



Shanghai Hezhou Cat.1 Module (EC618 Platform Series) AT Command Manual V1.3.3

Applicable modules: 780E/600E series

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1 AT Command Overview

1.1 Document Purpose

This manual describes in detail the set of AT commands supported by the Azeus Luat LTE module.

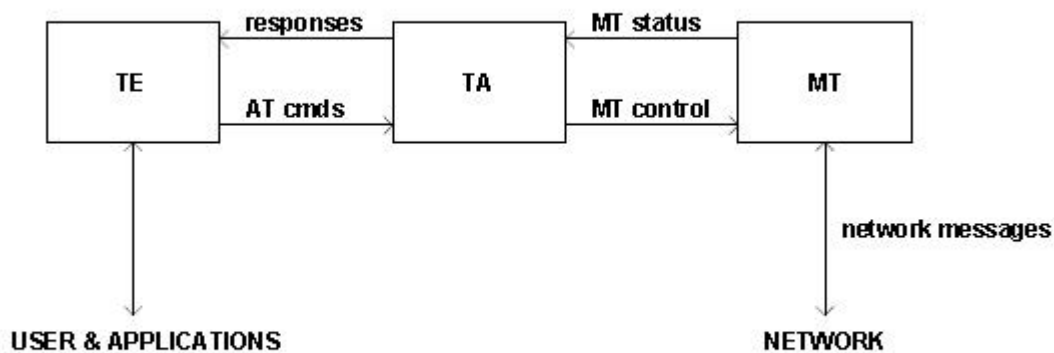
1.2 Conventions and terminological abbreviations

Modules may be referred to in this manual by the following terms:

- 1) ME (Mobile Equipment), which may include Mobile Terminal (MT), Terminal Adaptor (TA)
- 2) MS (mobile station), which includes the mobile equipment (ME) and the subscriber identification module (SIM)
- 3) TA (Terminal Accessory)
- 4) DCE (Data Communication Equipment) or Fax DCE (Fax Modem, Fax Board)

In the application, the controller controls the GSM module by sending AT commands through the serial port. The controller at the opposite end of the serial line can be referred to by the following terms:

- 1) TE (Terminal Equipment) or
- 2) DTE (Data Terminal Equipment) or simply put, an embedded application



Other terminological 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
MT	Mobile Termination
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 Result Code
NTP	Network Time Protocol
NITZ	Network Identity and Time Zone
MO	Mobile Originated

1.3 AT Command Syntax

All command lines in this manual must begin with "AT" or "at" and end with a carriage return (<CR>). The response, which usually follows the command, is of the form "<Carriage Return><New Line><Response Content><Carriage Return><New Line>" (<CR><LF><Response Content><CR><LF>). Throughout the manual, only <ResponseContent> is introduced throughout, while <Return><NewLine> is intentionally omitted.

The AT commands provided with the Aegis Wireless Module include commands that are compliant with GSM07.05, GSM07.07 and ITU-T Recommendation V.25ter.

All AT commands can be syntactically divided into three categories: "Basic", "S-parameter" and "Extended", which are described below:

1.3.1 Base Class AT Commands

These AT commands have the format of "AT<x><n>" or "AT&<x><n>", where "<x>" is the command; "<n>" can be one or more parameters. For example: "ATE<n>", this command is used to switch the display function for DCE, that is, DCE will decide whether to display the received characters back to DTE according to the value of "<n>", which is an optional parameter, if there is no value assigned, the module will use the default value.

1.3.2 S-parameter class AT commands

The format of this type of AT command is "ATS<n>=<m>", where "<n>" is the index of the S-register; "<m>" is the value assigned." <m>" is an optional parameter; if no value is assigned, the module will use the default value.

1.3.3 Extended Class AT Commands

In general, extension commands can be classified into the following types based on their functions:

Command Type	vocabulary	instructions
test command	AT+<X>=?	The command queries the parameters set by the setup command or internal procedure and their value ranges.
Enquiry command	AT+<X>?	This command returns the current value of the parameter
Setup Commands	AT+<X>=<...>	This command sets user-defined parameter values

execute a command	AT+<X>	This command is used to read the non-variable parameters controlled by the internal procedures of the GSM module.
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Extended class command syntax:

In the command line TA return result, <> contains mandatory parameters and [] contains optional parameters; In each command, the optional and mandatory parameters must be listed in the specified order, and the parameters must be separated by commas; String arguments are generally placed in double quotes; In practice, <>, [] need not be entered.

Syntax for entering multiple AT commands simultaneously on one line:

Several AT commands can be entered on the same command line. This eliminates the need to enter "AT" or "at" at the beginning of each command, and only requires that you enter "AT" or "at" at the beginning of the command line. Please note that a semicolon should be added as a delimiter after the extended class commands, while no semicolon is needed for the base class commands and S-argument commands.

Example:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	ATE0&W+CREG=2;&W	Set the display back to off and save, set the network registration status URC reporting mode to 2 and save
←	OK	Setting up successfully
→	AT+CFUN=1;+CIMI;+VER	
←	460060500266902 airm2m_780e_v1121_lte_at OK	

1.4 Maximum response time for AT commands

For the ATs listed in the following table, the maximum response time is as shown in the table, regardless of the setup command, query command or test command. For the ATs not listed in the table, the maximum response time is 9 seconds, regardless of the test command, query command or setup command.

AT command	Maximum response time (in seconds)
COPS	300
CGACT	108
CGATT	108
CFUN	45
CMGS	90
CMGW	90
CPBW	72

CPIN	180
CSTT	60
CIICR	90
CIPSHUT	90

2 basic command

2.1 Check manufacturer's name: AT+CGMI

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CGMI	<manufacturer> OK

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<manufacturer>	Manufacturer ID			Values are defined by the module manufacturer

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CGMI	Query the manufacturer's ID of the module
←	+CGMI: "AirM2M" OK	Return query results

2.2 Query Module Model: AT+CGMM

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CGMM	<model> OK

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<model>	Module type			Vendor dependent

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CGMM	Query Module Model
←	+CGMM: "Air780E"	Return query results

	OK	
--	----	--

2.3 Query module version information: AT+CGMR

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CGMR	Revision: <revision> OK
test command	AT+CGMR=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<revision>	Software version identification		Defined by the vendor

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CGMR	Query software version identification
←	+CGMR: "AirM2M_780E_V1120_LTE_AT" OK	Return query results

2.4 Check IMEI number: AT+CGSN

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CGSN	<IMEI> OK
test command	AT+CGSN=?	OK

Parameter Definition:

parametric	define	retrieve a	Explanation of values
ic		e a	

		value	
<IMEI>	Product serial number, i.e. IMEI (International Mobile Equipment Identification)	-	15-digit composition

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CGSN	Check Product IMEI
←	359759002514931 OK	Return query results

2.5 Query SIM card ICCID number: AT+CCID (/ICCID)

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CCID	<iccid> OK
	AT+ICCID	+ICCID:<iccid> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<ICCID>	Product ICCID number (Integrated circuit card identity , integrated circuit card identification code)		Generally consists of 20 digits

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CCID	Query SIM card ICCID number
←	89860117831003134201 OK	Return query results
→	AT+ICCID	Query SIM card ICCID number
←	+ICCID: 89860117831003134201 OK	Return query results

2.6 Query IMSI: AT+CIMI

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	AT+CIMI	<IMSI> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<IMSI>	International Mobile Subscriber Identity (IMSI)		Consists of 15 digits

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CIMI	Query IMSI number
←	460001841426414 OK	Return query results

2.7 Find product information: ATI

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	ATI	<module info> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<module info>	Module-related information (vendor, version)	-	Defined by the vendor

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	ATI	Query Module Information

←	airm2m_780e_v1120_lte_at	Return query results
	OK	

2.8 Query module FIRMWARE version: AT+VER

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+VER	<firmware ver> OK
caveat	Returns results consistent with ATI	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
< firmware ver>	Module internal software version	-	Defined by the vendor

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+VER	Query Module Information
←	airm2m_780e_v1120_lte_at OK	Return query results

2.9 Query platform hardware version: AT^HVER

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT^HVER	^HVER:<hardversion> OK

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
------------------------	-------------------	---------------------------------

n (←)		
→	AT^HVER	Query Modular Platform Hardware Information
←	^HVER: EC618 OK	Return query results

2.10 Query for various information: AT *I

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT*I	Manufacturer: <manufacturer> Model: <model> Revision: <revision> HWVer: <hwver> Buildtime: <Buildtime> IMEI: <imei> ICCID: <iccid> IMSI: <imsi> OK

Parameter Definition:

parametric	Definition	retrieve a value	account for
<manufacturer>	+CGMI command return		
<model>	Return of +CGMM command		
<revision>	Return of +CGMR command		
<hwver>	hardware version		
<Buildtime>	Compile time for version firmware		
<imei>	Same as the return value of the +CGSN command		
<iccid>	Same as the return value of the +ICCID command		
<imsi>	International Mobile Subscriber Identity (IMSI)		Consists of 15 digits

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT*I	
←	Manufacturer: AirM2M Model: Air780E Revision: AirM2M_780E_V1120_LTE_AT HWver: A12	

	Buildtime: Mar 6 2023 20:04:22 imei: 864040060365518 iccid: 89860621260002571487 IMSI: 460060086257148 OK	
--	---	--

2.11 Write SN number command: AT+WISN

AT+WISN is used to write the user sn (serial number) to the module.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+WISN=<user_sn>	OK
		+CME ERROR: <err>
Enquiry command	AT+WISN?	<user_sn> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<user_sn>	special SN	-	User-defined, up to 64 bits

Examples:

Command (→)/ Return (←)	an actual example	Explanations and clarifications
→	AT+WISN="1234567890"	Write customer SN number
←	OK	
→	AT+WISN?	Query Customer SN Number
←	1234567890 OK	

2.12 Reboot module: AT+RESET

Reboot the module.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+RESET	OK

2.13 Reboot the module and restore factory settings: AT+RSTSET

Reboot the module and restore the factory settings.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+RSTSET	OK

2.14 Query boot reason value: AT*EXINFO?

Query boot reason value command. [>=1126 Software version support.](#)

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT*EXINFO?	*EXINFO: <Power-on reason> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
Power-on reason	Reason for booting	0	powerkey or power on
		1	Charge or AT means switch on after the download is complete today.
		2	alarm clock
		3	software reboot
		4	unknown cause
		5	RESET button to reboot
		6	abnormal reboot
		7	Tool Control Reboot
		8	Internal Watchdog Reboot
		9	External reboot
		10	Charge and power on

