM cause value, see 3GPP TS 24.301 Annex A.
		1	Indicates that <reject_cause> contains a manufacturer-specific cause
<reject_cause>	integer type; contains the cause of the failed registration.		The value is of type as defined by <cause_type>

Note2： 3GPP TS 24.008 and 3GPP TS 24.301 specify the condition when the MS is considered as attached for emergency bearer services.

NOTE 3: 3GPP TS 44.060 specifies the System Information messages which give the information about whether the serving cell supports EGPRS.

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

5.6 Operator selection:AT+COPS

Set command forces an attempt to select and register the GSM/UMTS network operator. <mode>is used to selectwhether the selection is done automatically by the MT or is forced by this command to operator <oper>(it shall begiven in format <format>). If the selected operator is notavailable, no other operator shall be selected (except <mode>=4). The selected operator name format shall apply tofurther read commands (+COPS?) also. <mode>=2 forces an attempt to deregister from the network. The selectedmode affects to all further network registration (e.g. after <mode>=2, MT shall be unregistered until <mode>=0 or 1 isselected). This command should be abortable whenregistration/deregistration attempt is made.

Read command returns the current mode, the currently selected operatorand the current Access Technology.

Test command returns a set of five parameters, each representing an operator present in the network. A set consists ofan integer indicating the availability of the operator <stat>, long and short alphanumeric format of the name of theoperator, numeric format representation of the operator and access technology. Any of the formats may be unavailableand should then be an empty field. The list of operators shall be in order: home network,

networks referenced in SIM oractive application in the UICC (GSM or USIM) in the following order: HPLMN selector, User controlled PLMNselector, Operator controlled PLMN selector and PLMN selector (in the SIM or GSM application), and other networks.

It is recommended (although optional) that after the operator list TA returns lists of supported <mode>s and <format>s. These lists shall be delimited from the operator list by two commas.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+COPS=<mode>[,<format>[,<oper>[,< AcT>[, <Domain>]]]]	OK
Read Command	AT+COPS?	+COPS: <mode>[,<format>,<oper>[,< AcT>>[, <Domain>]]] OK
Test Command	AT+COPS=?	+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,< AcT>])s][,,(list of supported <mode>s),(list of supported <format>s)] OK

Defined values:

Parameter	Definition	Value	Description
<mode>	Operator registration mode	0	Automatic mode; <oper> field is ignored.
		1	manual operator selection(<oper> field shall be presentand <AcT> optionally)
		2	manually deregister from network and remain unregistered until mode 0,1,4 is selected
		3	Set only <format>(for read command +COPS?), do not attempt registration/deregistration (<oper>field is ignored); this value is not applicable in read command response
		4	manual/automatic mode; if manual selection fails, MT switches to automatic mode (<mode>=0). (<oper> field must be present)
<format>	format	0	long format alphanumeric <oper>; up to 16 characters.
		1	short format alphanumeric <oper>; up to 8 characters.
		2	numeric <oper>; GSM Location Area Identification number.
<oper>	Operator as per <format>	-	Operator as per <format>. The numeric format is the GSM Location Area Identification number which consists of a 3-digit country code plus a 2-digit network code. hence the number has a structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 3)(network code digit 2)(network code digit 1)
<stat>	Operator availability status	0	Unknown
		1	operator available
		2	current operator (registered)

		3	Forbidden operator
<AcT>		0	GSM (not applicable)
		1	GSM Compact (not applicable)
		2	UTRAN (not applicable)
		3	GSM w/EGPRS (see NOTE 3) (not applicable)
		4	UTRAN w/HSDPA (see NOTE 4) (not applicable)
		5	UTRAN w/HSUPA (see NOTE 4) (not applicable)
		6	UTRAN w/HSDPA and HSUPA (see NOTE 4) (not applicable)
		7	E-UTRAN
		8	UTRAN HSPA+
<Domain>		0	CS only
		1	PS only
		2	combined CS/PS

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+COPS?	Query the information about the current network operator
←	+COPS: 0,2,"46001",7 OK	
→	AT+COPS=3,1	Set <format>=1（short format alphanumeric）
←	OK	
→	AT+COPS?	Query the information about the current network operator
←	+COPS: 0,1,"UNICOM",7 OK	
→	AT+COPS=3,0	Set <format>=0(long format alphanumeric)
←	OK	
→	AT+COPS?	Query the information about the current network operator
←	+COPS: 0,0,"CHN-UNICOM",7 OK	

5.7 Automatic Time Zone Update:AT+CTZU

Read command returns the current settings in the MT.

Test command returns supported values.

Note: NITZ=Network Identity and Time Zone, is a mechanism for provisioning local time and dateinformation to mobile devices via a wireless network.

Syntax:

Type of Command	Command	Possible response(s)
Read Command	AT+CTZU?	+CTZU: <fun> OK
Test Command	AT+CTZU=?	+CTZU: (list of supported <fun>s) OK

Defined values:

Parameter	Definition	Value	Description
<fun>	Status of time zone update	0	Disable NITZ update, default
		1	Enable NITZ update

5.8 (URC) Network Identity and Time Zone: +NITZ:<time>,<ds>

Syntax:

URC
+NITZ:<time>,<ds>

Defined values:

Parameter	Definition	Value	Description
<time>	time	yy/mm/dd,hh:mm:ss±tz	tz :time zone, -48~+48 for example: +NITZ: 0, ,11/08/02,09:27:39+32,0
<ds>	daylight saving time	0	No adjustment for daylight saving time
		1	+1 hour(equals 4 quarters in <tz>) adjustment for daylight saving time
		2	+2 hour(equals 8 quarters in <tz>) adjustment for daylight saving time

5.9 Time Zone Report:AT+CTZR

Read command returns the current settings in the MT.
Test command returns supported on- and off-values.

Syntax:

Type of Command	Command	Possible response(s)
Read Command	AT+CTZR?	+CTZR: <fun> OK
Test Command	AT+CTZR=?	+CTZR: (list of supported <fun>s) OK

Defined values:

Parameter	Definition	Value	Description
<fun>	Status of report	0	Disable Time and time Zone Reporting, default
		1	Enable Time and time Zone Reporting

5.10 DTMF and tone generation:AT+VTS

This command allows the transmission of DTMF tones. These tones may be used (for example) when announcing the start of a recording period.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+VTS=<dtmf-string>or AT+VTS=<dtmf>[,<duration>]	OK
Test Command	AT+VTS=?	+VTS:(list of supported <dtmf>s),,(list of supported <duration>s) OK

Defined values:

Parameter	Definition	Value	Description
<dtmf-string>	DTMF string		String quoted with"" ; the maximum length is20 characters inthe set 0-9, #, *, A, B, C, D. Note: 1) every character is separated by comma 2) the length of each tone in <dtmf-string> is defined by +VTD
<dtmf>	A single ASCII character in the set 0-9, #,*,A-D		The duration of the <dtmf> is defined as follows: AT+VTS=<dtmf> , the duaration is defined by +VTD ; AT+VTS=<dtmf>,<duration>,the duaration is defined by <duration>

<duration>	Duration of tone	1~255	In units of 1/10 seconds

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+VTS=?	
←	+VTS: (0-9,*,#,A,B,C,D),,(1-255) OK	
The following is an example to input an extension :		
→	ATD5487**06;	Call a switchboard 5487**06
←	OK CONNECT	The switchboard is connected
→	AT+VTS=”1,0,9”	Connect to extenstion 109
←	OK	
The following is an example to select a service during an automatic speech service :		
→	ATD10086;	Dial a speech service number
←	OK CONNECT	connected
→	AT+VTS=2	Select service 2
←	OK	

5.11 DTMF Tone Duration:AT+VTD

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+VTD=<n>	OK
Read Command	AT+ VTD?	+ VTD:<n> OK
Test Command	AT+ VTD =?	+ VTD: (list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	The length of tone	1~255	In units of 1/10 seconds

5.12 Set Cell Background Searching:AT+BGLTEPLMN

This command is used to set cell background searching.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+BGLTEPLMN=<mode>,<interval>	+ BGLTEPLMN: OK OK
Read Command	AT+BGLTEPLMN?	+ BGLTEPLMN: <mode>,<interval> OK
Test Command	AT+BGLTEPLMN=?	+BGLTEPLMN:[list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>)[,<AcT>,<rsrp>]]s][,,(list of supported<format>s)] OK

Defined values：

Parameter	Definition	Value	Description
<mode>	cell background searching enabled or not	0	cell background searching disabled
		1	cell background searching enabled
<interval>	time interval between searching	0	search immediately
		0XFFFF	don’t search
		Other values between 1 and 0XFFFF	search with seconds
<stat>,<oper>,<AcT>, <format>			please refer to +COPS=?
<rsrp>			please refer to +CESQ

5.13 Enable/Disable HSDPA and HSUPA:AT*EHSDPA

This command is used to set cell background searching.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*EHSDPA=<mode>[,<DL_CATEGORY>[,<UL_CATEGORY>[,<CPC_STATE>[,<DPA_CATEGORY_EXT>[,<EDCH_CATEGORY_EXT>[,<F-DPC	OK

	HState>[,<enhanced F-DPCHState>]]]]]]	
Read Command	AT*EHSDPA?	*EHSDPA:<mode>,<DL_CATEGORY>,<UL_CATEGORY>,<CPC_STATE>,<DPA_CATEGORY_EXT>,<EDCH_CATEGORY_EXT>,<F-DPCHState>,<enhanced F-DPCHState> OK
Test Command	AT*EHSDPA=?	In TDSCDMA mode: *EHSDPA: (0-3),(1-11,13-16,23,35),(6),(0),(0),(0),(0),(0) OK In WCDMA mode: *EHSDPA: (0-2,4),(1-12),(1-6),(0,1),(1-14),(7),(0,1),(0,1) OK

Defined values：

Parameter	Definition	Value	Description
<mode>		0	disable HSDPA(also disable HSUPA if UE is supported) for Rel5
		1	enable HSDPA(also Enable HSUPA if UE is supported) for Rel7
		2	enable HSDPA only (not include HSUPA) for Rel5
		3	enable DLDC for Rel9 for TD production
		4	enable HSPA only for Rel6
In TDSCDMA mode:			
<DL_CATEGORY>	default value is 14	1,2,3	Max TB size: 2788 Max speed: 0.5M
		4,5,6	Max TB size: 5600 Max speed: 1.1M
		7,8,9	Max TB size: 8416 Max speed: 1.6M
		10,11	Max TB size: 11226Max speed: 2.2M
		13,14	Max TB size: 14043Max speed: 2.8M
<UL_CATEGORY>	default value is 6	6	Max TB size: 11160 Max speed: 2.2M
<CPC_STATE>		0	not supported
In WCDMA mode:			
<DL_CATEGORY>	default value is 6	1	Max TB size: 7298Max speed: 1.2M
		2	Max TB size: 7298 Max speed: 1.2M
		3	Max TB size: 7298 Max speed: 1.8M
		4	Max TB size: 7298 Max speed: 1.8M
		5	Max TB size: 7298 Max speed: 3.6M
		6	Max TB size: 7298 Max speed: 3.6M
<UL_CATEGORY>		0	not supported
<CPC_STATE>		0	not supported
<DPA_CATEGORY_EXT>	for WCDMA Rel7 support 1~20	1~20	default 14 for Rel7
<EDCH_CATEGORY_EXT>	for WCDMA Rel7 only support 7	7	
<F-DPCHState>	in TD mode	0	not supported, default value
	In WCDMA mode	0	disabled
		1	enabled

5.14 Set GSM/UMTS Engineering Mode indicator:AT+EEMOPT

Set/Get GSM/UMTS Engineering Mode indicator.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+EEMOPT=<option>[,<value>]	OK
Read Command	AT+EEMOPT?	+EEMOPT: <option>[,<value>] OK
Test Command	AT+EEMOPT=?	list of options

Defined values:

Parameter	Definition	Value	Description
<option>		0	Turn off indicator. This is the default mode after ME boot-up
		1	Set to query mode. In this mode, no indicator reported (NOTE: but user can query the network parameter by +EEMGINFO?)
		2	Set to periodic mode. In this mode, the GSM Engineering Mode's information will be reported in specific timeinterval, which specified by <value> second. (NOTE: refer to indicator +EEMGINFOBASIC, +EEMGINFOSVC, +EEMGINFOPS, +EEMGINFONC)
		3	Snapshot mode. The old <value> will stored as snapshot
		4	Restore to snapshot <value>
<value>	Time interval in seconds for reporting indicators. Only valid when <option> is set to 2.		

xamples:

Cmd(→)/ Rsp(←)	AT Sequences
→	AT+EEMOPT=?
←	AT+EEMOPT=0 :Turn off indicator. This is default mode after ME bootup AT+EEMOPT=1 :Set to query mode. User can use +EEMGINFO to query network parameter AT+EEMOPT=2,<interval>:Set to periodic mode. Report EM info in <value> seconds AT+EEMOPT=3 :The old <value> will be stored as snapshot AT+EEMOPT=4 :Restore to snapshot <value>

5.15 Query GSM/UMTS/LTE Information in Engineering Mode:AT+EEMGINFO

Query GSM/UMTS/LTEinformation in Engineering Mode. Only valid in query mode (use AT+EEMOPT=1 to set MT to query mode).

Syntax：

Type of Command	Command	Possible response(s)
Read Command	AT+EEMGINFO?	+EEMGINFO:<state>,<nw_type> OK

Defined values:

Parameter	Definition	Value	Description
<state>	MT state	0	in Idle mode
		1	in Dedicated mode
		2	in PS PTM mode
		3	invalid state
<nw_type>	network type	0	GSM
		1	UMTS
		2	LTE

5.16 GSM/UMTS/LTE Mode and Band Settings:AT*BAND

Set command controls parameters for GSM/UMTS/LTE user mode and optionally band settings.
The new parameters will be saved in NVM
UE will be reset to apply the new settings.

<mode>=0 forces the UE to search GSM network only, whereas
<mode>=1 forces the UE to search UMTS network only.
<mode>=2 forces the UE to dual mode (GSM and UMTS) (auto)
<mode>=3 forces the UE to dual mode(GSM and UMTS) (GSM preferred)
<mode>=4 forces the UE to dual mode(GSM and UMTS) (UMTS preferred)
<mode>=5 forces the UE to search LTE network only.
<mode>=6 forces the UE to dual mode(GSM and LTE) (auto)
<mode>=7 forces the UE to dual mode(GSM and LTE).(GSM preferred)
<mode>=8 forces the UE to dual mode(GSM and LTE).(LTE preferred)
<mode>=9 forces the UE to dual mode(UMTS and LTE).(auto)
<mode>=10 forces the UE to dual mode(UMTS and LTE). (UMTS preferred)

<mode>=11 forces the UE to dual mode(UMTS and LTE). (LTE preferred)

<mode>=12 forces the UE to trip mode(GSM,UMTS,LTE).(auto)

<mode>=13 forces the UE to trip mode(GSM,UMTS,LTE).(GSM preferred)

<mode>=14 forces the UE to trip mode(GSM,UMTS,LTE).(UMTS preferred)

<mode>=15 forces the UE to trip mode(GSM,UMTS,LTE). (LTE preferred)

Detailed <band>setting refers to below chart.

<roamingConfig>=0 forces the UE not support roaming.

<roamingConfig>=1 forces the UE to support roaming.

<roamingConfig>=2 means the UE should not change the roaming setting.

<srvDomain>=0 forces the UE to change service to CS (circuit service) only.

<srvDomain>=1 forces the UE to change service to PS (GPRS service) only.

<srvDomain>=2 forces the UE to change service to CS and PS both.

<srvDomain>=3 means let the UE choose a default service domain.

<srvDomain>=4 means the UE should not change the service domain setting.

< bandPriorityFlag > =0: default.

< bandPriorityFlag > =1: set TD-LTE band preferred.

< bandPriorityFlag > =2: set FDD-LTE band preferred.

If <mode> is GSM network, only bands defined in GSM band options can be selected.

If <mode> is UMTS network, one or more of the defined UMTS bands can be selected.

If <mode> is LTE network ,one or more of the defined LTE bands can be selected.

If <mode>are Dual mode, trip mode, there is no need to enter <band> parameter(s) since band will bereset to default settings. If this parameter will be entered it will be ignored.

Note that if <band> is not entered for <mode> GSM or UMTS the band setting inTTPCom_NRAM2_ABMM_WRITEABLE_DATA.gki will remain unmodified.

The default values of <roamingConfig> and <srvDomain> are 2 and 4.

The default value of <bandPriorityFlag> is 0, it only works if <mode> is LTE.

Read command returns the settings.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*BAND=[<mode>[<GSMband>,<UMTSband>,<LTEbandH>,<LTEbandL>[,<roamingConfig>,<srvDomain>,<bandPriorityFlag>]]]	OK

Read Command	AT*BAND?	*BAND :<mode>,<GSMband>, <UMTSband>,<LTEbandH>,<LTEbandL>,<roamingConfig>,<srvDomain>,< bandPriorityFlag > OK
Test Command	AT*BAND=?	*BAND: (list ofsupported<mode>s),<GSMband>, <UMTSband>,<LTEbandH>,<LTEbandL>,<bandPriorityFlag >,<srvDomain>，< bandPriorityFlag > OK

Defined values：

Parameter	Definition	Value	Description
<mode>	integer type	0	GSM network
		1	UMTS network
		2	Dual mode(GSM and UMTS) (auto)
		3	Dual mode(GSM and UMTS) (GSM preferred)
		4	Dual mode(GSM and UMTS) (UMTS preferred)
		5	LTE network
		6	Dual mode(GSM and LTE)(auto)
		7	Dual mode(GSM and LTE)(GSM preferred)
		8	Dual mode(GSM and LTE)(LTE preferred)
		9	Dual mode(UMTS and LTE)(auto)
		10	Dual mode(UMTS and LTE)(UMTS preferred)
		11	Dual mode(UMTS and LTE)(LTE preferred)
		12	Trip mode(auto)
		13	Trip mode(GSM preferred)
		14	Trip mode(TD preferred)
		15	Trip mode(LTE preferred)
<GSMband>	integer type, a sum of integers each representing a GSM band(bit mask)	1	PGSM 900 (standard or primary)
		2	DCS GSM 1800
		4	PCS GSM 1900
		8	EGSM 900 (extended)

		16	GSM 450
		32	GSM 480
		64	GSM 850
<UMTSband>	integer type, a sum of integers each representing a UMTS band(bit mask)	1	UMTS_BAND_1
		2	UMTS_BAND_2
		4	UMTS_BAND_3
		8	UMTS_BAND_4
		16	UMTS_BAND_5
		32	UMTS_BAND_6
		64	UMTS_BAND_7
		128	UMTS_BAND_8
		256	UMTS_BAND_9
<LTEbandH>	integer type(32 bit), a sum of integers each representing a TDD LTEband(bit mask)	32	TDLTE_BAND_38
		64	TDLTE_BAND_39
		128	TDLTE_BAND_40
		256	TDLTE_BAND_41
<LTEbandL>	integer type(32 bit), a sum of integers each representing a FDD LTEband(bit mask)	1	FDDLTE_BAND_1
		4	FDDLTE_BAND_3
		8	FDDLTE_BAND_4
		64	FDDLTE_BAND_7
		65536	FDDLTE_BAND_17
		524288	FDDLTE_BAND_20
<roamingConfig>	integer type	0	support
		1	not support
		2	no change
<srvDomain>	integer type	0	CS_ONLY
		1	PS_ONLY
		2	CS_PS

		3	ANY
		4	No Change
<bandPriorityFlag>	integer type	0	default
		1	TD-LTE
		2	FDD-LTE

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT*BAND?	
←	*BAND:15,74,129,480,133,0,2,0 OK	480=LTEbandH =00000000 00000000 0000 0001 11100000 =32+64+128+256 =TDLTE_BAND_38**&** TDLTE_BAND_39**&** TDLTE_BAND_40 **&**TDLTE_BAND_41 133=LTEbandL =00000000 00000000 00000000 10000101 =1+4+8 =FDDLTE_BAND_1 **&**FDDLTE_BAND_3**&** FDDLTE_BAND_4

5.17 Indicates the Current Band:AT*BANDIND

Indicates the current band.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*BANDIND[=<n>]	OK
Read Command	AT*BANDIND?	*BANDIND: <n>[,<band>,<AcT>] OK
Test Command	AT*BANDIND=?	*BANDIND: (0,1) OK
URC	<n>=1 and the band changes,there will be URC: ***BANDIND: <band>, <Act>** sent from MT to TE.	

Defined values：

Parameters	Definition	Value	Description
<n>	<n>=1 and the band changes,there will be an URC: *BANDIND: <band>, <Act>reported	0	disable
		1	enable

<band>	refer <GSMband>,<UMTSband>,<LTEbandH>,<LTEbandL> in AT*BAND		
<act>		0	GSM
		1	GSM Compact
		2	UTRAN
		3	GSM w/EGPRS
		4	UTRAN w/HSDPA
		5	UTRAN w/HSUPA
		6	UTRAN w/HSPA
		7	E-UTRAN
		8	UTRAN HSPA+

5.18 Get the Access Technology:AT^CACAP

This command is used to get the access technology of the serving cell.

Syntax：

Type of Command	Command	Possible response(s)
Read Command	AT^CACAP?	+CACAP:(0-7) OK
Test Command	AT^CACAP=?	+CACAP: <act> OK

Defined values：

Parameter	Definition	Value	Description
<act>		0	GSM
		1	GSM Compact
		2	UTRAN
		3	GSM w/EGPRS
		4	UTRAN w/HSDPA
		5	UTRAN w/HSUPA

		6	UTRAN w/HSPA
		7	E-UTRAN
		8	UTRAN HSPA+

5.19 Query Current System Information:AT^SYSINFO

This command is used to query current system information, for example: system service status, domain, roaming or not, etc.

Syntax：

Type of Command	Command	Possible response(s)
Execuation Command	AT^SYSINFO	^SYSINFO:<srv_status>,<srv_domain>,<roam_status>,<sys_mode>,<sim_state>,<sys_submode> OK

Defined values：

Parameter	Definition	Value	Description
<srv_status>		0	no service
		1	restricted service
		2	valid service
		3	restricted area service
		4	power service
<srv_domain>		0	no service
		1	CS only
		2	PS only
		3	CS and PS
<roam_status>		0	no roaming
		1	roaming
<sys_mode>		0	no service
		1	reserved
		2	reserved
		3	GSM/GPRS
		4	WCDMA

		5	TD_SCDMA
		17	LTE
<sim_state>		0	sim invalid
		1	sim valid
		255	sim not insert or PINunchecked/unblocked
<sys_submode>		0	GSM
		1	GSM Compact
		2	UTRAN
		3	GSM w/EGPRS
		4	UTRAN w/HSDPA
		5	UTRAN w/HSUPA
		6	UTRAN w/HSDPA and HSUPA
		7	E-UTRAN

5.20 Cell/Frequency Lock:AT*Cell

This proprietary AT command is used to requests to activate or to deactivate Cell/Frequency lock.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*Cell=<mode>[,<act>[,<band>][,<freq>[,<cellId>]]]	OK
Test Command	AT*Cell=?	*Cell:<mode>,<act>,<band>,<freq>,<cellId> OK
URC	*Cell:<mode>,<act>,<band>,<freq>,<cellId>	

Defined values：

Parameters	Definition	Value	Description
<mode>	lock mode	0	Cell/Frequency lock disabled
		1	Frequency lock enabled
		2	Cell locke enabled

<act>,<band>	refer to AT*BAND		
<freq>	Absolute radio frequency channel number	no need	no need in GSM
		umts_band:0~7	in UMTS-TD
		umts_band:0~8	in UMTS-WB
		0-599, 1200-1949, 2400-2649, 2750-3449, 3450-3799, 5180-5279, 5730-5849,6150-6449, 37750-38249,38250-38649, 38650-39649, 39650-41589	in LTE
<cellId>	Physical Cell ID	no need	no need in GSM
		0-127	in UMTS
		0-503	in LTE

5.21 Set the System Mode:AT^SYSCONFIG

This command sets the system mode,G/W access order ,roaming support and domain characteristics

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT^SYSCONFIG=<mode>,<acqorder>,<roam>,<srvdoman>	OK
Read Command	AT^SYSCONFIG?	^SYSCONFIG:<mode>,<acqorder>,<roam>,<srvdomain> OK

Defined values：

Parameters	Definition	Value	Description
<mode>	system mode	2	Automatic selection
		13	GSM ONLY
		14	WCDMA ONLY
		15	TD-SCDMA ONLY
		16	No Change
<acqorder>	Network access sequence	0	Automatic
		1	GSM first, then UTRAN

		2	UTRAN first ,then GSM
		3	No Change
<roam>	Roaming support	0	roaming disabled
		1	roaming enabled
		2	No Change
<srvdomain>	Domain Setting	0	CS_ONLY
		1	PS_ONLY
		2	CS_PS
		3	ANY
		4	No Change

5.22 Brand information:AT^SPN

This command can read the brand information which includes network operator brand such as China Mobile, ChinaUnicom, China Telecom etc. and user brand such as M-zone,GoTone etc.The brand information is usually stored in the files with the file identifier EFSPN and the file ID 6F46 in the SIM/USIM card.

This command is used to read the brand information in ths SIM/USIM card.For USIM card, there're two EFSPN files, which respectively locates in the GSM directory and in the USIM directory, so it needs to specify which file to read.The EFSPN file format follows the 3GPP TS 31.102 V5.9.0.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT^SPN=<spn_type>	^SPN:<disp_rplmn>,<coding>,<spn_name> OK
Test Command	AT^SPN =?	^SPN:list of supported <spn_type>s OK

Defined values：

Parameter	Definition	Value	Description
< spn_type >	SPN type	0	GSM_SPN

		1	USIM_SPN
<disp_rplmn>	whether to display RPLMN	0	not display RPLMN
		1	display RPLMN
		99	the field is invalid, and no need to read the span_name field
<coding>	coding scheme,identify the <span_name> field character encoding and specify language	0	GSM 7 bit Default Alphabet
		1	UCS2
<spn_name>	stringstyle. When<spn_name> is coded using GSM7bit, it is no more than 16 bytes; when coded using USC2,the content data of this string is described with the type of sixteen hexadecimal text value, and the length is no more than 32 bytes.		

5.23 GSM Location and Time:AT+CIPGSMLOC

This command can read the local time and/or GSM base station location.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+CIPGSMLOC=<type>,<cid>	**If <type>=1:** +CIPGSMLOC:<locationcode>[,<longitude>,<latitude>,<date>,<time>] OK **If <type>=2:** +CIPGSMLOC: <locationcode>[,<date>,<time>] OK **If error is related to ME functionality:** +CME ERROR: <err>
Test Command	AT+CIPGSMLOC=?	+CIPGSMLOC:(list of supported <type>s),(range of <cid>) OK

Defined values：

Parameter	Definition	Value	Description
<type >	operation type	0	View the longitude, latitude and time
		1	View the time only
<cid>	as <cid> defined in +SAPBR	1-3	
<longitude>	Current longitude in degrees		
<latitude>	Current latiitude in degrees		
<date>	the format is yy/mm/dd		for example 18/11/08
<time>	the format is hh/mm/ss		for example 15:47:26
<locationcode>		0	Success
		404	Not Found
		408	Request Time-out
		601	Network Error
		602	No memory
		603	DNS Error
		604	Stack busy
		65535	Other Error

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	set bearer type SAPBR command is used to activate PDP context ,thus UDP protocol can be used to resolute the domain name.
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	set APN
←	OK	
→	AT+SAPBR =1,1	activate the GPRS PDP context
←	OK	
→	AT+SAPBR=2,1	query the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	the first parameter 1 is cid the second parameter 1 means the connection is setup the third parameter is IP address
→	AT+CIPGSMLOC=1,1	query lcoation and time

←	+CIPGSMLOC: 0,31.241045,121.472313,18/11/08,15:37:30 OK	
→	AT+CIPGSMLOC=2,1	query the time only
←	+CIPGSMLOC: 0,18/11/08,15:47:26 OK	
→	AT+SAPBR=0,1	deactivate the bearer
←	OK	

5.24 (URC) Manual PLMN selection option:+MSRI

Notification of allowing/disallowing Manual PLMN selection option in the user menu. The protocol stack sends an indication regarding whether manual PLMN selectionappearance in the user's menu. The decision regarding allowing / disallowing the appearance of this option in the user's menu is done by SIM.

Syntax:

URC
+MSRI: <ind>

Defined values：

Parameter	Definition	Value	Description
<ind>		0	not allowed
		1	allowed

6 NTP Related Commands;

NTP（Network Time Protocol）is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.
NTP is intended to synchronize all participating computers to within a few milliseconds of Coordinated Universal Time. It uses the intersection algorithmto select accurate time servers and is designed to mitigate the effects of variable network latency. NTP can usually maintain time to within tens of milliseconds over the public Internet, and can achieve better than one millisecond accuracy in local area networks under ideal conditions.

6.1 Set GPRS Bearer ID:AT+CNTPCID

Type of Command	Command	Possible response(s)

Set Command	AT+CNTPCID=<cid>	
Read Command	AT+CNTPCID?	+CNTPCID:<cid> OK
Test Command	AT+CNTPCID=?	+CNTPCID:(<cid>s) OK

Defined values:

Parameter	Definition	Value	Description
<cid>	GPRS bearer id	1-3	as <cid> in AT+SAPBR

6.2 Time Synchronizing:AT+CNTP

Type of Command	Command	Possible response(s)
Set Command	AT+CNTP=<NTP server>[,<time zone>]	OK
Execution Command	AT+CNTP	OK +CNTP: <code>
Read Command	AT+CNTP?	+CNTP: <NTP server>,<time zone> OK
Test Command	AT+CNTP=?	+CNTP: length of <NTP server>,range of <time zone> OK
Note	After successful time synchronization,AT+CCLK? can be used to query the local time.	

Defined values:

Parameter	Definition	Value	Description
<NTP server>	NTP server	domain or ip address	URL of NTP server
<time zone>	local time zone	-47~+48	unit:1/4 time zone. In fact,the time zone range is -12~+12,but some countries or regions adopt half time zone or even fouth time zone,so the unit is 1/4 time zone here. + positive means East time zone -negative means West time zone

<code>	操作码	1	network time synchronization is successful
		61	Network error
		62	DNS resoluation error
		63	connection error
		64	service response error
		65	service response timeout

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+SAPBR=3,1,"Contype","GPRS"	
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	
←	OK	
→	AT+SAPBR=1,1	
←	OK	
→	AT+CNTPCID=1	
←	OK	
→	AT+CNTP	
←	OK +CNTP:1	
→	AT+CCLK?	
←	+CCLK: "18/05/16,15:49:28+32" OK	

7 Mobile Termination Control and Status Commands

7.1 Phone activity status:AT+CPAS

Execution command returns the activity status <pas>of the MT. It can be used to interrogate the MT before requestingaction from the phone.

Test command returns values supported by the MT as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CPAS	+CPAS: <pas> OK
Test Command	AT+CPAS=?	+CPAS: (list of supported <pas>s) OK

Defined values:

Parameter	Definition	Value	Description
<pas>	Activity status	0	MT is ready
		2	unknown
		3	ringing
		4	call in progress or call hold

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CPAS=?	Query the scope of <pas>
←	+CPAS: (0,2,3,4) OK	
→	ATD138********;	Make a call
←	OK	
→	AT+CPAS	Make a query at once
←	+CPAS: 3 OK	3 – ringing on the called party's side

←（URC）	CONNECT	The call is answered by the called party
→	AT+CPAS	Query again
←	+CPAS: 4 OK	4- the call is in progress
←（URC）	NO CARRIER	The called party hangs up the call
→	AT+CPAS	Query again
←	+CPAS: 0 OK	0- MT is ready(idle)

7.2 Set phone functionality:AT+CFUN

Set command selects the level of functionality <fun>in the MT. Level"full functionality" is where the highest level ofpower is drawn. "Minimum functionality" is where minimum power is drawn. Level of functionality between these mayalso be specified by manufacturers. When supported by manufacturers, MT resetting with <rst>parameter may beutilized.
Test command returns values supported by the MT as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CFUN=[<fun>[,<rst>]]	OK
Read Command	AT+CFUN?	+CFUN: <fun> OK
Test Command	AT+CFUN=?	+CFUN: (list of supported <fun> s),(list of supported <rst> s) OK
Parameter saving mode	Auto save to NVM	

Defined values:

Parameter	Definition	Value	Description
<fun>	Functionality mode	0	Minimum functionality
		1	Full functionality
		3	disable phone receive RF circuits
		4	Flying mode. disable phone both transmit and receive RF circuits in this mode
		5	disable SIM
		6	turn off full secondary receive
<rst>	reset is needed or not	0	do not reset the MT before setting it to <fun> power level

		1	reset the MT before setting it to <fun> power level

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+CFUN?	Query the current <fun>
←	+CFUN: 1 OK	
→	AT+CFUN=1,1	Set <fun> =1 and <rst>=1, which means the module will reset and then go into full functionality mode after reset.
←	OK	

7.3 Power off:AT+CPOWD

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPOWD=<n>	<n>=0: Urgent Power off(the “NORMAL POWER DOWN” URC will not be printed) <n>=1: Normal Power off(the “NORMAL POWER DOWN” URC will be printed)

7.4 Input PIN:AT+CPIN

Set command sends to the MT a password which is necessary before it can be operated (SIM PIN, SIM PUK, PH-SIM PIN, etc.). If no PIN request is pending, no action is taken towards MT and an error message, +CME ERROR, is returned to TE.
If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM.