Examples:

Command (→)/ Return (←)	an actual example	Explanations and clarifications
→	AT*EXINFO?	Query Boot Reason Value
←	*EXINFO: 0 OK	powerkey boot

2.15 Turn off the size limit of PCAP packages exported by EPAT: AT+CATCHPCAP

Turn off the size limit command for EPAT exported PCAP packages. [Supported by software version >=1128.](#)

Note: Turning off the PCAP packet size limit will result in the loss of other logs (except for other logs from the network), which are not saved by powering down.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT+CATCHPCAP?	+CATCHPCAP: <limited> OK
Setup Commands	AT+CATCHPCAP=<limited>	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
limited	Whether to limit PCAP packet size	0	Open Limit (default value is 0)
		1	Closure of restrictions

Examples:

Command (→)/ Return (←)	an actual example	Explanations and clarifications
→	AT+CATCHPCAP=1	Turning off the PCAP packet size limit
←	OK	

3 Configuration Commands

3.1 Select TE character set: AT+CSCS

The set command informs the DCE of the character set that the DTE needs to use to ensure that the DCE and DTE convert strings accurately between the agreed character sets.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CSCS=<chset>	OK
Enquiry command	AT+CSCS?	+CSCS: <chset> OK
test command	AT+CSCS=?	+CSCS: (list of <chset> values) OK

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<chset>	character set	"GSM"		GSM 7-bit default character (3GPP TS 23.038)
		"IRA"		International Reference Symbol Set (ITU-T T.50)
		"UCS2"		16-bit Universal Multi-Byte Encoded Character Set

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CSCS?	
←	+CSCS: "GSM" OK	
→	AT+CSCS=?	Query Character Set Range
←	+cscs: "gsm", "ira", "ucs2" OK	

3.2 Save the user's current configuration: AT+W

Most of the AT commands in this document need to be saved by AT+W if you want their parameters to remain unchanged after the module is rebooted. This command saves some AT command parameters set

by the user into NV, and the related configuration is automatically loaded and takes effect after reboot.
Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	AT&W	OK

3.3 Setting the Command Return Mode: ATE

Execute command to set whether the TA can display back the characters received from the TE in the command mode.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	ATE<value>	OK

Parameter Definition:

parame tric	define	retrieve a value	Explanation of values
<value>	Whether or not to display back	0	Display mode off
		<u>1</u>	Display mode on

3.4 Restore all parameters to factory configuration: AT&F

Execute the command to restore all parameters to the factory configuration.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT&F	OK

3.5 Setting the result code suppression mode: ATQ

This command is used to set whether the TA sends the result code to the TE. And this setting will not affect the contents of the response.

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	ATQ<n>	OK
Parameter storage	The parameters of the setup command can be saved to the NVM via the AT&W	

mode	command and are not lost on reboot
------	------------------------------------

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	Whether to display the result code	0	Send result code to TE
		1	Result code is suppressed and not sent

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	ATQ1	Set to not return result codes
←		The result code OK does not appear at this time
→	AT+CREG?	
←	+CREG: 0,1	The result code OK does not appear at this time

3.6 FOTA Aerial Upgrade: AT+UPGRADE

FOTA (Firmware Over The Air) is the function of upgrading firmware over the air. The process is in the following order:

- 1 Compare the size of the version number with the server firmware version;
- 2 If the server firmware version number is large, the process of downloading the firmware is initiated;
- 3 When the download of the firmware is complete, the module automatically reboots and burns the new version;
- 4 The module automatically reboots again, running the new firmware

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+UPGRADE=<tag>,<value> [,<savetoNV>]	OK	Setting the <tag> value
	AT+UPGRADE=<tag>	+UPGRADE:<tag>,<value> OK	Query <tag> value
Enquiry command	AT+UPGRADE?	+UPGRADE: <state> OK	Returns when <state>=0
		+UPGRADE: <state>,<percent>	Returns when <state>=1

		OK +UPGRADE: <state>, [<error code>, <http response>, <fota error cause>] OK	Returns when <state>=2
execute a command	AT+UPGRADE	OK	Manually triggered upgrades

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<tag>		"KEY"	Use "KEY" to set the ProductKEY of the server.
		"AUTO"	Use "AUTO" to set whether to upgrade automatically or not.
		"PERIOD"	Use "PERIOD" to set the query period for auto-upgrade in seconds. When the set period is up, the module will query the server for the version, and the server will initiate the automatic upgrade if the version number of the module is larger than your own.
		"URL"	Use "URL" to set the URL address of your own upgrade server.
<savetoNV>	Whether to save parameters to NV	<u>0</u>	Save, default
		1	unsaved
<value>	The value of <tag>, different <tag> has different values		String, <tag> = "KEY", set this value to the ProductKey of a product on the iot server to perform OTA upgrade under this product.
		0	Value for <tag> = "AUTO", integer.
		<u>1</u>	0: Disable automatic FOTA (module no longer communicates with the server) 1: Turn on automatic FOTA (module periodically queries the server) Note: The default is 1, i.e., automatically upgraded to on!
		60~2^32 (4294967296)	The value for <tag> = "PERIOD", integer, in seconds. Default value is 86400, i.e. 24 hours.
		"http://xxxx.bin"	Value for <tag> = "URL", string type
<state>		0	FOTA not implemented

		1	Downloading firmware from server
		2	Firmware download results
<percent>	Percentage of upgrades	1~100	Percentage of firmware downloaded when the module is in the state <state>=1
<error code>		-1000	Invalid URL
		-1001	network error
		-1002	Server link error
		-1003	Invalid firmware
		-1004	http reply error
		-1005	Storage Firmware Error
		-1006	Other errors
<http response>	http error code		Please refer to the detailed values: https://baike.baidu.com/item/HTTP%E7%8A%B6%E6%8
<fota error cause>	FOTA error causes	3	Invalid device. Device not found
		17	no entitlement
		25	Invalid items
		26	Invalid firmware
		27	Already the latest version. Passed the previous checks, but the version number is already the latest, or the upgrade switch is not turned on, no imei is specified, etc.

Examples:

Upgrade using the user's own server:	
	<p>The user puts the bin file on their server and types it in:</p> <pre>AT+UPGRADE="URL", "http://xxx.bin"</pre> <p>OK</p> <p>Again, the default is an automatic upgrade, and the interval period is also 24 hours. The module downloads the firmware from the server using the HTTP protocol.</p>

3.7 Setting the command line terminator: ATS3

Set command to set the character to be used for the AT command line terminator that can be recognised by the TA.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	ATS3=<n>	OK
Enquiry command	ATS3?	<n> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	ASCII value of the command line terminator	<u>13</u>	Default value: 13, the corresponding ASCII character is <CR> (Carriage Return). Note: Only this value is supported

3.8 Setting the command line edit character: ATS5

This command sets the character that deletes the previous character of the command line.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	ATS5=<n>	OK
Enquiry command	ATS5?	<n> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	ASCII value of the command line editor	<u>8</u>	Default value: 8 (corresponds to the ASCII character <BS> backspace character)

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications

→	ATS5?	Queries the current command line edit character
←	8	The current command line edit character is the BackSpace backspace character.
	OK	

3.9 Setting the CDC function mode: AT&C

This command sets the relationship between the 109 (DCD) circuit status and the signal detection on the remote receive line.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute command	AT&C<value>	OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<value>	DCD Circuit Status	0	The DCD line is always ON.
		<u>1</u>	The DCD line is ON only when the data carrier is present

3.10 Setting the DTR function mode: AT&D

This command sets the response state of TA when circuit 108/2 (DTR) changes from ON to OFF in data mode.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute command	AT&D<value>	OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<value>	DTR Circuit Status	0	TA Ignore DTR status
		<u>1</u>	DTR from ON to OFF: TA switches to command mode while holding the current data call
		2	DTR from ON to OFF: The TA releases the data call and switches to command mode. When DTR= OFF, it is the auto answer off state.

3.11 Real-time clock: AT+CCLK

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CCLK=<time>	OK
Enquiry command	AT+CCLK?	+CCLK: <time> OK
test command	AT+CCLK=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<time>	times	-	String type (string must be enclosed in inverted commas); format similar to "yyy/MM/dd,hh:mm:ss±zz", the last two characters indicate the year, month, day, hour, minute, second, and time zone (expressed as the difference between local time and GMT time in 1/4 hour format; range -47... +48). +48)

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CCLK?	Query current time
←	+CCLK: "18/08/01,12:12:58+00" OK	Returned query results
→	AT+CCLK="18/08/07,13:28:29+32"	Set the current time to the correct time, setting the time zone can be done with a "+" sign
←	OK	
→	AT+CCLK?	Query the current time again
←	+CCLK: "18/08/07,13:28:31+32" OK	Returned query results

3.12 Set USB mode: AT+SETUSB

This command sets the usage mode of the USB port.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup	AT+SETUSB=<mode>[,<vid>,<pid>]	OK

Commands		
Enquiry command	AT+SETUSB?	mode: <mode> Vid: <vid> Pid: <pid> OK
test command	AT+SETUSB=?	OK
caveat	This command shuts down the machine and automatically saves	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	USB usage mode, mandatory parameters for setup commands	1	RNDIS+AT+PPP+DIAG mode, default value
		2	ECM+ AT+PPP+DIAG model
		3	reservation
<vid>	Vendor id, an optional parameter for the setup command.		series default value is 0x19d1
<pid>	Product id, an optional parameter of the setup command		series default value is 0x0001

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+SETUSB=2	Set to ECM NIC
←	OK	
→	AT+SETUSB?	
←	mode: 2 vid: 0x19d1 pid: 0x1 OK	

3.13 Device error: AT+CMEE

This command enables or masks the use of the result code +CME ERROR: <err> as an indication related to the ME function error.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CMEE=[<n>]	OK
Enquiry	AT+CMEE?	+CME ERROR :<n>

command		OK
test command	AT+CMEE=?	+CMEE: (list of <n> values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	Result code reporting model	0	Disable result code + CME ERROR: <err>, use ERROR
		1	Enable result code + CME ERROR: <err> with numeric <err> value
		2	Enable result code + CME ERROR: <err> and use the redundant way of taking <err> values