Read command returns an alphanumeric string with mixed mode, to indicate whether a password is required.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPIN=<pin>[,<new pin>]	OK
Read Command	AT+CPIN?	TA returns an alphanumeric string indicating whether or not a password is required. Response: +CPIN: <code>

		OK
Test Command	AT+CPIN=?	OK
URC	+CPIN: <code>	

Defined values:

Parameter	Definition	Value	Description
<pin>	Password	-	String type
<new pin>	New password	-	String type
<code>		READY	PIN has already been entered,or MT is not pending for any password
		SIM PIN	MT is waiting for SIM PIN to be given
		SIM PUK	MT is waiting for SIM PUK1 to be given if PIN1 was disabled after three failed attempts to enter PIN1
		SIM PIN2	MT is waiting for SIM PIN 2 to be given
		SIM PUK2	MT is waiting for SIM PUK 2 to be given
		SIM REMOVED	SIM card is removed

Examples:

Command （→）/Response（←）	AT Sequences	Description
→	AT+CPIN?	Query the PIN status
←	+CPIN: READY OK	
→	AT+CLCK="SC",1,"1234"	Open the PIN request,1234 is PIN code,SC=SIM card
←	OK	Reset the module after OK
←	+CPIN: SIM PIN	After initialization ,URC like this is reported , which means SIM PIN:ON and PIN request is pending
→	AT+CPIN="1234"	Input PIN code
←	+CPIN: READY OK	PIN code is correct
→	AT+CLCK="SC",2	Query the facility lock for SIM PIN
←	+CLCK: 0 OK	0- PIN code request is pending
→	AT+CLCK="SC",0,"1234"	Set the facility lock for SIM PIN disabled
←	OK	Reset the module after OK
←	+CPIN: READY	After initialization ,URC like this is reported , which means SIM PIN:OFF

7.5 Remaining Number of Retry:AT+EPIN

Get PIN's remaining number of retry.

Syntax:

Type of Command	Command	Possible response(s)
Read Command	AT+EPIN?	+EPIN:<p1 retry>,<p2 retry>,<puk1 retry>,<puk2 retry> OK
Test Command	AT+EPIN=?	+EPIN: (0-3),(0-3),(0-10),(0-10) OK

Defined values:

Parameter	Definition	Value	Description
<p1 retry>	remaining number of retry for PIN1	0-3	
<p2 retry>	remaining number of retry for PIN2	0-3	
<puk1 retry>	remaining number of retry for for PUK1	0-10	
<puk2 retry>	remaining number of retry for for PUK2	0-10	

7.6 Facility lock:AT+CLCK

Set command is used to lock, unlock or interrogate a MT or a network facility <fac>. Password is normally needed to do such actions. When querying the status of a network service (<mode>=2) the response line for 'not active'case (<status>=0) should be returned only if service is not active for any <class>.

Test command returns facility values supported as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CLCK=<fac>,<mode>[,<password>[,<class>]]	<mode>≠2,use this command to lock, unlock a MT or a network facility <facility>.Response: OK
		<mode>=2,use this command to interrogate a MT or a network facility <facility>.Response: +CLCK:<status>[,<class1><CR><LF>+CLCK:<status>,<class2>[...]] OK
Test Command	AT+CLCK=?	+CLCK:(list of supported <fac>s) OK

Defined values:

Parameter	Definition	Value	Description
<fac>	Facility	"AO"	BAOC (Bar All Outgoing Calls)
		"OI"	BOIC (Bar Outgoing International Calls)
		"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country)
		"AI"	BAIC (Bar All Incoming Calls)
		"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country)
		“AB”	All Barring services (applicable only for <mode>=0)
		“AG”	All outGoing barring services (applicable only for <mode>=0)
		“AC”	All inComing barring services (applicable only for <mode>=0)
		"SC"	SIM (lock SIM/UICC card) (SIM/UICC asks password in MT powerup and when this lock command issued)
		"FD"	SIM fixed dialing memory
		"PN"	Network Personalisation (GSM 02.22)
		"PP"	Service Provider Personalisation (GSM 02.22)
		"PU"	Network subset Personalisation(GSM 02.22)
		“PC”	Corporate Personalization (refer 3GPP TS 22.022)
<mode>	mode	0	Unlock
		1	Lock
		2	Query status
<status>	status	0	Off
		1	on
<classx>	Service class	1	Voice
		2	data
		4	Fax
		8	short message service
		16	data circuit sync
		32	data circuit async
		64	dedicated packet access
		128	dedicated PAD access
<password>	password		Password string used to lock or unlock a <facility>. String type.

Examples:

Command（→）/ Response（←）	AT Sequences	Description
		Please refer to +CPIN item

7.7 Change password:AT+CPWD

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

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK
Test Command	AT+CPWD=?	+CPWD: list of supported (<fac>,<pwdlength>)s OK

Defined values:

Parameter	Definition	Value	Description
<oldpwd>,<newpwd>	oldpassword, new password	-	string type; <oldpwd>shall be the same as password specified for the facility from the ME user interface or with command Change Password +CPWD and <newpwd>is the new password;maximumlength of password can be determined with <pwdlength>
<pwdlength>	Length of password	-	integer type ; maximum length of password for the facility
<fac>	facility		The same as the <fac> in AT+CLCK

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CLCK="SC",1,"1234"	PIN code lock must be enabled before changing the password
←	OK	
→	AT+CPWD="SC","1234","8888"	Change thePINcode from 1234 to8888
←	OK	Reset the module after OK
		reset the MT
←	+CPIN: SIM PIN	After initialization ,URC like this is reported , which means SIM PIN:ON and PIN request is pending
→	AT+CPIN="8888"	Input the new PIN code
←	+CPIN: READY OK	The pin code is correct

7.8 Set TE-TA baud rate:AT+IPR

Set command specifies the data rate at which the DCE will accept commands.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+IPR=<rate>	OK
Read Command	AT+IPR?	+IPR: <rate> OK
Test Command	AT+IPR=?	+IPR: (list of supported <rate>s) OK
Note	The default value of <rate> is 0(auto bauding).When <rate>=0,please note that: 1) once the baudrate is synchronized, AT commands in uppercase/lowercase/combined characters are eligible. 2) "AT+IPR=x;&W"(take x=115200,for example) can set the moudle to fixed baudrate x and save the baudrate to NVM. After the restart of the module,the baudrate is still x.	

Defined values:

Parameter	Definition	Value	Description
< rate>	Baud rate in bps(bit per second)	0	auto bauding
		1200	
		2400	
		4800	
		9600	
		14400	
		19200	
		28800	
		38400	
		57600	
		115200	
		230400	
		460800	
		921600	

Examples:

Command（→）/ Response（←）	AT Sequences	Description

→	AT+IPR=?	Query the current baud rate
←	+IPR: (),(1200,2400,4800,9600,14400,19200,28800,38400,57600,115200,230400,460800,921600) OK	

7.9 Set DTE-DCE character framing:AT+ICF

Set command is used to determine the local serial port start-stop (asynchronous) characterframing that the DCE shall use while accepting DTE commands and while transmitting information text and result code.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+ICF=<format>,[<parity>]	OK
Read Command	AT+ICF?	+ICF: < format >[,<parity >] OK
Test Command	AT+ICF=?	+ICF: (list of supported <format>s),(list of supported <parity>s) OK

Defined values:

Parameter	Definition	Value	Description
< format >	Framing format	0	auto detect
		1	8 data bits,0 parity bits, 2 stop bits
		2	8 data bits,1 parity bits, 1 stop bits
		3	8 data bits,0 parity bits, 1 stop bits
		4	7 data bits,0 parity bits, 2 stop bits
		5	7 data bits,1 parity bits, 1 stop bits
		6	7 data bits,0 parity bits, 1 stop bits Note: 0 parity bits means <parity> shall be ignored.
<parity>	Parity bit	0	odd
		1	even
		2	mark
		3	space

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+ICF=?	Query the scope of the value of the parameters

←	+ICF: (1-6),(0-3) OK	

7.10 DTE-DCE Local flow control:AT+IFC

Flow Control Introduction:

Flow control is very important for correct communication between the module and DTE. For in the case such as a data or fax call, the sending device is transferring data faster than the receiving side is ready to accept. When the receiving buffer reaches its capacity, the receiving device should be capable to cause the sending device to pause until it catches up.

There are basically two approaches to achieve data flow control: software flow control and hardware flow control.

And AirM2M wireless modules support both.

- software flow control

Software flow control sends different characters to stop (XOFF, decimal 19) and resume (XON, decimal 17) data flow. It is quite useful in some applications that only use three wires on the serial interface.

To enable software flow control, type the following AT:

AT+IFC=1, 1

This setting is stored volatile, for use after restart, AT+IFC=1, 1 should be stored to the user profile with AT&W. For example,if you want to set the module to 9600 baudrate permanently,type:

AT+IPR=9600;&W

Note:Software Flow control should not be used for data calls where binary data will be transmitted or received (e.g. TCP/IP) as the DTE interface may interpret binary data as flow control characters.

- hardware flow control

Hardware flow control achieves the data flow control by controlling the RTS/CTS line. When the data transfer should be suspended, the CTS line is set inactive until the transfer from the receiving buffer has completed. When the receiving buffer is ok to receive more data, CTS goes active once again.

To achieve hardware flow control, ensure that the RTS/CTS lines are present on your application platform.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+IFC=<dce_by_dte>,[<dte_by_dce>]	OK
Read Command	AT+IFC?	+IFC: < dce_by_dte>,< dte_by_dce> OK
Test Command	AT+IFC=?	+IFC: (list of supported <dce_by_dte>s),(list of supported <dte_by_dce>s)

		OK

Defined values:

Parameter	Definition	Value	Description
<dce_by_dte>	The follow control method adoped by DTE when receiving data from DCE	0	NO flow control
		1	Software flow control , do not pass XON/XOFF characters to the remote DCE
		2	Hardware flow control(RTS)
		3	Software flow control , pass XON/XOFF characters to the remote DCE
<dte_by_dce>	The follow control method adoped by DCE when receiving data from DTE	0	NO flow control
		1	Software flow control
		2	Hardware flow control(CTS)

Examples:

Command （→） / Response（←）	AT Sequences	Description
→	AT+IFC=?	Query the scope of < dce_by_dte> and < dte_by_dce>
←	+IFC: (0-3),(0-2) OK	
→	AT+IFC?	Query the current flow control method
←	+IFC: 0,0 OK	

7.11 Set Flicker Frequency of NET_LED:AT+SLEDS

This command is able to set the flicker frequency of the NET_LED.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT+SLEDS=<mode>, <timer_on>,<timer_off>	OK
Read Command	AT+SLEDS?	+SLEDS:<mode>, <timer_on>,<timer_off> OK
Test Command	AT+SLEDS=?	+SLEDS: (list of <mode>s), (list of <timer_on>s), (list of <timer_off>s) OK

Defined values：

Parameter	Definition	Value	Description
<mode>	mode of module	1	unregistered
		2	registered
		3	in PPP link
<timer_on>	time span of light on	0 or 40~65535	in unit of ms 0 means the LED is always on
<timer_off>	time span of light off	0 or 40~65535	in unit of ms 0 means the LED is always off

Examples：

Command（→）/ Response（←）	AT Sequences	Description
→	AT+SLEDS=?	test command
←	+SLEDS : (1-3),(0,40-65535),(0,40-65535) OK	
→	AT+SLEDS?	Read command
←	+SLEDS:<2>,<64>,<3000> +SLEDS:<1>,<64>,<800> +SLEDS:<3>,<64>,<300> OK	this is the default config

7.12 Hardware Detection of SIM:AT*SIMDETEC

The set command is used to detect the sim in specified slot was removed or not.

The test command returns supported sim slot.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT*SIMDETEC=<simslot>	*SIMDETEC: <state> OK
Test Command	AT*SIMDETEC=?	*SIMDETEC: (1,2) OK

Defined values：

Parameter	Definition	Value	Description
<simslot>	which sim slot	1	master sim slot

		2	slave sim slot(**not supported yet**)
<state>	string type	NOS	SIM was removed
		SIM	SIM was inserted

Examples：

Command（→）/ Response（←）	AT Sequences	Description
→	AT*SIMDETEC=1	
←	*SIMDETEC: NOS OK	the master sim was removed

7.13 Control Sim State Event Report:AT^CARDMODE

The set command controls the URC report ^CARDMODE.
When <n>=1 and the state of the SIM/USIM card changes,^CARDMODE:<sim_state> will be reported.
The read command returns the current SIM/USIM card state.

Syntax：

Type of Command	Command	Possible response(s)
Set Command	AT^CARDMODE=<n>	OK
Read Command	AT^CARDMODE?	^CARDMODE:<sim_state>[,<n>] OK
Test Command	AT^CARDMODE=?	^CARDMODE: (list of supported <n>s) OK
URC	^CARDMODE:<sim_state>	

Defined values:

Parameter	Definition	Value	Description
<n>		0	prohibit the active report event ^CARDMODE
		1	enable the active report event CARDMODE:<sim_state>.
<sim_state>	SIM card state	0	unknown mode
		1	SIM CARD
		2	USIM CARD
		255	no SIM/USIM card or the pin has not been checked or unlocked

7.14 Get Sim Type:AT*EUICC

Get the SIM card type.

Syntax：

Type of Command	Command	Possible response(s)
Read Command	AT^EUICC?	*EUICC: <n> OK

Defined values:

Parameter	Definition	Value	Description
<n>	SIM card type	0	SIM
		1	USIM

8 Phonebook

8.1 Select phonebook storage:AT+CPBS

This command is used to select the active phonebook storage, i.e. the phonebook storage that all subsequent phonebook commands will be operating on.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPBS=<storage>[,<password>]	OK
Read Command	AT+CPBS?	+CPBS:<storage>[,<used>,<total>] OK
Test Command	AT+CPBS=?	+CPBS: (list of supported <storage>s) OK
Note	Please set the <storage> type with the Set command before any other AT commands related to phonebook.	

Defined values:

Parameter	Definition	Value	Description
<storage>	storage type	“SM”	SIM/USIM phonebook
		“LD”	Last Dialing number
		"FD"	SIM fixed dialing number
		"ON"	Own Numbers,MSISDNs IN SIM card(can be read by+CNUM too)
		"DC"	Dialed Calls List
		"AP"	Selected application phonebook. If a UICC with an active USIM application is present, the application phonebook, DFPHONEBOOK under ADFUSIM is selected
<used>	indicating the number of used locations in selected storage	-	Integer type.
<total>	maximum number of locations allowed in the selected storage	-	Integer type.

Examples:

Command(→)/ Response(←)	AT Sequences	Description

→	AT+CPBS=?	Query all the storage type
←	+CPBS: ("SM","FD","LD","DC","ON","AP") OK	
→	AT+CPBS="SM"	Set SM as the storage type
←	OK	
→	AT+CPBS?	Query the current storage type
←	+CPBS: "SM",6,250 OK	
→	AT+CPBR=1,2	List all the SIM phonebook numbers
←	+CPBR: 1,"+8613762613263",145,"" OK	

8.2 Find a phonebook entry:AT+CPBF

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field starts with string <findtext>. Entry fields returned are location number <indexn>, phone number stored there,<number> (of format <type>), text <text> associated with the number .If listing fails in an MT error, +CME ERROR: <err> is returned.

Test command returns the maximum lengths of <number> and <text> fields.

Syntax:

Type of Command	Command	Responses
Set Command	AT+CPBF=<find text>	[+CPBF:<index1>,<number>,<type>,<text>[[...]<CR><LF>+CBPF:<index2>,<number>,<type>,<text>]] OK
Test Command	AT+CPBF=?	+CPBF:[<nlength>],[<tlength>] OK

Defined values:

Parameter	Definition	Value	Description
<index1>,<index2>	Index for entry	-	Integer type values in the range of location numbers of phonebook memory
<number>	Phone number	-	String type phone number of format <type>
<type>	Type of phone number	-	Please refer to GSM 04.08 subclause10.5.4.7AT+CSTA
<text>,<findtext>	The name of the phonebook entry	-	String type, and the character set is specified by +CSCS

<nlength>	The max length of <number>	-	Integer type,in units of bytes
<tlength>	The max length of the <text>	-	Integer type,in unit of bytes

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CPBF=?	
←	+CPBF: 40,14 OK	The max length of the name:14 The max length of the phone number:40
→	AT+CPBF="TOM"	Find a contact named ”TOM”
←	+CPBF: 5,"13601***187",129,"TOM" OK	Find it ,index=5

8.3 Read the phonebook entry:AT+CPBR

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

Test command returns location range supported by the current storage as a compound value and the maximum lengths of <number> and <text> fields.

Syntax:

Type of Command	Command	Response
Set Command	AT+CPBR=<index1>[,<index2>]	[+CPBR: <index1>,<number>,<type>,<text><CR><LF> [...]+CPBR: <index2>,<number>,<type>,<text>] OK
Test Command	AT+CPBR=?	+CPBR:(list of supported<index>s),[<nlength>], [<tlength>] OK

Defined values:

Parameter	Definition	Value	Description
<index1>,<index2>	Index for entry	-	Integer type values in the range of location number s of phonebook memory

<number>	Phone number	-	String type,defined by <type>
<type>	Type of phone number	-	Please refer to GSM 04.08 subclause 10.5.4.7 AT+CSTA
<text>	The name of the phonebook entry	-	String type, and the character set is defined by +CSCS
<nlength>	The max length of <number>	-	Integer type, unit: bytes
<tlength>	The max length of the <text>	-	Integer type,unit: bytes

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CPBR=1,5	List pb entry whose index=1~5
←	+CPBR: 1,"137***8187",129,"Test" +CPBR: 2,"139****8096",129,"TEST" +CPBR: 5," 13601***187",129,"zhangsan" OK	The result of the query
→	AT+CPBR=?	Query the range of the parameters
←	+CPBR: (1-250),40,14 OK	
→	AT+CPBS="ON"	Set “ON” as the PB storage type
a←	OK	
→	AT+CPBR=?	Query the range of the parameters
←	+CPBR: (1-2),40,14 OK	
→	AT+CPBS="ME"	Set “ME” as the PB storage type
←	OK	
→	AT+CPBR=?	Query the range of the parameters
←	+CPBR: (1-18),40,21 OK	

8.4 Write phonebook entry:AT+CPBW

Set command writes phonebook entry in location number <index>in the current phonebook memory storageselected with +CPBS. Entry fields written are phone number <number>(in the format <type>), text <text>associated with the number. If <index> is given as the only parameter, the phonebook entry specified by <index>is deleted. If writing fails in an MT error, +CME ERROR: <err>is returned.

Test command returns location range supported by the current storage as a compound value, the maximum

length of<number>field, supported number formats of the storage, and the maximum length of <text>field. In case of SIMstorage, the lengths may not be available.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPBW=[<index>][,<number>[,<type>,[<text>]]]	OK
Test Command	AT+CPBW=?	+CPBW: (list of supported <index>s),[<nlength>],(list of supported <type>s), [<tlength>] OK

Defined values:

Parameter	Definition	Value	Description
<index>	Index for entry		Integer type value in the range of location number of phonebook memory
<number>	Phone number		String type,defined by <type>
<type>	Type of phone number		Please refer to GSM 04.08 subclause 10.5.4.7 AT+CSTA in this doc
<text>	The name of the phonebook entry		String type, and the dcs is defined by +CSCS
<nlength>	The max length of the phone number		Integer type,in units of byte
<tlength>	The max length of the name		Integer type,in units of byte

Examples:

Command （→）/ Response（←）	AT Sequences	Description
→	AT+CPBW=?	
←	+CPBW:(1-500),40,(128,129,145,161,177) OK	
→	AT+CPBW=1, "150******58",129,"T"	Write an entry at a location (index=1)
←	OK	
→	AT+CPBR=1,200	Query all the PB entry(the storage type is defined by +CPBS)
←	+CPBR: 1,"150******58",129,"T" +CPBR: 2,"152******59",129,"LIAO" +CPBR: 3,"1502650",129,"" +CPBR: 4,"021******52",129,"W" +CPBR: 5,"021******68",129,"A"	Total 6 entries

	+CPBR: 6,"1",129,"" OK	
→	AT+CPBW=1	Delete the entry whose index=1
←	OK	
→	AT+CPBW=2	Delete the entry whose index=2
←	OK	
→	AT+CPBR=1,6	Query again
←	+CPBR: 3,"1502650",129,"" +CPBR: 4,"02131252252",129,"W" +CPBR: 5,"02131252252",129,"A" +CPBR: 6,"1",129,"" OK	The 1st and the 2nd entries are missing

8.5 Subcriber number:AT+CNUM

Action command returns the MSISDNs related to the subscriber.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CNUM	+CNUM:[<alpha1>],<number1>,<type1>[,<speed>,<service>][<CR><LF>+CNUM:[<alpha2>],<number2>,<type2>[,<speed>,<service>]][...]] OK
Test Command	AT+CNUM=?	OK

Defined values:

Parameter	Definition	Value	Description
<alphax>	Name of the number		Optional alphanumeric string associated with <numberx> ,whose coding sytem is defined by +CSCS
<numberx>	Own number		String type , in format of <typex>
<typex>	Type of <numberx>		Defined in GSM 04.08 subclause 10.5.4.7
<speed>	speed		Refer to <speed> in AT+CBST
<service>	Service related to phone number	0	asynchronous Modem
		1	synchronous Modem
		2	PAD access(asynchronous)
		3	Packet access(synchronous)
		4	Voice
		5	fax

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CPBS="ON"	SetON(Own Number) as the PB storage type
←	OK	
→	AT+CPBW=1,"180********",145	Write the own number in
←	OK	
→	AT+CNUM	Query the own number(i.e. subscriber number)
←	+CNUM: "","+180********",145 OK	

8.6 (URC)Phonebook Ready: +MPBK

AirM2M extended AT command to indicate that the SIM and/or NVRAM phonebooks are ready to use.

Syntax:

URC
+MPBK: <bReady >

Defined values:

Parameter		Value	Description
<bReady>	whether SIM and/or NVRAM phonebooks are ready for use	0	ready
		1	not ready

9 Commands for SIM Card Operation

9.1 Generic SIM Access:AT+CSIM

Set command transmits to the MT the SIM command it then shall send as it is to the SIM.

This command allows a direct control of the SIM by a distant application on the TE. The TE shall then take care of processing SIM information within the frame specified by GSM/UMTS.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSIM=<length>,<Command>	+CSIM: < length >,< response > OK
Test Command	AT+CSIM=?	OK

Defined values:

Parameter	Definition	Value	Description
<length>	length of characters sent to the TE in <Command> or <response>		Integer type,twice the number of octets in the raw data
<Command>	command passed on by the MT to the SIM in the format as described in GSM 51.011		string type(string should be included in quotation marks), hexadecimal character format
<response>	response to the command passed on by the SIM to the MT in the format as described in GSM 51.011		string type(string should be included in quotation marks), hexadecimal character format

A command APDU has the following general format:

CLA	INS	P1	P2	P3	Data

The response APDU has the following general format:

Data	SW1	SW2

The bytes have the following meaning:

CLA is the class of instruction, ‘A0’ is used in the GSM application;

INS is the instruction code for each command.

✧ P1, P2, P3 are parameters for the instruction. P1, P2, P3 are parameters for the instruction. They are specified in below table. ‘FF’ is a valid value for P1, P2 and P3. P3 gives the length of the data element. P3=’00’ introduces a 256 byte data transfer from the SIM in an outgoing data transfer command

(response direction). In an ingoing data transfer command (command direction), P3='00' introduces no transfer of data;

✧ SW1 and SW2 are the status words indicating the successful or unsuccessful outcome of the command.

Coding of the commands

COMMAND	INS	P1	P2	P3	S/R
SELECT	'A4'	'00'	'00'	'02'	S/R
STATUS	'F2'	'00'	'00'	lgth	R
READ BINARY	'B0'	offset high	offset low	lgth	R
UPDATE BINARY	'D6'	offset high	offset low	lgth	S
READ RECORD	'B2'	rec No.	Mode	lgth	R
UPDATE RECORD	'DC'	rec No.	Mode	lgth	S
SEEK	'A2'	'00'	type/mode	lgth	S/R
INCREASE	'32'	'00'	'00'	'03'	S/R
VERIFY CHV	'20'	'00'	CHV No.	'08'	S
CHANGE CHV	'24'	'00'	CHV No.	'10'	S
DISABLE CHV	'26'	'00'	'01'	'08'	S
ENABLE CHV	'28'	'00'	'01'	'08'	S
UNBLOCK CHV	'2C'	'00'	see note2	'10'	S
INVALIDATE	'04'	'00'	'00'	'00'	
REHABILITATE	'44'	'00'	'00'	'00'	
RUN GSM ALGORITHM	'88'	'00'	'00'	'10'	S/R
SLEEP	'FA'	'00'	'00'	'00'	
GET RESPONSE	'C0'	'00'	'00'	lgth	R
TERMINAL PROFILE	'10'	'00'	'00'	lgth	S
ENVELOPE	'C2'	'00'	'00'	lgth	S/R
FETCH	'12'	'00'	'00'	lgth	R
TERMINAL RESPONSE	'14'	'00'	'00'	lgth	S

NOTE1:

The direction of the data is indicated by (S) and I, where (S) stands for data sentby the ME while I stands for data received by the ME.

NOTE2:

If the UNBLOCK CHV command applies to CHV1 then P2 is coded '00'; if it applies to CHV2 then P2 is coded '02'.

NOTE3: for detail information, please refer to 3GPP TS 11.11

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+CSIM=14,A0A40000023F00	first use “SELECT” command(INS is A4) to select master file of GSM, file ID is 3F00
←	+CSIM:48,000000003F0001000000000009 9301020400838A838A9000	the end two bytes 9000 mapping SW1 and SW2 show the correctly executed of command
→	AT+CSIM=14,A0A40000026F07	then use “SELECT” command to select element file EFIMSI that contain IMSI, file ID is 6F07
←	+CSIM:34,000000096F07040014FF14010 200009000	
→	AT+CSIM=10,A0B0000009	use “READ BINARY” command(INS is B0) to read the IMSI
←	+CSIM:22,0849060057432199449000	
→	AT+CSIM=10,A0F200002F	CSIM is for all kinds of SIM-ME interface commands, on condition that the user must be familiar with GSM11.11 and GSM11.14. Here,take STATUS command for example,we can use it to query the current MF/DF/EF information: 10 –the number of characters in the following “” A0 - CLA F2 - INS 00 - P1 00 - P2 2F - P3 Please refer to GSM11.11 chapter 9
←	+CSIM: 48,"000022c07f1002000000000000991000c 0600838a838a91d3" OK	48 –the length of the <response> quoted in “” 0000 – RFU(For Future Use) 22c0 – the remaining space in DF/EF 7F10– fileid ,7F10 means this is a DF file （DFTELECOM） 02 – type of file,02 means DF 0000000000 – RFU(reserved for future use) 09 – the length of the following data(GSM specific data here)

9.2 Restricted SIM access:AT+CRSM

By using this command instead of Generic SIM Access +CSIM TE application has easier but more limited access to theSIM database. Set command transmits to the MT the SIM <command>and its required parameters. MT handlesinternally all SIM-MT interface locking and file selection routines. As response to the command, MT sends the actualSIM information parameters and response data. MT error result code +CME ERROR may be returned when thecommand cannot be passed to the SIM, but failure in the execution of the command in the SIM is reported in <sw1>and <sw2>parameters.

Coordination of command requests to SIM and the ones issued by GSM/UMTS application inside the MT is implementation dependent. However the TE should be aware of the precedence of the GSM/UMTS application commands to the TE commands.

Syntax:

Type of	Command	Possible response(s)

Command		
Set Command	AT+CRSM=<command>[,<fileid>[,<P1>,<P2>,<P3>[,<data>[,<pathid>]]]]	+CRSM:<sw1>,<sw2> [,<response>] OK
Test Command	AT+CRSM=?	+CRSM: (176,178,192,214,220,242),(12037-28599),(0-255),(0-255),(0-255),<data>,<pathid> OK

Defined values:

Parameter	Definition	Value	Description
<command>	The command sent to SIM （please refer to GSM51.011）	176	READ BINARY
		178	READ RECORD
		192	GET RESPONSE
		214	UPDATE BINARY
		220	UPDATE RECORD,
		242	STATUS
		other values	Reserved
<fileid>	EF File ID Necessary for every command except STATUS	(2FE2)12258	ICCID file
		(6F37)28471	ACMmax
		(6F07)28423	IMSI
		(6F39)28473	ACM file
		(6F3A)28474	ADN file(i.e. SIM PB)
		(6F40)28480	MSISDN
		(6F41)28481	PUKT
		(6F42)28476	SMS
		(6F46)28486	SPN
		(6FAD)28589	EF_{AD}(Administrative data)
		(6FC9)28617	EF_{MBI} (Mailbox Identifier)
		-	Other Value
<data>		-	Information sent toSIM card (in hexadecimal format)
<sw1>, <sw2>	Reponse information Integer type Please refer to GSM 11.11	0x90 0x00	144,0,command executed sucessfully
		0x9F 0xXX	length XX of the response data
		0x92 0x0X	update successful but after using an internal retry routine X times
		0x92 0x40	memory problem
		0x94 0x02	out of range (invalid address)
		0x94 0x04	file ID not found; pattern not found

<table>
<tr><td></td><td></td><td>0x94 0x08</td><td>file is inconsistent with the command</td></tr>
<tr><td></td><td></td><td>0x98 0x02</td><td>no CHV initialized</td></tr>
<tr><td></td><td></td><td>0x98 0x04</td><td>access condtion not fullfiled / unsuccessfull CHV verify / authentication failed</td></tr>
<tr><td></td><td></td><td>0x98 0x08</td><td>in contradiction with CHV status</td></tr>
<tr><td></td><td></td><td>0x98 0x10</td><td>in contradiction with invalidation status</td></tr>
<tr><td></td><td></td><td>0x98 0x40</td><td>Unsuccessfull CHV-verif. or UNBLOCK CHF / CHV blocked /UNBL.blocked</td></tr>
<tr><td></td><td></td><td>0x98 0x50</td><td>increase can not be performed. Max. value reached</td></tr>
<tr><td></td><td></td><td>0x67 0xXX</td><td>incorrect parameter P3</td></tr>
<tr><td></td><td></td><td>0x6B 0xXX</td><td>incorrect parameter P1 or P2</td></tr>
<tr><td></td><td></td><td>0x6D 0xXX</td><td>unknown instruction code given in the command</td></tr>
<tr><td></td><td></td><td>0x6E 0xXX</td><td>wrong instruction class given in the command</td></tr>
<tr><td></td><td></td><td>0x6F 0xXX</td><td>technical problem with no diagnostic given</td></tr>
<tr><td><response></td><td></td><td>-</td><td>Response for command</td></tr>
<tr><td><P1>,<P2></td><td>File access conditions,please refer to GSM 11.11</td><td>0~255</td><td rowspan="2"><P1>,<P2>,<P3> are all decimal integer,defined as:
<table><tr><th>COMMAND</th><th>INS</th><th>P1</th><th>P2</th><th>P3</th><th>S/R</th></tr><tr><td>STATUS</td><td>'F2'</td><td>'00'</td><td>'00'</td><td>lgth</td><td>R</td></tr><tr><td>READ BINARY</td><td>'B0'</td><td>Offset high</td><td>Offset low</td><td>lgth</td><td>R</td></tr><tr><td>UPDATE BINARY</td><td>'D6'</td><td>Offset high</td><td>Offset low</td><td>lgth</td><td>S</td></tr><tr><td>READ RECORD</td><td>'B2'</td><td>Rec No.</td><td>Mode</td><td>lgth</td><td>R</td></tr><tr><td>UPDATE RECORD</td><td>'DC'</td><td>Rec No</td><td>Mode</td><td>lg h</td><td>S</td></tr><tr><td>GET RESPONSE</td><td>'C0'</td><td>'00'</td><td>'00'</td><td>lgth</td><td>R</td></tr></table>
P3=00 means:
1) in ME->SIM direction(command),P3=00 means no data input
2) in SIM->ME direction(response),P3=00 means there are 256 bytes waiting for fetch</td></tr>
<tr><td><P3></td><td>File length</td><td>0~255</td></tr>
</table>

<pathid>	string type; contains the path of an elementary file on the SIM/UICC in hexadecimal format as defined in ETSI TS 102 221 (e.g. “7F205F70” in SIM and UICC case). The <pathid> shall only be used in the mode “select by path from MF” as defined in ETSI TS 102 221n Note: Since valid elementary file identifiers may not be unique over all valid dedicated file identifiers the <pathid> indicates the targeted UICC/SIM directory path in case of ambiguous file identifiers. For earlier versions of this specification or if <pathid>is omitted, it could be implementation specific which one will be selected

Examples:

<table>
<tr><th>Command(→)/ Response(←)</th><th>AT Sequences</th><th>Description</th></tr>
<tr><td colspan="3">Reading and writing of a SIM Short Messages(EFSMS):</td></tr>
<tr><td>→</td><td>AT+CRSM=178,28476,9,4,176</td><td>Read a SIM message(i.e.EFSMS)

<table><tr><th>Parameter</th><th>Definition</th><th>decription</th></tr><tr><td>178</td><td><command></td><td>READ RECORD</td></tr><tr><td>28476</td><td><fileid></td><td>SIMEF_{SMS}</td></tr><tr><td>9</td><td><P1></td><td>9-index of the SM</td></tr><tr><td>4</td><td><P2></td><td>4-absolute mode</td></tr><tr><td>176</td><td><P3></td><td>176-length of the SIM message record</td></tr></table></td></tr>
<tr><td>←</td><td>+CRSM:
144,0,"010891683110304105F16005A
10110F10008118082127424238805000
033B02015C0A656C76845BA26237FF
0C60A8672C6B214E0A7F516D4191C
F0030002E003000370035004D0042FF
0C672C67087D2F8BA14F7F7528672
C57306D4191CF00320037003300360
02E003300340030004D0042FF0C595
799105185672C670852694F59672C57
306D4191CF003300330035002E0036
00360030004D0042FF0C672C6708FF
FFFFFFFFFFFFFFFFFFFFFFFFF"

OK</td><td>The result of the query.

<table><tr><th>Parameter</th><th>Definition</th><th>decription</th></tr><tr><td>144,0</td><td><sw1>, <sw2></td><td>command succeeds</td></tr><tr><td>"01”</td><td>status</td><td>01-read MT SM；
00-empty MT SM；
02-unread MT SM；
05-sent MO SM；
07-unsent MO SM.

Please refer to GSM11.1110.3.3</td></tr><tr><td>“08916831
10304105
….FFFF”</td><td>TPDU packet</td><td>Please refer to GSM 03.40 and GSM 04.11</td></tr></table></td></tr>
<tr><td>→</td><td>AT+CRSM=220,28476,2,4,176,"01089
1683110304105F16005A10110F10008
118082127424238805000033B02015C0
A656C76845BA26237FF0C60A8672C
6B214E0A7F516D4191CF0030002E00
3000370035004D0042FF0C672C6708
7D2F8BA14F7F7528672C57306D4191
CF00320037003300360002E003300340</td><td>Write a message.
The parameters are just the same as above.</td></tr>
</table>

<table>
<tr><td></td><td>030004D0042FF0C595799105185672
C670852694F59672C57306D4191CF0
03300330035002E003600360030004D
0042FF0C672C6708FFFFFFFFFFFFF
FFFFFFFFFFFFFF"</td><td></td></tr>
<tr><td>←</td><td>+CRSM: 144,0,""

OK</td><td>This command is executed successfully</td></tr>
<tr><td colspan="3">Reading and writing of a SIM PB entry（i.e.EFADN）:</td></tr>
<tr><td>→</td><td>AT+CPBR=?</td><td>Query the max length for the name of a SIM PB entry（i.e. Alpha Identifier）: X</td></tr>
<tr><td>←</td><td>+CPBR: (1-250),40,14

OK</td><td><tlength>=X=14,so
The record length=X+14=28 bytes
（as to why ,please refer to GSM11.11 subclause 10.3.1）</td></tr>
<tr><td>→</td><td>AT+CRSM=220,28474,3,4,28,"545454
54303132333435363738390781313 63
83838F8FFFFFFFFFFFF"</td><td>Having known the record length,we can use UPDATE RECORD to write a SIM PB record(index=3)

<table><tr><th>Parameter</th><th>Definition</th><th>decription</th></tr><tr><td>220</td><td><command></td><td>UPDATE RECORD</td></tr><tr><td>28474</td><td><file id></td><td>SIM PB（i.e.EFADN）</td></tr><tr><td>3</td><td><P1></td><td>3-index of the record</td></tr><tr><td>4</td><td><P2></td><td>4-absolute mode</td></tr><tr><td>28</td><td><P3></td><td>the record length =28</td></tr><tr><td>54545454 30313233 34353637 3839</td><td>The name of a PB entry</td><td>TTTT0123456789</td></tr><tr><td>07</td><td>length of phone number</td><td></td></tr><tr><td>81</td><td>TON/NPI</td><td></td></tr><tr><td>31363838 38F8</td><td>Phone number（ in BCD form）</td><td>The number is 13638383838</td></tr></table></td></tr>
<tr><td>←</td><td>+CRSM: 144,0,""

OK</td><td>This command is executed successfully</td></tr>
<tr><td>→</td><td>AT+CRSM=178,28474,3,4,28</td><td>Read the PB record(index=3)</td></tr>
<tr><td>←</td><td>+CRSM: 144,0,"
54545454303132333435363738390 78
13136383838F8FFFFFFFFFFFF "

OK</td><td></td></tr>
<tr><td colspan="3">Read IMSI:</td></tr>
<tr><td>→</td><td>AT+CRSM=176,28423,0,0,9</td><td>READ BINARY, file ID(6F07)</td></tr>
<tr><td>←</td><td>+CRSM: 144,0,084906005743219944</td><td>generic success code, 9 bytes of file data</td></tr>
<tr><td colspan="3">Read other EF file:</td></tr>
<tr><td>→</td><td>AT+CRSM =176,12258,0,0,10</td><td>This EF file is transparent type,so it must be read with</td></tr>
</table>

		READ BINARY offset high and offset low is 0,the length of the file is 10,so here P3=10
←	+CRSM: 144,0,"98681011271300853289" OK	

9.3 SIM Toolkit Application Related Service: AT+MSTK

Services related to SIM Toolkit application [AirM2M private AT command].

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+MSTK=<cmd>[,<data>]	+MSTK:<cmd>, <response data> OK
Test Command	AT+MSTK=?	+MSTK: (0-3),<data> OK
URC	There will be unsolicited result code +MSTK:<cmdType>[,<value>] sent from MT to TE after set command is applied	

Defined values:

Parameter	Definition	Value	Description
<cmd>		0	enable/disable proactive command Indication
		1	download ME capability profile
		2	requests SIMAT notification capability info
		3	get SIM card profile
		4	send envelope command
		11	respond to proactive command
		12	respond to setup call request from STK app
<cmdType>		11	proactive indication
		12	setup call indication
		13	display Info indication
		14	session end indication
		15	set up call status indication
		16	set up call result indication
		18	send SM status indication
		19	send SM result indication
		20	send USSD result indication

Examples:

cmd(→)/ rsp(←)	AT Sequences	Description
disable proactive command indication:		
→	AT+MSTK=0,0	
←	OK	
enable proactive command indication:		
→	AT+MSTK=0,1	
←	OK	
get SIM(USIM) card profile, every bit represent each facility supported or not by SIM		
→	AT+MSTK=3	
←	+MSTK:3, FFFFFFFF7F11009F3F0000000000000000 (+MSTK:3, FFFFFFFF7F1100DFFF000000000000000000) OK	SIM USIM
request SIMAT notification capability info:		
→	AT+MSTK=2	
←	+MSTK: 2, 111212111333421211 OK	
download ME capability profile, every bit represent each facility supported or not by SIM(USIM)		
→	AT+MSTK=1, FFFFFFFF7F11009F3F0000000000000000 (AT+MSTK=1, FFFFFFFF7F1100DFBF000000000000000000)	SIM USIM
←	OK	
proactive SIM toolkit commands:		
←	+MSTK: 11, D05E010302250002028182050F80005500530049004D53615E9475280F082880624B673A62A50F0C5680624B673A84254E1A53850F06688070AB94C30F0A778065B095FB5A314E500F0AA880638C4E0A80A15E020F0ABF807CBE5F694E0A6D77	proactive SIM commands ”SET UP MENU” indication
→	AT+MSTK=11,0103022500820282818301 00	respond to proactive command “SET UP MENU”
←	OK	
→	AT+MSTK=4,d30782020181900128	send envelope command “MENU SELECTION”
←	OK	
←	+MSTK: 11, D02F0103042400020281820F10018065B095FB65E9665A62A55B9A52360F06028053D66D880F0A03804E1A52A14ECB7ECD	proactive SIM commands “SELECT ITEM” indication
→	AT+MSTK=11,0103042400820282818301 11	respond to proactive command “SELECT ITEM”
←	OK	
←	+MSTK: 14	Session End indication

10 Commands for Short Messages

10.1 PDU Introduction

Octet 1								Octet 2								Octet sequence
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
SCA Length = n								1	TON			NPI				1 ~ 2
SCA																3 ~ (1+n)
RP	UDHI	SRR	VPF		R D	MTI		TP-MR								(2+n)~ (3+n)
DA – length = m								1	TON			NPI				(4+n)~(5+n)
Destination Address																(6+n) ~ (6 + n + (m+1) / 2)
PID								DCS								(7 + n + (m+1) / 2) ~ (8 + n + (m+1) / 2)
VP (Valid Period) (length = s, s= 1 octet or 7 octet according to VPF value)																(8 + n + (m+1) / 2)~ (8 + s + n + (m+1) / 2)
UDL (User Data Length) = x								UD (user data)								(9 + s + n + (m+1) / 2) ~(10 + x + s + n + (m+1) / 2)
UD (user data)																

Figure 2:MO PDU format

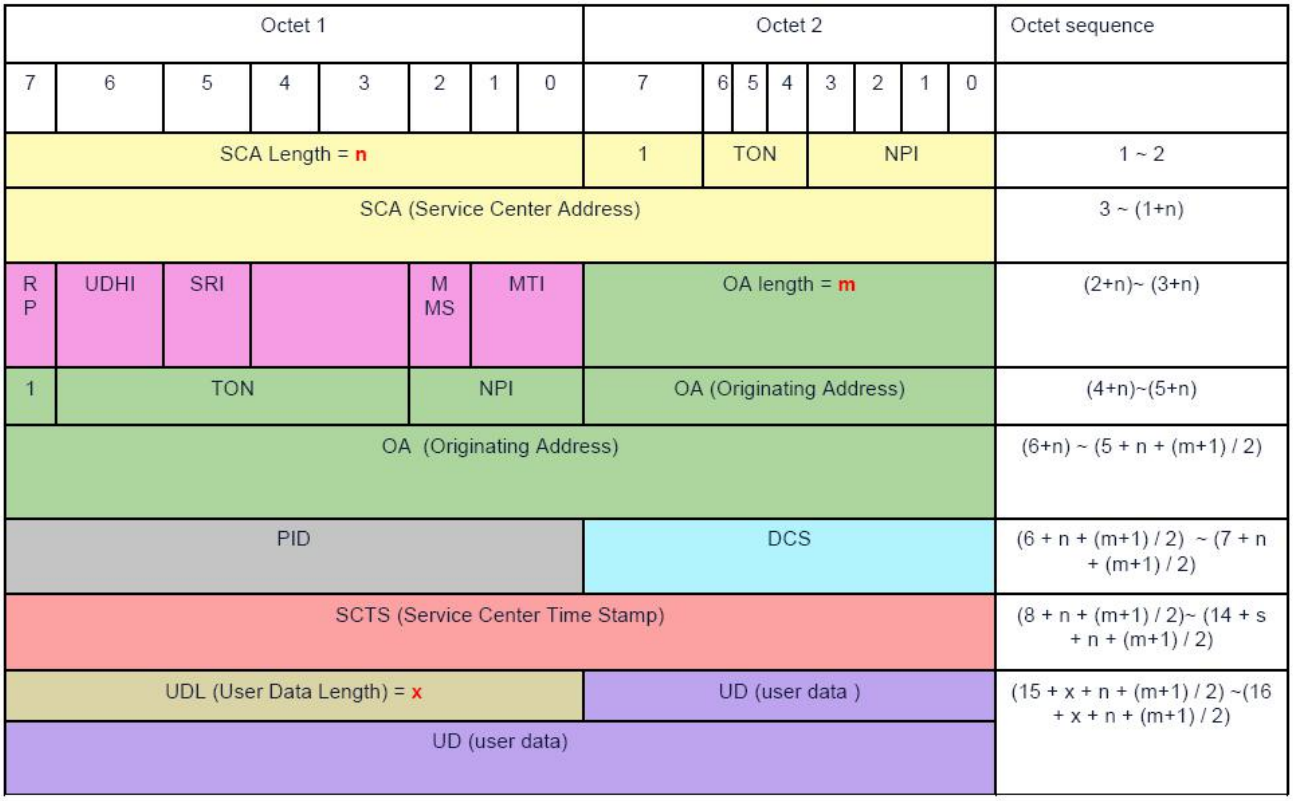

Figure 3:MT PDU formtat

Defined values:

Parameter	Definition	Description
MO	Mobile Originated	
MT	Mobile Terminated	
SCA Length	Length of SCA	SCA: Short message Center Address
TON	Type of Number	000: unknown 001: international 010: national 111: reserved
NPI	Numbering Plan Identifier	0000:unknown 0001:ISDN/phone number 1111:reserved
SCA	ShortMessageCenter Address	
MTI	Message Type Identifier	Bit1 0 Description 11 Reserved 10 SMS-STATUS REPORT (SC => MS) 01 SMS-SUBMIT (MS => SC) 00 SMS-DELIVER (SC => MS)
RD	Reject Duplicate	
VPF	Validity Period Format	
SRR	Status Report Request	

SRI	Status Report Indication	
UDHI	User Data Header Indicator	
RP	Reply Path	

10.2 Short message Service:AT+CSMS

Set command selects messaging service <service>. It returns the types of messages supported by the MT: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported by the MT (but is supported by the TA), final result code +CMS ERROR: <err> shall be returned.

Also read command returns supported message types along the current service setting.

Test command returns a list of all services supported by the TA.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSMS=<service>	+CSMS:<mt>,<mo>,<bm> OK
Read Command	AT+CSMS?	+CSMS:<service>,<mt>,<mo>,<bm> OK
Test Command	AT+CSMS=?	+CSMS:(list of supported <service>s) OK

Defined values:

Parameter	Definition	Value	Description
<service>	Short message service level	0	3G TS 23.040 and 3G TS 23.041
		1	3GTS 23.040 and 3G TS 23.041 (the requirement of <service> setting 1 is mentioned under corresponding command descriptions)
<mt>	SMS-MO（sent message）	0	type not supported
		1	type supported
<mo>	SMS-MT（received message）	0	type not supported
		1	type supported
<bm>	Cell broadcast message	0	type not supported
		1	type supported

10.3 Preferred Message Storage:AT+CPMS

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS:<used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK
Read Command	AT+CPMS?	+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK
Test Command	AT+CPMS=?	+CPMS:(list of supported <mem1>s),(list of supported <mem2>s),(list of supported <mem3>) OK

Defined values:

Parameter	Definition	Value	Description
<mem1>	string type; memory from which messages are read and deleted The related commands are: AT+CMGL, AT+CMGR ,AT+CMGD	“SM”	SIM message storage
		“ME”	ME message storage
<mem2>	string type; memory to which writing and sending operations are made The related commands are:AT+CMSS and AT+CMGW	“SM”	SIM message storage
		“ME”	ME message storage
<mem3>	string type; memory to which received SMs are preferred to be stored (unless forwarded directly to TE; refer command New Message Indications +CNMI)	“SM”	SIM message storage
		“ME”	ME message storage
<used1><used2><used3>	Number of messages currently in <mem1,2,3>	-	Integer type.
<total1><total2><total3>	total number of message locations in <mem1,2,3>	-	Integer type.

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CPMS=?	
←	+CPMS: ("SM"),("SM"),("SM") OK	
→	AT+CPMS?	The current preferred SM storage type
←	+CPMS: "SM",8,50,"SM",8,50,"SM",8,50 OK	
→	AT+CPMS="SM","SM","SM"	set “SM” storage type for <mem1>, <mem2> and <mem3> Note: only SM type is supported at present
←	OK	

10.4 Service Center Address:AT+CSCA

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSCA=<sca>[,<tosca>]	OK
Read Command	AT+CSCA?	+CSCA:<sca>,<tosca> OK
Test Command	AT+CSCA=?	OK

Defined values:

Parameter	Definition	Value	Description
<sca>	ShortMessage Servercie Center Address	-	String type, the format is defined by <tosca>
<tosca>	Type of sca, Integer type	145	ISDN / telephone numbering design, the world number
		129	ISDN / telephone numbering design, the country / world is unknown.
		161	ISDN / telephone numbering design, the country's number.
		128~255	other values please refer to GSM 04.08 section 10.5.4.7

Examples:

Command（→）	AT Sequences	Description

/Response（←）		
→	AT+CSCA="+8613010314500",145	Set the SCA number
←	OK	
→	AT+CSCA?	Query the SCA number
←	+CSCA:"+8613010314500",145 OK	

10.5 Select SMS Message Format:AT+CMGF

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

Test command returns supported modes as a compound value.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMGF=[<mode>]	OK
Read Command	AT+CMGF?	+CMGF: <mode> OK
Test Command	AT+CMGF=?	+CMGF: (list of supported <mode>s) OK

Defined values:

Parameter	Definition	Value	Description
<mode>	the input, output,display format of the short messages	0	PDU,default
		1	TEXT

Examples:

Command（→） /Response（←）	AT Sequences	Description
→	AT+CMGF?	Query the current format
←	+CMGF: 0 OK	PDU

10.6 Set Text Mode Parameters:AT+CSMP

Set command is used to select values for additional parameters needed when SM is sent to the network or placed in storage when text format message mode is selected. It is possible to set the validity period starting from when the SM is received by the SMSC (<vp> is in range 0... 255) or define the absolute time of the validity period termination (<vp> is a string). The format of <vp> is given by <fo>. If TA supports the EVPF, rf. 3GPP TS 23.040 [3], it shall be given as a hexadecimal coded string (refer e.g. <pdu>) with double quotes.

NOTE: When storing a SMS-DELIVER from the TE to the preferred memory storage in text mode (refer command Write Message to Memory +CMGW), <vp> field can be used for <scts>.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]	OK
Read Command	AT+CSMP?	+CSMP:<fo>,<vp>,<pid>,<dcs> OK
Test Command	AT+CSMP=?	+CSMP: (list of supported <fo>s),(list of supported <vp>s), (list of supported <pid>s), (list of supported <dcs>s) OK

Defined values:

Parameter	Definition	Value	Description
<fo>	First Octet		Detailed information about <fo>（take SMS-SUBMIT for example）: b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 RP | UDHI | SRR | VPF | RD | MTI MTI(Message Type Indication): b1=0&b0=0 :SMS-DELIVER b1=0&b0=1 :SMS-SUBMIT please refer to GSM03.40 for other message type VPF(valid period format): b4=1&b3=0:Relative format,<vp>is a 1-byte integer b4=1&b3=1:Absolute format,<vp>is a 7-byte integer SRR(Status Report Request),defines if status report is needed: 0- Status report is not needed 1- Status report is needed UDHI(User Data Header Indicator),indicates that if there is a header in User Data: 0- There is no header 1- There is a header

<table>
<tr><td></td><td></td><td></td><td>RP:Reply Path
RD:Reject Duplicate</td></tr>
<tr><td><vp></td><td>Valid Period</td><td></td><td>The foramat is defined by VPF in <fo>:
● If VPF=10(Binary),<vp> is in relative format,and the valid period is defined as follows:
<table><tr><th><vp> value</th><th>Valid period</th></tr><tr><td>0-143(00 to 8F)</td><td>(vp + 1) x5 minutes</td></tr><tr><td>144-167(90 to A7)</td><td>12hours + ((vp – 143)×30minutes</td></tr><tr><td>168-196(A8 to C)</td><td>(vp – 166) x 1 days</td></tr><tr><td>197-255(C5 to FF)</td><td>(vp – 192) x 1 weeks</td></tr></table>● If VPF=11(Binary),<vp> is in absolute format which is a 7-byte string.</td></tr>
<tr><td><pid></td><td>TP-protocol-id</td><td>0</td><td>Integer type ,please refer to GSM03.40 for details</td></tr>
<tr><td><dcs></td><td>Data coding scheme</td><td></td><td>Integer type ,please refer to GSM03.38 for details, generally:
0- 7bit GSM Default
4- 8bit Data
8- UCS2</td></tr>
</table>

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CSMP=17,11,0,0	Set the TEXTParameters: <fo>=17（default）,means: MTI=01（binary）=SMS-SUBMIT,and VPF=10（binary）= Relative format <vp>=11,means the valid period is（11+1）x5minutes=1 hour <dcs>=0,means 7bit GSM Default
←	OK	

10.7 Show text mode parameters:AT+CSDH

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSDH=[<show>]	OK
Read Command	AT+CSDH?	+CSDH:<show> OK
Test Command	AT+CSDH=?	+CSDH:<show> OK

Defined values:

Parameter	Definition	Value	Description
<show>	If the header information will be showed	0	do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in AT+CNMI, AT+CMGL,AT+CMGR result codes for SMS-DELIVERs and SMSSUBMITs in text mode; for SMS-COMMANDs in AT+CMGR result code, do not show <pid>, <mn>, <da>, <toda>,<length> or <cdata>
		1	Show the header informations mentioned above

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CSDH?	Query about <show>
←	+CSDH: 0 OK	Header information is not displayed
→	AT+CMGR=8	Read the SM whose index=8
←	+CMGR: "REC READ","+86131******56",,"12/08/08,10:43:04+32" Good! OK	<fo>,<vp>,<pid>,<dcs>,<sca>,<tosca> are not displayed
→	AT+CNMI=2,2,0,0,0	Set that new message is routed to TE directly
←	OK	
←（URC）	+CMT: "+86131******56",,"12/08/08,11:09:23+32" Report	<fo>、<vp>、<pid> and <dcs>、<sca>、<tosca> are not displayed
→	AT+CSDH=1	Set <show>=1
←	OK	
→	AT+CMGR=8	Read the SM whose index=8
←	+CMGR: "REC UNREAD" ,"+86131******56",,"12/08/08,10:43:04+32",145,17,0,0,"+8613800210500",145,4 Good! OK	<fo>、<vp>、<pid> and <dcs>、<sca>、<tosca> are displayed
←（URC）	+CMT: "+86131******56",,"12/08/08,11:05:45+32",145,17,0,0,"+8613800210500",145,7 weather	A new message is reported. <fo>、<vp>、<pid> and <dcs>、<sca>、<tosca> are displayed

10.10 New Message Indications to TE:AT+CNMI

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

When DTR signal is not available or the state of the signal is ignored (V.25ter command &D0), reliable message transfer can be assured by using +CNMA acknowledgement procedure.

<mode> controls the processing of unsolicited result codes specified within this command, <mt> sets the result code indication routing for SMS-DELIVERs, <bm> for CBMs and <ds> for SMS-STATUS-REPORTs. <bfr> defines the handling method for buffered result codes when <mode> 1, 2 or 3 is enabled. If ME does not support requested item (although TA does), final result code +CMS ERROR: <err> is returned.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	OK
Read Command	AT+CNMI?	+CNMI:<mode>,<mt>,<bm>,<ds>,<bfr> OK
Test Command	AT+CNMI=?	+CNMI: (list of supported <mode>s),(list of supported <mt>s),(list of supported <bm>s),(list of supported <ds>s),(list of supported <bfr>s) OK

Defined values:

Parameter	Definition	Value	Description
<mode>	controls the processing of unsolicited result codes specified within this command	0	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
		1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved (e.g. in on-line data mode). Otherwise forward them directly to the TE.
		2	Buffer unsolicited result codes in the TA when TA-TE link is reserved (e.g. in on-line data mode) and flush them to the TE after reservation. Otherwise forward them directly to the TE.
		3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband technique used to embed result codes and data when TA is in on-line data mode
<mt>	the rules	0	No SMS-DELIVER indications are routed to the TE.

<table>
<tr><td rowspan="5"></td><td rowspan="5">for storing received SMs depend on its data coding scheme</td><td>1</td><td>If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code: +CMTI: <mem>,<index></td></tr>
<tr><td>2</td><td>SMS-DELIVERs (except class 2 messages and messages in the message waiting indication group (store message)) are routed directly to the TE using unsolicited result code in the following formats:
+CMT:[<alpha>],<length><CR><LF><pdu> (PDU mode) or
+CMT:<oa>, [<alpha>] , <scts> , <tooa>, <fo>, <pid>, <dcs>,<sca>,<tosca>,<length>]<CR><LF><data>(TEXT mode)
If ME has its own display device then class 0 messages and messages in the message waiting indication group (discard message) may be copied to both ME display and to TE. In this case, ME shall send the acknowledgement to the network (refer table 2). Class 2 messages and messages in the message waiting indication group (store message) result in indication as defined in <mt>=1.</td></tr>
<tr><td>3</td><td>Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1</td></tr>
<tr><td colspan="2">The relationship between SMS-DELIVER result code（+CMT, +CMTI）and +CNMA:
<table>
<tr><td><mt></td><td>n class or class 1</td><td>class 0 or messagewaiting indication group (discard)</td><td>class 2 or messagewaiting indication group (store)</td><td>class 3</td></tr>
<tr><td>1</td><td>+CMTI</td><td>[+CMTI1)]</td><td>+MTI</td><td>+CMTI</td></tr>
<tr><td>2</td><td>+CMT & +CNMA3)</td><td>+CMT [& +CNMA2)]</td><td>+CMTI</td><td>+CMT & +CNMA3)</td></tr>
<tr><td>3</td><td>+CMTI</td><td>[+CMTI1)]</td><td>+CMTI</td><td>+CMT& +CNMA3)</td></tr>
<tr><td colspan="5">1) This result code is displayed if AT is the only display device；
2) When +CSMS <service>=1 and AT is the only display device for ME,+CNMA is needed for confirmation.
3) When +CSMS <service>=1, confirmation of +CNMA is needed in due time,otherwise,NO new SM will be routed to TE.</td></tr>
</table></td></tr>
<tr><td rowspan="2"><bm></td><td rowspan="2">the rules for storing received CBMs depend on its data coding scheme</td><td>0</td><td>No CBM indications are routed to the TE.</td></tr>
<tr><td>2</td><td>New CBMs are routed directly to the TE using unsolicited result code:
+CBM:<length><CR><LF><pdu> (PDU mode) or
+CBM:<sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data> (TEXT mode)</td></tr>
<tr><td rowspan="2"><ds></td><td rowspan="2">Status report mode</td><td>0</td><td>无SMS-STATUS-REPORTS发送到TE.</td></tr>
<tr><td>1</td><td>SMS-STATUS-REPORTs are routed to the TE using unsolicited result code:
+CDS:<length><CR><LF><pdu>(PDU mode) or
+CDS:<fo>,<mr>,[<ra>],[<tora>],<scts>, <dt>,<st>(TEXT mode)</td></tr>
</table>

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

Examples:

Command(→) /Response(←)	AT Sequences	Description
→	AT+CNMI=?	
←	+CNMI: (0-3),(0-3),(0,2,3),(0-1),(0) OK	
→	AT+CNMI?	Querty the the current value of parameters
←	+CNMI: 2,1,0,0,0 OK	2,1,0,0,0 is the current and default configuration
←（URC）	+CMTI: "SM",1	A new message has arrived,buffered in <mem1>,report the new message index indication via +CMTI to TE
→	AT+CNMI=2,2 Or AT+CNMI=2,2,0,0,0	<mt>=2,i.e. new message is not buffered but routed to TE directly
←	OK	
→	AT+CMGF?	
←	+CMGF: 0 OK	PDU mode now
←（URC）	+CMT: ,24 0891683108200105F0040D916831 29634152F6000021808041844223 04F7349B0D	A new PDU short message is in: +CMT: ,24 24-length of PUD,length of SCA is not included 08- Length of SCA（in bytes,TON/NPI is included） 91- TON/NPI 683108200105F0- SCA, 8613800210500. 04- First Octet of PDU 0D-length of OA 91683129634152F6- OA,8613923614256 00- PID（Protocol Identifier） 00- DCS（Data Coding Scheme）:7BIT GSM DEFAULT 21801341844223- SCTS（SM Center Time Stamp）,08/31/2012,14:48:24,+8GMT 04- length of user data F7349B0D- 7BIT GSM DEFAULT decoded “will”
→	AT+CNMA	+CNMA is needed
←	OK	
→	AT+CMGF=1	Set to TEXT mode
←	OK	
←（URC）	+CMT: "+86131******56",,"12/08/08,11:05:4	Receive a new TEXT short message

	5+32",145,17,0,0,"+8613800210500",145,7 Will-go	
→	AT+CNMA	+CNMA is needed
←	OK	

10.11 New Message Acknowledgement to TA/ME:AT+CNMA

Execution command confirms correct reception of a new message (SMS-DELIVER or SMS-STATUS-REPORT) which is routed directly to the TE.
This acknowledgement command (causing ME to send RP-ACK to the network) shall be used when +CSMS parameter <service> equals 1. TA shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.
Syntax:

Type of Command	Command	Possible response(s)
Execution Command	TEXT mode（AT+CMGF=1）: AT+CNMA	OK
	PDU mode（AT+CMGF=0）: AT+CNMA[=<n>[,<length>[<CR>PDU is given <ctrl-Z/ESC>]]]	OK
Test Command	AT+CNMA=?	OK

Defined values:

Parameter	Definition	Value	Description
<n>	The +CNMA application methods	0	command operates similarly as defined for the text mode
		1	Send RP-ACK (or buffered result of receiving the correct code)
		2	send RP-ERROR (if PDU is not given, ME/TA shall send SMS-DELIVER-REPORT with 3GPP TS 23.040 TP-FCS value set to 'FF' (unspecified error cause))

Examples:

Command（→）/Response（←）	AT Sequences	Description
		Look up +CNMI for application

10.12 Send a short message:AT+CMGS

Set command sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	In TEXT mode (AT+CMGF=1): AT+CMGS=<da>[,<toda>]<CR>text to send <CTRL-Z/ESC>	+CMGS:<mr> OK Note:< CTRL-Z > sends a message,<ESC> cancel sending
		+CMS ERROR: <err>
	In PDU mode (AT+CMGF=0): AT+CMGS=<length><CR>PDU to send < CTRL-Z/ESC>	+CMGS:<mr> OK
		+CMS ERROR: <err>
Test Command	AT+CMGS=?	OK

Defined values:

Parameter	Definition	Value	Description
<da>	Destination Address	-	3GPP TS 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>
<toda>	Type of <da>	-	3GPP TS 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43), default is 145, otherwise default is 129)
<length>	PDU length	-	integer type,SCA length is not included
<mr>	Message Reference	0~255	integer type, GSM 03.40 TP-Message-Reference

Examples:

Command（→）/Response（←）	AT Sequences	Description
Send an english short message in TEXT mode:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CSMP?	Query the parameters in TEXT mode
←	+CSMP: 17,11,0,0 OK	Current <dcs>=0 （GSM 7 bit default）
	AT+CSCS?	
	+CSCS: "IRA" OK	
→	AT+CMGS="139****6785"	Send an English short message to a cell phone

<table>
<tr><td></td><td>>HI!<ctrl-Z ></td><td></td></tr>
<tr><td>←</td><td>+CMGS: 108

OK</td><td>succeed,<mr>=108</td></tr>
<tr><td colspan="3">Send a chinese short message in TEXT mode:</td></tr>
<tr><td>→</td><td>AT+CSMP=17,167,0,8</td><td><dcs>=8（UCS2）</td></tr>
<tr><td>←</td><td>OK</td><td></td></tr>
<tr><td>→</td><td>AT+CMGS="1381671****"

>611F8C22<ctrl-Z ></td><td>Send a Chinese SM to 1381671****

Note:in software,please input 611F8C22 in hexadecimal format,and send with <ctrl-Z > (0x001A in hexadecimal format)</td></tr>
<tr><td>←</td><td>+CMGS: 109

OK</td><td>succeed,<mr>=109</td></tr>
<tr><td colspan="3">Send an chinese short message in PDU mode:</td></tr>
<tr><td>→</td><td>AT+CMGF=0</td><td>Set to PDU mode</td></tr>
<tr><td>←</td><td>OK</td><td></td></tr>
<tr><td>→</td><td>AT+CMGS=19
>0011100D91683161450179F90008
0004611F8C22 [CTRL+Z]</td><td>19- PDU length(SCA length is not included)
00- Means the SCA length is 0,in which case ,SCA is got from SIM card. This byte(00) is not include in PDU.
11- PDU first octet
<table><tr><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr><tr><td>RP</td><td>UDHI</td><td>SRR</td><td colspan="2">VPF</td><td>RD</td><td colspan="2">MTI</td></tr><tr><td></td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td colspan="2">1</td></tr></table>
10- TP-MR,benchmark
0D- DA length
91683161450179F9- DA（Destination Address）
● Protocol Identifier (PID)
08- Data coding scheme (DCS),8 =UCS2
00- Valid Period (VP)
04- User Data length
611F8C22- Unicode for Chinese character</td></tr>
<tr><td>←</td><td>+CMGS: 110

OK</td><td></td></tr>
</table>

10.13 Send Message from Storage:AT+CMSS

Set command sends message with location value <index> from preferred message storage <mem2> to the network (SMS-SUBMIT or SMS-COMMAND). If new recipient address <da> is given for SMS-SUBMIT, it shall be used instead of the one stored with the message. Reference value <mr> is returned to the TE on successful message delivery.