3.14 Error code description: +CME ERROR:<err>

Numeric <err> values	Redundant way of taking <err> values	account for
common error		
0	phone failure	malfunction of a mobile phone
1	no connection to phone	Not connected to mobile phone
2	phone-adaptor link reserved	Reserve mobile phone adapter link
3	operation not allowed	Operation is not permitted
4	operation not supported	Unsupported operations
5	PH-SIM PIN required	PH-SIM card PIN required
6	PH-FSIM PIN required	Requires a PIN for PH-FSIM
7	PH-FSIM PUK required	PUK requiring PH-FSIM
10	SIM not inserted	No SIM card inserted
11	SIM PIN required	SIM card PIN required
12	SIM PUK required	PUK requiring a SIM card
13	SIM failure	SIM card failure
14	SIM busy	SIM card is busy
15	SIM wrong	SIM error
16	incorrect password	Invalid password
17	SIM PIN2 required	Requires SIM card PIN2
18	SIM PUK2 required	PUK2 requiring a SIM card
20	memory full	Storage full
21	invalid index	Invalid index
22	not found	not found
23	memory failure	memory failure
24	text string too long	Text string too long
25	invalid characters in text string	Invalid characters in text string
26	dial string too long	Dialling strings too long

27	invalid characters in dial string	Invalid characters in dialling string
30	no network service	no network service
31	network timeout	network timeout
32	network not allowed - emergency calls only	Network not allowed - only for emergency calls
40	network personalisation PIN required	Network personalised PIN required
41	network personalisation PUK required	Web personalised PUK required
42	network subset personalisation PIN required	Requires a subset of the network to personalise the PIN
43	network subset personalisation PUK required	Requires a subset of the network to personalise the PUK
44	service provider personalisation PIN required	Personalised PIN for service providers required
45	service provider personalisation PUK required	Service Provider Personalised PUK required
46	corporate personalisation PIN required	Company personalised PIN required
47	corporate personalisation PUK required	Company personalised PUK required
48	hidden key required	Requires a hidden password
49	EXE_NOT_SURPORT	
50	EXE_FAIL	(for cat1 modules)
50	Invalid Param	Invalid parameter (for cat4 modules)
51	NO MEMORY	Out of memory (for cat1 modules)
52	OPTION NOT SURPORT	Option not supported (for cat1 modules)
53	parameters are invalid	Invalid parameter (for cat1 modules)
54	EXT_REG_NOT_EXIT	(for cat1 modules)
55	EXT_SMS_NOT_EXIT	(for cat1 modules)
56	EXT_PBK_NOT_EXIT	(for cat1 modules)
57	EXT_FFS_NOT_EXIT	(for cat1 modules)
58	INVALID_COMMAND_LINE	(for cat1 modules)
59	ITF_DIFFERENT	(for cat1 modules)
60	BURN_FLASH_FAIL	(for cat1 modules)
61	TFLASH NOT EXIST	TF card not present (for cat1 modules)
62	FILE NOT EXIST	File does not exist (for cat1 module)
63	FILE TOO LARGE	File too large (for cat1 modules)
96	INVALID DATE OR TIME	Invalid date or time (for cat1 modules)
97	DIR CREATE FAIL	Failure to create folder (for cat1 module)
98	DIR NOT EXIST	Folder does not exist (for cat1 modules)
99	NOT IMPLEMENTED	Not executable (for cat1 modules)
100	unknown	uncharted
103	Illegal MS	Illegal MS
106	Illegal ME	Illegal ME
107	GPRS services not allowed	GPRS services are not allowed
111	PLMN not allowed	PLMN not allowed
112	Location area not allowed	Not permitted location zones
113	Roaming not allowed in this location area	Roaming is not allowed in this location area
132	service option not supported	No support for business options
133	requested service option not subscribed	Undescribed service selection request

134	service option temporarily out of order	Business Selection Temporarily No Connection
148	unspecified GPRS error	GPRS error not specified
149	PDP authentication failure	PDP authentication failure
150	invalid mobile class	Invalid move category
151	AT command timeout	AT command timeout
181	UNSUPPORTED QCI VALUE	CQI is not supported
214	SS_UNKNOWN_SUBSCRIBER	
222	SS_ILLEGAL_SUBSCRIBER	
223	SS_BRERSERV_NOT_PROV	
224	SS_TELESERV_NOT_PROV	
225	SS_ILLEGAL_EQUIPMENT	
226	SS_CALL_BARRED	
229	SS_ILLEGAL_OPERATION	
230	SS_ERROR_STATUS	
231	SS_NOT_AVAILABLE	
232	SS_SUBS_VIOLATION	
233	SS_INCOMPATIBILITY	
234	SS_FACILITY_NOT_SUPPORTED	
240	SS_ABSENT_SUBSCRIBER	
247	SS_SYSTEM_FAILURE	
248	SS_DATA_MISSING	
249	SS_UNEXPECTED_DATA_VALUE	
250	SS_PWD_REGISTRATION_FAILURE	
251	SS_NEGATIVE_PWD_CHECK	
256	SS_NUMOF_PWD_ATTEMPT_VIOL	
264	SIM VERIFY FAIL	(for cat1 modules)
265	SIM UNBLOCK FAIL	(for cat1 modules)
266	SIM CONDITION NO FULLFILLED	(for cat1 modules)
267	SS_POSITION_METHOD_FAILURE	(for cat4 modules)
267	sim unblock fail no left	(for cat1 modules)
268	sim verify fails no left	(for cat1 modules)
269	SIM INVALID PARAMETER	(for cat1 modules)
270	SIM UNKNOW COMMAND	(for cat1 modules)
271	SIM WRONG CLASS	(for cat1 modules)
272	SIM TECHNICAL PROBLEM	(for cat1 modules)
273	SIM CHV NEED UNBLOCK	(for cat1 modules)
274	SIM NOEF SELECTED	(for cat1 modules)
275	SIM FILE UNMATCH COMMAND	(for cat1 modules)
276	SIM CONTRADICTION CHV	(for cat1 modules)
277	SIM CONTRADICTION INVALIDATION	(for cat1 modules)
278	SIM MAXVALUE REACHED	(for cat1 modules)
279	SIM PATTERN NOT FOUND	(for cat1 modules)
280	SIM FILEID NOT FOUND	(for cat1 modules)
281	SIM STK BUSY	(for cat1 modules)

282	SIM UNKNOW	(for cat1 modules)
283	SIM PROFILE ERROR	(for cat1 modules)
284	SS_UNKNOWN_ALPHABET	
285	SS_USSD_BUSY	
323		Cat1 module
339	SS_MAXMPTY_CALLS_EXCEEDED	
340	SS_RESOURCES_NOT_AVAILABLE	
501	WIFI labtool return error	
502	BT labtool return error	
503	FM labtool return error	
504	MRD file already exist	
505	MRD file with same version already exist	
506	MRD file with newer version already exist	
507	MRD authorisation failure	
508	(U)SIM PUK blocked	
509	Vendor not supported	
510	NVM path not exist	
511	NVM file comcfg error	
535	PROTOCOL stack busy	
600	BTSAP card not accessible	
601	BTSAP card powered off	
602	BTSAP card removed	
603	BTSAP card powered on	
604	BTSAP data not available	
605	BTSAP not supported	
606	Non-Production mode	
753	missing required cmd parameter	CRSM Missing Parameters
754	Invalid SIM command	CRSM Invalid Order
755	Invalid file id	CRSM Invalid document
756	Missing required P1/2/3 parameter	CRSM Missing P parameter
757	Invalid P1/2/3 parameter	CRSM Invalid P Parameter
758	Missing required command data	CRSM Missing command data
759	invalid characters in command data	CRSM Invalid characters in command line
765	Invalid input value	Invalid Input Value
766	Unsupported mode	Unsupported modes
767	Operation failed	failure of an operation
768	Mux already running	Multiplexing is already running
769	Unable to get control	Inability to gain control
770	SIM network reject	SIM Network Rejection
771	Call setup in progress	Call being set up
772	SIM powered down	SIM is off.
773	SIM file not present	SIM files are not
774	RAC refresh net time failure	
791	Param count not enough	

792	Param count beyond	
793	Param value range beyond	
794	Param type not match	
795	Param format invalid	
796	Get a null param	
797	CFUN state is 0 or 4	
810	No Error	
811	Unrecognized Command	
812	Return Value Error	
813	Syntax Error	
814	Unspecified Error	
815	Data Transfer Already	
816	Action Already	
817	Not At Cmd	
818	Multi Cmd too long	
819	Abort Cops	
820	No Call Disc	
821	BT SAP Undefined	
822	BT SAP Not Accessible	
823	BT SAP Card Removed	
824	AT Not Allowed By Customer	
890	GPS_NOT_RUNNING	
891	GPS_IS_RUNNING	
892	GPS_IS_FIXING	
893	GPS_IS_SLEEPING	
894	GPS_NOT_SLEEPING	
900	DIAED_REJECT	
901	PDP_NO_ACTIVE	
902	PDP_ACTIVE	
910	TCP_CONNECTION_REJECT	
911	TCP_CONNECT_OVERTIME	
912	SOCKET_CONNECTION_EXIST	
913	SOCKET_CONNECTION_NOT_EXIST	
914	BUFFER_OVER_SIZE	
915	SENDING_OVERTIME	
916	DNS_EXIST	
917	DNS_PARSE_OVERTIME	
918	DNS_PARSE_ERROR	
980	INPUT_VALUE_ERROR	
981	OTHER_ERROR	
982	ERROR	
983	not_allowed	
1000	UPGRADE_INVALID_URL	
1001	UPGRADE_NET_ERROR	

1002	UPGRADE_SERVER_CONNECT_ERROR	
1003	UPGRADE_INVALID_FILE	
1004	UPGRADE_SERVER_RESPONSE_ERROR	
1005	UPGRADE_WRITE_FLASH_ERROR	
1006	UPGRADE_ERROR	
65535	Other Error	

4 Device Control Commands

4.1 Module Function Mode: AT+CFUN

Sets the function mode of the command selection module.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CFUN=<fun>[,<rst>]	OK
Enquiry command	AT+CFUN?	+CFUN: <fun> OK
test command	AT+CFUN=?	+CFUN: (<fun> list of values), (<rst> list of values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<fun>	functional mode	0	minimum functionality
		<u>1</u>	All functions
		4	Flight Mode. Turn off the receive and transmit functions of the module's RF circuitry
<rst>	Whether a reboot is required	<u>0</u>	No reset of ME when setting <fun> level
		1	Reset ME when setting <fun> level