Syntax:

Type of Command	Command	Response
Set Command	AT+CMSS=<index>[,<da>[,<toda>]]	+CMSS:<mr>

		OK
Test Command	AT+CMSS=?	OK

Defined values:

Parameter	Definition	Value	Description
<index>	The index of the SM to be sent	-	integer type
<da>	Destination Address	-	3GPP TS 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>
<toda>	Type of <da>	-	3GPP TS 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43), default is 145, otherwise default is 129)
<mr>	Message Reference	0~255	integer type, GSM 03.40 TP-Message-Reference

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CMSS=6	Send previously stored message(index=6), the receiver's number is still the one which is stored in the message by +CMGW
←	+CMSS: 11 OK	Sent successfully ,<mr>=11
→	AT+CMSS=7,"136017*****"	Send previously stored message(index=7), and change the recipient number to 136017*****
←	+CMSS: 12 OK	Sent successfully

10.14 More message to send:AT+CMMS

Set command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.
Test command returns supported values as a compound value.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMMS= [<n>]	OK
Read Command	AT+CMMS?	+CMMS: <n>

		OK
Test Command	AT+CMMS=?	+CMMS: (list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	-	0	disable
		1	Keep enabled until the time between the response of the latest message send command (+CMGS, +CMSS, etc.) and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), then ME shall close the link and TA switches <n> automatically back to 0
		2	enable if the time between the response of the latest message send command and the next send command exceeds 1-5 seconds (the exact value is up to ME implementation), ME shall close the link but TA shall not switch automatically back to <n>=0

10.15 Write Message to Memory:AT+CMGW

Set command stores message (either SMS-DELIVER or SMS-SUBMIT) to memory storage <mem2>. Memory location <index> of the stored message is returned. By default message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	In TEXT mode（AT+CMGF=1）: AT+CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]]<CR>text is entered <ctrl-Z/ESC>	+CMGW: <index> OK
		+CMS ERROR: <err>
	In PDU mode（AT+CMGF=0）: AT+CMGW=<length>[,<stat>] <CR> PDU is given <ctrl-Z/ESC>	+CMGW: <index> OK
		+CMS ERROR: <err>
Test Command	AT+CMGW=?	OK

Defined values:

Parameter	Definition	Value	Description
<da>	Destination Address	-	3GPP TS 23.040 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default

			alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in 3GPP TS 27.007); type of address given by <toda>
<toda>	Type of <da>	-	3GPP TS 24.011 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43), default is 145, otherwise default is 129)
<oa>	Originating Address	-	3GPP TS 23.040 TP-Originating-Address Address-Value field in string format; BCD numbers (or GSM 7 bit default alphabet characters) are converted to characters of the currently selected TE character set (refer command +CSCS in TS 07.07); type of address given by <tooa>
<tooa>	Type of <oa>	-	3GPP TS 24.011 TP-Originating-Address Type-of-Address octet in integer format
<length>	PDU length	-	integer type,SCA length is not included
<stat>	Message state	REC UNREAD	received unread message (in TEXT mode,i.e. +CMGF=1)
		REC READ	received read message (in TEXT mode,i.e. +CMGF=1)
		STO UNSENT	stored unsent message (in TEXT mode,i.e. +CMGF=1)
		STO SENT	stored sent message (in TEXT mode,i.e. +CMGF=1)
		0	received unread message (in PDU mode,i.e.+CMGF=0)
		1	received read message (in PDU mode,i.e.+CMGF=0)
		2	stored unsent message (in PDU mode,i.e.+CMGF=0)
		3	stored sent message (in PDU mode,i.e.+CMGF=0)

Examples:

Command（→）/Response（←）	AT Sequences	Description
Store a short message in TEXT mode:		
	AT+CMGF=1	
	OK	
	AT+CMGW="139****6785" >HI!<ctrl-Z >	
	+CMGW: 6 OK	index=6,means this message is stored in location 6
Store a short message in PDU mode:		
→	AT+CMGF=0	
←	OK	
→	AT+CMGW=19 >0011100D91683161450179F9000800046 11F8C22 [CTRL+Z]	683161450179F9-detination address,8613165410979

←	+CMGW: 7 OK	index=7,means this message is stored in location 7

10.16 Read a short message:AT+CMGR

Set command returns message with location value <index> from message storage <mem1> to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters +CSDH. If status of the message is 'received unread', status in the storage changes to 'received read'.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMGR=<index>	In PDU mode（AT+CMGF=0）,Response: **+CMGR:<stat>,[<alpha>],<length><CR><LF><pdu>** **OK**
		In TEXT mode（AT+CMGF=1）: for SMS-DELIVER,response: **+CMGR:<stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>** **OK** for SMS-SUBMIT,response: **+CMGR:<stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,[<vp>],<sca>,<tosca>,<length>]<CR><LF><data>** **OK** for SMS-STATUS-REPORT,response: **+CMGR:<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>** **OK** for SMS-COMMAND,response: **+CMGR:<stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length><CR><LF><cdata>]** **OK**
Test Command	AT+CMGR=?	OK

Defined values:

Parameter	Definition	Value	Description
<da>,<oa>			Please refer to AT+CMGW
<toda>,<tooa>			
<length>			
<stat>			
<alpha>	Name of <da> or <oa>		String type
<pid>	Protocol Identification		Please refer to AT+CSMP
<fo>	PDU first octedt		
<vp>	Valid Period		
<dcs>	Data Coding System		
<scts>	ShortMessageCenter Time Stamp		GSM 03.40 TP-Service-Centre-Time-Stamp
<dt>	Discharge time		GSM 03.40 TP-Discharge-Time
<st>	Status		integer type,GSM 03.40 TP-Status
<ct>	Command Type		integer type,GSM 03.40 TP-Command-Type,default value is 0
<ra>	Receiver address		String type,GSM 03.40 TP-Recipient-Address -Value
<cdata>	Response to SMS-COMMAND in TEXT mode		GSM 03.40 TP-Command-Data
<mr>	Message Reference		integer type, GSM 03.40 TP-Message-Reference

Examples:

Command（→）/Response（←）	AT Sequences	Description
Read a message in TEXT mode:		
→	AT+CMGF=1	Set to TEXT mdoe
←	OK	
→	AT+CSCS="GSM"	
←	OK	
→	AT+CMGR=6	Read a message whose index=6
←	+CMGR: "REC READ","+86139*******9","12/03/30,20:40:31+32" HI!	
Read a message in PDU mode:		
→	AT+CMGF=0	Set to PDU mode
←	OK	
→	AT+CMGR=9	Read a message whose index=9

←	+CMGR: 0,,24 0891683108200105F0240D9168316145017 9F900082180904121102304611F8C22 OK	

10.17 List messages:AT+CMGL

Set command returns messages with status value <stat> from message storage <mem1> to the TE. About text mode parameters in italics, refer command Show Text Mode Parameters +CSDH.

If status of the message is 'received unread', status in the storage changes to 'received read'.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMGL=<stat>	In PDU mode（AT+CMGF=0）: **+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu><CR><LF>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu>[...]]** **OK**
		In TEXT mode（AT+CMGF=1）: SMS-DELIVER or SMS-SUBMIT, Response: **+CMGL:<index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF>+CMGL:<index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]]** **OK** SMS-STATUS-REPORT,Response: **+CMGL:<index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR><LF>+CMGL:<index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]** **OK** To SMS-COMMAND,Response: **+CMGL:<index>,<stat>,<fo>,<ct>[<CR><LF>+CMGL:<index>,<stat>,<fo>,<ct>[...]]** **OK**

Test Command	AT+CMGL=?	+CMGL: (list of supported <stat>s) OK
Note	**All the values of <stat> in text mode must be capitalized and quoted in "".**	

Defined values:

Parameter	Value		Description
<stat>	in PDU mode (AT+CMGF=0)	0	received unread messages (i.e. new messages)
		1	received read messages
		2	stored unsent messages
		3	stored sent messages
		4	all messages
	in TEXT mode (AT+CMGF=1)	"REC UNREAD"	received unread messages (i.e. new messages)
		"REC READ"	received read messages
		"STO UNSENT"	stored unsent messages
		"STO SENT"	stored sent messages
		"ALL"	all messages

Examples:

Command(→) /Response(←)	AT Sequences	Description
List short messages in TEXT mode:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CMGL=?	Query the scope of <stat>s
←	+CMGL: "REC UNREAD","REC READ","STO UNSENT","STO SENT","ALL" OK	
→	AT+CMGL="ALL"	List all messages
List	+CMGL: 8,"REC READ","+8613162310263",,"12/08/08,10:43:04+32" hi +CMGL: 9,"REC READ","+8613162310263",,"12/08/09,14:12:01+32" aŒ" OK	
List short messages in PDU mode:		
→	AT+CMGF=0	Set to PDU mode

←	OK	
→	AT+CMGL=?	
←	+CMGL: (0-4) OK	
→	AT+CMGL=4	List all messages
←	+CMGL: 8,1,,24 0891683108200105F0240D91683161320162F3 000021808001344023 04D7A2930A +CMGL: 9,1,,24 0891683108200105F0240D91683161320162F3 000821809041211023 04611F8C22 OK	

10.18 Delete message:AT+CMGD

Execution command deletes message from preferred message storage <mem1> location <index>. If <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below.

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

Type of Command	Command	Possible response(s)	Description
Set Command	AT+CMGD=<index>	OK	Delete message whose location is <index>
	AT+CMGD=<index>,<delflag>	OK	Delete all the messages whose state=<deflag>
Test Command	AT+CMGD=?	+CMGD:(list of supported <index>s),(list of supported <delflag>s) OK	
Note	When <delflag>=1,2,3,4,<index>shall be ignored		

Defined values:

Parameters	Definition	Value	Description
<index>	SM location index	-	integer type
<delflag>	Delete flag,integer type.	0	delete the message specified in <index>
		1	Delete all read messages from preferred message storage, leaving unread messages and storedmobile originated messages (whether sent or not) untouched
		2	Delete all read messages from preferred message storage and sent mobile originated messages,leaving unread messages and

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

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CPMS="SM"	Set storage type to SIM
←	OK	
→	AT+CMGD=1	Delete the message whose index =1
←	OK	
→	AT+CMGD=1,4	All short messages are deleted
←	OK	

10.19 Select Cell Broadcast Message Types:AT+CSCB

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

Syntax:

Type of Command	Command	Response
Set Command	AT+CSCB=[<mode>[,<mids>[,<dcss>]]]	OK
Read Command	AT+CSCB?	+CSCB:<mode>,<mids>,<dcss> OK
Test Command	AT+CSCB=?	+CSCB: (list of supported <mode>s) OK

Defined values:

Parameter	Definition	Value	Description
<mode>		0	message types specified in <mids> and <dcss> are accepted
		1	message types specified in <mids> and <dcss> are not accepted
<mids>	all different possible combinations of CBM message identifiers	-	String type; default is empty string, e.g. "0,1,5,320-478,922"
<dcss>	all different possible combinations of CBM data coding schemes	-	String type;default is empty string,e.g. "0-3,5"

10.20 Reset Memory Full Status:AT*RSTMemFull

Execution command resets memory full status.The PS will send the networkan indication that there is enough memory to send at least one SMS.The network can start forwarding the pending messages that were held due to memeory full status.

Syntax:

Type of Command	Command	Response
Set Command	AT*RSTMemFull	OK
Test Command	AT*RSTMemFull =?	*RSTMemFull: OK

10.21 (URC)SMS Status Change Indication:+MMSG

AirM2M extended AT command to Indicate an Short Messages Storage status change.

Syntax:

URC
+MMSG: <smsReady>, <smsFull>

Defined values:

Parameter	Definition	Value	Description
<smsReady>	indicates if the SIM is ready for SMS	0	not ready
		1	ready
<smsFull>	indicates if the memory capacity of SIM for SMS has been reached	0	not reached
		1	reached

10.22 Short Message Service Failure Result Code:CMS ERROR:<err>

Final result code +CMS ERROR: <err> indicates an error related to mobile equipment or network. The operation is similar to ERROR result code. None of the following commands in the same command line is executed. Neither ERROR nor OK result code shall be returned. ERROR is returned normally when error is related to syntax or invalid parameters.

<err> code	Definition
300	ME failure
301	Reserved SMS operation of ME
302	operation not allow

303	operation not support
304	Invalid parameters of PDU mode
305	Invalid parameters of Text mode
310	need SIM card PIN number
311	need PH-SIM card PIN number
312	SIM failure
313	SIM busy
314	SIM error
315	need SIM card PUK
316	need SIM card PIN2
317	need SIM card PUK2
318	Memory failure
320	need SIM card PIN number
321	Invalid memory index
322	Memory full
323	Invalid Parameter
324	Invalid inputting format
330	SMSC address unknown
331	no network service
332	SMSC address unknown
340	No confirmation is expected in the + CNMA
500	Unknown error
511	Reserved value within 256 ~ 511
512	Vary according to the manufacturer
513	Unread record in SIM
514	CB unknown error
515	PS busy
517	SM not ready
528	Invalid(non-hexadecimal) character in PDU
529	PDU length wrong
530	invalid MTI
531	Invalid(non-hexadecimal) character in address
532	Invalid address
533	PDU lengh（UDL）wrong
534	SCA length wrong
536	Invalid first octet
537	Invalid type of Command
538	SRR bit is not set
539	SRR set
540	invalid User Data Header IE
753	CRSM Parameter lack
754	CRSM invalid command
755	CRSM invalid file

756	CRSM missing P Parameter
757	CRSM invalid P Parameter
758	CRSM command data lack
759	CRSM invalid character in command line
765	Invalid input
766	Mode not supported
767	Operation fail
770	SIM network refuse
771	Seting up call
772	SIM closed
773	SIM file not present

11 Commands for Supplementary Services

11.1 Call Forwarding Number and Conditions:AT+CCFC

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CCFC=<reason>,<mode>[,<number>[,<type>[,<class>[,<subaddr>[,<atype>[,<time>]]]]]]	If <mode>≠2 and the command is executed successfully: **OK**
		If <mode> = 2 and the command is executed successfully（In which case <reason>= 0 ~3,in other words ,when <mode>=2,<reason> is not allowed to be 4 or 5）: ● For a SIM card whose call forwarding service has been activated: **+CCFC: <status>,<class1>[,<number>,<type>[,<subaddr>,<satype>[,< time>]]][<CR><LF>+CCFC: <status>,<class2>[,<number>,<type>[,<subaddr>,<satype>[,< time>]]][…]** **OK** ● For a SIM card whose call forwarding service has not been activated: **+CCFC: <status>, <class>** **OK**
Test Command	AT+CCFC=?	+CCFC: (list of supported<reason>s) OK

Defined values:

Parameter	Definition	Value	Description
<reason>	The reason for call forwarding	0	unconditional
		1	mobile busy
		2	no reply
		3	not reachable
		4	all call forwarding (please refer to 3GPP TS 22.030)

		5	all conditional call forwarding (please refer to 3GPP TS 22.030)
<mode>	The state of call forwarding	0	disable
		1	enable
		2	query status
		3	registration
		4	erasure
<number>	phone number of forwarding address in format specified by <type>		
<type>	The type of <number>		defined by <type> in AT+CSTA default 145 when dialling string includes international access code character "+", otherwise 129
<class>	is a sum of integers each representing a class of service	1	voice (telephony)
		2	data (refers to all bearer services; with <mode>=2 this may refer only to some bearer service if TA does not support values 16, 32, 64 and 128)
		4	fax (facsimile services)
		7	All of the above 3
<subaddr>	subaddress of format specified by <satype>		String type
<satype>	type of <subaddr>		integer type
<time>	Waiting time	1~30s	when "no reply" is enabled or queried, this gives the time in seconds to wait before call is forwarded,default value is 20
<status>	Status	0	not active
		1	active

Examples:

Command（→）/Response（←）	AT Sequences	Description
	AT+CCFC=?	Query the scopt of value of <reason>
	+CCFC: (0,1,2,3,4,5) OK	<reason>=0,1,2,3,4,5
→	AT+CCFC=0,2	Query the current states of unconditionalcall forwarding supplementary services
←	+CCFC: 0,7 OK	<status>=0, not active <class>=7, all types of call forwarding supplementary services supported by module
→	AT+CCFC=1,2	Query the current states of mobile busy call forwarding supplementary services
←	+CCFC: 0,1	Call forwarding services for class 1/2/4 are not registered yet

	+CCFC: 0,2 +CCFC: 0,4 OK	
→	AT+CCFC=1,3,"1360******7"	Set a mobile busy call forwarding to number 1360******7
←	OK	
→	AT+CCFC=1,2	Query the current states of mobile busy call forwarding supplementary services
←	+CCFC: 1,1,"+861360******7",145,,, +CCFC: 0,2 +CCFC: 0,4 OK	<status>=1 and <class>=1 means mobile busy call forwarding service for voice has been registered/enabled
→	AT+CCFC=1,4	Erasure of mobile busy call forwarding service
←	OK	
→	AT+CCFC=1,2	Query the current states of mobile busy call forwarding supplementary services again
←	+CCFC: 0,1 +CCFC: 0,2 +CCFC: 0,4 OK	Call forwarding services for class 1 is erased

11.2 Call Waiting:AT+CCWA

This command allows control of the Call Waiting supplementary service according to 3GPP TS 22.083. Activation,deactivation and status query are supported. When querying the status of a network service (<mode>=2) the responseline for 'not active' case (<status>=0) should be returned only if service is not active for any <class>. Parameter<n>is used to disable/enable the presentation of an unsolicited result code +CCWA:<number>,<type>,<class>[,<alpha>] to the TE when call waiting service is enabled. Command should be abortable when network isinterrogated.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is describedin the GSM/UMTS standards.

Test command returns values supported as a compound value.
Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CCWA=<n>[,<mode>[,<class>]]	<mode>≠2,and the command is executed successfully: OK

		<mode> = 2 and the command is executed successfully: +CCWA :<status>,<class1>[<CR><LF>+CCWA:<status>,<class2>[...]] OK
Read Command	AT+CCWA?	+CCWA: <n> OK
Test Command	AT+CCWA=?	+CCWA: (list of supported <n>s) OK
URC report	+CCWA: <number>,<type>,<class>[,<alpha>]	When AT+CCWA=1,1(Set call waiting on),a URC like this will be routed to TE if another call is coming in during call connection state.

Defined values:

Parameter	Definition	Value	Description
<n>	sets/shows the result code presentation status to the TE	0	disabled
		1	enabled
<mode>	when <mode> parameter is not given, network is not interrogated	0	disabled
		1	enabled
		2	query status
<class>	a sum of integers each representing a class of information (default 7)	1	voice (telephony)
		2	data
		4	fax (facsimile services)
		7	all（1+2+4）
<status>	status	0	Inactive
		1	active
<number>	phone number of calling address in format specified by <type>		string type
<type>	type of address octet		integer format (refer TS 24.008 subclause 10.5.4.7)

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CCWA=1,2	Query the current state of call waiting
←	+CCWA: 0,7 OK	The call waiting service is inactive
→	AT+CCWA=1,1	Set call waiting service to active
←	OK	
→	AT+CCWA=1,2	Query the current state of call waiting
←	+CCWA: 1,1	<status>=1 and <class>=1 means the call waiting

	OK	service for voice has been registered
→	ATD137******98;	Originate a voice call
←	OK	
←（URC）	CONNECT	The call is connected
←（URC）	+CCWA: "13601*****97",129,1	Another call is coming in

11.3 Call related supplementary services:AT+CHLD

This command allows the control of the following call related services:
- A call can be temporarily disconnected from the ME but the connection is retained by the network;
- Multiparty conversation (conference calls);
- The served subscriber who has two calls (one held and the other either active or alerting) can connect the other parties and release the served subscriber's own connection.

Calls can be put on hold, recovered, released, added to conversation, and transferred similarly as defined in 3GPP TS 22.030.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CHLD=<n>	OK
Test Command	AT+CHLD=?	+CHLD: (list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	integer type	0	Terminate all held calls or UDUB (User Determined User Busy) for a waiting call
		1	Terminate all active calls (if any) and accept the other call (waiting call or held call)
		1X	Terminate the active call number X (X= 1-7)
		2	Place all active calls on hold (if any) and accept the other call (waiting call or held call) as the active call
		2X	Place all active calls except call X (X= 1-7) on hold
		3	Add the held call to the active calls
		4	connects the two calls and disconnects the subscriber from both calls (ECT)

Examples:

Command（→）	AT Sequences	Description

/Response（←）		
→	AT+CCWA=1,1	Set call waiting service to active
←	OK	
→	ATD137******98;	Make a voice call
←	OK	
←（URC）	CONNECT	The called party accepts the call
←（URC）	+CCWA: "13601*****97",129,1	Just now another call is coming in
→	AT+CHLD=2	Hold the first call (+CLCCid=1),accept the second call(+CLCCid=2)
←	OK	
→	AT+CLCC	List the current call
←	+CLCC: 1,0,1,0,0," 137******98",129 +CLCC: 2,1,0,0,0, " 13601*****97",128,"TEST" OK	For the first call(id=1),the third parameter <stat>=1 means this call is held For the second call(id=2),<stat>=0 means this call is in active state
→	AT+CHLD=21	put the second call (+CLCC id=2) on hold, recover the first call(+CLCC id=1)
←	OK	
→	AT+CHLD=3	Set up multi-party call（the precondition is the multi-party call service has been opened for this SIM card）
←	OK	
→	AT+CHLD=11	Release the first call
←	OK	

11.4 Calling line identification presentation:AT+CLIP

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

When the presentation of the CLI at the TE is enabled (and calling subscriber allows), +CLIP:<number>,<type> response is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from TA to TE. It is manufacturer specific if this response is used when normal voice call is answered.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the CLIP service according 3GPP TS 22.081 (given in <m>).

Syntax:

Type of Command	Command	Possible response(s)

Set Command	AT+CLIP=<n>	OK
Read Command	AT+CLIP?	+CLIP:<n>,<m> OK
Test Command	AT+CLIP=?	+CLIP:(list of supported <n>s) OK
URC report	+CLIP: <number>,<type>[,<subaddr>,<satype>,<alphaId>,<CLI validity>]	AT+CLIP=1, a URC like this will be is returned after every RING (or +CRING: <type>; refer subclause "Cellular result codes +CRC") result code sent from TA to TE

Defined values:

Parameter	Definition	Value	Description
<n>	parameter sets/shows the result code presentation status to the TE	0	disabled
		1	enabled
<m>	parameter shows the subscriber CLIP service status in the network	0	CLIP not provisioned
		1	CLIP provisioned
		2	Unknown (e.g. no network, etc.)
<number>	phone number		
<type>	type of phone number		
<CLI validity>	Calling line validity	0	CLI valid
		1	CLI has been withheld by the originator
		2	CLI is not available due to interworking problems or limitations of originating network

11.5 Calling line identification restriction:AT+CLIR

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

Set command overrides the CLIR subscription (default is restricted or allowed) when temporary mode is provisioned as a default adjustment for all following outgoing calls. This adjustment can be revoked by using the opposite command.

If this command is used by a subscriber without provision of CLIR in permanent mode the network will act according 3GPP TS 22.081.

Read command gives the default adjustment for all outgoing calls (given in <n>), and also triggers an interrogation of the provision status of the CLIR service (given in <m>). Test command returns values supported as a compound

value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CLIR=<n>	OK
Read Command	AT+CLIR?	+CLIR:<n>,<m> OK
Test Command	AT+CLIR=?	+CLIR:(list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	parameter sets the adjustment for outgoing calls	0	presentation indicator is used according to the subscription of the CLIR service
		1	CLIR invocation
		2	CLIR suppression
<m>	parameter shows the subscriber CLIR service status in the network	0	CLIR not provisioned
		1	CLIR provisioned in permanent mode
		2	Unknown (e.g. no network, etc.)
		3	CLIR temporary mode presentation restricted
		4	CLIR temporary mode presentation allowed

Examples:

Command（→）/Response（←）	AT Sequences	Description
What's displayed by the calling party （MT1）:		
→	AT+CLIR=1	CLIR is enabled
←	OK	
→	AT+CLIR?	Query the calling line identification restriction state
←	+CLIR: 0,1 OK	<m>=1,CLIR provisioned in permanent mode
→	ATD136****9087;	Make a call to MT2
←	OK	
What's displayed by called party（MT2）:		
→	AT+CLIP=1	calling line identity presentation URC is enabled
←	OK	
→	AT+CLIP?	Query the calling line presentation status
←	+CLIP: 1,1	<n>=1 means that the +CLIP URC report is enabled <m>=1 means that CLIP is provisioned

	OK	
←（URC）	RING +CLIP: "",128,,,,1	CLIR is enabled on MT1 side, so the phone number of MT1 can not be seen on MT2 side

11.6 Connected line identification presentation:AT+COLP

This command refers to the GSM/UMTS supplementary service COLP (Connected Line Identification Presentation)that enables a calling subscriber to get the connected line identity (COL) of the called party after setting up a mobileoriginated call. The command enables or disables the presentation of the COL at the TE. It has no effect on theexecution of the supplementary service COLR in the network.

When enabled (and called subscriber allows), +COLP:<number>,<type>[,<subaddr>,<satype> [,<alpha>]] intermediate result code is returned from TA toTE before any +CR or V.250 responses. It is manufacturer specific if this response is used when normal voice callis established.

Read command gives the status of <n>, and also triggers an interrogation of the provision status of the COLP serviceaccording 3GPP TS 22.081 (given in <m>).

Test command returns values supported as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+COLP=<n>	OK
Read Command	AT+COLP?	+COLP:<n>,<m> OK
Test Command	AT+COLP=?	+COLP:(list of supported <n>s) OK
URC report	+COLP:<number>,<type>[,<subaddr>,<satype> [,<alpha>]] OK	<n>=1,a URC like this will be reported when a originating call is connected by the called party

Defined values:

Parameter	Definition	Value	Description
<n>	parameter sets/shows the result code presentation status to the TE	0	disabled
		1	enabled

<m>	parameter shows the subscriber COLP service status in the network	0	COLP not provisioned
		1	COLP provisioned
		2	Unknown (e.g. no network, etc.)
<number>, <type>,<subaddr>,<satype>,<alpha>			Please refer +CLIP

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+COLP?	Make a query
←	+COLP:0,0 OK	
→	AT+COLP=1	Set <n>=1 to make URC report available
←	OK	
→	AT+COLP?	Query again
←	+COLP:1,0 OK	
→	ATD136****0987;	Originate a call
←	+COLP: "136****0987",129,"",,"SAM" OK	136****0987accepts the call,then this 136 number is shown in +COLP URC.
→	AT+CHUP	Hang up the call
←	OK	
→	ATD136****0987;	Originate a call again
		The called party doesn't answer it Note:+COLP result code will only be routed to TE when the called party has answered the call ,and OK will be returned after +CLOP report.
→	&	Input any character to terminate the ATD command
←	NO CARRIER	Hang up the call

11.7 Unstructured supplementary service data:AT+CUSD

This command allows control of the Unstuctured Supplementary Service Data (USSD) according to 3GPP TS 22.090. Both network and mobile initiated operations are supported. Parameter <n> is used to disable/enable the presentation of an unsolicited result code (USSD response from the network, or network initiated operation) +CUSD:<m>[,<str>,<dcs>] to the TE. In addition, value <n>=2 is used to cancel an ongoing USSD session.

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

+CUSD result code.

NOTE: In case of successful mobile initiated operation, TA implemented according to a version prior to 6 of this standard, waits the USSD response from the network and sends it to the TE before the final result code. This will block the AT command interface for the period of the operation. Such TA does not support <n> value 2.

The interaction of this command with other commands based on other GSM/UMTS supplementary services is described in the GSM/UMTS standards.

Test command returns values supported as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CUSD=[<n>[,<str>[,<dcs>]]]	OK
Read Command	AT+CUSD?	+CUSD: <n> OK
Test Command	AT+CUSD=?	+CUSD: (list of supported <n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	-	0	disable the result code presentation to the TE
		1	enable the result code presentation to the TE
		2	cancel session (not applicable to read command response)
<str>	string type USSD-string (when <str> parameter is not given, network is not interrogated)	-	- if <dcs> indicates that 3GPP TS 23.038 [25] 7 bit default alphabet is used: ● if TE character set other than "HEX" (refer command Select TE Character Set +CSCS): ME/TA converts GSM alphabet into current TE character set according to rules of 3GPP TS 27.005 Annex A ● if TE character set is "HEX": ME/TA converts each 7-bit character of GSM alphabet into two IRA character long hexadecimal number (e.g. character Π (GSM 23) is presented as 17 (IRA 49 and 55)) - if <dcs> indicates that 8-bit data coding scheme is used: ME/TA converts each 8-bit octet into two IRA character long hexadecimal number (e.g. octet with integer value 42 is presented to TE as two characters 2A (IRA 50 and 65))
<dcs>	Data Coding Scheme	-	GSM 03.38 Data Coding Scheme in integer format (default 0)

<m>	-	0	no further user action required (network initiated USSD-Notify, or no further information needed after mobile initiated operation)
		1	further user action required (network initiated USSD-Request, or further information needed after mobile initiated operation)
		2	USSD terminated by network
		3	other local client has responded
		4	operation not supported
		5	network time out

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CSCS="GSM"	Set the dcs of the strings(within “”) in any AT commands to GSM
←	OK	
→	AT+CUSD=1,"*#21#",15	Query the state of unconditional call forward
←	+CCFC: 0,1 +CCFC: 0,2 +CCFC: 0,4 OK	Query results
→	AT+CSCS="UCS2"	Set the dcs of the strings(within “”) in any AT commands to UCS2
←	OK	
→	AT+CUSD=1,"002A0023003200310023",15	Query the state of unconditional call forward
←	+CCFC: 0,1 +CCFC: 0,2 +CCFC: 0,4 OK	Query results

11.8 Preffered Operator List:AT+CPOL

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CPOL=[<index>[,<format>[,<oper>[,<GSM_AcT>,<GSM_Compact_AcT>,<UTRAN_AcT>,<E-UTRAN_AcT>]]]]	OK
Read Command	AT+CPOL?	+CPOL: <index1>,<format>,<oper1>[,<GSM_AcT1>,<GSM_C

		ompact_AcT1>,<UTRAN_AcT1>,<E-UTRAN_AcT1>][<CR><LF>+CPOL: <index2>,<format>,<oper2>[,<GSM_AcT2>,<GSM_Compact_AcT2>,<UTRAN_AcT2>,<E-UTRAN_Act2>][...]] OK
Test Command	AT+CPOL=?	+CPOL:(list of supported <index>s), (list of supported <format>s) OK

Defined values:

Parameter	Definition	Value	Description
<indexn>	the order number of operator in the SIM/USIM preferred operator list	-	integer type
<format>	The format of <oper>	0	long format alphanumeric <oper>
		1	short format alphanumeric <oper>
		2	numeric <oper>
<opern>	operator	-	String type, in format of <format>
<GSM_AcT>	GSM access technology	0	access technology not selected
		1	access technology selected
<GSM_Compact_AcT>	GSM compact access technology	0	access technology not selected
		1	access technology selected
<UTRAN_AcT>	UTRAN access technology	0	access technology not selected
		1	access technology selected
<E-UTRAN_AcT>	E-UTRAN access technology	0	access technology not selected
		1	access technology selected

11.9 Read operator names:AT+COPN

Execute command returns the list of operator names from the MT. Each operator code <numeric*n*>that has an alphanumeric equivalent <alpha*n*>in the MT memory shall be returned.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+COPN	+COPN:<numeric1>,<alpha1>[<CR><LF>+COPN:<numeric2>,<alpha2>[...]] OK

Test Command	AT+COPN=?	OK

Defined values:

Parameter	Definition	Value	Description
<numericn>	operator in numeric format	-	string type (quoted in " "), see +COPS
<alphan>	operator in long alphanumeric format	-	string type (quoted in " "), see +COPS

11.10 Supplementary service notifications:AT+CSSN

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

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code +CSSI: <code1>[,<index>] is sent to TE before any other MO call setup result codes presented in the present document or in V.250. When several different <code1>s are received from the network, each of them shall have its own +CSSI result code.