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CFUN=?	Queries the value range of each parameter
←	+CFUN: (0,1,4),(0,1) OK	Enquiry results
→	AT+CFUN?	Query the current function mode
←	+CFUN: 1 OK	Enquiry results
→	AT+CFUN=1,1	Used to actively reboot the module, after rebooting it enters full-featured mode.
←	OK	

4.2 Shutdown: AT+CPOWD

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Command	AT+CPOWD=<n>	<n>=0 , emergency shutdown without any return <n>=1 , normal power off, return: NORMAL POWER DOWN

4.3 Enter PIN code: AT+CPIN

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Command	AT+CPIN=<pin>[,<newpin>]	OK Note: If the required pin is SIM PUK or SIM PUK2, a second pin is required. <new pin> is used to replace the original pin in the SIM card.
Enquiry command	AT+CPIN?	+CPIN: <code> OK
test command	AT+CPIN=?	OK
URC	+CPIN: <code>	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<pin>	cryptographic	-	string type
<newpin>	new password	-	string type
<code>		READY	ME no longer needs to provide a password
		SIM PIN	ME waiting to provide PIN code for SIM card
		SIM PUK	ME waiting to provide PUK code for SIM card
		SIM PIN2	ME waiting to provide PIN2 code for SIM card
		SIM PUK2	ME waiting to provide PUK2 code for SIM card
		SIM REMOVED	SIM card not detected

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CPIN?	Query PIN code lock status
←	+CPIN: READY	Indicates that the PIN lock is not on

	OK	
→	AT+CLCK="SC",1, "1234"	Turn on the power-on PIN code lock, 1234 is the PIN code, SC means it's a SIM card
←	OK	After returning OK, restart the module
←	+CPIN: SIM PIN	After rebooting, the module will automatically report the PIN code status, SIM PIN indicates the status of the power-on PIN code is ON (i.e. power-on needs to enter the PIN code)
→	AT+CPIN="1234"	You will need to enter the PIN code at this point
←	+CPIN: READY OK	Indicates that the password is correct and the PIN code lock is unlocked
→	AT+CLCK="SC",2	Query whether the current power-on PIN code is still on
←	+CLCK: 1 OK	1 means there is still a power-on PIN code prompt
→	AT+CLCK="SC",0, "1234"	Turning off the boot-up PIN code prompt
←	OK	Return to OK and reboot
←	+CPIN: READY	After rebooting, the module will automatically report the PIN code status, READY means power-on PIN code: OFF

4.4 Device lock: AT+CLCK

Execute commands to lock, unlock, and query the ME or network device <fac>. Usually requires a password.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CLCK=<fac>,<mode> [,<password>[,<class>]]	Returns when <mode> ≠ 2: OK
		When <mode>=2, return: +CLCK:<status>[,<class1><CR><LF> +CLCK:<status>,<class2>[...] OK
test command	AT+CLCK=?	+CLCK: (list of <fac> values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<fac>	appliances	"CS"	Control surface
		"PS"	Locking the device to one or some SIM cards
		"PF"	Lock the device to the first inserted SIM card

		"SC"	SIM/UICC (lock SIM card)
		"AO"	Disable all outgoing calls
		"OI"	Disable all international outgoing calls
		"OX"	Prohibition of all international outgoing calls, except to countries of attribution
		"AI"	Disable all incoming calls
		"IR"	Prohibit all incoming calls when roaming outside the country of attribution
		"NT"	Prohibit TA unsaved numbers from incoming calls
		"NM"	Prohibit MT unsaved numbers from entering the call
		"NS"	Prohibit SIM/UICC unsaved numbers from entering the call
		"NA"	Prohibit incoming calls from numbers that are not saved in any storage space
		"AB"	Disable all services, only valid if mode=0
		"AG"	Disable all outgoing services, valid only if mode=0
		"AC"	Disable all incoming services, valid only if mode=0
		"FD"	SIM card fixed dialling
		"PN"	Network personalisation (please refer to GSM 02.22)
		"PP"	Service provider personalisation (please refer to GSM 02.22)
		"PU"	Network subset personalisation (please refer to GSM 02.22)
		"PC"	Enterprise personalisation (please refer to GSM 02.22)
<mode>	operating mode	0	release
		1	lock (denying access to a computer system or device or files)
		2	Enquiry Status
<status>	activation state	0	inactive
		1	activate
<classx>	Business Type	1	voice
		2	Data (all bearer services; when <mode>=2, if the TA does not support values of 16, 32, 64, 128, this parameter indicates only partial bearer services)
		4	Fax (fax operations)
		8	short message service
		16	Data Circuit Synchronisation
		32	Data Circuit Asynchronous
		64	Dedicated Packet Access
		128	Dedicated PAD access
<password>	cryptographic		Character type; same as the device password used for the ME user interface and the password set by the Change Password command +CPWD

4.5 Change password: AT+CPWD

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK
test command	AT+CPWD=?	+CPWD: (<fac>,<pwdlength>) list of values. OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<oldpwd>,<newpwd>	Old code, new code.	-	Character type; same as the device password used for the ME user interface, the password change command + the password set by CPWD
<pwdlength>	Password length	-	Integer type, the maximum password length supported by the device
<fac>	appliance		Same definition as in AT+CLCK

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CLCK="SC",1, "1234"	If you want to change the power-on PIN code, you have to open the power-on PIN code lock first.
←	OK	
→	AT+CPWD="SC", "1234", "8888"	Modify the boot PIN code to 8888
←	OK	Restart the module at this point
←	+CPIN: SIM PIN	After rebooting, the module will automatically report the PIN code status, SIM PIN indicates the power-on PIN code: ON
→	AT+CPIN="8888"	You will need to enter the PIN code at this point
←	+CPIN: READY OK	Indicates that the password is correct and the PIN code lock is unlocked

4.6 Network light blinking interval: AT+SLEDS

Grammatical rules:

Command	vocabulary	come (or go) back
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d Type		
Setup Comman ds	AT+SLEDS=<mode>, <timer_on>,<timer_off>	OK
Enquiry command	AT+SLEDS?	+SLEDS:<mode>,<timer_on>,<timer_off> OK
test command	AT+SLEDS=?	+SLEDS: (<mode> value list), (<timer_on> value list), (<timer_off> value list) OK

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<mode>	Setting the interval between flashing lights in which state	1		Setting the network light blinking interval when not registered on the network
		2		Setting the network light blinking interval when you are already registered on the network
		3		Setting the network light blinking interval during PPP communication status
<timer_on>	length of time the light is on	0 or 40 to 65535		Unit ms, 0 is always off
<timer_off>	lights out time	0 or 40~65535		Unit ms, 0 is always on

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+SLEDS=?	test command
←	+SLEDS:(1-3),(40~65535),(40~65535) OK	Return results
→	AT+SLEDS?	Enquiry command
←	+SLEDS:1,200,1800 +SLEDS:2,1800,200 +SLEDS:3,125,125 OK	This is the default configuration

4.7 Setting the TE-TA baud rate: AT+IPR

Grammatical rules:

Comman	vocabulary	Returns and notes
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d Type		
Setup Comman ds	AT+IPR=<rate>	OK
Enquiry command	AT+IPR?	+IPR: <rate> OK
test command	AT+IPR=?	+IPR: (adaptive baud rate picklist), (fixed baud rate picklist) OK
caveat	<p>1. Default baud rate = 0, i.e. adaptive baud rate.</p> <p>2. When the module is switched on, you need to input a number of "AT" or (Note: "aT", "At" can not train the baud rate), you can train the baud rate of the module to be the same as the main control, at this time there will be an initialisation message reported, indicating that the training is successful.</p> <p>3. After successful training, the AT command can recognise upper, lower or mixed case.</p> <p>4. "AT+IPR=x;&W", you can set a fixed baud rate and save it. After restarting the module, the module is still at this baud rate x. If the upper computer baud rate is also x, at this time, you don't need to input anything, the module will automatically report the power-on initialisation information.</p> <p>Note: x is the baud rate, e.g. 115200</p>	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<rate>	Baud rate in bps	0	Adaptive baud rate (adaptive range varies with module model)
		600	
		1200	
		2400	
		4800	
		9600	
		19200	
		38400	
		57600	
		115200	
		230400	
		460800	
		921600	

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications

→	AT+IPR=?	Queries the currently supported baud rate range
	+ipr:(600,1200,2400,4800,9600,19200,38400,57600,115200,230400),(0,600,1200,2400,4800,9600,19200,38400,57600,115200,230400, 460800, 921600) OK	

4.8 Setting the TE-TA frame format: AT+ICF

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+ICF=<format>,[<parity>]	OK
Enquiry command	AT+ICF?	+ICF: < format >[,<parity >] OK
test command	AT+ICF=?	+ICF: (<format> list of values), (<parity> list of values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<format >	frame format	0	automatic recognition
		1	8 Data bit 0 Parity bit 2 Stop bit
		2	8 Data bit 1 Parity bit 1 Stop bit
		<u>3</u>	8 Data bit 0 Parity bit 1 Stop bit
		4	7 Data bit 0 Parity bit 2 Stop bit
		5	7 Data bit 1 Parity bit 1 Stop bit
		6	7 Data bit 0 Parity bit 1 Stop bit Note: 0 parity bit means no parity bit, in this case <parity> is ignored
<parity>	check digit	0	Odd bits (Odd)
		1	Even digits (Even)

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+ICF=?	Query parameter value range
←	+ICF: (1-6), (0-1)	

	OK	
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4.9 Setting the command line newline character: ATS4

Use the Set command of this instruction to set the characters to be used for result codes and message text line feeds.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	ATS4=<n>	OK
Enquiry command	ATS4?	<n> OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<n>	ASCII value of command line breaks	<u>10</u>	Default value: 10 (corresponds to the ASCII character <LF> line break) Note: Only this value is supported

4.10 TE-TA Local Traffic Control: AT+IFC

Introduction to Flow Control:

Flow control is important for reliable communication between the module and the DTE. Assuming a data or fax call in which the sending end is sending faster than the receiving end is receiving, when the receive buffer is nearly full, the receiving end should have a way for the sending end to pause sending until it catches up again. This is flow control.

Generally, there are two ways to implement flow control. They are software flow control and hardware flow control. In multiplexed mode, hardware flow control is recommended. Both methods of flow control are supported by the HopZoo module.

Software flow control:

The software flow control sends different characters to pause (XOFF, decimal 19) and resume (XON, decimal 17) the data stream. It is suitable for serial communication with only three wires.

If the Hopu LTE module uses software flow control, it needs to be configured with the command:

AT+IFC=1,1

Because this configuration is not saved, if you wish to continue to use software flow control after a reboot, you need to save it to the User Configuration Table via AT&W.

Note: When the module transmits binary/hexadecimal data, the software flow control method is not

suitable because the TE may treat the binary data as flow control characters.

Hardware flow control:

Hardware flow control is implemented via the RTS/CTS signals. When the receive buffer is almost full, the module sets the CTS signal to invalid and the data transfer is suspended. When the module's receive buffer can receive more data, the CTS signal is reset to active.

To implement the hardware flow control feature, make sure your application serial port contains the RTS/CTS line.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+IFC=<dce_by_dte>,[<dte_by_dce>]	OK
Enquiry command	AT+IFC?	+IFC: <dce_by_dte>,<dte_by_dce> OK
test command	AT+IFC=?	+IFC: (<dce_by_dte> list of values),<dte_by_dce> list of values) OK
caveat	The module has no flow control by default. If you need hardware flow control, please enter "AT+IFC=2,2;&W" and reboot the module to take effect all the time.	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<dce_by_dte>	Flow control method used by the TE to receive data from the TA	0	no-flow control
		1	software flow control
		2	hardware flow control
<dte_by_dce>	Flow control method used when TA receives data from TEs	0	no-flow control
		1	software flow control
		2	hardware flow control

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+IFC=?	Query the range of values for <dce_by_dte> and <dte_by_dce>.
←	+IFC: (0-2), (0-2) OK	Enquiry results

→	AT+IFC?	Query the current flow control method
←	+IFC: 2,2 OK	hardware flow control

4.11 Enabling and disabling SIM card presence hardware detection: AT+CSDT

The setup command of this command enables the function of this pin USIM_CD. When AT+CSDT=1, enable this pin. At this time with the SIM card peripheral detection circuit can detect the SIM card in position state, that is, inserted or dropped.

Note: The USIM_CD pin is the USIM card presence detection pin, please refer to the hardware manual of the relevant model for the specific definition.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CSDT=<mode>,[<level>]	OK
Enquiry command	AT+CSDT?	+CSDT:<mode>,[<level>] OK
test command	AT+CSDT=?	+CSDT: (list of <mode> values) OK
caveat	<p>When SIM card presence is detected, a URC is immediately reported: +CPIN: READY</p> <p>When the SIM card is detected to be out of position, a URC is immediately reported: +CPIN: SIM REMOVED</p> <p>If you need to shut down and save, enter AT+CSDT=<mode>;&W</p> <p>AT+CSDT=1: default rising edge trigger, low without card insertion, high with card insertion</p> <p>AT+CSDT=1,0: you can configure falling edge triggering, high without card insertion, low with card insertion</p> <p>AT+CSDT=1,1: Rising edge trigger can be configured, low without card inserted, high with card inserted</p>	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	SIM presence detection on state	<u>0</u>	Disable SIM card presence detection

		1	Enable SIM card presence detection
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4.12 Detect whether the SIM card of a slot is in position: AT *SIMDETEC

The set command is used to detect whether the SIM card of a certain slot is in position.

The test command is used to display the currently supported SIM slots.

Grammatical rules:

Command Type	vocabulary	come (or go) back
		*SIMDETEC: <simslot>,<state> OK
test command	AT*SIMDETEC=?	*SIMDETEC: (1,2) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<simslot>	Which sim card slot	1	Primary sim card
		2	Spare sim card (not supported yet)
<state>	SIM card status	NOS	SIM card does not exist
		SIM	SIM card inserted

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT*SIMDETEC=1	
←	*SIMDETEC: 1, NOS OK	SIM card not in position

4.13 Get Sim type: AT*EUICC

Getting to know the SIM card type.

Grammatical rules:

Command Type	vocabulary	come (or go) back
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Enquiry command	AT*EUICC?	*EUICC: <n> OK
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Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<n>	SIM card type	0	SIM
		1	USIM

4.14 Setting sleep wake-up via UART port: AT+CSCLK

A prerequisite for putting the module to sleep via the serial port is that the USB port is not connected.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CSCLK=<n>	OK
Enquiry command	AT+CSCLK?	+CSCLK: <n> OK
test command	AT+CSCLK=?	+CSCLK: (list of supported <n>s) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	Sleep settings	0	Disable the module sleep function. The module cannot enter the sleep state. Default value.
		1	Sleep mode 1. controlled by the module AP_WAKEUP_MODULE pin to enter sleep or not. When AP_WAKEUP_MODULE is pulled high (default is high because there is an internal pull-up), AT+CSCLK=1 is set, and no other interrupts are generated (GPIOs, incoming calls, incoming SMS, etc.), the module automatically enters Sleep Mode 1. In this mode, the module is still able to receive calls and SMS from the network. When the module is in sleep mode 1, the module can be woken up by several methods as follows.

		<ul style="list-style-type: none"> ● The module receives an external interrupt signal; ● The module receives a voice or data call; ● The module receives a short message (SMS); ● The serial port receives the AT command; ● Pull down the AP_WAKEUP_MODULE pin for roughly 50ms <p>Note: URCs are reported when the module receives a voice or data call or short message</p>
	2	<p>Sleep mode 2.</p> <p>After setting AT+CSCLK=2, the module will continuously monitor the serial port data, if there is no data input on the module's serial port and no other interrupt is generated (GPIO, incoming call, incoming SMS, incoming data, etc.), the module will automatically enter Sleep Mode 2 after 5 seconds by default. (Note: In the case of Sleep Mode 2, the level of AP_WAKEUP_MODULE has no effect on the module's Sleep Wake function. This is the main difference with sleep mode 1). In this mode, the module can still receive calls and SMS from the network.</p> <p>When the module is in sleep mode 2, the module can be woken up by several methods as follows.</p> <ul style="list-style-type: none"> ● The module receives an external interrupt signal; ● The module receives a voice or data call; ● The module receives a short message (SMS); ● The serial port receives the AT command.
	3	<p>Sleep mode 3 (ultra-low power consumption).</p> <p>After setting AT+CSCLK=3, the module will continuously monitor the serial port data, if there is no data input on the module's serial port and no other interrupt is generated (GPIO, incoming call, incoming SMS, incoming data, etc.), the module will automatically enter Sleep Mode 3 after 5 seconds by default. (Note: In the case of Sleep Mode 3, the AP_WAKEUP_MODULE level has no effect on the module's Sleep Wake function. This is the main difference with sleep mode 1). In this mode, the module can still receive calls and SMS from the network.</p> <p>When the module is in sleep mode 3, the module can be woken up by one of the following methods.</p> <ul style="list-style-type: none"> ● The module receives an external interrupt signal; ● The module receives a voice or data call; ● The module receives a short message (SMS); ● The serial port receives the AT command. <p>Software version >= V1026 support.</p>

Examples:

Command (→) / Return	an actual example	Explanations and clarifications
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(←)		
Sleep-wake application example 1		
→	AT+CSCLK=2	Set to sleep mode 2. In this sleep mode, the module goes to sleep when the following conditions are met simultaneously. <ul style="list-style-type: none"> ● Module has no input on AT port ● No URC reported (including no incoming calls, no SMS, no data received from the server, etc.) ● No GPIO interrupt
←	OK	
→	AT+WAKETIM?	Check the time to go to sleep
←	+WAKETIM:5 OK	The query result is 5 seconds. 5 seconds is the default time to go to sleep after CSCLK is set to sleep.
→	AT+WAKETIM=8	If you need to change the time to go to sleep, you can set it via WAKETIM, e.g. change it to 8 (normally you don't need to set it) Note: WAKETIM should not be set to 0 at this time, as this will disable sleep.
←	OK	
		The module wakes up in one of the following ways. <ol style="list-style-type: none"> 1) Enter several AT commands into the serial port (one often doesn't wake up, you need to enter more than one) 2) Arbitrary URC reporting (including incoming calls, incoming SMS, data received from server, etc.) 3) GPIO interrupt
→	AT+CSCLK=0	
←	OK	0, set to disallow module sleep
Sleep-wake application example 2		
→	AT+CSCLK=1	Set to sleep mode 1. In this sleep mode, the module goes to sleep when the following conditions are met simultaneously. <ul style="list-style-type: none"> ● Module has no input on AT port ● No URC reported (including no incoming calls, no SMS, no data received from the server, etc.) ● Module AP_WAKEUP_MODULE is high (AP_WAKEUP_MODULE high is to allow the module to sleep; AP_WAKEUP_MODULE low is to wake up the module) ● No GPIO interrupt
←	OK	
→	AT+WAKETIM?	Check the time to go to sleep
←	+WAKETIM:5 OK	The query result is 5 seconds. 5 seconds is the default time to go to sleep after CSCLK is set to sleep.
→	AT+WAKETIM=8	If you need to change the time to go to sleep, you can set it via WAKETIM, e.g. change it to 8 (normally you don't need to set it) Note: WAKETIM should not be set to 0 at this time, as this will disable sleep.
←	OK	
		The module wakes up in one of the following ways. <ul style="list-style-type: none"> ● Enter several AT commands into the serial port (one or two ATs will do) ● Arbitrary URC reporting (including incoming calls,

		<p>incoming SMS, data received from server, etc.)</p> <ul style="list-style-type: none"> ● GPIO interrupt ● AP_WAKEUP_MODULE wake-up (AP_WAKEUP_MODULE low, wake-up; AP_WAKEUP_MODULE high, sleep allowed)
→	AT+CSCLK=0	
←	OK	0, set to disallow module sleep
Examples of ultra-low power applications (for most digital transmission business scenarios)		
→	AT+CSCLK=3	<p>Set to sleep mode 3 (ultra-low power consumption). In this sleep mode, the module goes to sleep when the following conditions are met simultaneously.</p> <ul style="list-style-type: none"> ● Module has no input on AT port ● No URC reported (including no incoming calls, no SMS, no data received from the server, etc.) ● No GPIO interrupt
←	OK	
→	AT+WAKETIM=1	Set to wait 1 second to enter sleep state in IDL state
←	OK	
→	AT*RTIME=2	Set to wait 2 seconds to enter sleep state when in digital transmission mode
←	OK	
		<p>The module wakes up in one of the following ways.</p> <p>4) Enter several AT commands into the serial port (one often doesn't wake up, you need to enter more than one)</p> <p>5) Arbitrary URC reporting (including incoming calls, incoming SMS, data received from server, etc.)</p> <p>6) GPIO interrupt</p>
→	AT+CSCLK=0	
←	OK	0, set to disallow module sleep

4.15 Sets how long to wait to go to sleep in digital transmission mode:

AT*RTIME

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT*RTIME=<wait_time>	OK
Enquiry command	AT*RTIME?	*RTIME: <wait_time> OK
caveat	<p>Under normal circumstances, the shorter the <wait_time> value, the lower the power consumption, and it is recommended to set it to 2. If the actual use of the environment signal is relatively poor, the data sending and receiving often retransmission delay, then this value needs to be changed to a larger one.</p>	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<wait_time>	How long to wait to go to sleep in digital transmission mode.	0~20	Unit:second, 0 means off. The default value is 0.