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

Test command returns values supported as a compound value.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSSN=[<n>[,<m>]]]	OK
Read Command	AT+CSSN?	+CSSN: <n>,<m> OK
Test Command	AT+CSSN=?	+CSSN: (list of supported <n>s),(list of supported <m>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	parameter sets/shows the +CSSI result code presentation status to the TE	0	Disable
		1	enable

<m>	parameter sets/shows the +CSSU result code presentation status to the TE	0	Disable
		1	enable
<index>	Index for Closed User Group	0~10	refer "Closed user group +CCUG"
<code1>	it is manufacturer specific	0	unconditional call forwarding is active
		1	some of the conditional call forwardings are active
		2	call has been forwarded
		3	call is waiting
		4	this is a CUG call (also <index> present)
		5	outgoing calls are barred
		6	incoming calls are barred
		7	CLIR suppression rejected
		8	call has been deflected
<code2>	it is manufacturer specific,	0	this is a forwarded call (ME call setup)
		1	this is a CUG call (also <index> present) (ME call setup)
		2	call has been put on hold (during a voice call)
		3	call has been retrieved (during a voice call)
		4	multiparty call entered (during a voice call)
		5	call on hold has been released (this is not a SS notification) (during a voice call)
		6	forward check SS message received (can be received whenever)
		7	call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)
		8	call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or ME call setup)
		9	this is a deflected call (ME call setup)
		10	additional incoming call forwarded
<number>	phone number of format specified by <type>		string type
<type>	type of address octet		in integer format (refer TS 24.008 subclause 10.5.4.7)
<subaddr>	subaddress of format specified by <satype>		string type
<satype>	type of subaddress octet		integer format (refer TS 24.008 subclause 10.5.4.8)

12 Commands for Audio Control

Note: Commands in this chapter are not supported yet!

12.1 Mute Control:AT+CMUT

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMUT=<n>	OK
Read Command	AT+CMUT?	+CMUT: <n> OK
Test Command	AT+CMUT=?	+CMUT: (list of supported<n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	Turn on/off the mute	0	mute off
		1	mute on

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	ATD180****9710;	Make a voice call
←	OK	
←(URC)	CONNECT	The called party accept the call
→	AT+CMUT=1	Set mute on
←	OK	Then the called party can not hear the voice of the calling party

12.2 Loudspeaker volume level:AT+CLVL

This command is used to select the volume of the internal loudspeaker/receiver/earpiece of the MT.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CLVL =< level >	OK
Read Command	AT+CLVL?	+CLVL:<level> OK
Test Command	AT+CLVL=?	+CLVL: (list of supported<level>s) OK

Defined values:

Parameter	Definition	Value	Description
<level>	Level of volume	0~100	integer type value with manufacturer specific range (smallest value represents the lowest sound level)

12.3 MIC Gain Control:AT+CMIC

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CMIC =<n>	OK
Read Command	AT+CMIC?	+CMIC:<n> OK
Test Command	AT+CMIC=?	+CMIC: (list of supported<n>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	MIC gain	0~20	integer type(smallest value represents the lowest gain)

12.4 Handfree equipment control:AT+CHF

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CHF=<ind>,<state>	OK
Read Command	AT+CHF?	+CHF: <ind>,<state> OK

Test Command	AT+CHF=?	+CHF: (list of supported <ind>s),(list of supported<state>s) OK

Defined values:

Parameter	Definition	Value	Description
<ind>	URC report enabled or disabled	0	URC report is enabled
		1	URC report is disabled
<state>	Audio path	0	path 0 (RECEIVER)
		1	path 1 (EARPIECE)
		2	path 2 (LOUDSPEAKER)
		3	path 3 (AUX_RECEIVER)
		4	path 4 (AUX_LOUDSPEAKER)
		5	path 5 (AUX_EARPIECE)
		6	path6 (DUMMY_RECEIVER)
		7	path7 (DUMMY_AUX_RECEIVER)
		8	path8 (DUMMY_LOUDSPEAKER)
		9	path9 (DUMMY_AUX_LOUDSPEAKER)

12.5 Audio path switch:AT+CHFA

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CHFA=<n>	OK
Read Command	AT+CHFA?	+CHFA: <n> OK
Test Command	AT+CHFA=?	+CHFA: (0 = RECEIVER, 1 = EARPIECE, 2 = LOUDSPEAKER, 3 = AUX_RECEIVER, 4 = AUX_LOUDSPEAKER, 5 = AUX_EARPIECE, 6 = DUMMY_RECEIVER, 7 = DUMMY_AUX_RECEIVER, 8 = DUMMY_LOUDSPEAKER, 9 = DUMMY_AUX_LOUDSPEAKER) OK

Defined values:

Parameter	Definition	Value	Description
<n>	Audio path	0	path 0 (RECEIVER)
		1	path 1 (EARPIECE)

		2	path 2 (LOUDSPEAKER)
		3	path 3 (AUX_RECEIVER)
		4	path 4 (AUX_LOUDSPEAKER)
		5	path 5 (AUX_EARPIECE)
		6	path6 (DUMMY_RECEIVER)
		7	path7 (DUMMY_AUX_RECEIVER)
		8	path8 (DUMMY_LOUDSPEAKER)
		9	path9 (DUMMY_AUX_LOUDSPEAKER)

12.6 Alert Sound Mode:AT+CALM

This command is used to select the general alert sound mode of the MT.

Syntax:

Type of Command	Command	Response
Set Command	AT+CALM=<mode>	OK
Read Command	AT+ CALM?	+ CALM:<mode> OK
Test Command	AT+ CALM =?	+ CALM: (list of supported<mode>s) OK

Defined values:

Parameter	Definition	Value	Description
<mode>	Alert sound mode	0	Normal mode
		1	Silent mode

12.7 Ringer Sound Level:AT+CRSL

This command is used to select the incoming call ringer sound level of the MT.

Syntax:

Type of Command	Command	Response
Set Command	AT+CRSL=<level>	OK
Read Command	AT+CRSL?	+CRSL:<level> OK

Test Command	AT+CRSL =?	+CRSL: (list of supported<level>s) OK

Defined values:

Parameter	Definition	Value	Description
<level>	Ring sound level	0~100	integer type value with manufacturer specific range (smallest value represents the lowest sound level)

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CRSL?	Query the ring sound level
←	+CRSL: 50 OK	The result is 50,which is the default configure

12.8 Local DTMF Tone Generation:AT+CLDTMF

Set command generates local DTMF tone.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CLDTMF=<n>[,<DTMF string>]	OK
Execution Command	AT+CLDTMF	Aborts any DTMF tone currently being played
Test Command	AT+CLDTMF =?	+CLDTMF: (list of supported <n>s),(0~9,A,B,C,D,*,#) OK
Note	**How to know play time for each tone ,time interval and total play time?** Default play time for each tone in <DTMF string> is 200ms,default time interval between each tone is 50ms。 Take <DTMF string>"ABCDE" for example, there are 5 characters in the dtmf string, so thetotal play time for the dtmf string is 200*5+50*4=1200ms by default. If n*100>1200ms: first,increase time interval until total play time = n*100 or until time interval = 550ms. If total play time is still less than n*100 when time interval =550ms, increase play time for each tone to (n*100-4*550)/5 ms	

	If n*100<1200ms: first decrease play time for each tone until total play time = n*100 or until play time for each tone =100ms. If total play time is still more than 1200ms when play time for each tone =100ms, decrease the tone play number.

Defined values:

Parameter	Definition	Value	Description
<n>	duration of all DTMF tones in< DTMFstring>	1~1000	integer type,in unit of 100ms.
<DTMF string>	DTMF string	-	a string parameter(string should be included in quotation marks) which has a max length of 20 DTMF characters in the set of 0~9,A,B,C,D,*,# separated by commas.

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CLDTMF=100,"0,1,2,3,4,5,6,7,8,9"	Generate 0,1,2,3,4,5,6,7,8,9 totally 10 DTMF tone,and the total duration of play is 10s
←	OK	

12.9 DTMF Code Detection:AT+DDET

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+DDET=<mode>[,<interval>][,<reportMode>][,<ssdet>]	OK
Read Command	AT+DDET?	+DDET: <mode>,<interval>,<reportMode>,<ssdet> OK
Test Command	AT+DDET=?	+DDET: (0,1),(0-10000),(0,1),(0,1) OK
URC Report	+DTMF:<key>	if <mode>=1 and <reportMode>=0 and a DTMF code is detected
	+DTMF:<key>,<lasttime>	if <mode>=1 and <reportMode>=1 and a DTMF code is detected

Defined values:

Parameter	Definition	Value	Description
<mode>	DTMF code detection is enabled or disabled	0	DTMF code detection is disabled
		1	DTMF code detection is enabled
<interval>	the min interval between two	0-10000	the default value is 0. unit is ms.

	same key URC		
<key>	DTMF key	1-9,*,#,A,B,C,D	
<reportMode>		0	key value reported only
		1	key value and last time are reported, the last time is in ms
<lasttime>	duration of keytone playing		unit is ms.
<ssdet>	single frequency sound detect function on off	0	switch off
		1	switch on

Examples:

Command （→）/ Response（←）	AT Sequences	Description
→	AT+ DDET=1	Set DTMF decoding:enabled
←	OK	
→	ATD1389000****;	Originate a call to 1389000****
←	OK	
←(URC)	CONNECT	The call is answered by the called party
	+DTMF:1 +DTMF:2 +DTMF:3 +DTMF:4 +DTMF:5 +DTMF:6 +DTMF:7 +DTMF:8 +DTMF:9 +DTMF:0 +DTMF:* +DTMF:#	The called party inputs 1,2,3,4,5,6,7,8,9,*,# on the keyboard of the phone.
←(URC)	NO CARRIER	The call is hung up

12.10 TTS(Text To Speech): AT+CTTS

Syntax:

Type of Command	Command	Response
Set command	AT+CTTS=<mode>[,<text>]	OK
Read command	AT+CTTS?	+CTTS: <status> OK
Test command	AT+CTTS=?	OK
URC	when TTS play is over ,there will be such URC as follows: +CTTS:0	

Defined values:

Parameters	Definition	Values	Description
<mode>		0	stop TTS playing
		1	start to play synthetic speech, <text> is in UCS2 coding format
		2	start to play synthetic speech, <text> is in ASCII(numerals and/or alphabets) or in GBK(Chinese charaters) coding format
<text>	text to be play	-	string type, must be quoted with ""
<status>		0	idle mode
		1	play mode

Examples:

command(→) / response(←)	AT Sequences	Description
→	AT+CTTS=2,"123，欢迎你的到来"	play numerals and Chinese charaters Note: can not play English words yet. Like"bus",it will sounds like "b""u""s",not [b∧s]
←	OK	
→	AT+CTTS=1,"6B228FCE003100310033"	play “欢迎123”
←	OK	
←(URC)	+CTTS:0	
→	AT+CTTS=0	
←	OK	

12.11 Set parameters for TTS play: AT+CTTSPARAM

Syntax:

Type of	Command	Response

Command		
Set command	AT+CTTSPARAM=<volume>,<mode>,<pitch>,<speed>[,<channel>]	OK
Read command	AT+CTTSPARAM?	+CTTSPARAM:<volume>,<mode>,<pitch>,<speed>,<channel> OK
Test command	AT+CTTSPARAM=?	OK

Defined values:

Parameters	Definition	Values	Description
<volume>	TTS play volume	0-100	default value : 50
<mode>	TTS play mode	0	auto read digit, and read digit based on number rule first
		1	auto read digit, and read digit based on telegram rule first
		2	read digit based on telegram rule
		3	read digit based on number rule
<pitch>	TTS play pitch	1-100	default value : 50
<speed>	TTS play speed	1-100	default value : 50
<channel>	TTS play channel	0	main channel
		1	aux channel

12.12 Record and Play: AT+CREC

This command can be used to record sound and play the record.

Syntax：

Type of Command	Command	Response
Set Command	AT+CREC=<mode>[,<id>]:	
	<mode>=1,start recording: AT+CREC=1,<id>,<form>[,<time>,<location>,<quality>,<input path>]	OK
	<mode>=2,stop recording: AT+CREC=2	OK +CREC: <id>,<form>,<time>,<len>
	<mode>=3,delete a record file: AT+CREC=3,<id>	OK
	<mode>=4,play a record file:	OK

	AT+CREC=4,<id>,<channel>,<level>,<repeat>	
	<mode>=5,stop playing a record file: AT+CREC=5	+CREC: 0 OK
	<mode>=6,read a record file: AT+CREC=6,<id>,<len>,<offset>	+CREC: 6,<id>,<len> data OK
	<mode>=7,check the information of a record file: AT+CREC=7[,<id>]	+CREC: 7,<id>,<len>,<form> OK
	<mode>=8,check available space for recording: AT+CREC=8	+CREC: 8,<len> OK
	<mode>=9,create a directory for recording: AT+CREC=9,<location>	OK
Read command	AT+CREC?	+CREC: <status> OK
Test Command	AT+CREC=?	+CREC: (1-n),(1-10) OK

Defined values:

Parameter	Definition	Value	Description
<dl voice>	whether the record can be heard at local side in downlink path (earpiece,handset or loudspeak) Note: this parameter can only be effective in record play mode	0	downlink sound cannot be heard
		1	downlink sound can be heard
<play mode>	the play mode of the record Note: this parameter can only be effective in record play mode	0	played only once
		1	loop playback
<action>	the operation to the module	0	stop recording
		1	start recording
		2	start playing
		3	stop playing
		4	delete the record
<aud id>	id of the audio record	0~4	
<duration>	play time of the record Note: for a single play,this parameter defines	1~50000	in unit of ms(millisecond)

	the play time of the play;for loop play, this parameter defines the duration of one single play.		

Examples：

Command(→)/ Response(←)	AT Sequences	Description
→	AT+AUDREC=?	testing command
←	+AUDREC: (0-1),(0-1),(0-4),(0-4),(1-50000) OK	
sound recording：		
→	AT+AUDREC=1,1,1,3,10000	<dl voice>=1（this parameter is of no use in recording action） <play mode>=1：cycle play <action>=1：start recording <aud id>=3：id <duration>=10000：recording time is 10s
←	OK	sound recording begins
stop recording		
1：recording is normally ended		
←	+AUDREC：1,10000	10s is due, the recording comes to an end
2：AT command to early terminate the recording before the Set <duration> is due		
→	AT+AUDREC=1,1,0,3,10000	stop recording
←	OK +AUDREC: 1,5960	+AUDREC: 1,5960 5960 means the actual recording time
play record during a call (the sound can be heard at the opposite end）：		
→	ATD138****9087;	initiate a call
←	OK CONNECT	the call is accepted by the opposite end
→	AT+AUDREC=1,0,2,3,6000	play the record for once,play tiem is 6s. Note: in single play, if the play time <duration> is longer than the actual recording time,the redundant part is null(silent); if <duration> is shorted than the actual recording time, the redundant recording is not played at all.
←	OK	
←	+AUDREC: 2,6000	the URC is routed when play is over naturally
→	AT+AUDREC=1,1,2,3,5000	cycle play the record, play time of per single play is 5s
←	OK	

→	AT+AUDREC=1,1,3,3,5000	cycle play will not end by itself , so an AT command is needed to stop playing
←	OK	
←	+AUDREC: 2, 38000	total play tiem is 38s
→	AT+AUDREC=0,1,4,3,5000	delete the record whose aud_id=3
←	OK	
←	+AUDREC:4,3	tis URC indicates that the deleting is a success

12.13 Audio Loop Test: AT+AUDLB

This command is used to test the audio functionby loopback.

Syntax：

Type of Command	Command	Response
Set Command	AT+AUDLB=<loopback>,<audiopath>	OK
Test Command	AT+AUDLB=?	+AUDLB:list of <loopback>s,list of <audiopath>s OK
Note	this command and AT+QTTS , can not be available at the same time. Please set the <loopback> to off before TTS is applied.	

Defined values:

Parameter	Definition	Value	Description
<loopback>	loopback is on or off	0	off
		1	on
<audiopath>	audio path	0	path 0（RECEIVER）
		1	path 1（EARPIECE）
		2	path 2（LOUDSPEAKER ）
		3	path 3（AUX_RECEIVER）
		4	path 4（AUX_LOUDSPEAKER）

13 Commands for GPRS Services

13.1 GPRS mobile station Class:AT+CGCLASS

This command is not supported at present!

The Set command is used to set the ME to operate according to the specified mode of operation, rf. TS 23.060.

The Read command returns the mode of operation set by the TE, independent of the current serving cell capability and independent of the current serving cell Access Technology. If no value has been set by the TE previously, the return value shall be the highest mode of operation that can be supported by the MT.
The Test command is used for requesting information on the supported MT mode of operation.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGCLASS=<class>	OK
Read Command	AT+CGCLASS?	+CGCLASS: <class> OK
Test Command	AT+CGCLASS=?	+CGCLASS: (list of supported <class>s) OK

Defined values:

Parameter	Definition	Value	Description
<class>	GPRSmobile station class	“B”	Class B,MT supports packet and circuit switch,but not at the same time.

Examples:

Command（→）/ Response（←）	AT Sequences	Description
→	AT+CGCLASS=?	Query the supported <class>s
←	+CGCLASS: ("B") OK	Only class B is supported
→	AT+CGCLASS?	Query current class
←	+CGCLASS:"B" OK	

13.2 GPRS attach and detach:AT+CGATT

The Set command is used to attach the ME to, or detach the ME from, the Packet Domain service. After the command has completed, the ME remains in V.250 command state. If the ME is already in the requested state, the command is ignored and the OK response is returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. Any active PDP contexts will be automatically deactivated when the attachment state changes to detached.
The Read command returns the current Packet Domain service state.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGATT=<state>	OK
Read Command	AT+CGATT?	+CGATT: <state> OK
Test Command	AT+CGATT=?	+CGATT: (list of supported <state>s) OK

Defined values:

Parameter	Definition	Value	Description
<n>	GPRS attach state	0	Detach
		1	Attach

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CGATT?	Check the GPRS attach state
←	+CGATT: 1 OK	<state>=1,GPRS is attached
→	AT+CGATT=?	Query the range of <state>
←	+CGATT: (0-1) OK	

13.3 GPRS Context Definition:AT+CGDCONT

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

given by the range returned by the Test command.
A special form of the Set, +CGDCONT=<cid> causes the values for context number <cid> to become undefined.

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

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr> [,<d_comp>[,<h_comp>]]]]]	OK
Read Command	AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[<CR><LF>+CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>] OK
Test Command	AT+CGDCONT=?	+CGDCONT: (list of supported <cid>s),<PDP_type>,,,(list of supported <d_comp>s),(list of supported <h_comp>s) OK

Defined values:

Parameter	Definition	Value	Description
<cid>	PDP Context Identifier	-	a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-ME interface and is used in other PDP context-related commands. The range ofpermitted values (minimum value = 1) is returned by the test form of the command.
<PDP_type>	Packet Data Protocol type	"IP"	a string parameter which specifies the type of packet data protocol
<APN>	Access Point Name		a string parameter which is a logical name that is used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested.
<PDP_address>	PDP address,string type		IP address in format of "<n>.<n>.<n>.<n>" in which <n>=0~255 If the value is "0.0.0.0" or omitted, then a value may be

			provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested.
<d_comp>	PDP data compression		Controls PDP data compression (applicable for Subnetwork Dependent Convergence Protocol (SNDCP only) (3GPP TS 44.065) 0 –off(default)
<h_comp>	Header compression		Controls the PDP header compression 3GPP TS 44.065, 3GPP TS 25.323 0 –off (default)

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CGDCONT?	Query the current PDP context definition
←	OK	NO PDP context at all
→	AT+CGDCONT=1,"ip","cmnet"	Set a PDP context
←	OK	
→	AT+CGDCONT?	Query again
←	+CGDCONT: 1,"IP","cmnet","",0,0 OK	There is a PDP context,whose <cid>=1
→	AT+CGDCONT=?	Query the scope of the parameters
←	+CGDCONT: (1-10),"IP",,,(0,1),(0,1) OK	

13.4 Display PDP Address:AT+CGPADDR

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

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

Syntax:

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

Defined values:

Parameter	Definition	Value	Description
<cid>	PDP Context Identifier,integer type	-	a numeric parameter which specifies a particular PDP context definition. The parameter is local to the TE-ME interface and is used in other PDP context-related commands. The range ofpermitted values (minimum value = 1) is returned by the test form of the command.
<PDP_address>	PDP address,string type		IP address in format of "<n>.<n>.<n>.<n>" in which <n>=0~255 If the value is “0.0.0.0” or omitted, then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested.

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CGDCONT?	Query the current PDP context
←	+CGDCONT: 1,"IP","cmnet","",0,0 OK	There is a PDP context,whose <cid>=1, and no IP address is allocated to the module
→	AT+CGACT?	Query activation mode of the PDP context
←	+CGACT:1,0 OK	<state>=0,means the PDP context (<cid>=1) is not activated
→	AT+CGPADDR=1	Query the PDP address (i.e.IP address）
←	+CGPADDR: 1 OK	NO IP address exists
→	AT+CGACT=1,1	Activate the PDP context whose <cid>=1
←	OK	
→	AT+CGACT?	Query activation mode of the PDP context
←	+CGACT:1,1 OK	<state>=1,means the PDP context (<cid>=1) is activated
→	AT+CGPADDR=1	Query the PDP address (i.e.IP address）
←	+CGPADDR: 1,"010.085.222.016" OK	"010.085.222.016" is the allocated IP address by the network
→	AT+CGACT=0,1	deactivate the PDP context whose <cid>=1
←	OK	
→	AT+CGACT?	Query activation mode of the PDP context
←	+CGACT:1,0 OK	<state>=0,means the PDP context (<cid>=1) is deactivated

←（URC）	CALL READY	CALL READY is reported ,which means module is used for call services now

13.5 PDP Context Activate or Deactivate:AT+CGACT

The Set command is used to activate or deactivate the specified PDP context (s). After the command has completed, the ME remains in V.250 command state.

If any PDP context is already in the requested state, the state for that context remains unchanged.

If the requested state for any specified context cannot be achieved, an ERROR or +CME ERROR response is returned. Extended error responses are enabled by the +CMEE command. If the ME is not PS attached when the activation form of the command is executed, the ME first performs a PS attach and them attempts to activate the specified contexts. If the attach fails then the ME responds with ERROR or, if extended error responses are enabled, with the appropriate failure-to-attach error message.

If no <cid>s are specified the activation form of the command activates all defined contexts.
If no <cid>s is specified the deactivation form of the command deactivates all active contexts.

The Read command returns the current activation states for all the defined PDP contexts.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGACT=<state>,<cid>[,<cid>[,…]]]	OK
Read Command	AT+CGACT?	+CGACT:<cid>,<state>[<CR><LF>+CGACT:<cid>, <state>[...]] OK
Test Command	AT+CGACT=?	+CGACT: (list of supported <state>s) OK

Defined values:

Parameter	Definition	Value	Description
<state>	the state of PDP context activation	0	Not activated
		1	activated
<cid>	PDP Context Identifier		integer type

Examples:

Command（→）/	AT Sequences	Description

Response（←）		
		Please refer to +CGPADDR

13.6 Enter Data Mode:AT+CGDATA

Set command causes the ME to perform whatever actions are necessary to establish communication between the TE and the network using one or more Packet Domain PDP types. This may include performing a PS attach and one or more PDP context activations. If the <L2P> parameter value is unacceptable to the ME, the ME shall return an ERROR or +CME ERROR response. Otherwise, the ME issues the intermediate result code CONNECTS and enters V.250 online data state.

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

The detailed behaviour after the online data state has been entered is dependent on the PDP type. It is described briefly in 3GPP TS 27.060and in more detail in 3GPP TS 29.061 and the specifications for the relevant PDPs. PS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the +CGATT and +CGACT commands.

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGDATA[=<L2P>,[<cid>]]	CONNECT
Test Command	AT+CGDATA=?	+CGDATA: list of supported <L2P>s,list of supported <cid>s OK

Defined values:

Parameter	Definition	Value	Description
<cid>	PDP Context Identifier	-	integer type
<L2P>	Layer 2 protocol	"PPP"	String type

Examples:

Command(→)/Response(←)	AT Sequences	Description
→	AT+CGDATA=?	
←	+CGDATA: “PPP”,(1- 8)	

	OK	
→	AT+CGDCONT=1,"IP","UNINET"	
←	OK	
→	AT+CGACT=1,1	
←	OK	
→	AT+CGDATA="PPP",1	Set up a PPP connection between TE and network
←	CONNECT	

13.7 GPRS Network Registration Status:AT+CGREG

Set command controls the presentation of an unsolicited result code
+CGREG: <stat> when <n>=1 and there is a change in the ME's GPRS network registration status, or code +CGREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change of the network cell.

NOTE: If the GPRS ME also supports circuit mode services, the +CREG command and +CREG: result code applies to the registration status and location information for those services.

Read command returns the status of result code presentation and an integer <stat> which shows whether the network has currently indicated the registration of the MT. Location information elements <lac> and <ci> are returned only when <n>=2 and MT is registered in the network.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGREG=[<n>]	OK
Read Command	AT+CGREG?	+CGREG:<n>,<stat>[,<lac>,<ci>] OK
Test Command	AT+CGREG=?	+CGREG:(list of supported <n>s) OK
URC report	+CREG: <stat>	Set <n>=1,When the registration state changes a URC like this will be reported
	+CREG: <stat>[<lac>,<ci>]	Set <n>=2,When the registration state changes a URC like this will be reported

Defined values:

Parameter	Definition	Value	Description
<n>	URC Reported status	0	disable network registration unsolicited result code
		1	enable network registration unsolicited result code +CGREG: <stat>

		2	enable network registration and location information unsolicited result code +CGREG: <stat>[,<lac>,<ci>]
<stat>	Current registration state	0	not registered, ME is not currently searching an operator to register to The UE is in GMM state GMM-NULL or GMM-DEREGISTERED-INITIATED. The GPRS service is disabled, the UE is allowed to attach for GPRS if requested by the user.
		1	registered, home network
		2	not registered, but ME is currently trying to attach or searching an operator to register.
		3	registration denied
		4	unknown
		5	registered, roaming
<lac>	Location Area Code	-	string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal)
<ci>	Cell Id	-	string type; two byte cell ID in hexadecimal format

Examples:

Command（→）/Response（←）	AT Sequences	Description
→	AT+CGREG?	Query the registration status
←	+CGREG: 0,1 OK	<n>=0,<stat>=1
→	AT+CGREG=1	Set <n>=1
←（URC）	+CGREG: 1	When the registration state changes a URC like this will be reported
→	AT+CGREG=2	Set <n>=2
←（URC）	+CGREG: 5,"18be","9363"	When the registration state changes a URC like this will be reported

13.8 Quality of Service Profile (Minimum acceptable):AT+CGQMIN

This command allows the TE to specify a minimum acceptable profile which is checked by the ME against the negotiated profile returned in the Activate PDP Context Accept message. The Set specifies a profile for the context identified by the (local) context identification parameter, <cid>. Since this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQMIN command is effectively an extension to these commands. The QoS profile consists of a number of parameters, each of which may be set to a separate value.
A special form of the Set, +CGQMIN= <cid> causes the minimum acceptable profile for context number <cid> to become undefined. In this case no check is made against the negotiated profile.
The Read command returns the current settings for each defined context. The Test returns values supported as a compound value. If the ME supports several PDP types, the parameter value ranges for each PDP type are returned on

a separate line.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGQMIN=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>,<mean>]]]]]	OK
Read Command	AT+CGQMIN?	+CGQMIN: <cid>,<precedence >,<delay>,<reliability>,<peak>,<mean>[<CR><LF>+CGQMIN: <cid>,<precedence>,<delay>, <reliability>,<peak>,<mean>[…]] OK
Test Command	AT+CGQMIN=?	+CGQMIN:<PDP_type>, (list of supported <precedence>s),(list of supported <delay>s),(list of supported <reliability>s) ,(list of supported <peak>s),(list of supported <mean>s) […] OK

Defined values:

Parameter	Definition	Value	Description
<cid>	PDP Context Identifier	-	integer type
<precedence>	QOS precedence class	0	Network subscribed value
		1~3	Other value
<delay>	QOS delay class	0	Network subscribed value
		1~4	Other value
<reliability>	QOS reliability class	0	Network subscribed value
		1~5	Other value
<peak>	QOSPeak throughput class (in octets per second)	0	Network subscribed value
		1~9	Other value
<mean>	QOSMean throughput class	0	Network subscribed value
		1~18	Other value
		31	best effort

13.9 Quality of Service Profile(requested):AT+CGQREQ

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

The Set command specifies a profile for the context identified by the local context identification parameter, <cid>. Since

this is the same parameter that is used in the +CGDCONT and +CGDSCONT commands, the +CGQREQ command is effectively an extension to these commands.

The QoS profile consists of a number of parameters, each of which may be set to a separate value. A special form of the Set, +CGQREQ= <cid> causes the requested profile for context number <cid> to become undefined.

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

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGQREQ=[<cid>[,<precedence>[,<delay>[,<reliability>[,<peak>,<mean>]]]]]	OK
Read Command	AT+CGQREQ?	+CGQREQ: <cid>,<precedence >,<delay>,<reliability>,<peak>,<mean> [<CR><LF>+CGQREQ: <cid>,<precedence>,<delay>, <reliability>,<peak>,<mean>[…]] OK
Test Command	AT+CGQREQ=?	+CGQREQ:<PDP_type>, (<precedence>s),(<delay>s),(<reliability>s) ,(<peak>s),(<mean>s) […] OK

Defined values: :

Parameters	Definition	Value	Description
<cid>	a numeric parameter which specifies a particular PDP context definition (see the +CGDCONT and+CGDSCONT commands).	-	integer type
<precedence>	a numeric parameter which specifies the precedence class	0	Network subscribed value
		1~4	Other value
<delay>	a numeric parameter which specifies the delay class	0	Network subscribed value
		1~3	Other value
<reliability>	a numeric parameter which specifies the reliability class	0	Network subscribed value
		1~5	Other value
<peak>	a numeric parameter which specifies the peak throughput class	0	Network subscribed value
		1~9	Other value
<mean>	a numeric parameter which specifies the mean throughput class	0	Network subscribed value
		1~18	Other value
		31	best effort

13.10 Packet Domain Event Report:AT+CGEREP

Set command enables or disables sending of unsolicited result code +CGEV: XXX from ME to TE in the case of certain events occurring in the Packet Domain ME or the network.
<mode> controls the processing of unsolicited result codes specified within this command.
<bfr> controls the effect on buffered codes when <mode> 1 or 2 is entered.
If a setting is not supported by the ME, ERROR or +CME ERROR is returned.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGEREP=<mode>[,<bfr>]	OK
Read Command	AT+CGEREP?	+CGEREP:<mode>,<bfr> OK
Test Command	AT+CGEREP=?	+CGEREP:(list of supported<mode>s) ,(list of supported <bfr>s) OK
URC	+CGEV: XXX	If <mode>=1,certain events occurring in the Packet Domain (ME or the network) will be reported in URC like this

Defined values:

Parameter	Definition	Value	Description
<mode>	URC report mode	0	buffer unsolicited result codes in the ME; if ME result code buffer is full, the oldest ones can be discarded. No codes are forwarded to the TE.
		1	discard unsolicited result codes when ME-TE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the TE
		2	buffer unsolicited result codes in the ME when ME-TE link is reserved (e.g. in on-line data mode) and flush them to the TE when ME-TE link becomes available; otherwise forward them directly to the TE
<bfr>	The mothod to deal with the buffered URCs	0	ME buffer of unsolicited result codes defined within this command is cleared when <mode>1 or 2 is entered
		1	ME buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1 or 2 is entered (OK response shall be given before flushing the codes).