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT*RTIME=2	Set the wait time to 2 seconds
←	OK	

4.16 Ultra-low power command: AT+POWERMODE

>=V1143 (LPAT version) support, ultra-low power programme reference: <https://doc.openluat.com/wiki/50>

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+POWERMODE=<mode>[,<para>][, <para2>]	OK
Enquiry command	AT+POWERMODE?	+POWERMODE: <mode>[, <para>] OK
caveat	1. Response priority mode and balanced mode, the serial port baud rate is set to 9600, which can ensure that the first packet of AT sent during sleep is not lost. 2. PSM+ mode, the serial port baud rate is set to 9600, which can guarantee the must wake up 3. The AT+CFGRI=1 instruction is required to pull down the RI pin. 4. AT+CIPSEND=10\r1234567890 (send data with the left side, the length of the latter directly \r plus the way the data is sent, because waiting for > may lead to a timeout module into hibernation) 5.PSM+ mode does not support automatic upgrade, fota upgrade recommended manual upgrade	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	Response Priority Mode (shutdown	"PRO"	Function 1. Remote wake-up speed (within

	will save)		<p>2 seconds)</p> <p>2.474uA average standby current under good signal condition</p> <p>3. Support UART and GPIO interrupt wake-up</p> <p>Wake-up method</p> <ol style="list-style-type: none"> 1. The linked server, sends down data to the module, the module will be woken up and print the URC and pull down the RI pin for 120ms. 2. The module can be woken up by pulling down DTR or pulling up VBUS. 3. Send data to the module via UART, which can wake up the module.
	Equilibrium mode (switch-off opportunity to save)	"STD"	<p>Function</p> <ol style="list-style-type: none"> 1. Remote wake-up speed (within 2 minutes) 2.474uA average standby current under good signal condition 3.Support UART and GPIO interrupt wake-up <p>Wake-up method</p> <ol style="list-style-type: none"> 1. The linked server, sends down data to the module, the module will be woken up and print the URC and pull down the RI pin for 120ms. 2. The module can be woken up by pulling down DTR or pulling up VBUS. 3. Send data to the module via UART, which can wake up the module.
	PSM+ mode (switch-off will save)	"PSM+"	<p>Function</p> <ol style="list-style-type: none"> 1. Remote can not wake up 2. Standby power consumption 2.89uA 3. Support UART and GPIO interrupts and timer wake-up (will pull down the RI wake-up or open the microcontroller) <p>Wake-up method</p>

			<ol style="list-style-type: none"> 1. If time is entered, the microcontroller wakes up periodically and performs the response. 2. The module can be woken up by pulling down DTR or pulling up VBUS. 3. Send data to the module via UART, which can wake up the module.
	Exit ultra-low power mode (switch-off will save)	"CLOSE"	
<para>	Timed pull-down of the RI pin in PSM+ mode		Unit: s
	Enable or disable ipv6 in "PRO" and "STD" modes. (>=V1146 (LPAT version) support)	0	Off (default off)
		1	show (a ticket)
<para2> (>=V1148 (LPAT version) support)	Whether or not to open TAU in PSM+ mode	0	Open TAU (default)
	(TAU configured as 1 Standby power consumption can go up to 2.9uA, configured as 0, and the base station is assigned a TAU time of 54 minutes)	1	Close TAU
	In STD mode, 1 further reduces power consumption, which can lead to increased packet loss, and 0 is the default	0	default (setting)
		1	Further reduction in power consumption can lead to increased packet loss rates

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+IPR=9600;&W	Switching to 9600 ensures that the first packet of AT sent while sleeping is not lost
←	OK	
→	AT+POWERMODE="PRO"	Set to response priority mode
←	OK	
→	AT+CIPSTART="TCP",112.12	Enter PRO mode first and then link to the server)

	5.89.8,42951	
←	CONNECT OK	
→	at^heartconfig=1,0,300	Setting the heartbeat period
←	OK	
→	at^heartbeathex=0,6,41424 3444546	Setting the heartbeat content
←	OK	

4.17 Setting the sleep wait time: AT+WAKETIM

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+WAKETIM=<wait_time>	OK
Enquiry command	AT+WAKETIM?	+WAKETIM:<wait_time> OK
caveat	<ul style="list-style-type: none"> Please use WAKETIM command to set the module sleep time, and please use CCLK to set the sleep. 	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<wait_time>	How long to wait in IDLE state (no AT, no SMS, no call and AP_WAKEUP_MODULE is high) to go to sleep?	0~100	Unit:second, 0 means no sleep. The default value is 5.

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+WAKETIM=8	Set sleep time to 8 seconds
←	OK	

4.18 Setting the RI indication function: AT+CFGRI

The setup command sets whether the RI pin (corresponding MAIN_RI pin in the module) is indicated with a low pulse when a URC upload is received. If the indication is turned on (<status>=1), the RI generates a 120ms low pulse when the corresponding URC arrives (default setting).

Grammatical rules:

Command Type	vocabulary	come (or go) back
--------------	------------	-------------------

Setup Commands	AT+CFGRI=<status> [,<h_time>][,<l_time>][,<count>]	OK
Enquiry command	AT+CFGRI?	+CFGRI:<status> OK
caveat	<ul style="list-style-type: none"> Whether <status> is 0 or 1, a 120ms low pulse is generated by default when an SMS is received; Only after setting AT+CFGRI=1, the URC upload on the arrival of data services (including TCP/IP, HTTP, MQTT, FTP) will cause the RI to generate low pulse 	

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<status>	RI indication status	0	RI indication function off
		1	RI indication turned on (TCP/IP/FTP/HTTP/MQTT and other URCs)
<h_time>	Time to pull up	>0	Unit: milliseconds
<l_time>	pull-down time	>0	Unit: milliseconds
<count>	Number of pull-downs	>0	Unit: milliseconds

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CFGRI=0	This is the default setting for the module. Under this setting, a 120ms low pulse will be generated when an SMS is received; when a call comes in, it will jump to a low level, and won't go high until the call is connected or hung up
←	OK	
→	AT+CFGRI=1	In this setting: When an SMS is received, it generates a 120ms low pulse; when a call comes in, it jumps to a low level and does not go high until the call is connected or hung up; The URC upload on the arrival of data services (including TCP/IP, HTTP, MQTT, FTP) generates a 120ms low pulse.
←	OK	
→	at+cfgri=1,200,150,3	When receiving URC from SMS or data service, it will generate three 150ms low pulses with 200ms pull-up time between low pulses; when a call comes in, it will jump to low level and will not become high until the call is connected or hung up
←	OK	

4.19 Save RI setting function: AT+CFGRISAVE

Sets whether the value set by the AT+CFGRI command is saved.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CFGRISAVE=<save>	OK
Enquiry command	AT+CFGRISAVE?	+CFGRISAVE:<save> OK
caveat	After AT+CFGRI sets the corresponding value, AT+CFGRISAVE=1 is required to keep the corresponding value.	

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<save>	Is it critical to save	0	unsaved
		1	save (a file etc) (computing)

4.20 Set wakeup string command: AT^WAKEUPHEX

Set wake-up string command, send this command, and open the RI, then only the specified string of the URC reported to wake up the RI pulse, the other will be blocked, you want to disable this command in the string inside the fill in the blanks on the line, you need to the first one on the blanks, the string inside the acsii code hexadecimal string, for example, A is 41. ([Software version >> V1131 version support](#)) =V1131 version support)

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT^WAKEUPHEX=<str>	OK
Enquiry command	AT^WAKEUPHEX?	^wakeuphex: <str> OK
test command	AT^WAKEUPHEX=?	^WAKEUPHEX="str". OK
caveat	String must be acsii code hexadecimal representation, other direct error, does not support non-displayable characters	

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<str>	Is it critical to save	ascii code 16	String must be ascii code hexadecimal representation, other direct error, does not support non-displayable characters

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CFGRI=1	Turned on RI reporting
←	OK	
→	AT^WAKEUPHEX="414243"	Setting the wakeup string
←	OK	
→	AT+CIPSTART="TCP", "112.125.89.8",35046	Connects to the server and triggers the RI pulse when the server sends 414243 with a string sent in HEX, other URC non-conformities do not trigger.
→	AT^WAKEUPHEX=" "	Disable (just fill in the blanks in the string if you want to disable this command)
←	OK	

4.21 Read ADC: AT+CADC

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CADC=<adc_id>,<mode>	OK
retrieve command	AT+CADC<adc_id>,2	+CADC:<adc_id>,<volt> OK
take note of	Corresponding channel should be opened before reading, default maximum range 1.2V.	

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<adc_id>	ADC id, there are two	0	

		1	
<mode>	ADC Usage Mode	0	prohibit the use of sth.
		1	start using
		2	Query the voltage of the adc of this circuit (>=V1115 version support)
<volt>	ADC Voltage		Unit: millivolt

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CADC=0,1	Open ADC0
←	OK	
→	AT+CADC=0,2	Read ADC0 value
←	+CADC: 0,1086 OK	

4.22 Read VBAT voltage: AT+CBC

Grammatical rules:

Command Type	vocabulary	come (or go) back
retrieve command	AT+CBC	+CBC: <volt> OK
test command	AT+CBC=?	OK
Setup Commands	AT+CBC=<powerOnVol>,<powerOffVol>	OK
retrieve command	AT+CBC?	+CBC: <powerOnVol>,<powerOffVol> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<volt>	VBAT current voltage		Unit: millivolt

<powerOnVol>	Voltage value for power-on detection	>=0	Unit: millivolt
<powerOffVol>	Voltage value for shutdown detection	>=0	Unit: millivolt

4.23 Turn on/off the network light: AT+CNETLIGHT

The setup command of this command is used to turn on or off the network status indicator (NET_STATUS).

This query command is used to query whether the network status indicator has been turned on.

The Air780E series modules each use the following pin signals to indicate the status of the network. The following table describes the pin definitions.

Network Indication Pin Definitions

pin name	type	serial	Voltage domain	function
NET_STATUS	DO	16	LDOAON	Indicates the 4G network status of the module

status	Pin working status	network state
NET_STATUS	On for 1.8 seconds, off for 0.2 seconds	Search network state
	On for 0.2 seconds, off for 1.8 seconds	idle
	On for 0.125 seconds, off for 0.125 seconds	Data transmission state Note: This status prompt is limited to successful PPP dial-up or active PDP activation by the AT command The RNDIS network is successfully connected.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CNETLIGHT=<n>	OK
retrieve command	AT+CNETLIGHT?	+CNETLIGHT:<n> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	Network Status Indicator Switch Status	0	cloture
		<u>1</u>	show (a ticket)

4.24 SIM physical card, virtual card switching: AT+ECSIMCFG

Note: This command only applies to the Hopu 4G CAT1 module (software version >=V1108).

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+ECSIMCFG="SoftSim",<mode>	OK
Enquiry command	AT+ECSIMCFG?	+ECSIMCFG: "SimPowerSave",<mode> +ECSIMCFG: "SimPowerSave",<mode> +ECSIMCFG: "SimPresenceDetect",<mode> +ECSIMCFG: "SimSlot",<mode> +ECSIMCFG: "SoftSim",<mode> OK
test command	AT+ECSIMCFG=?	+ECSIMCFG: (list of supported) OK
caveat	Need to go into flight mode for card switching (enter flight mode (AT+CFUN=0), switch card, exit flight mode AT+CFUN=1)	

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<mode> (SoftSim)	Whether to switch to a virtual card	<u>0</u>	Switch to physical card
		1	Switch to virtual card

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CFUN=0	Switch to flight mode
←	OK	
→	AT+ECSIMCFG="SoftSim",1	Switch to virtual card
←	OK	

→	AT+CFUN=1	Exit Flight Mode
←	OK	

4.25 SIM card switching: AT+SIMCROSS

When the module is switched on, it will firstly go to query whether there is a SIM card inserted on the SIM0 interface, and if it detects a SIM card on the SIM0 interface, it will read the card information on the SIM0 interface to register the network;

If no SIM card is detected on the SIM0 interface, it will go back to detect whether there is a SIM card on the SIM1 interface, and if a SIM card is detected on the SIM1 interface, it will read the card information on the SIM1 interface to register with the network;

If a SIM card is also not detected on the SIM1 interface, an error is reported: no SIM card inserted; If SIM cards are inserted into both SIM0 and SIM1 interfaces, the SIM card on the SIM0 interface will be used by default, and you can also switch between them by using the command AT+SIMCROSS.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+SIMCROSS=<id>	OK
Enquiry command	AT+SIMCROSS?	+SIMCROSS:<id> OK
test command	AT+SIMCROSS=?	+SIMCROSS:(range of values for <id>) OK
caveat	This command is saved by shutting down the computer, but it needs to be rebooted to take effect. EC618 needs to go into flight mode for card switching (enter flight mode (AT+CFUN=0), switch cards, exit flight mode AT+CFUN=1)	

Parameter Definition.

parametric	define	retrieve value	Explanation of values
<id>	SIM No.	0	SIM card 0
		1	SIM card 1 or internal patch card

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+SIMCROSS?	
←	+SIMCROSS:0	SIM card position is 0

	OK	
→	AT+SIMCROSS=1	Switch to internal patch card or SIM card1
←	OK	

4.26 SIM card automatic switching switch: AT*SIMAUTO

You can determine which card to use for network communication based on the simSlot in the AT+ECSIMCFG? return value.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT*SIMAUTO=<state>	OK
Enquiry command	AT*SIMAUTO?	*SIMAUTO: <state> OK
caveat	This command is saved by shutting down the computer, but it needs to be rebooted to take effect.	

Parameter Definition.

parametric	define	retrieve value	a	Explanation of values
<state>	Automatic switching of switching status	0		Disable automatic switching
		1		Turn on the SIM auto switching function to judge according to the communication card set up
		2		Switching SIM cards and selecting the right communication card by signal quality Note: This configuration will not run automatically every time you turn on the computer, but needs to be triggered by AT + SIMSWT command (1. When you run AT + SIMSWT, it will trigger the operation of selecting a communication card, and save the information of the communication card selected by the system to ensure that the network communication will be carried out in accordance with the saved communication card after restarting the computer). 2. When you need to update the selected communication card, you need to run AT + SIMSWT again. 3. When you need to update the selected communication card, you just need to run this AT + SIMSWT again. 3. When you don't know the saved communication card, you can query the saved communication card by AT + SIMSWT?)
caveat	The SIMSWT command is valid only when used in mode 2			

4.27 RNDIS/ECM function switch: AT+RNDISCALL

>=V1140 version support

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+RNDISCALL=<mode>	OK
retrieve command	AT+RNDISCALL?	+RNDISCALL:<mode> OK
test command	AT+RNDISCALL=?	+RNDISCALL:(0-disable;1-enable) OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<mode>	operating mode	0	Turn off the RNDIS/ECM NIC and reboot to take effect
		1	Turn on the RNDIS/ECM card and reboot to take effect

4.28 Re-open USB: AT+SYSNV=1, "ureboot",1

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+SYSNV=1, "ureboot",1	OK
Enquiry command	AT+SYSNV=0, "ureboot"	+SYSNV: "ureboot",1 OK

4.29 GPIO port control: AT+CGPIO

Note: This command is only applicable to Hopu 4G CAT1 module (EC618 series) >=V1115 version

Grammatical rules:

Command Type	vocabulary	come (or go) back
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Setup Comma nds	AT+CGPIO=<mode>,<gpio_id>,<set_mode>	+CGPIO: <mode><mode>,<gpio_id>,<set_mode> OK
caveat	The design does not consider the gpio multiplexing situation, it is normal that some of the gpio multiplexing settings do not take effect, and it is also normal that the input default state of the original factory limitations cannot be changed.	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	state of affairs	0	importation
		1	exports
<gpio_id>	Specific GPIO No.		Refer to the corresponding hardware manual
<set_mode>	Output high and low levels	0,1	If it is an output, it is: 1: output high level 0: output low level
	Input drop-down state	0,1,2	If it's an input, it's: 0: pull down 1: pull up 2: hovering

5 Network Service Related Commands

5.1 Query Signal Quality: AT+CSQ

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CSQ	+csq: <rssi>,<ber> OK
test command	AT+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s) OK

Parameter Definition:

parame tric	define	retrieve a value	Corresponding received signal strength (dbm)
<rssi>	Received signal strength indication (received signal strength indication) <rssi>=(Received signal strength dBm+113)/2	0	Less than or equal to -115dBm
		1	-111dBm
		2~30	-109 to -53dBm
		31	Greater than or equal to -51dBm
		99	unknown or unmeasurable
<ber>	Channel BER (bit error rate, which is only known after the call is established)	0~7	RXQUAL value shown in GSM 05.08 section 8.2.4
		99	unknown or unmeasurable

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CSQ	Check signal strength and quality
←	+CSQ: 15,0 OK	Enquiry results

5.2 Query signal quality (extended): AT+CESQ

Execute the command to return the individual parameters of the received signal. If the current serving cell is not a GERAN cell, <rxlev> and <rxqual > are set to 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; <rsrq> and <rsrp> are set to 255 if the current serving cell is not an E-UTRA cell.

Grammatical rules:

Command Type	vocabulary	come (or go) back
--------------	------------	-------------------

execute a command	AT+CESQ	+CESQ: <rxlev>,<rxqual >,<rscp>,<ecno>,<rsrq>,<rsrp> OK
-------------------	---------	--

Parameter Definition.

parameter	define	retrieve a value	Explanation of values
<rxlev>	Received signal strength (received signal strength level ; 3GPP TS 45.008 subclause 8.1.4); integer type	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	unknown or unmeasurable
		<rxqual >	Received signal quality (see XQUAL value in Table R in 3GPP TS 45.008 subclause 8.2.4); integer type	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	unknown or unmeasurable		
<rscp>	received signal code power (refer to 3GPP TS 25.133 subclause 9.1.1.3 and 3GPP TS 25.123 subclause 9.1.1.1.3); integer type			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	unknown or unmeasurable
<ecno>	ratio of the received energy per PN chip to the total received power spectral density (see 3GPP TS 25.133); integer type	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	unknown or unmeasurable
<rsrq>	reference signal received quality (refer to 3GPP TS	0	rsrq < -19.5 dB
		1	-19.5 dB ≤ rsrq < -19 dB

	36.133 subclause 9.1.7); integer type	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	unknown or unmeasurable
<rsrp>	reference signal received power (see 3GPP TS 36.133 subclause 9.1.4); integer type	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	unknown or unmeasurable

5.3 Turn on CSQ active reporting: AT*CSQ

The reported URCs (CSQ indicators) are listed below:

+CSQ:<rsqi>,<ber>

+CESQ:<rxlev>,<ber>,<rsqp>,<ecno>,<rsrq>,<rsrp>

***CESQ: <rxlev>,<ber>,<rsqp>,<ecno>,<rsrq>,<rsrp>,<sinr>**

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT*CSQ=<n>	OK
Enquiry command	AT*CSQ?	*CSQ:<n> OK
test command	AT*CSQ=?	*CSQ = (list of supported <n>s) OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<n>		0	Closure of active reporting
		1	Open Active Reporting
<rsqi>,<ber>	See AT+CSQ		
<rxlev>,<rsqp>,<ecno>,<rsrq>,<rsrp>	See AT+CESQ		
<sinr>	Signal to interference plus noise ratio (S/N ratio)		

5.4 Web registration information: AT+CREG

The setup command turns on or off URC reporting for +CREG, and the URC reporting is as follows:

Set <n>=1 to proactively report +CREG: <stat> when there is a change in network registration status.

Set <n>=2 to proactively report +CREG: <stat>[,<lac>,<ci>[,<act>]] when there is a change in the network registration status or resident cell.