13.11 Packet Domain Events Report URC:+CGEV

Indication from MT to TE in the case of certain events occurring in the Packet Domain MT or the network.
Syntax:

URC

+CGEV: XXX

The following unsolicited result codes and the corresponding events are defined as follows.

Defined events:

Events	Description
+CGEV: NW DEACT <PDP_type>, [<PDP_addr>], <cid>	The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the MT. The format of the parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT. Examples: +CGEV: “IP”,”10.0.0.0”,1 +CGEV: “PPP”,””,2 +CGEV: NW DETACH
+CGEV: ME DEACT <p_cid>, <cid>	The mobile termination has forced a context deactivation. The associated <cid> is provided to the TE in addition to the PDN connection associated <p_cid>. The format of the parameters <p_cid> and <cid> are found in command +CGDSCONT
+CGEV: ME ACT <p_cid>, <cid>	The network has responded to an ME initiated Traffic Flow activation request with an EPS bearer activation or modification. The associated MT allocated context identifier <cid> is provided to the TE in addition to the PDN connection associated <p_cid>. The format of the parameters <p_cid> and <cid> are found in command +CGDSCONT
+CGEV: ME ACT <PDP_type>, <PDP_addr>, <cid>	The mobile termination has forced a context activation. The <cid> that was used to activate the context is provided if known to the MT. The format of the parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT
+CGEV: NW ACT <PDP_type>, <PDP_addr>, <cid>	The network has forced a context activation. The <cid> that was used to activate the context is provided if known to the MT. The format of the parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT.
+CGEV: NW DETACH	ME has detached from packet service domain. This implies that all active contexts have been deactivated. These are not reported separately.
+CGEV: ME DETACH	The mobile termination has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.
+CGEV: EPS PDN ACT <cid>	The network has activated a PDN connection. The format of the parameter <cid> is found in command +CGDCONT
+CGEV: ME PDN ACT <cid>	The mobile termination has activated a PDN connection.

	The format of the parameter <cid> is found in command +CGDCONT
+CGEV: EPS PDN DEACT <cid>	The network has deactivated a PDN connection. The associated <cid> is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT.
+CGEV: ME PDN DEACT <cid>	The mobile termination has deactivated a PDN connection. The associated <cid> is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT
+CGEV: EPS DED ACT <p_cid>, <cid>	The network has activated an EPS dedicated bearer. The associated MT allocated secondary context identifier <cid> is provided to the TE in addition to the PDN connection associated <p_cid>. The format of the parameters <p_cid> and <cid> are found in command +CGDSCONT
+CGEV: EPS DED DEACT <p_cid>, <cid>	The network has deactivated an EPS dedicated bearer. The associated <cid> is provided to the TE in addition to the PDN connection associated <p_cid>. The format of the parameters <p_cid> and <cid> are found in command +CGDSCONT
+CGEV: EPS ACT <cid>	The network has activated a PDP context. The associated <cid> is provided to the TE, its format is found in command +CGDCONT
+CGEV: EPS MODIFY <cid>, <change_reason>	The network has modified EPS bearer context parameter(s). The associated <cid> is provided to the TE in addition of the change reason: TFT and/or QoS modification. The format of the parameter <cid> is found in command +CGDCONT. <change_reason> integer type parameter indicates what kind of change occurred. 1: TFT only changed 2: Qos only changed 3: Both TFT and QoS changed

Examples:

+CGEV: “IP”,”10.0.0.0”,1

+CGEV: “PPP”,””,2

+CGEV: NW DETACH

13.12 Select Service for MO SMS:AT+CGSMS

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGSMS=<service>	OK The Set command is used to specify the service or service preference that the ME will use to send MO SMS messages.
Read Command	AT+CGSMS?	+CGSMS:<service> OK
Test Command	AT+CGSMS=?	+CGSMS: (list of supported <service>s) OK

Defined values:

Parameters	Definition	Value	Description
<service>	a numeric parameter which indicates the service or service preference to be used	0	Packet Domain (GPRS)
		1	circuit switched
		2	Packet Domain preferred (use circuit switched if GPRS not available)
		3	circuit switched preferred (use Packet Domain if circuit switched not available)

13.13 Search IP via cid:AT+GETIP

Search IP via cid from local IP list.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+GETIP=<cid>	+GETIP: <cid>,<ip>,<gateway>,<apn> OK

Defined values:

Parameters	Definition	Value	Description
<cid>	PDP context id	1-8	
<ip>	IPaddress		
<gateway>	gateway address		
<apn>	access point name		

13.14 Send Data through Specified PS Channel:AT*TGSINK

Private AT command,used to send the data through the specified PS data channel identified by cid.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT*TGSINK=<cid>[,<PacketSize>[,<PacketCount>]]	OK
Test Command	AT*TGSINK=?	*TGSINK: (range of supported <cid>s),((range of<PacketSize>),(range of <PacketCount>) OK

Defined values:

Parameters	Definition	Value	Description
<cid>		1-8	
<PacketSize>		0-10000	
<PacketCount>		1-20	

13.15 Send Data through Activated PS Channel:AT+CGSEND

Private AT command,used to send the data through current activated PS data channel.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CGSEND=<datalen>	OK
Test Command	AT+CGSEND=?	+CGSEND: (range of <datalen>) OK

Defined values:

Parameters	Definition	Value	Description
<datalen>	length of sent data	0-20000	unit: bytes

13.16 Put TA into a Particular Mode of Operation:AT+FCLASS

This command puts the TA into a particular mode of operation (data, fax, voice etc).

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+FCLASS=<n>	OK
Read Command	AT+FCLASS?	+FCLASS:<n> OK
Test Command	AT+FCLASS=?	+FCLASS: (range of <n>) OK

Defined values:

Parameters	Definition	Value	Description
<n>	operation mode	0	data
		1	fax class 1 (TIA 578 A)

13.17 Add Authentication to a PDP Context:AT*AUTHREQ

This proprietary AT command is used to requests to add authentication parameters to a defined PDP context. The command must be sent after the PDP context was defined and before the PDP context is activated. The authentication parameters will be sent to the GGSN in a protocol configuration information entry, when PDP context is activated.

In case authentication parameters are already defined for this PDP context the new authentication parameters will replace the existing parameters. Set authentication type to none will delete authentication parameters defined for this PDP context.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT*AUTHREQ=<cid>,<type>[,<UserName>[,<Password>]]	OK
Test Command	AT*AUTHREQ=?	*AUTHREQ: <cid>,<type>(0-None;1-PAP;2-CHAP),<UserName>,<Password>

		OK

Defined values:

Parameters	Definition	Value	Description
<cid>	as <cid> defined in +CGDCONT		
<type>	Authentication Protocol type,a numeric parameter which specifies the type of authentication data protocol	0	NONE
		1	PAP (Password Authentication Protocol)
		2	CHAP (Challenge Handshake Authentication Protocol)
<UserName>	a string parameter that specifies a user name added in PPP authentication packet and sent to server forauthentication		
<Password>	a string parameter that specifies a password added in PPP authentication packet and sent to server for authentication		

Examples：

Command(→)/ Response(←)	AT Sequences	Description
→	AT*AUTHREQ=1,1,AirM2M,123456	
←	OK	

13.18 Add Authentication to LTE Default Bearer:AT*CGDFAUTH

This proprietary AT command is used to requests to add authentication parameters to LTE default bearer.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT*CGDFAUTH=<mode>,<auth_prot>[,<userid>[,<password>]]	OK
Test Command	AT*CGDFAUTH =?	*CGDFAUTH: <auth_prot >(0-None;1-PAP;2-CHAP),<UserName>,<Password> OK

13.19 Failure Cause Code for PDP Activation:AT+PEER

Requests the failure cause code for the most recently failed PDP context activate.

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+PEER	+PEER: <information text> OK
Test Command	AT+PEER=?	OK

14 Commands for Embeded TCPIP Protocol

14.1 Enable multi-connection mode:AT+CIPMUX

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPMUX=<n>	OK
Read Command	AT+CIPMUX?	+CIPMUX: <n> OK
Test Command	AT+CIPMUX=?	+CIPMUX: (0,1) OK
Note	● Only in IP initial state of single connection mode,AT+CIPMUX=1 can be set; ● Only in multi connection mode and all GPRS connections are shut,AT+CIPMUX=0 can be set	

Defined values:

Parameter	Definition	Value	Description
<n>	multi connection switch	0	single connection（default）
		1	multi connection

14.2 Start Task and Set APN,USER NAME,PASSWORD:AT+CSTT

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CSTT=<apn>,<user name>,<password>	OK
Execution command	AT+CSTT	OK
Read Command	AT+CSTT?	+CSTT: <apn>,<user name>,<password> OK
Test Command	AT+CSTT=?	+CSTT: "APN","USER","PWD" OK
Note	The Set command and Execution command will respond OK only in the state of IP INITIAL,then the state will be changed to IP START after OK response.	

	The default APN for the Execution command is CMNET

Defined values:

Parameter	Definition	Value	Description
<apn>	GPRS access point name	-	a string parameter(string should be included in quotation marks)
<user name>	GPRS user name	-	a string parameter(string should be included in quotation marks)
<password>	GPRS password	-	a string parameter(string should be included in quotation marks)

14.3 Activate Wireless Connection:AT+CIICR

This command is used to acitivate PDP context and acquire an IP address.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CIICR	If succeeded: OK If failed: ERROR
Test Command	AT+CIICR=?	OK
Note	● AT+CIICR can only activate PDP contextin the state of IP START,then the state will be changed to IP CONFIG. ● If activated successfully, the state will be changed to IP GPRSACT from IP CONFIG andthe MT respondsOK, otherwise responds ERROR	

14.4 Get Local IP Address:AT+CIFSR

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CIFSR	<IP address>
Test Command	AT+CIFSR=?	OK
Note	● Only after PDP context is activated(IP GPRSACT, TCP/UDP CONNECTING, CONNECT OK, IP CLOSE), local IP Address can be obtained by AT+CIFSR, otherwise it will respond ERROR. ● after operating this Command, the state will be changed to IP STATUS.	

Defined values:

Parameter	Definition	Value	Description

<IP address>	IP address obtained	-	a string parameter(string should be included in quotation marks)

14.5 Start up TCP or UDP connection:AT+CIPSTART

Syntax:

Type of Command	Command	Possible response(s)
Set Command	In single connection mode (+CIPMUX=0): AT+CIPSTART=<mode>,<IP address>,<port> Or AT+CIPSTART=<mode>,<domain name>,<port>	If command is executed correctly,response: **OK** Otherwise response: **+CME ERROR <err>** If the connection already exists: **ALREADY CONNECT** Then: If a connection is set up,a URC will appear: **CONNECT OK** Otherwise a URC as follows will appear: **STATE: <sl_state>** **CONNECT FAIL**
	In Multi-connection mode(+CIPMUX=1): AT+CIPSTART=<n>,<mode>,< IP address>,<port> Or AT+CIPSTART=<n>,<mode>,<domain name>,<port>	If command is executed correctly,response: **OK** Otherwise response: **+CME ERROR <err>** If the connection already exists: **<n>,ALREADY CONNECT** Then: If a connection is set up,a URC will appear: **<n>,CONNECT OK** Otherwise a URC as follows will appear: **<n>,CONNECT FAIL**
Test Command	AT+CIPSTART=?	In single connection mode (+CIPMUX=0): +CIPSTART: (<mode>s),(IP address range),(port range) +CIPSTART: (<mode>s),(domain name),(port range) OK
		In Multi-connection mode(+CIPMUX=1): +CIPSTART: (<n>s),(<mode>s),(IP address range),(port range) +CIPSTART: (<n>s),(<mode>s),(domain name),(port range) OK
Note	● Set command is used to setup TCP/UDP connection. ● Set command is allowed only when the state is IP INITIAL or IP STATUS in single connection mode or when the state is IP STATUS in multi-connection mode. So it is	

	necessary to implement “AT+CIPSHUT” before establish a TCP/UDP connection with this command when the state is not IP INITIAL or IP STATUS. ● in multi-connection mode,AT+CSTT, AT+CIICR,AT+CIFSR must be executed before the set command.

Defined values:

Parameter	Definition	Value	Description
<n>	Link No.	0~5	Integer type
<mode>	connection type	“TCP”	TCP
		“UDP”	UDP
<IP address>	IP address of remote server	-	String type quoted in “”
<domain name>	Domain name of remote server	-	String type quoted in “”
<port>	Port of remote server	-	Integer type
<sl_state>	Single link state	IP INITIAL	Initial state,module enters this state after power on
		IP START	Enter this state after execution of +CSTT
		IP CONFIG	Enter this state after execution of +CIICR and before the GPRS context is activated
		IP GPRSACT	Enter this state after execution of +CIICR and after the GPRS context is activated
		IP STATUS	Enter this state after execution of +CIFSR
		TCP CONNECTING/UDP CONNECTING	Enter this state after execution of +CIPSTART and before connection succeeds
		CONNECT OK	Enter this state after execution of +CIPSTART and after connection succeeds
		TCP CLOSING/UDP CLOSING	Enter this state after execution of +CIPCLOSE and before closed successfully
		TCP CLOSED/UDP CLOSED	Enter this state after execution of +CIPCLOSE and after closed successfully
		PDP DEACT	Enter this state after execution of +CGACT=0 or +CIPSHUT

14.6 Select TCPIP application mode:AT+CIPMODE

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPMODE=<mode>	OK
Read command	AT+CIPMODE?	+CIPMODE: <mode> OK
Test Command	AT+CIPMODE =?	+CIPMODE: (0-NORMAL MODE,1-TRANSPARENT MODE) OK

Defined values:

Parameter	Definition	Value	Description
<mode>	mode	0	Normal mode
		1	Transparent mode

14.7 Select data sending mode:AT+CIPQSEND

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPQSEND=<n>	OK
Read Command	AT+CIPQSEND?	+CIPQSEND: <n> OK
Test Command	AT+CIPQSEND=?	+CIPQSEND: (0,1) OK

Defined values:

Parameter	Definition	Value	Description
<n>	Data sending mode	0	Ordinary mode,also called slow sending mode –when the server has received data,"SEND OK" will be routed to TE
		1	Quick sending mode –when data is sent out by module,"DATA ACCEPT:<n>,<length>" will be routed to TE,whether the server has received the data or not.

14.8 Config transparent transfer mode:AT+CIPCCFG

Syntax:

Type of	Command	Possible response(s)

Command		
Set Command	AT+CIPCCFG=<NmRetry>,<WaitTm>,<SendSz>,<esc>[,<Rxmode>,<RxSize>,<Rxtimer>]	OK
Read command	AT+CIPCCFG?	+CIPCCFG:<NmRetry>,<WaitTm>,<SendSz>,<esc>,<Rxmode>,<RxSize>,<Rxtimer> OK
Test Command	AT+CIPCCFG=?	+CIPCCFG:(NmRetry:3-8),(WaitTm:2-10),(SendSz:1-1460),(esc:0,1),(Rxmode:0,1),(RxSize:50-1460),(Rxtimer:20-1000) OK
Note	This command will be effective only in single connection mode (+CIPMUX=0) and in IP INITIAL state.	

Defined values:

Parameter	Definition	Value	Description
<NmRetry>	Retry number of an IP packet	3~8	5 by default
<WaitTm>	Number of 100ms intervals to wait for serial(tx buffer) input before sending the packet	2~10	Unit: 100ms, default value is 2
<SendSz>	bytes to be received from serial port(tx buffer) before sending.	1~1460	1024 by default
<esc>	If escape sequence is enabled	1	enabled,default value
		0	disabled
<Rxmode>	Whether to set time interval during output data from serial port(rx buffer)	0	output data from serial port without interval
		1	output data from serial port within <Rxtimer> interval
<RxSize>	Output data length for each time	50-1460	units:bytes, default value:1460
<Rxtimer>	Time interval (ms) to wait for serial port(rx buffer) to output data again	20-1000	default value:50

14.9 Send data:AT+CIPSEND

Syntax:

Type of Command	Command	Possible response(s)
Set Command	In single connection mode (AT+CIPMUX=0): AT+CIPSEND=<length>	Send fixed-length data 1) respond **>** input data of <length>after **>**and the data will be send out . If data is sent successfully, response is as follows:

		SEND OK (if AT+CIPQSEND=0) or: **DATA ACCEPT:<length>** (if AT+CIPQSEND=1) If data is sent unsuccessfully,response: **SEND FAIL** 2) If NO connection exists or other error happens,response: **+CME ERROR <err>**
	In multi-connection mode (+CIPMUX=1): AT+CIPSEND=<n>[,<length>]	1) When<length> is omitted, it is used to send varied-length data. **">"** appears, then input data and [CTRL-Z](0x1A) to send them or [ESC](0x1B) to cancel sending. When <length> is present, it is used to send fixed-length data. **">"** appears, then input data of <length>after **>**and the data will be send out If data is sent successfully, response is as follows: **<n>,SEND OK** (if AT+CIPQSEND=0) or **DATA ACCEPT:<n>,<length>**(if AT+CIPQSEND=1) If data is sent unsuccessfully,response: **<n>,SEND FAIL** 2) If NO connection exists or other error happens,response: **+CME ERROR <err>**
Execution Command	AT+CIPSEND	it is used to send varied-length data in single connection mode. 1) "**>**" appears, then input data and [CTRL-Z](0x1A) to send them or [ESC](0x1B) to cancel sending. If data is sent successfully, **SEND OK** (if AT+CIPQSEND=0) or **DATA ACCEPT:<length>**(if AT+CIPQSEND=1) If data is sent unsuccessfully,response: **SEND FAIL** 2) If NO connection exists or other error happens,response: **+CME ERROR <err>**
Read Command	AT+CIPSEND?	In single connection mode (AT+CIPMUX=0),response: +CIPSEND: <size> OK
		In multi connection mode (AT+CIPMUX=1),response: +CIPSEND: <n>,<size> OK
Test Command	AT+CIPSEND=?	In single connection mode (AT+CIPMUX=0),response: +CIPSEND: <length> OK
		In multi connection mode (AT+CIPMUX=1),response: +CIPSEND: <0-7>,<length> OK
Note	● The Execution and Set commands will send data automatically at the expiration of timer set by AT+CIPATS,so data can be sent by [CTRL-Z] ,by<length> parameter or by the timer set by	

	AT+CIPATS. ● Can send data on the condition that at least one TCP/UDP connection has been setup by +CIPSTART. ● The max size of data sending can not exceed <size>.

Defined values:

Parameter	Definition	Value	Description
<n>	Link No. defined as <n> in +CIPSTART	0~5	Integer type
<length>	Length of data	-	Integer type,it must be less than <size>
<size>	The max length of data sent at one time	-	Integer type,the value at present is 1460bytes

14.10 Set Auto Sending Timer:AT+CIPATS

If <mode> is set to 1 by set command ,the data will be sent immediately after <time> is due when sending data with AT+CIPSEND (that is if <CTRL+Z> is not input in AT+CIPSEND or less than <length> data is input in AT+CIPSEND=<length> before <time> is due).

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPATS=<mode>[,<time>]	OK
Read Command	AT+CIPATS?	+CIPATS: <mode>,<time> OK
Test Command	AT+CIPATS=?	+CIPATS: (<mode>s),(<time>s) OK

Defined values:

Parameter	Definition	Value	Description
<mode>	An integer parameter which indicates whether set timer when sending data	0	not set timer when sending data
		1	set timer when sending data
<time>	An integer parameter which indicates the seconds after which the data will be sent	1~100	unit: seconds

14.11 If display '>' and SEND OK when sending data:AT+CIPSPRT

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPSPRT=<send prompt>	OK
Read Command	AT+CIPSPRT?	+CIPSPRT: <send prompt>

		OK
Test Command	AT+CIPSPRT=?	+CIPSPRT: (<send prompt>s) OK

Defined values:

Parameter	Definition	Value	Description
<send prompt>	If '>' and/or 'SEND OK' will be displayed after execution of AT+CIPSEND. integer type	0	Not display '>' but display: 'SEND OK'
		1	Display '>' and 'SEND OK'（default）
		2	Display neither '>' nor 'SEND OK'

14.12 Query the current connecton status:AT+CIPSTATUS

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CIPSTATUS	In single connection mode(AT+CIPMUX=0),response: **OK** **STATE: <sc_state>**
		In multi connection mode (AT+CIPMUX=1),response: **OK** **STATE: <n>,<mc_state>** **C:<n>,<bearer>, <TCP/UDP>, <IP address>, <port>, <client state>**
Test Command	AT+CIPSTATUS=?	OK

Defined values:

Parameter	Definition	Value	Description
<n>	Link No.	0~5	integer type defined as <n> in +CIPSTART
<bearer>	GPRS bearer	0~1	Default value is 0
<IP address>	IP address	-	String type(quoted in "")
<port>	Port No.	-	integer type
<sc_state>	Single connection state	IP INITIAL	Initial state,module enters this state after power on
		IP START	Enter this state after execution of +CSTT
		IP CONFIG	Enter this state after execution of +CIICR and before the GPRS context is activated
		IP GPRSACT	Enter this state after execution of +CIICR and after the GPRS context is activated
		IP STATUS	Enter this state after execution of +CIFSR

		TCP CONNECTING/UDP CONNECTING / SERVER LISTENING	Enter this state after execution of +CIPSTART and before connection succeeds
		CONNECT OK	Enter this state after execution of +CIPSTART and after connection succeeds
		TCP CLOSING/UDP CLOSING	Enter this state after execution of +CIPCLOSE and before closed successfully
		TCP CLOSED/UDP CLOSED	Enter this state after execution of +CIPCLOSE and after closed successfully
		PDP DEACT	Enter this state after execution of +CGACT=0 or +CIPSHUT
<mc_state>	Multi connection state	IP INITIAL	Initial state,module enters this state after power on
		IP START	Enter this state after execution of +CSTT
		IP CONFIG	Enter this state after execution of +CIICR and before the GPRS context is activated
		IP GPRSACT	Enter this state after execution of +CIICR and after the GPRS context is activated
		IP STATUS	Enter this state after execution of +CIFSR
		IP PROCESSING	Enter this state after execution of +CIPSTART
		PDP DEACT	Enter this state after execution of +CGACT=0 or +CIPSHUT
<client state>	Client state	INITIAL	Initial state
		CONNECTING	It is establishing a TCP/UDP connection
		CONNECTED	The TCP/UDP connection is established
		REMOTE CLOSING	Server closes the connection
		CLOSING	The connection is being closed
		CLOSED	The connection has been closed

14.13 Query the transmission state of a connection:AT+CIPACK

Syntax:

Type of Command	Command	Possible response(s)
Set Command	in multi connection mode(+CIPMUX=1): AT+CIPACK=<n>	+CIPACK: <txlen>, <acklen>, <nacklen> OK
Execution Command	in single connection mode(AT+CIPMUX=0): AT+CIPACK	+CIPACK: <txlen>, <acklen>, <nacklen> OK
Test Command	AT+CIPACK=?	OK

Defined values:

Parameter	Definition	Value	Description
<n>	Link No. defined as <n> in +CIPSTART	0~5	integer type
<txlen>	The length of sent data	-	integer type,unit: bytes
<acklen>	The length of data that has been acknowledged by server	-	integer type, unit: bytes
<nacklen>	The length of data that has not been acknowledged by server	-	integer type, unit: bytes

14.14 Set GPRS connection mode:AT+CIPCSGP

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPCSGP=<mode>,[(<apn>,< user name >,<password>)]	OK
Read Command	AT+CIPCSGP?	+CIPCSGP: <mode>, <apn>, <user name>, <password> OK
Test Command	AT+CIPCSGP=?	+CIPCSGP: 1-GPRS,APN,USER NAME,PASSWORD OK

Defined values:

Parameter	Definition	Value	Description
<mode>	Wireless connection mode	1	GPRS
Parameter about GPRS connection:			
<apn>	GPRS access point name	-	String type(quoted in “”)
<user name>	GPRS user name	-	String type(quoted in “”)
<password>	GPRS password	-	String type(quoted in “”)

14.15 Config DNS(Domain Name Server):AT+CDNSCFG

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CDNSCFG=<pri_dns>,[<sec_ dns>]	OK
Read Command	AT+CDNSCFG?	PrimaryDns: <pri_dns> SecondaryDns: <sec_dns> OK
Test Command	AT+CDNSCFG=?	+CDNSCFG: (“Primary DNS”),(“Secondary DNS”) OK

Defined values:

Parameter	Definition	Value	Explanation
<pri_dns>	The IP address of primary DNS	0~7	String type(quoted in “”)
<sec_ dns>	The IP address of secondary DNS	0~1	String type(quoted in “”)

14.16 Get the IP address of a given DNS:AT+CDNSGIP

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CDNSGIP=<domain name>	If command format is correct and the IP address is resoluted correctly,response: **OK** **+CDNSGIP: 1, <domain name>,<IP address>** If command format is correct but the IP address can not be parsed,response: **OK** **+CDNSGIP:0,<dns error code>** If command format is not correct,response: **ERROR**
Test Command	AT+CDNSGIP=?	OK

Defined values:

Parameter	Definition	Value	Explanation
<domain name>	Domain name	-	String type(quoted in “”)
<IP address>	IP address of the DNS	-	String type(quoted in “”)
<dns error code>	DNS related error code	10	GENERAL ERROR
		11	MAX RETRIES
		12	NO SERVER ADDR
		13	NO MEMORY
		14	INVALID NAME
		15	INVALID RESP
		Other values	Some other error code

14.17 Set sender prompt when receiving data:AT+CIPSRIP

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPSRIP=<mode>	OK

Read Command	AT+CIPSRIP?	+CIPSRIP: <mode> OK
Test Command	AT+CIPSRIP=?	+CIPSRIP: (<mode>s) OK
Note	This command is available only in single connection mode(+CIPMUX=0)	

Defined values:

Parameter	Definition	Value	Explanation
<mode>	whether show the prompt of a received data	0	Do not show the prompt（default）
		1	Show the prompt whose format is as follows: RECV FROM:<IP ADDRESS>:<PORT>

14.18 Set a header when receiving data:AT+CIPHEAD

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPHEAD=<mode>	OK
Read Command	AT+CIPHEAD?	+CIPHEAD: <mode> OK
Test Command	AT+CIPHEAD=?	+CIPHEAD: (<mode>s) OK
Note	This command is available only in single connection mode(+CIPMUX=0)	

Defined values:

Parameter	Definition	Value	Explanation
<mode>	whether show the header of a received data	0	Do not show the header（default）
		1	Show the header whose format is as follows: +IPD,data length:

14.19 Set a protocol header when receiving data:AT+CIPSHOWTP

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPSHOWTP=<mode>	OK
Read Command	AT+CIPSHOWTP?	+CIPSHOWTP: <mode> OK

Test Command	AT+CIPSHOWTP=?	+CIPSHOWTP: (<mode>S) OK
Note	This command is available only in single connection mode(+CIPMUX=0) and AT+CIPHEAD=1	

Defined values:

Parameter	Definition	Value	Explanation
<mode>	whether show the protocol header of a received data	0	Do not show the protocol header（default）
		1	Show the header whose format is as follows: +IPD,<data Size>,<TCP/UDP>:

14.20 Rceive data in multi connection mode: +RECEIVE

Syntax:

Type of Command	Command	Possible response(s)
URC report	+RECEIVE,<n>,<length>: <data>	Note:<data> is received data

Defined values:

Parameter	Definition	Value	Description
<n>	Link No. defined as <n> in +CIPSTART	0~5	integer type
<length>	The length of received data	-	integer type,in units of bytes

14.21 Get data from network manually: AT+CIPRXGET

Syntax:

Type of command	Command	Possible response(s)
Set command	Single connection(AT+CIPMUX=0): AT+CIPRXGET=<mode>[,<len>]	AT+CIPRXGET=1: **OK** Note; To enable this function, parameter <mode> must be set to 1 before connection. Then ,there will be**+CIPRXGET:1**to indicate data receiving.
		AT+CIPRXGET=2,<len> to read data in ascii format: **+IPRXGET:2,<cnlen>,<rlen>** **….data….** **OK**
		AT+CIPRXGET=3,<len> to read data in HEX format: **+IPRXGET:3,<cnlen>,<rlen>** **….data….**

		OK
		AT+CIPRXGET=4: **+CIPRXGET: 4, <cnflength>** **OK**
	Multi-connection(AT+CIPMUX=1): AT+CIPRXGET=<mode>,<n>[,<len>]	AT+CIPRXGET=1: **OK**
		AT+CIPRXGET=2,<n>,<len> to read data in ascii format: **+IPRXGET:2,<n>,<cnlen>,<rlen>** **….data….** **OK**
		AT+CIPRXGET=3, <n>,<len> to read data in HEX format: **+IPRXGET:3, <n>,<cnlen>,<rlen>** **….data….** **OK**
		AT+CIPRXGET=4: **+CIPRXGET: 4, <n>,<cnflength>** **OK**
Read Command	AT+CIPRXGET?	+CIPRXGET: <mode> OK
Test Command	AT+CIPRXGET=?	If single IP connection (+CIPMUX=0): **+CIPRXGET: (list of supported <mode>s),(list of supported <reqlength>)** **OK** If multi IP connection (+CIPMUX=1): **+CIPRXGET: (list of supported <mode>s), (list of supported <id>s), (list of supported <reqlength>)** **OK**
URC	+IPRXGET:1	In single connection, this URC may appear after AT+CIPRXGET=1 which means AT+CIPRXGET=2,<len> or AT+CIPRXGET=3,<len> can be input to read data now
	+IPRXGET:1,<n>	In multi connection, this URC may appear after AT+CIPRXGET=1 which means AT+CIPRXGET=2,<n>,<len> or AT+CIPRXGET=3, <n>,<len> can be input to read data now

Defined values:

Parameter	Definition	Value	Description
<mode>	mode	0	Disable getting data from network manually, MT is set to normal mode, data will be pushed to TE directly
		1	Enable getting data from network manually
		2	The module can get data, but the length of output data can not exceed 1460 bytes at a time
		3	Similar to mode 2, but in HEX mode, which means the module can get 730 bytes maximum at a time
		4	Query how many data has not been read
<n>	Link id in multi-connection	0-5	Defined as <n>in +CIPSTART

<len>	Number of data requested	1-1460	In ascii characters
		1-730	In HEXcharacters
<cnlen>	Number of readdata		Unit: bytes
<rlen>	Data still to be read		Unit: bytes

Examples:

Command(→)/ Response(←)	AT Sequences	Description
Application scenario in single connection:		
→	AT+CIPRXGET=1	Enable getting data from network manually
←	OK	
→	AT+CGREG?	
←	+CGREG:0,1 OK	
→	AT+CIPSTART="TCP","36.9.88.120",6001	Set up a single TCP connection
←	OK	
←（URC）	CONNECT OK	
←（URC）	+CIPRXGET: 1	Receive data from the server
→	AT+CIPRXGET=2,150	Read 150charaters in ascii format
←	+CIPRXGET: 2,10,0 1234567890 OK	Read 10 charaters：1234567890，0 not read yet
→	AT+CIPRXGET=4	Query the number of unread data
←	+CIPRXGET: 4,0 OK	0is not read
←（URC）	+CIPRXGET: 1	The server sends data again
→	AT+CIPRXGET=3,150	This time, read 150charaters in hex format
←	+CIPRXGET: 3,5,0 48454C4C4F OK	Read 5：HELLO(in fact 10 bytes)
Application scenario in multi-connection:		
→	AT+CIPRXGET=1	
←	OK	
→	AT+CIPMUX=1	
←	OK	
→	AT+CSTT="CMNET"	
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	

←	OK	
→	AT+CIPSTART=3,"TCP","36.9.88.120",6001	Set up multi TCP connection
←	OK	
←（URC）	3, CONNECT OK	
←（URC）	+CIPRXGET: 1,3	Receive data on the connection of id=3
→	AT+CIPRXGET=2,3,10	
←	+CIPRXGET: 2,3,5,0 AAAAA OK	
→	AT+CIPRXGET=4,3	
←	+CIPRXGET: 4,3,0 OK	

14.22 Save TCPIP application context: AT+CIPSCONT

Module saves current TCPIP Application Contexts to NVRAM. When system is rebooted, the parameters will be loaded automatically.

Syntax:

Type of command	Command	Possible response(s)
Read Command	AT+CIPSCONT?	+CIPSCONT:<mode0> +CIPCSGP:<mode> Gprs Config APN:<apn> Gprs Config UserId:<user name> Gprs Config Password:<password> +CLPORT:<port> +CIPHEAD:<mode> +CIPSHOWTP:<mode> +CIPSRIP:<mode> +CIPATS:<mode>,<time> +CIPSPRT:<send prompt> +CIPQSEND:<n> +CIPMODE:<mode> +CIPCCFG:<NmRetry>,<WaitTm>,<SendSz>,<esc> +CIPMUX:<n> +CIPDPDP:<mode>, <interval>, <timer> +CIPRXGET:<mode> +CIPQRCLOSE:<mode> +CIPUDPMODE:<mode> OK

Execution Command	AT+CIPSCONT	OK

14.23 Close a TCP/UDP Connection:AT+CIPCLOSE

Syntax:

Type of Command	Command	Possible response(s)
Set Command	in single connection mode: AT+CIPCLOSE=<id>	CLOSE OK
	in multi connection mode: AT+CIPCLOSE=<n>[,<id>]	<n>,CLOSE OK
Execution Command	AT+CIPCLOSE	If succeed, Response: **CLOSE OK** If fail, Response: **ERROR**
Test Command	AT+CIPCLOSE=?	OK
Note	● Execution Command (AT+CIPCLOSE) is available only in single connection mode; it will return ERROR in multi connection mode. ● Execution/Set Command can close the connection only in TCP/UDP CONNECTING or CONNECT OK state, otherwise it will return ERROR . ● in single connection mode, the state goes to IP CLOSE after Set/Execution command	

Defined values:

Parameter	Definition	Value	Description
<id>	Close mode	0	Slow close（default）
		1	Quick close
<n>	Link No. defined as <n> in +CIPSTART	0~5	integer type

14.24 Establish as A Server:AT+SERVER

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPSERVER=<mode>[,<port>]	OK
Read Command	AT+CIPSERVER?	+CIPSERVER: <mode>[,<port>,<channel id>,<bearer>]

		OK
Test Command	AT+CIPSERVER=?	+CIPSERVER: (0-CLOSE SERVER, 1-OPEN SERVER),(1-65535) OK
URC	SERVER OK	This URC will be reported after set command AT+CIPSERVER=<mode>[,<port>] responds OK
Notice	This command is allowed to establish module as a TCP server only when the state is IP INITIAL or IP STATUS when it is in single state. In multi-IP state, this command is allowed to establish module as a TCP server when the state is IP STATUS only.	

Defined values:

Parameter	Definition	Value	Description
<mode>	server mode switch	0	server mode is established
		1	server mode is closed
<port>	server listening port	1~65535	
<channel id>	channel id		
<bearer>	GPRS bearer	0	GPRS

14.25 Ping Echo Request:AT+CIPPING

Syntax:

Type of Command	Command	Possible response(s)
Set Command	AT+CIPPING=<IPaddr>[,<retry Num>[,<dataLen>[,<timeout>[,<ttl>]]]]	+CIPPING: <replyId>,<Ip Address>,<replyTime>,<ttl>[<CR><LF> +CIPPING: <replyId>,<Ip Address>,<replyTime>,<ttl> [...]] OK
Read Command	AT+CIPPING?	+CIPPING: <retryNum>,<dataLen>,<timeout>,<ttl> OK
Test Command	AT+CIPPING=?	+CIPPING: (list of supported <retryNum>s),(list of supported <dataLen>s),(list of supported <timeout>s),(list of supported <ttl>s) OK
Note	• Before sending PING Request the GPRS context must be activated. • When the Echo Request timeout expires (no reply received on time), the response will contains <replyTime> setting to 600 and <ttl> setting to 255. • When executing this command, if PDP context is deactivated for some reasons, such as	

	out of service, etc., the "+PDP: DEACT" URC is reported and the command will end immediately.

Defined values:

Parameter	Definition	Value	Description
<IPaddr>	Address of the remote host,string type. This parameter can be either an IP address or a domain name	ip address	
		Domain name	
<retryNum>	The number of Ping Echo Requset to send.	1-100	default:4
<dataLen>	The length of Ping Echo Request data	0-1024	default:32
<timeout>	The timeout waiting for a single Echo Reply	1-600	in units of 100 ms,
<ttl>	time to live	1-255	default:64
<replyId>	Echo Reply serial number		
<Ip Address>	IP Address of the remote host		
<replyTime>	time to receive the response		in units of 100 ms

14.26 Deactivate GPRS PDP context:AT+CIPSHUT

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	AT+CIPSHUT	If the connection is closed successfully,response: **SHUT OK** If the connection is closed unsuccessfully, response: **ERROR**
Test Command	AT+CIPSHUT=?	OK
Note	● The state goes to IP INITIAL after execution of AT+CIPSHUT. ● in multi connection mode, all TCP and UDP connections will be closed after execution of AT+CIPSHUT. ● If the URC "+PDP:DEACT" is reported which means that the GPRS PDP context has been deactivated by the network , AT+CIPSHUT is still be needed for the state machine to go to original state.	

14.27 Switch from data mode to command mode:+++

This Command is only available during a CSD call or a GPRS connection. The +++ character sequence causes the TA to switch to Command mode while keeping the GPRS data connection.

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	+++	OK
Notice	To prevent the +++ escape sequence from being misinterpreted as data, it should comply to following rules: ● No characters should be entered in 1 second before +++; ● “+++” characters should be entered with nocharacters in between; ● No characters should be entered in 0.5 second after +++.	

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	ATD*99#	
←	CONNECT ~~~ÿ}#À!}!}!} }<}!}$}&@}#}$À#}%}&Êê}*h}"}&} } } } } '}"}{}"7S~~ÿ}#À!}!}"} }<}!}$} &@}#}$À#}%}&Êê}*h}"}&} } } } }'}"}{}"ï¥~~ÿ}#À!}!}#} }<}!}$}&@}#}$À#}%}&Êê}*h}"}& } } } } }'}"}{}"§÷~~ÿ}#À!}!}$} }<}!}$}&@}#}$À#}%}&Êê}*h}"}&} } } } }'}"}	Data call is setup
→	+++	+++ to return to command mode
←	OK	OK indicates that it’s command mode now
→	ATH	Hang up the data call
←	OK	

14.28 Switch from command mode to data mode:ATO

Syntax:

Type of Command	Command	Possible response(s)
Execution Command	ATO	If the data connection is resumed successfullye: CONNECT If the data connection is resumed unsuccessfully: NO CARRIER

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	ATD*99#	Make a data call
←	CONNECT	Success

	~~ÿ}#À!}!}!} }<}!}$}&@}#}$À#}%}&Êê}*h}"}&} } } } }'}"}(}" 7S~~ÿ}#À!}!}"} }<}!}$}	
→	+++	Return to command mode
←	OK	Success
→	ATO	Resume the data connetion
←	CONNECT ~~~ÿ}#À!}!}!} }<}!}$}&@}#}$À#}%}&Êê}*h}"}&} } } } }'}"}(}" 7S~~ÿ}#À!}!}"} }<}!}$}	success

14.29 TCP/UDP Error codes

Errors occurred in TCP applications will be reported in form of TCP ERROR:<err code>.

TCP error code:

<err code>	Definition in English
0	No error
1	TCPIP is idle
2	No tsapi
3	Invalid tsapi
4	No buffer
5	Network error
6	Remote host is unreachable
7	The address is already in use
8	The address is not available
9	The supplied buffer is too large or small
10	Invalid parameter
11	Remote host has rejected the connection
12	Time out
13	An established connection is aborted
14	Remote host has reset the connection
15	The socket is already connected
16	The socket is not connected
17	The socket has been shutdown
18	Undefined error

Errors occurred in UDP applications will be reported in form of UDP ERROR:<err code>.

UDP error code:

<err code>	Definition in English
0	No error
1	TCPIP is idle
2	No tsapi
3	Invalid tsapi

4	The callback has not been registered
5	No buffer
6	Network error
7	Remote host has rejected the connection
8	Remote host is unreachable
9	The address is already in use
10	The address is not available
11	The supplied buffer is too large or small
12	Invalid parameter
13	TCPIP is busy
14	Undefined error
15	The socket is already connected

14.30 State Machine

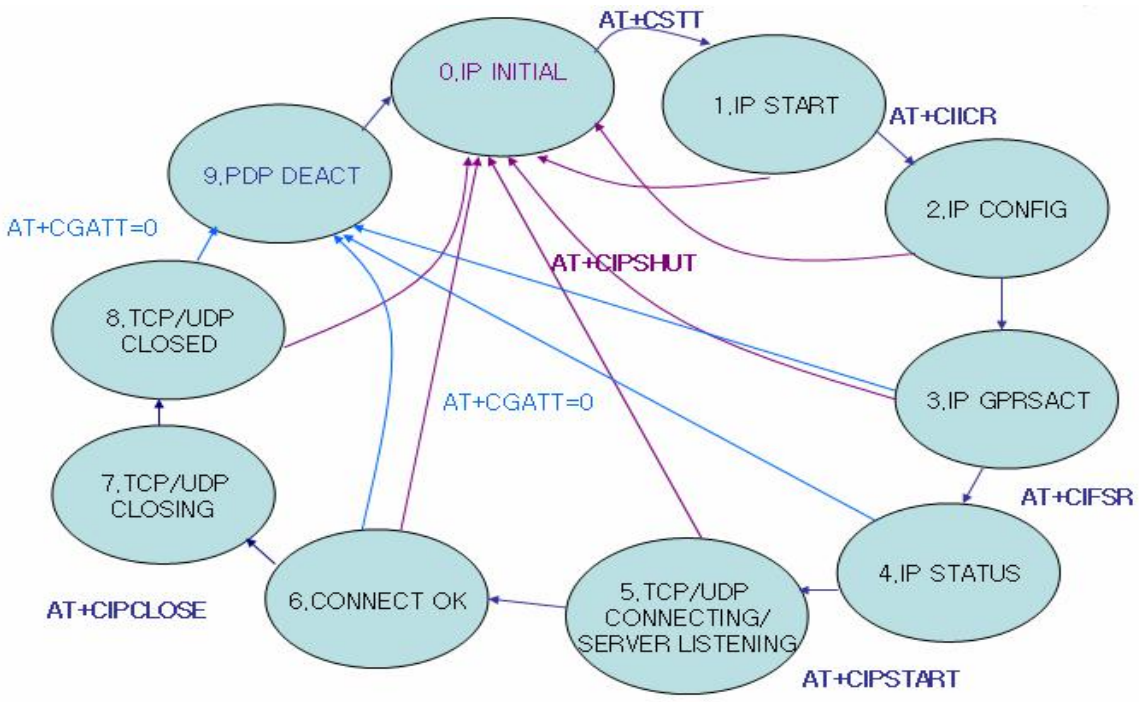

Chart 4:State machine in single connection mode

Descriptons:

- Input AT+CIICR,the state machine will go to IP CONFIG state immediately;when OK is reported,it will go to IP GPRSACT state;
- Input AT+CIPSTART,the state machine will go to IP/UDP CONNECTING state immediately; if CONNECT OK is reported afterward,it means that the connection has been established, and the

machine will go to CONNECT OK state;

- Input AT+CIPCLOSE,the state machine will go to TCP/UDP CLOSING state immediately;if CLOSE OK is reported afterward,it means that the connection has been closed successfully,and the machine will go to TCP/UDP CLOSED;
- If the URC "+PDP:DEACT" is reported,it means that the GPRS PDP context has been deactivated by the network, in which case, the machine will go to PDP DEACT state;
- In IP GPRSACT,IP STATUS,CONNECT OK or TCP/UDP CLOSED state,exectution of AT+CGATT=0 will make the GPRS PDP context deactivated and the state machine to go to PDP DEACT state;
- In PDP DEACT state,AT+CIPSHUT is needed for the machine to go to IP INITIAL state;
- AT+CIPSHUT can be executed in all states to make state machine to go to IP INITIAL state.

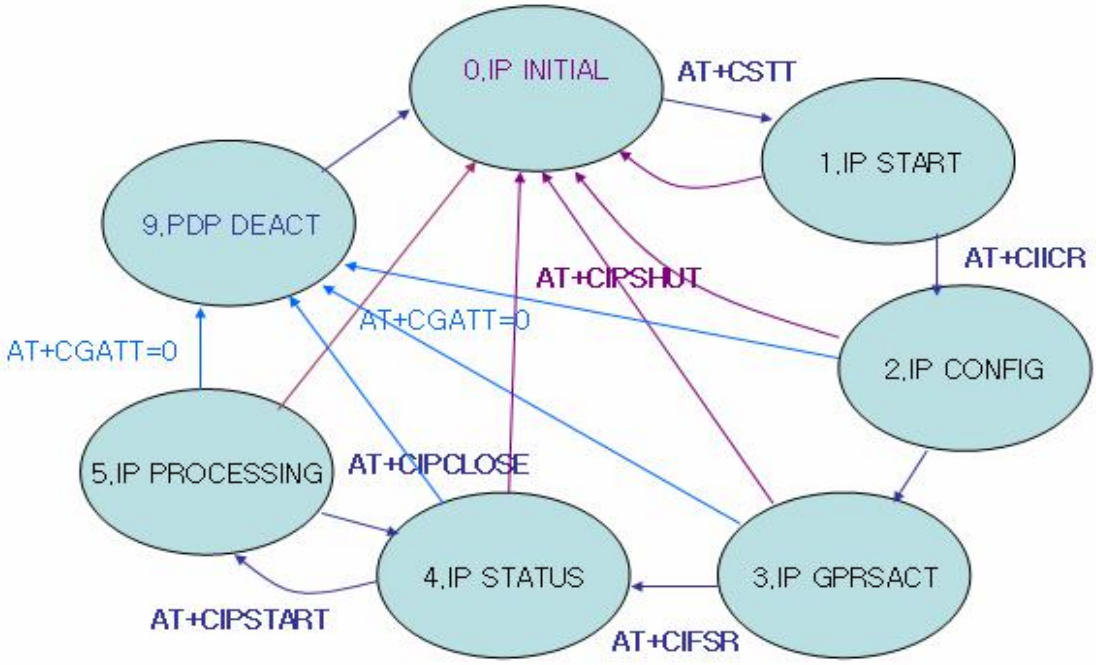

Chart 5:State machine in multi connection mode

14.31 Examples for application

Because the commands in this part are highly dependent on each other,we could describe them together in application expamples.

Command(→) /Response(←)	AT Sequences	Description
TCP application scenario 1:module as client,single connection,sending data（slow sending）		
→	AT+CGREG?	Query GPRS registration state
←	+CGREG:0,1 OK	<n>=0,URC report is not permitted <stat>=1,registered to local operator
→	AT+CGATT?	Query the GPRS attach state
←	+CGATT: 1 OK	<state>=1,GPRS is attached
→	AT+CIPMUX=0	Set to single connection mode
←	OK	
→	AT+CIPQSEND=0	Set to slow sending
←	OK	
→	AT+CSTT="CMNET","","" Or AT+CSTT="CMNET"	Start a task, set APN to "CMNET" when no account or password is needed,just use a empty string "".
←	OK	
→	AT+CIICR	Activate the GPRS PDP context,get IP address
←	OK	
→	AT+CIFSR	Query the IP address
←	010.083.172.111	
→	AT+CIPSTATUS	Query the state
←	OK STATE: IP STATUS	
→	AT+CIPSTART="TCP","60.166.12.210",7500 Or AT+CIPSTART="TCP","60.166.12.210","7500"	In IP STATUS state,+CIPSTART can be used to establishe a connection: "TCP" – protocol type of the link "60.166. *.*" – server IP 7500 –server port No.
←	OK	
←(URC)	CONNECT OK	If the TCP connection has been established ,a “CONNECT OK” URC will be reported
→	AT+CIPSTATUS	Query the state again

←	OK STATE: CONNECT OK	
→	AT+CIPSEND	Send data（varied-length）
→	>1234567890<CTRL-Z>	Input data following ”>” and input <CTRL-Z> to send them
←	SEND OK	SEND OK means the server has received the data
→	AT+CIPACK	Check the transmission state of the TCP connection
←	+CIPACK: 1073,1073,0 OK	First 1073- data sent, Second 1073- data received by server 0- Data hasn’t received by server
→	AT+CIPSEND=10	Send data（fixed-length）
→	>1234567890	
←	SEND OK	When the length of data reaches 10 bytes,the data will be sent automatically
→	AT+CIPATS=1,10	Set timer for auto data sending to 10s
←	OK	
→	AT+CIPSEND	Send data
→	>1234567890ABCDEFG	
←	SEND OK	When the 10 seconds timer expires,the data will be sent automatically
→	AT+CIPSEND=100	
→	>123	
←	SEND OK	When the 10 seconds timer expires,the data will be sent automatically
→	AT+CIPCLOSE	Close the TCP link
←	CLOSE OK	
→	AT+CIPSTATUS	Check the state
←	OK STATE: TCP CLOSED	TCP link is closed successfully
→	AT+CIPSHUT	Shut the GPRS PDP context
←	SHUT OK	
→	AT+CIFSR	Query local IP
←	ERROR	IP can not be found

TCP application scenario 2:module as client,single connection,sending data（fast sending）

（in fact,there are 2 methods of data sending: slow sending and fast sending which can be set by +CIPQSEND. The differences are as follows:

- In slow sending,TE needs the acknowledgement from server(which is SEND OK) for every sending of data
- In fast sending,TE just sends the data to TA(i.e. module) without expectation of the acknowledgement from server(which is SEND OK)

→	AT+CIPMUX=0	Set to single connection mode
←	OK	
→	AT+CIPQSEND=1	Set to fast sending
←	OK	

→	AT+CIPSTATUS	Query the state
←	OK STATE: IP INITIAL	
→	AT+CIPSTART="TCP","60.166.12.210",7500	In IP STATUS state,+CIPSTART can be used to establishe a connection: "TCP" – protocol type of the link "60.166. *.*" – server IP 7500 –server port No.
←	OK	
←(URC)	CONNECT OK	
→	AT+CIPSEND	Send data
→	>1234567890<CTRL-Z>	
←	DATA ACCEPT:10	Indicates that module has received 10 bytes of data (for further sending)from TE
	……	+CIPCLOSE,+CIPSHUT ….
UDP application scenario 1:module as client,single connection,sending data（slow sending）		
→	AT+CIPMUX=0	Set to single connection mode
←	OK	
→	AT+CIPQSEND=0	Set to slow sending
←	OK	
	……	+CSTT +CIICR +CIFSR
→	AT+CIPSTART="UDP","60.166.12.210"6100	Establish an UDP link: "UDP" -protocol type of the link "60.166.*.*" -server IP 6100 - server port No.
←	OK	
←(URC)	CONNECT OK	
→	AT+CIPSEND	Send data
→	>1234567890<CTRL-Z>	
←	SEND OK	SEND OK means the server has received the data
	……	+CIPCLOSE,+CIPSHUT…
UDP application scenario 2:module as client,single connection,sending data（fast sending）		
→	AT+CIPMUX=0	Set to single connection mode
←	OK	
→	AT+CIPQSEND=1	Set to fast sending
←	OK	
	……	+CSTT +CIICR +CIFSR +CIPSTART
→	AT+CIPSEND	Send data
→	>1234567890<CTRL-Z>	
←	DATA ACCEPT:10	SEND OK
	……	+CIPCLOSE,+CIPSHUT
TCP&UDP application scenario 1:module as client,multi connection,sending data（slow sending）		

→	AT+CIPMUX=1	Set to multi connection mode
←	OK	
→	AT+CIPQSEND=0	Set to slow sending
←	OK	
	……	+CSTT +CIICR +CIFSR
→	AT+CIPSTART=0,"TCP","60.166.12.210", 7500	
←	OK	
←(URC)	CONNECT OK	A TCP link, whose id=0 ,is established
→	AT+CIPSTART=1,"UDP","60.166.12.210",6100	
←	OK	
←(URC)	CONNECT OK	A UDP link, whose id=1 ,is established
→	AT+CIPSTATUS	Query the state
←	OK STATE: IP PROCESSING C: 0,0,"TCP","60.166.12.210","7500","CONNECTED" C: 1,0,"TCP","60.166.12.210","7500","CONNECTED" C: 2,,"","","","INITIAL" C: 3,,"","","","INITIAL" C: 4,,"","","","INITIAL" C: 5,,"","","","INITIAL" C: 6,,"","","","INITIAL" C: 7,,"","","","INITIAL"	
→	AT+CIPSEND=0	Send data on the TCP link
→	>1234567890<CTRL-Z>	
←	0,SEND OK	
→	AT+CIPSEND=1	Send data on the UDP link
→	>1234567890<CTRL-Z>	
←	1,SEND OK	
	……	Send more data
→	AT+CIPCLOSE=0	Close link 0
←	0,CLOSE OK	
→	AT+CIPSHUT	
←	SHUT OK	
→	AT+CIPMUX=0	
←	OK	

TCP&UDP application scenario 2:module as client,multi connection,sending data（fast sending）

→	AT+CIPMUX=1	Set to multi connection mode
←	OK	
→	AT+CIPQSEND=1	Set to fast sending
←	OK	
	……	+CSTT +CIICR +CIFSR
→	AT+CIPSTART=6,"TCP","60.166.12.210", 7500	
←	OK	
←(URC)	CONNECT OK	A TCP link, whose id=6 ,is established
→	AT+CIPSTART=7,"UDP","60.166.12.210",6100	
←	OK	
←(URC)	CONNECT OK	A UDP link, whose id=7 ,is established
→	AT+CIPSEND=6	Send data on the TCP link
→	>1234567890<CTRL-Z>	
←	DATA ACCEPT:6,10	
→	AT+CIPSEND=7	Send data on the UDP link
→	>1234567890<CTRL-Z>	
←	DATA ACCEPT:7,10	
→	AT+CIPATS=1,10	Set the auto-sending timer to 10 seconds
←	OK	the timer begins counting down after OK is returned
→	AT+CIPSEND=6	Send data on the TCP link 6
→	>TEST Auto fast send	Input the data to be sent（<CTRL-Z> is not needed）
←	DATA ACCEPT:6,19	When the timer expires,data will be sent automatically
	……	+CIPCLOSE, +CIPSHUT…
Receiving data in single connection mode:		
	……	Setup a TCP link
→	AT+CIPHEAD=1	Set header on
←	OK	
←(UCR)	+IPD,4:TEST	Receive data:TEST
→	AT+CIPSHOWTP=1	Set protocol header on
←	OK	
←(UCR)	+IPD,4,TCP:TEST	Receive data:TEST **If it is a UDP link:** **+IPD,4,UDP:TEST**
→	AT+CIPSRIP=1	Set the sender prompt on
←	OK	
←(URC)	+RECV FROM: 60.166.12.210:7500 +IPD,4:TEST	Receive data:TEST ,the length of which is 4
→	AT+CIPSHOWTP=0	Set protocol header off
←	OK	

→	AT+CIPHEAD=0	Set header off
←	OK	
→	AT+CIPSRIP=0	Set sender prompt off
←	OK	
←(URC)	TEST	Receive data:TEST
Receiving data in multi connection mode:		
	……	+CSTT +CIICR +CIFSR,and setup a TCP link(link id=0) and a UDP link(link id=1)
←(URC)	+RECEIVE,0,7: TEST123	Receive 7 chars on link 0: TEST123
←(URC)	+RECEIVE,1,10: TEST123456	Receive 10 chars on link 1: TEST123456
Transparent data transmission: TCP link		
→	AT+CIPMODE=1	set to transparent mode
←	OK	
→	AT+CIPSCONT	save the CIPMODE to NV
←	OK	
→	AT+CIPSTART="TCP","60.166.18.9",7500	set a single TCP link
←	OK	
←(URC)	CONNECT	the link is connected
→/←	……	send and receive data transparently
→	+++	+++ to quit data mode.
←	OK	
→	ATO	set module to data mode again
←	CONNECT	
Domain name resolution: **(Note: applicable only after at+cstt、at+ciicr、at+cifsr have been executed)**		
→	AT+CDNSGIP="WWW.SINA.COM.CN"	resolute the domain name of sina site
←	OK +CDNSGIP:1,"WWW.SINA.COM.CN","221.179.180.76"	The ip is 221.179.180.76
The conclusion of format for sending and receiving data:		

Data sending (take link id=5 for example in multi connection mode)

	protocol	Fast sending	Slow sending
Single connection	TCP	AT+CIPSEND >test TCP DATA ACCEPT:8	AT+CIPSEND >test TCP SEND OK
	UDP	AT+CIPSEND >test UDP DATA ACCEPT:8	AT+CIPSEND >test UDP SEND OK
multi connection	TCP	AT+CIPSEND=5 >test TCP DATA ACCEPT:5,8	AT+CIPSEND=5 >test TCP 5,SEND OK
	UDP	AT+CIPSEND=5 >test UDP DATA ACCEPT:5,8	AT+CIPSEND=5 >test UDP 5,SEND OK

Data receiving

	protocol	AT+CIPHEAD=0	AT+CIPHEAD=1	
			+CIPSHOWTP=0	+CIPSHOWTP=1
Single connection	TCP	TEST123	+IPD,7:TEST123	+IPD,7,TCP:TEST123
	UDP	TEST123	+IPD,7:TEST123	+IPD,7,UDP:TEST123
multi connection	TCP	+RECEIVE,1,7: TEST123	+RECEIVE,1,7: TEST123	+RECEIVE,1,7: TEST123
	UDP	+RECEIVE,1,7: TEST123	+RECEIVE,1,7: TEST123	+RECEIVE,1,7: TEST123

15 IP application related commands

15.1 Bearer Settings for Applications Based on IP: AT+SAPBR

This command is applied to activate bearer for some applications such as HTTP, FTP.

Syntax:

Type of	Command	Possible response(s)

Command		
Execution command	AT+SAPBR=<cmd_type>,<cid>[,<ConParamTag>,<ConParamValue>]	if <cmd_type> = 2: **+SAPBR: <cid>,<Status>,<IP_Addr>** **OK**
		if <cmd_type> = 4: **+SAPBR:<ConParamTag>,<ConParamValue>** **OK**
		else: **OK**
Test command	AT+SAPBR=?	+SAPBR: (0-4),(1-3),"ConParamTag","ConParamValue" OK
URC report	+SAPBR <cid>: DEACT	if

Defined values:

Parameters	Definition	Value	Description
<cmd_type>	command type	0	close bearer
		1	open bearer
		2	query bearer
		3	set bearer parameters
		4	query bearer parameters
<cid>	bearer identifier	1~3	
<Status>	state of the bearer	0	Bearer is connecting
		1	Bearer is connected
		2	Bearer is closing
		3	Bearer is closed
<IP_Addr>	IP address of the bearer		
<ConParamTag>	bearer parameters	"CONTYPE"	INTERNET connection type. See <ConParamValue_ConType>
		"APN"	access point name, no more than 50 charcters
		"USER"	user name, no more than 50 charcters
		"PWD"	password, no more than 50 charcters
		"PHONENUM"	CSD number
		"RATE"	CSD connection rate see <ConParamValue_Rate>
<ConParamValue>(including <ConParamValue_ConType> and <ConParamValue_Rate>):			
<ConParamValue_Co	INTERNET	"CSD"	CSD connection

nType>	connection type	“GPRS”	GPRS connection
<ConParamValue_Rate>	CSD connection rate	0	2400
		1	4800
		2	9600
		3	14400

16 Commands for HTTP applications

The HTTP AT command set,based on embedded TCP/IP stack,enables the host application to easily access the Internet HTTP service.

16.1 Initialize HTTP service: AT+HTTPINIT

Syntax:

Type of Command	Command	Possible response(s)
Execution command	AT+HTTPINIT	OK
Test command	AT+HTTPINIT=?	OK
Note	HTTPINIT should first be executed to initialize the HTTP service	

16.2 SSL Function: AT+HTTPSSL

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPSSL=<n>	OK
Read command	AT+HTTPSSL?	+ HTTPSSL: <n> OK
Test command	AT+HTTPSSL=?	+HTTPSSL: (0-1) OK

Defined values:

Parameters	Definition	Value	Description
<n>	SSL function switch	0	SSL disabled
		1	SSL enabled

16.3 Set HTTP parameters:AT+HTTPPARA

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPPARA=<HTTPParamTag>, <HTTPParamValue>	OK
Read command	AT+HTTPPARA?	+HTTPPARA: list of (<HTTPParamTag>:<HTTPParamValue>) OK
Test command	AT+HTTPPARA=?	+HTTPPARA: "HTTPParamTag","HTTPParamValue" OK

Defined values:

Parameters	Definition	Value	Description
<HTTPParamTag> :HTTP parameters,including:			
“CID”	Bearer profile identifier(Mandatory Parameter)	1~3	
“URL”	HTTP or HTTPS URL (Mandatory Parameter) Note:HTTPS URL is supported only in module firmware versions with SSL suffix	"http://server/path:tcpPort " or "https://server/path:tcpPort "	Server: FQDN or IP-address Path: path of file or directory tcpPort: default value is80 see "IETF-RFC 261
“UA”	The user agent string which is set by theapplication to identify the mobile. Usually thisparameter is set as operation system and software version information	-	default value: M2M module
“PROIP”	The IP address of HTTP proxy server	-	
“PROPORT”	The port of HTTP proxy server	-	
“REDIR”	This flag controls the redirection mechanism of the DCE when it is acting as HTTP client(numeric). If the server sends a redirect code (range 30x), the client will automatically send anew HTTP request when the flag is set to 1.	-	Default value is 0 (no redirection)
“BREAK”	Parameter for HTTP method "GET", used forresuming broken transfer	-	get the data from BREAK to BREAKEND. Note that this function is not supported by every HTTP server.

“BREAKEND”	Parameter for HTTP method "GET", used forresuming broken transfer. which is used together with "BREAK"	-	If the value of "BREAKEND" is bigger than"BREAK", the transfer scope is from "BREAK" to"BREAKEND". If the value of "BREAKEND" is smaller than"BREAK", the transfer scope is from "BREAK" tothe end of the file.
“USER_DEFINED”	user defined parameters		For example: AT+HTTPPARA="USER_DEFINED","Content-type: json-user-define"
<HTTPParamValue> : HTTP Parameter value.Type and supported contentdepend on related <HTTPParamTag>.			

Examples:

Command(→)/ Response(←)	AT Sequences	Description
→	AT+HTTPPARA?	
←	+HTTPPARA: CID: 1 URL: UA: AIRM2M_MODULE PROIP: 0.0.0.0 PROPORT: 0 REDIR: 0 BREAK; 0 BREAKEND: 0 OK	

16.4 Input HTTP data: AT+HTTPDATA

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPDATA=<size>,<time>	DOWNLOAD OK
Test command	AT+HTTPDATA=?	+HTTPDATA: (<size>s),(<time>s) OK

Defined values:

Parameters	Definition	Value	Description
<size>	Size in bytes of the data to POST	1-102400	The maximum is 102400
		0	Delete all the content
<time>	Maximum time for inputting data	1000-120000	Unit: ms
Note: It is strongly recommended to set enough time to input all data with the length of <size>.			

16.5 HTTP method action: AT+HTTPACTION

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPACTION=<method>	OK +HTTPACTION: <Method>,<StatusCode>,<DataLen>
		+CME ERROR: <err> +HTTPACTION: <Method>,<StatusCode>,<DataLen>
Test command	AT+HTTPACTION=?	+HTTPACTION: (0-2) OK

Defined values:

Parameters	Definition	Value	Description
<Method>	HTTPmethods	0	GET
		1	POST
		2	HEAD
<DataLen>	The length of data got	-	Integer type
<StatusCode>	HTTP Status Code responded by remote server, refer to HTTP1.1(RFC2616) for more information	100	继续（Continue）
		101	交换协议(Switching Protocols)
		200	确定(OK)
		201	已创建(Created)
		202	已接受(Accepted)
		203	非权威消息(Non-Authoritative Information)
		204	无内容(No Content)
		205	重置内容(Reset Content)
		206	部分内容(Partial Content)
		300	多重选择(Multiple Choices)
		301	永久删除(Moved Permanently)
		302	找到(Found)

		303	参考其他(See Other)
		304	未修改(Not Modified)
		305	使用代理服务器(Use Proxy)
		307	临时重定向(Temporary Redirect)
		400	错误请求(Bad Request)
		401	未授权(Unauthorized)
		402	付费请求(Payment Required)
		403	(Forbidden)
		404	(Not Found)
		405	(Method not Allowed)
		406	(Not Acceptable)
		407	要求进行代理身份认证 (Proxy AuthenticationRequired)
		408	请求超时 (Request Time-out)
		409	冲突(Conflict)
		410	所请求资源不在服务器上有效，且不知道转发地址(Gone)
		411	需要输入长度(Length Required)
		412	前提条件失败 (Precondition Failed)
		413	请求实体太大(Request Entity Too Large)
		414	请求URI太长(Request-URI Too Large)
		415	媒体类型不支持(Unsupported Media Type)
		416	所请求的范围无法满足(Requested range notsatisfiable)
		417	执行失败(Expectation Failed)
		500	内部服务器错误(Internal Server Error)
		501	未执行 (Not Implemented)
		502	网关错误(Bad Gateway)
		503	服务不可用(Service Unavailable)
		504	网关超时(Gateway Time-out)
		505	HTTP 版本不支持(HTTP Version not supported)
		600	非 HTTP PDU 格式(Not HTTP PDU)
		601	网络错误(Network Error)
		602	内存不足(No memory)
		603	DNS 错误(DNS Error)
		604	栈忙(Stack Busy)
		605	SSL建立通道失败(SSL link setup error)
		606	SSL通讯警告错误(SSL communication warning error)

16.6 Read the response from HTTP server: AT+HTTPREAD

The Set command reads data after AT+HTTPACTION=0 or AT+HTTPDATA is executed.
The Execution command reads all data after AT+HTTPACTION=0 or AT+HTTPDATA is executed.
If<byte_size> is bigger than the data size received, module will only return actual data size.

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPREAD=<start_address>,<byte_size>	+HTTPREAD: <date_len> <data> OK
Execution command	AT+HTTPREAD	+HTTPREAD:<date_len> <data> OK
Test command	AT+HTTPREAD=?	+HTTPREAD: (list of supported <start_address>s),(list of supported<byte_size>s) OK

Defined values:

Parameters	Definition	Value	Description
<date_len>	The actual length for data output		
<date >	Data from HTTP server or user input		
<start_address>	The starting point for data output	0 ~ 307200	unit: byte
<byte_size>	The length for data output	1 ~ 307200	unit: byte

16.7 Save HTTP context: AT+HTTPSCONT

The Execution command returns HTTP Application Context.

Syntax:

Type of Command	Command	Possible response(s)
Execution command	AT+HTTPSCONT	+HTTPREAD: (list of supported <start_address>s),(list of supported<byte_size>s) OK
Read command	AT+HTTPSCONT?	+HTTPSCONT:<mode> CID:<value> URL: <value> UA: <value> PROIP: <value> PROPORT: <value> REDIR: <value> BREAK: <value> BREAKEND: <value>

		OK

Defined values:

Parameters	Definition	Value	Description
<mode>	mode for HTTP context save	0	saved to NVRAM. when system is rebooted, the parameters willbe loaded automatically from NVRAM
		1	unsaved

16.8 Terminate HTTP service: AT+HTTPTERM

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+HTTPTERM	OK
Test command	AT+HTTPTERM=?	OK

16.9 HTTP error code:<err code>

HTTP error codes will be reported in ERROR:<err code>.

<err code>:

Values	Notations in English	Notations in Chinese
0	Unknown session id	未知的会话 ID
1	File is too short	文件的内容太短
2	DNS is fail	域名解析失败
3	HTTP is busy	HTTP 任务正忙
4	Socket is wrong	套接字失败
5	Connect fail	连接失败
6	File is error	文件错误
7	Connection is closed	连接已关闭
8	Connection is destroyed	连接已销毁
9	HTTP header is not found	HTTP 头不存在
10	HTTP authentication scheme is not supported	HTTP 认证机制不支持
11	PDP active is wrong	PDP 激活失败
12	Param is wrong	参数有误
13	No buffer	缓冲区不足
14	PDP deactive is wrong	PDP 去激活失败

16.10 Examples for application

Examples:

Command(→)/ Response(←)	AT Sequences	Description
HTTP GET application scenario：		
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	set HTTP bearer type SAPBR command is used to activate PDP context ,thus UDP protocol can be used to resolute the domain name.
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	set APN
←	OK	
→	AT+SAPBR =1,1	activate the GPRS PDP context
←	OK	
→	AT+SAPBR=2,1	query the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	the first parameter 1 is cid the second parameter 1 means the connection is setup the third parameter is IP address
→	AT+HTTPINIT	HTTP initialization
←	OK	
→	AT+HTTPSSL=1	enabled SSL function. If you do not intend to use SSL,please ignore this line.
←	OK	
→	AT+HTTPPARA="CID",1	set CID
←	OK	
→	AT+HTTPPARA="URL","www.baidu.com"	set URL.It equals to : Note: 1) The SAPBR commands above are not necessary if the URL address is IP; 2) The URL address without http or https prefix is http protocol for example: AT+HTTPPARA="URL","www.baidu.com" equals to AT+HTTPPARA="URL","http://www.baidu.com" 3) The http and https URLs are both suppported in _SSL firmware version ;and only http url is supported in _TTS firmware version. For example,in _SSL verison, the following command is supported: AT+HTTPPARA="URL","https://fanyi.baidu.com"
←	OK	
→	AT+HTTPACTION=0	GET begins
←	OK	
←	+HTTPACTION:0,200,1348 +HTTPACTION:0,200,1348	waiting to be READ

	+HTTPACTION:0,200,1348 … …	
→	AT+HTTPREAD	read data from server
←	+HTTPREAD: 9592 …… OK	….. = HTTP data
→	AT+HTTPTERM	end HTTP service
←	OK	
HTTP POST application scenario：		
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	
←	OK	
→	AT+SAPBR =1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213 OK	
←	OK	
→	AT+HTTPINIT	
←	OK	
→	AT+HTTPPARA="CID",1	
←	OK	
→	AT+HTTPPARA="URL","fanyi.baidu.com"	
←	OK	
→	AT+HTTPDATA=4,100000	
← → ←	DOWNLOAD 中国 OK	DOWNLOAD= ready for inputting data input “中国” OK = inputting is completed
→	AT+HTTPACTION=1	POST begins
←	OK	
←	+HTTPACTION:1,200,0	
→	AT+HTTPTERM	
←	OK	

17 Commands for FTP applications

17.1 Set FTP port: AT+FTPPORT

Syntax:

Type of Command	Command	Possible response(s)
Set command	AT+FTPPORT=<value>	OK
		ERROR
Read command	AT+FTPPORT?	+FTPPORT:<value> OK
Test command	AT+FTPPORT=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTP control port	1~65535	Default value is 21 Numbers above 65535 are illegal as the port identification fields are 16 bits long in the TCP header

17.2 Set Active or passive FTP mode: AT+FTPMODE

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPMODE=<value>	OK
		ERROR
Read command	AT+FTPMODE?	+FTPMODE:<value> OK
Test command	AT+FTPMODE=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTP mode	0	Active mode
		1	Passive mode

17.3 Set the type of FTPdata transfer: AT+FTPTYPE

When this value is set to A, all the data sent by the stack to the FTP server is made of 7 bits characters (NVT-ASCII: the MSB is set to 0). As a consequence, binary data containing 8 bits characters will be corrupted during the transfer if the FTPTYPE is set to A.

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPTYPE=<value>	OK
		ERROR
Read command	AT+FTPTYPE?	+FTPTYPE:<value> OK
Test command	AT+FTPTYPE=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	Format for FTP data transfer	"A"	FTP ASCIIcharacters set
		"I"	FTP Binarycharacters set

17.4 Set FTP put type:AT+FTPPUTOPT

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPPUTOPT=<value>	OK
		ERROR
Read command	AT+FTPPUTOPT?	+FTPPUTOPT:<value> OK
Test command	AT+FTPPUTOPT=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTPput type	"APPE"	Appending to a file
		"STOU"	Store a unique file
		"STOR"	Store a file

17.5 Set FTP bearer identifier:AT+FTPCID

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPCID=<value>	OK
		ERROR
Read command	AT+FTPCID?	+FTPCID:<value> OK
Test command	AT+FTPCID=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTP bearer identifier	1~3	The same as the <cid> in +SAPBR

17.6 Set FTP breakpoint resume:AT+FTPREST

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPREST=<value>	OK
		ERROR
Read command	AT+FTPREST?	+FTPREST:<value> OK
Test command	AT+FTPREST=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	Breakpoint to be resumed		

17.7 Set FTP server address:AT+FTPSERV

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPSERV=<value>	OK
		ERROR
Read command	AT+FTPSERV?	+FTPSERV:<value>

		OK
Test command	AT+FTPSERV=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTPserver address	IP（xxx.xxx.xxx.xxx） or DNS	IP: 32-bit decimal, separated by “.” DNS is an ASCII string whose length can not exceed 49

17.8 Set FTPUser name:AT+FTPUN

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPUN=<value>	OK
		ERROR
Read command	AT+FTPUN?	+FTPUN:<value> OK
Test command	AT+FTPUN=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	FTP user name		an ASCII string whose length can not exceed 49 characters

17.9 SetFTP password: AT+FTPPW

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPPW=<pw>	OK
		ERROR
Read command	AT+FTPPW?	+FTPPW:<pw> OK
Test command	AT+FTPPW=?	OK

Defined values:

Parameters	Definition	Value	Description
<pw>	FTPpassword		an ASCII string whose length can not exceed 49 characters

17.10 Set the name of download file: AT+FTPGETNAME

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPGETNAME=<name>	OK
		ERROR
Read command	AT+FTPGETNAME?	+FTPGETNAME:<name> OK
Test command	AT+FTPGETNAME=?	OK

Defined values:

Parameters	Definition	Value	Description
<name>	Name of FTP download file		an ASCII string whose length can not exceed 99 characters

17.11 Set the path of download file: AT+FTPGETPATH

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPGETPATH=<value>	OK
		ERROR
Read command	AT+FTPGETPATH?	+FTPGETPATH:<value> OK
Test command	AT+FTPGETPATH=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	Path of FTP download file		an ASCII string whose length can not exceed 99 characters

17.12 Set the name of upload file: AT+FTPPUTNAME

Syntax:

Type of command	Command	Possible response(s)

Set command	AT+FTPPUTNAME=<value>	OK ERROR
Read command	AT+FTPPUTNAME?	+FTPPUTNAME:<value> OK
Test command	AT+FTPPUTNAME=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	Name of FTP upload file		an ASCII string whose length can not exceed 99 characters

17.13 Set the path of upload file:AT+FTPPUTPATH

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPPUTPATH=<value>	OK ERROR
Read command	AT+FTPPUTPATH?	+FTPPUTPATH:<value> OK
Test command	AT+FTPPUTPATH=?	OK

Defined values:

Parameters	Definition	Value	Description
<value>	path of FTP upload file		an ASCII string whose length can not exceed 99 characters

17.14 Download a file: AT+FTPGET

The max response time for AT+FTPGET is 75 seconds in case no data is received from server.

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPGET=<mode>[,<reqlength>]	After AT+FTPGET=1, the response is: **OK**
		After AT+FTPGET=2, <reqlength>, the response is:

		+FTPGET:2,<cnlength> **……..…….. //data** **OK**
URC	+FTPGET:1,1	This URC may emerge after AT+FTPGET=1,indicating that the file has been downloaded and ready for reading. When "+FTPGET:1,1" is shown, use AT+FTPGET=2,<reqlength> to read data. If the module still has unread data, "+FTPGET:1,1" will be shown again in certain time
	+FTPGET:1,<error>	This URC may emerge after AT+FTPGET=1,indicating that the file download failed
	+FTPGET:1,0	Data transfer is finished
Test command	AT+FTPGET=?	OK

Defined values:

Parameters	Definition	Value	Description
<mode>	mode	1	Begin FTPGET session
		2	Read FTP download data
<reqlength>	Number of data bytes requested to be read	1~1460	
<cnlength>	Number of data bytes confirmed to be read	1~1460	May be less than <reqlength>. 0indicates than no data has been read
<error>	Error code	61	net error
		62	DNS error
		63	connect error
		64	timeout
		65	server error
		66	operation not alowed
		70	replay error
		71	user error
		72	password error
		73	type error
		74	rest error
		75	passive error
		76	active error
		77	operate error
		78	upload error
		79	download error
		86	manual quit

17.15 FTP PUT session: AT+FTPPUT

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPPUT=<mode>[,<reqlength>]	After AT+FTPPUT=1 is input, the response is: **OK**
		After AT+FTPPUT=2, <reqlength> is input, the response is: **+FTPPUT:2,<cnlength>** ….. //input data **OK**
		AT+FTPPUT=2,0 to close FTP PUT session, the response is: **OK**
URC	+FTPPUT:1,1,<maxlength>	This URC may emerge afterAT+FTPPUT=1, indicating that AT+FTPPUT=2,<reqlength> can be used to FTP PUT a file now.
	+FTPPUT:1,0	Indicating that FTP PUT session finished
	+FTPPUT:1,<error>	This URC may emerge afterAT+FTPPUT=1, indicating that data transfer failed.
Test command	AT+FTPPUT=?	OK

Defined values:

Parameters	Definition	Value	Description
<mode>	FTPPUT mode	1	Begin FTPPUT session
		2	Write FTP PUT data
<reqlength>	Number of data bytes requested to be PUT	0-<maxlength>	
<cnlength>	Number of data bytes confirmed to be PUT		
<maxlength>	The max length of data can be sent at a time		It depends on the network status

17.16 Save FTPapplication context: AT+FTPSCONT

MT saves to NV FTP Application Context which consists of the following AT Command parameters, and when system is rebooted, the parameters will be loaded from NV automatically.

Syntax:

Type of command	Command	Possible response(s)

Read command	AT+FTPSCONT?	+FTPSCONT: <value> +FTPSERV: <value> +FTPPORT: <value> +FTPUN: <value> +FTPPW: <value> +FTPCID: <value> +FTPMODE: <value> +FTPTYPE: <value> +FTPPUTOPT: <value> +FTPREST: <value> +FTPGETNAME: <value> +FTPGETPATH: <value> +FTPPUTNAME: <value> +FTPPUTPATH: <value> +FTPTIMEOUT: <value> OK
Execution command	AT+FTPSCONT	OK

17.17 Quit current FTP session: AT+FTPQUIT

Syntax:

Type of command	Command	Possible response(s)
Set command	AT+FTPQUIT	OK
		ERROR
Test command	AT+FTPQUIT=?	OK

17.18 Examples for application

Command(→)/ Response(←)	AT Sequences	Description
FTP GET application scenario:		
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	Set the type of FTP bearer
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	Set APN
←	OK	
→	AT+SAPBR =1,1	Activate GPRS PDPcontext
←	OK	
→	AT+SAPBR=2,1	Query the state of the bearer

←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter <cid>=1 The second parameter <status>=1 indicates that the bearer is connected The third parameter is the local IP adderss
→	AT+FTPCID=1	Choose the bearer identifier <cid>
←	OK	
→	AT+FTPSERV="36.7.87.100"	Set the IP or DNS of the FTP server
←	OK	
→	AT+FTPUN="user"	Input user name
←	OK	
→	AT+FTPPW="123456"	Input password
←	OK	
→	AT+FTPGETNAME="1.txt"	Set the name of the download file
←	OK	
→	AT+FTPGETPATH="/"	Set the path of the download file
←	OK	
→	AT+FTPGET=1	Start FTP GET session
←	OK	
←	+FTPGET: 1,1	This URC indicates that the file has been downloaded,you can read it now.
→	AT+FTPGET=2,20	Request to read 20 bytes
←	+FTPGET: 2, 10 ??/ ??/ OK	And 10 has been read
←（URC）	+FTPGET: 1,0	FTPGET session is over
→	AT+FTPQUIT	Quit current FTP GET session
←	OK	
FTP PUT application scenario:		
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	
←	OK	
→	AT+SAPBR=3,1,"APN","CMNET"	
←	OK	
→	AT+SAPBR =1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213 OK	
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.87.100"	
←	OK	

→	AT+FTPUN="user"	
←	OK	
→	AT+FTPPW="123456"	
←	OK	
→	AT+FTPPUTNAME="1222.txt"	Set the name of the upload file
←	OK	
→	AT+FTPPUTPATH="/"	Set the path of the upload file
←	OK	
→	AT+FTPPUT=1	Start FTP PUT session
←	OK	
←	+FTPPUT:1,1,1360	This URC indicates that MT is ready for FTP PUTand the max length of the each PUT is 1360
→	AT+FTPPUT=2,7	
←	+FTPPUT: 2,7 ……. //input 7 character here OK	Input 7 characters and the data is FTP PUT to the server automatically
→	AT+FTPPUT=2,0	Terminate the FTP PUT session
←	OK	

18 Other URCs(Unsolicited Result Code)

18.1 System Mode: ^MODE

Indicates that system mode has changed.

Syntax:

URC
^MODE:<SysMainMode>,<SysMode>

Defined values:

Parameter	Value	Description
<SysMainMode>,<SysMode>	17,17	TD LTE capabilities （4G）
	5/15,8	3G only (3G)
	5/15,7	3G, HSDPA, and HSDPA capabilities (3G)
	5/15,6	3G and HSUPA capabilities (3G)
	5/15,5	3G and HSDPA capabilities (3G)
	3,3	GSM, GPRS, and EGPRS capabilities （2G）
	3,2	GSM and GPRS capabilities (2G)
	3,1	GSM only (2G)

18.2 SIM Card Mode: ^SIMST

Indicates that sim card mode has changed.

Syntax:

URC
^SIMST:<currSimState>,<lockstate>

Defined values:

Parameter	Value	Description
<currSimState>	0	SIM card in initialization
	1	Network Registration succeeded
	2	Network Registration denied, invalid in CS
	3	Network Registration denied, invalid in PS
	4	Network Registration denied, invalid in PS+CS
	255	SIM not ready

<lockstate>	0	SIM removed or not detected
	1	SIM PIN code open

Examples:

URCs	Description
^SIMST: 255,1	SIM card is pending for PIN code(AT+CPIN=”pin code” is needed)
^SIMST: 255,0	SIM card is not inserted
Note: <lockstate> is not needed when SIM card is ready(which means <currSimState> is not 255)	

18.3 Basic information in GSM Engineering Mode:+EEMGINFOBASIC

Indication of basic information in GSM Engineering Mode.

Syntax:

URC
+EEMGINFOBASIC: <state>

Defined values:

Parameter	Value	Description
<state>	0	ME in Idle mode
	1	ME in Dedicated mode
	2	ME in PS PTM mode

18.4 Serving-cell information in GSM Engineering Mode:+EEMGINFOSVC

Indication of serving-cell information in GSM Engineering Mode.

Syntax:

URC
+EEMGINFOSVC: <mcc>, <mnc>, <lac>, <ci>, <nom>, <nco>, <bsic>, <C1>, <C2>, <TA>, <TxPwr>,<RxSig>, <RxSigFull>, <RxSigSub>, <RxQualFull>, <RxQualSub>, <ARFCN_tch>, <hopping_chnl>,<chnl_type>, <TS>, <PacketIdle>, <rac>, <arfcn>, <bs_pa_mfrms>, <C31>, <C32>, <t3212>, <t3312>,<pbcch_support>, <EDGE_support>, <ncc_permitted>, <rl_timeout>, <ho_count>, <ho_succ>,<chnl_access_count>, <chnl_access_succ_count>

Defined values:

Parameter	Description
<mcc>	Mobile Country Code
<mnc>	Mobile Network Code
<lac>	Location Area Code
<ci>	Cell Identifier

<nom>	Network Operation Mode
<nco>	Network Control Order
<bsic>	Base Station Identity Code
<C1>	C1 value
<C2>	C2 value
<TA>	Timing Advance
<TxPwr>	Transmit Power
<RxSig>	Receive level BCCH
<RxSigFull>	Receive level for full set of TCH
<RxSigSub>	Receive level for sub set of TCH
<RxQualFull>	BER in DTX mode
<RxQualSub>	BER in non-DTX mode
<ARFCN_tch>	Traffic Channel ARFCN(Absolute Radio Frequency Channel)
<hopping_chnl>	Channel is hopping
<chnl_type>	Channel type
<TS>	Serving timeslot
<PacketIdle>	In packet idle mode
<rac>	Routing Area Code
<arfcn>	Absolute Radio Frequency Channel
<bs_pa_mfrms>	BS PA frames
<C31>	C31 value
<C32>	C32 value
<t3212>	timeout No. 3212
<t3312>	timeout No. 3312
<pbcch_support>	Support PBCCH
<EDGE_support>	Support EDGE
<ncc_permitted>	NCC permitted
<rl_timeout>	Radio link timeout
<ho_count>	Total hand-over count
<ho_succ>	Success hand-over count
<chnl_access_count>	Total channel access count
<chnl_access_succ_count>	Success channel access count

18.5 PS information in GSM Engineering Mode:+EEMGINFOPS

Indication of PS information in GSM Engineering Mode.

Syntax:

URC
+EEMGINFOPS:<PS_attached>,<attach_type>,<service_type>,<tx_power>,<c_value>,<ul_ts>,<dl_ts>,<ul_cs>,<dl_cs>,<ul_modulation>,<dl_modulation>,<gmsk_cv_bep>,<8psk_cv_bep>,<gmsk_mean_bep>,<8psk

_mean_bep>,<EDGE_bep_period>,<single_gmm_rej_cause>,<pdp_active_num>,<mac_mode>,<network_control>,<network_mode>, <EDGE_slq_measurement_mode>, <edge_status>

Defined values:

Parameter	Description
<PS_attached>	GPRS/EDGE attached
<attach_type>	Attach type
<service_type>	Service type
<tx_power>	Transmit power
<c_value>	C value
<ul_ts>	Uplink timeslot
<dl_ts>	Downlink timeslot
<ul_cs>	Uplink Coding Scheme
<ul_cs>	Uplink Coding Scheme
<dl_cs>	Downlink Coding Scheme
<ul_modulation>	Uplink modulation
<dl_modulation>	Downlink modulation
<gmsk_cv_bep>	GMSK CV BEP(Block Error Probability)
<8psk_cv_bep>	8PSK CV BEP
<gmsk_mean_bep>	GMSK mean BEP
<8psk_mean_bep>	8PSK mean BEP
<EDGE_bep_period>	EDGE BEP period
<single_gmm_rej_cause>	Is single GMM reject cause
<pdp_active_num>	Activated PDP number
<mac_mode>	MAC mode
<network_control>	Network control
<network_mode>	networkmode
<EDGE_slq_measurement_mode>	EDGE SLQ measurement mode
<edge_status>	EDGE status

18.6 Cell information in GSM Engineering Mode:+EEMGINFONC

Indication of neighboring cell information in GSM Engineering Mode.

Syntax:

URC
+EEMGINFONC: <nc_num>, [<mcc>, <mnc>, <lac>, <rac>, <ci>, <rx_lv>, <bsic>, <C1>, <C2>, <arfcn>, <C31>, <C32>, […]]

Defined values:

Parameter	Description
<nc_num>	Neighbor cell number

<mcc>	Mobile Country Code
<mnc>	Mobile Network Code
<lac>	Location Area Code
<rac>	Routing Area Code
<ci>	Cell Identifier
<rx_lv>	Receive signal level
<bsic>	Base Station Identity Code
<C1>	C1 value
<C2>	C2 value
<arfcn>	Absolute Radio Frequency Channel
<C31>	C31 value
<C32>	C32 value

18.7 Notify current network status which used for EFEM :+EEMGINBFTM

To notify current network status which used for EFEM.

Syntax:

URC
+EEMGINBFTM:<p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>,<p10>,<p11>,<p12>,<p13>,<p14>,<p15>,<p16>,<p17>,<p18>,<p19>

Defined values:

Parameter	Description
<p1>	Engineering Mode
<p2>	mcc
<p3>	mnc
<p4>	lac
<p5>	cell Identifier
<p6>	bsic
<p7>	C1
<p8>	C2
<p9>	Time Advance
<p10>	TxPowerLevel
<p11>	rxSigLevel
<p12>	rxSigLevelFull
<p13>	rxSigLevelSub
<p14>	rxQualityFull
<p15>	rxQualitySub
<p16>	arfcnTch
<p17>	hopping status
<p18>	channel type

<p19>	Server Timeslot

18.8 Serving-cell information in UMTS Engineering Mode:+EEMUMTSSVC

Indication of serving-cell information in UMTS Engineering Mode.

Syntax:

URC
+EEMUMTSSVC:<p1>,<p2>,<p3>,<p4>,[<p5>,<p6>,<p7>,<p8>],[<p9>,<p10>,…,<p26>],[<p27>,<p28>,…,<p53>]

Defined values:

Parameter	Description
<p1>	Engineer Mode
<p2>	sCMeasPresent
<p3>	sCParamPresent
<p4>	ueOpStatusPresent
If **sCMeasPresent** is TRUE, the following 4 items will be printed:	
<p5>	pccpchRSCP
<p6>	utraRssi
<p7>	sRxLev
<p8>	txPower
If **sCParamPresent** is TRUE, the following 18 items will be printed:	
<p9>	rac
<p10>	nom
<p11>	mcc
<p12>	mnc
<p13>	lac
<p14>	ci
<p15>	uraId
<p16>	cellParameterId
<p17>	arfcn
<p18>	t3212
<p19>	t3312
<p20>	hcsUsed
<p21>	attDetAllowed
<p22>	csDrxCycleLen
<p23>	psDrxCycleLen
<p24>	utranDrxCycleLen
<p25>	HSDPASupport
<p26>	HSUPASupport
If **ueOpStatusPresent** is TRUE, the following 27 items will be printed:	

<p27>	rrcState
<p28>	numLinks
<p29>	srncId
<p30>	sRnti
<p31>	algPresent
<p32>	cipherAlg
<p33>	cipherOn
<p34>	algPresent
<p35>	cipherAlg
<p36>	cipherOn
<p37>	HSDPAActive
<p38>	HSUPAActive
<p39>	MccLastRegisteredNetwork
<p40>	MncLastRegisteredNetwork
<p41>	TMSI
<p42>	PTMSI
<p43>	IsSingleMmRejectCause
<p44>	IsSingleGmmRejectCause
<p45>	MMRejectCause
<p46>	GMMRejectCause
<p47>	mmState
<p48>	gmmState
<p49>	gprsReadyState
<p50>	readyTimerValueInSecs
<p51>	NumActivePDPContext
<p52>	ULThroughput
<p53>	DLThroughput

18.9 Intra freq information in UMTS Engineering Mode:+EEMUMTSINTRA

Indication of Intra freq information in UMTS Engineering Mode.

Syntax:

URC
+EEMUMTSINTRA:<p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>,<p10>

Defined values:

Parameter	Description
<p1>	index of ENGMODEINTRAFREQ
<p2>	pccpchRSCP
<p3>	utraRssi

<p4>	sRxLev
<p5>	mcc
<p6>	mnc
<p7>	lac
<p8>	ci
<p9>	arfcn
<p10>	cellParameterId

18.10 Inter freq information in UMTS Engineering Mode:+EEMUMTSINTER

Indication of Inter freq information in UMTS Engineering Mode.

Syntax:

URC
+EEMUMTSINTER:<p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>,<p10>

Defined values:

Parameter	Description
<p1>	index of ENGMODEINTERFREQ
<p2>	pccpchRSCP
<p3>	utraRssi
<p4>	sRxLev
<p5>	mcc
<p6>	mnc
<p7>	lac
<p8>	ci
<p9>	arfcn
<p10>	cellParameterId

18.11 Inter RATInformation in UMTS Engineering Mode:+EEMUMTSINTERRAT

Indication of Inter RAT information in UMTS Engineering Mode.

Syntax:

URC
+EEMUMTSINTERRAT:<p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>,<p10>,<p11>

Defined values:

Parameter	Description
<p1>	index of ENGMODE INTERRAT

<p2>	gsmRssi
<p3>	rxLev
<p4>	C1
<p5>	C2
<p6>	mcc
<p7>	mnc
<p8>	lac
<p9>	ci
<p10>	arfcn
<p11>	bsic

18.12 Serving CellInformation in LTE Engineering Mode:+EEMLTESVC

Indication of serving-cell information in LTE Engineering Mode.

Syntax:

URC
+EEMLTESVC: <mcc>,<length of mnc> ,<mnc>,<tac>,<PCI>,<dlEuarfcn>,<ulEuarfcn>,<band>,<dlBandwidth>,<ci>,<rsrp>,<rsrq>,<sinr>,<MainRsrp>,<DiversityRsrp>,<MainRsrq>,<DiversityRsrq>,<rssi>,<cqi>,<ErrorModeState>,<emmState>,<serviceState>,<IsSingleEmmRejectCause>,<EMMRejectCause>,<MmeGroupId>,<MmeCode>,<mTmsi>

Defined values:

Parameter	Description
<mcc>	Mobile Country Code
<length of mnc>	length of mnc
<mnc>	Mobile Network Code
<tac>	Tracking area code
<PCI>	Physical Cell Identifier
<dlEuarfcn>	dl arfcn
<ulEuarfcn>	ul arfcn
<band>	band
<rsrp>	rsrp
<rsrq>	rsrq
<sinr>	sinr
<MainRsrp>	Rsrp in main antenna
<DiversityRsrp>	Rsrp in slave antenna
<MainRsrq>	Rsrq in main antenna
<DiversityRsrq>	Rsrq in slave antenna
<rssi>	rssi
<cqi>	cqi

<ErrorModeState>	ErrorModeState
<emmState>	emmState
<serviceState>	serviceState
<IsSingleEmmRejectCause>	IsSingleEmmRejectCause
<EMMRejectCause>	EMMRejectCause
<MmeGroupId>	MmeGroupId
<MmeCode>	MmeCode
<mTmsi>	mTmsi

18.13 Intra Freq Information in LTE Engineering Mode:+EEMLTEINTRA

Indication of Intra freq information in LTE Engineering Mode.

Syntax:

URC
+EEMLTEINTRA: <p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>

Defined values:

Parameter	Description
<p1>	index of ENGMODE INTRAFREQ
<p2>	phyCellId
<p3>	euArfcn
<p4>	rsrp
<p5>	rsrq
<p6>	mcc
<p7>	mnc
<p8>	tac
<p9>	cellId

18.14 InterFreq Information in LTE Engineering Mode:+EEMLTEINTER

Indication of Inter freq information in LTE Engineering Mode.

Syntax:

URC
+EEMLTEINTER: <p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>

Defined values:

Parameter	Description
<p1>	index of ENGMODE INTERFREQ

<p2>	phyCellId
<p3>	euArfcn
<p4>	rsrp
<p5>	rsrq
<p6>	mcc
<p7>	mnc
<p8>	tac
<p9>	cellId

18.15 InterRATInformation in LTE Engineering Mode:+EEMLTEINTERRAT

Indication of inter RAT information in LTE Engineering Mode.

Syntax:

URC
+EEMLTEINTERRAT: <p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>[,<p10>]

Defined values:

Parameter	Description
<p1>	networktype (0:GSM,1:UMTS)
<p2>	number of INTERRAT
<p3>	mcc
<p4>	mnc
<p5>	lac
<p6>	ci
<p7>	arfcn(GSM)/uarfcn(UMTS)
<p8>	bsic(GSM)/ psc_cellParameterId(UMTS)
<p9>	rssi(GSM)/ rscp(UMTS)
<p10>	cpichEcN0(UMTS)