The query returns the current value of <n>,<stat> and the value of <lac>,<ci> when <n>=2.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CREG=[<n>]	OK
Enquiry command	AT+CREG?	<n>=0 (default) or 1. +CREG: <n>,<stat> OK <n>=2. +CREG: <n>,<stat>,<lac>,<ci>,<act> OK
test command	AT+CREG=?	+CREG: (list of supported <n> values) OK
URC report	+CREG: <stat>	If <n>=1 , report this URC when the network registration status changes.
	+CREG: <stat>[,<lac>,<ci>[,<act>]]	If <n>=2, when the network registration status changes or the location zone cell changes
	+CREG: <stat>[,<tac>],<ci>[,<AcT>],<cause_type>,<reject_cause>]]	If <n>=3, when the network registration status changes or the location zone cell changes

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<n>	URC reporting status	0	Disable Network Registration Unsolicited Result Code (URC,Unsolicited Result Code)
		1	Enable network registration of unsolicited result codes +CREG: <stat>
		2	Enable web registration and location information unsolicited result codes +CREG: <stat>[,<lac>,<ci>[,<act>]]

		3	Enable web registration and location information unsolicited result codes +CEREG: <stat>[,<tac>],[<ci>],[<AcT>][,<cause_type>,<reject_cause>]]]
<stat>	Current Network Registration Status	0	Unregistered; ME Currently not searching for new operators to register for business
		1	Registered, local network
		2	Not registered, but ME is searching for a new operator to register the business with
		3	Registration denied
		4	uncharted
		5	Registered, roaming
		6	Register local network, SMS-only (only possible if <AcT>= E-UTRAN)
		7	Register for roaming network, SMS-only (only possible if <AcT>= E-UTRAN)
		8	Attached to emergency bearer service only (not supported)
		9	Registration of attribution "CSFB not preferred" operations (only possible if <AcT>= E-UTRAN)
		10	Registration for roaming "CSFB not preferred" service (possible only if <AcT>= E-UTRAN)
		11	Available for emergency operations only
<lac>	location area	-	Hexadecimal number, string type
<ci>	Cell id	-	Hexadecimal number, string type
<act>	access mode	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
		8	UTRAN HSPA+ (CAT1 module) EC-GSM-IoT (CAT4 module)

Example.

Command (→)/ return (←)	AT Sequences	account for
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→	AT+CREG=?	Query the range of values of <n>
←	+creg:(0,1,2,3) OK	Enquiry results
→	AT+CREG?	<n> The default is 0, when the registration status of the network is queried
←	+CREG: 0,1 OK	The query comes up with <n>=0 and <stat>=1 (registered and registered to a local network)
← (URC)	+CREG:0	Unplug the antenna or walk into an area where there is no signal, a URC will be reported indicating that the network is not currently registered
← (URC)	+CREG:1	Attach an antenna or walk into an area with a signal, at this point, there will be a URC reported at this time, indicating that the current re-registration to the network
→	AT+CREG=2	Setting <n>=2
←	OK	
→	AT+CREG?	Query the registration status of the network
←	+creg: 2,1, "1863", "0183db22",7 OK	Query to <n>=2, <stat>=1, <lac>=1863, <ci>=0183db22, <act>=7
← (URC)	+creg: 1, "1863", "01a2c315",7	Mobile module, a URC is reported when the cell number changes

5.5 E-UTRAN EPS Network Registration Status: AT+CEREG

The setup command turns on or off URC reporting for +CEREG, and the URC reporting is as follows:

Set <n>=1 to proactively report +CEREG when there is a change in EPS registration status on the E-UTRAN network:
<stat>

Set <n>=2 to proactively report +CEREG: <stat>[,<tac>,<ci>,<act>] when there is a change in the registration status of an EPS on an E-UTRAN network or a resident cell.

Set <n>=3 to proactively report +CEREG when there is a change in EPS registration status or resident cell on the E-UTRAN network: <stat>[,<tac>,<ci>,<act>[,<cause_type>,<reject_cause>]]

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CEREG=<n>	OK
Enquiry command	AT+CEREG?	+CEREG: <n>,<stat>[,<tac>],[<ci>],[<Act>[,<cause_type>,<reject_cause>]]]
test	AT+CEREG=?	OK +CEREG: (list of supported <n>s)

command		OK
URC reporting	+CEREG: <stat>	<n>=1 when there is a change in the EPS registration status on the E-UTRAN network
	+CEREG: <stat>[,<tac>],<ci>[,<AcT>]	<n>=2 when there is a change in the EPS registration status or resident cell in the E-UTRAN network
	+CEREG: <stat>[,<tac>],<ci>[,<AcT>][,<cause_type>,<reject_cause>]]	<n>=3 when there is a change in the EPS registration status or resident cell in the E-UTRAN network
	+CEREG: <stat>[,<tac>],<ci>[,<AcT>][,<Active Time>], [<Periodic-TAU>]]]]	<n>=4, for UEs requesting PSM, enable proactive reporting of network registration status, proactive reporting of location information and network timer configuration
	+CEREG:<stat>[,<tac>],<ci>[,<AcT>][,<cause_type>],<reject_cause>][,<Active-Time>], [<Active-Time>], [<Periodic-TAU> [<Periodic-TAU>]]]]	<n>=5, for the UE requesting PSM, enable proactive reporting of network registration status, location information, reason for registration failure and network timer configuration, with the reporting content as

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<n>	URC reporting status	0	Disable reporting of network registration status URC +CEREG
		1	Allow active reporting + CEREG: <stat>
		2	Allow active reporting + CEREG:<stat>[,<tac>],<ci>
		3	Allow active reporting + CEREG: <stat>[,<tac>],<ci>[,<AcT>][,<cause_type>,<reject_cause>]]
		4	+CEREG: <stat>[,<tac>],<ci>[,<AcT>][,<Active Time>], [<Periodic-TAU>]]]]
		5	+CEREG:<stat>[,<tac>],<ci>[,<AcT>][,<cause_type>],<reject_cause>][,<Active-Time>], [<Active-Time>], [<Periodic-TAU> [<Periodic-TAU>]]]]
<stat>	Current Network Registration Status	0	Unregistered; ME Currently not searching for new operators to register for business
		1	Registered, local network
		2	Not registered, but ME is searching for a new operator to register the business with
		3	Registration denied
		4	Unknown (beyond E-UTRAN coverage)

		5	Register for Roaming Network
		6	Registering for "SMS only" services at the place of attribution
		7	Registering for "SMS only" service in roaming destinations
		8	Attachment of emergency bearer operations only
		9	Registration of "CSFB not preferred" business in the place of attribution
		10	Register for "CSFB not preferred" service in roaming locations
		11	Available for emergency operations only
<ta>	Tracking area code	-	String type, hexadecimal number
<ci>	Cell id	-	String type, hexadecimal number
<act>	access mode	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
		8	UTRAN HSPA+ (CAT1 module) EC-GSM-IoT (CAT4 module)
<cause_type>	Integer type, define <reject_cause> type	0	Display <reject_cause> includes an EMM cause value (refer to 3GPP TS 24.301 Annex A)
		1	Display <reject_cause> values defined by the manufacturer
<reject_cause>	Integer type, defines the reason for registration failure		The type of this value is defined by <cause_type>

5.6 Setting the network mode: AT^SYSCONFIG

This command sets the system mode, GSM/WCDMA access sequence, roaming and service domain characteristics.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT^SYSCONFIG=<mode>,<acqorder>,<roam>,<srvdomain>	OK
Enquiry command	AT^SYSCONFIG?	^SYSCONFIG:<mode>,<acqorder>,<roam>,<srvdomain> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	network paradigm	2	Automatic selection
		13	GSM ONLY
		14	WCDMA ONLY
		15	TD-SCDMA ONLY
		16	LTE+UTRAN+GSM
<acqorder>	Network Access Sequence	0	Automatic
		1	GSM first, then UTRAN
		2	UTRAN first ,then GSM
		3	LTE first, then GSM or UTRAN
<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

5.7 Query cid-related context definition: AT+CGCONTRDP

The set command returns <cid>-related <bearer_id>, <apn>, <local_addr and subnet_mask>, <gw_addr>, <DNS_prim_addr>, <DNS_sec_addr>, <P-CSCF_prim_addr>, <P-CSCF_sec_addr>, and <IM_CN_Signalling_Flag>. sec_addr>, <P-CSCF_prim_addr>, <P-CSCF_sec_addr>, <IM_CN_Signalling_Flag> and <LIPA_indication>.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGCONTRDP[=<cid>]	<p>[+CGCONTRDP: <cid>,<bearer_id>,<apn>[,<local_addr>,<subnet_mask>[,<gw_addr>[,<DNS_prim_addr>&gt;[,<DNS_sec_addr>[,<P-CSCF_prim_addr>[,<P-CSCF_sec_addr>[,<IM_CN_Signalling_Flag>[,<LIPA_indication>[&gt;]]]]]]]]]]</p> <p>[<CR><LF>+CGCONTRDP: <cid>,<bearer_id>,<apn>[,<local_addr>,<subnet_mask>[,<gw_addr>[,<DNS_prim_addr>[,<DNS_sec_addr>[,<P-CSCF_prim_addr>[,<P-CSCF_sec_addr>[,<IM_CN_Signalling_Flag>[,&lt;LIPA_indication>]]]]]]]]]]</p> <p>[...]</p> <p>OK</p>
test command	AT+CGCONTRDP=?	<p>+CGCONTRDP: (list of <cid>s associated with active contexts)</p> <p>OK</p>

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<cid>	defines a specific PDP context.		integer type (math.)
<bearer_id>	A bearer is specified, e.g., an EPS bearer in an EPS network, an NSAPI bearer in UMTS/GPRS.		integer type (math.)
<apn>	Access Point Name, access point name, used to select GGSN or external packet data network		string type
<local_addr>	Module Local IP Address		string type
<subnet_mask>	subnet mask		string type
<gw_addr>	Gateway IP address		string type
<DNS_prim_addr>	Primary DNS server IP address		string type
<DNS_sec_addr>	Secondary DNS server IP address		string type
<P-CSCF_prim_addr>	Main P-CSCF server IP address		string type

<P-CSCF_sec_addr>	Auxiliary P-CSCF server IP address		string type
<IM_CN_Signalling_Flag>	Integer type defining whether the PDP context is related to the IM CN subsystem maximum only	0	clogged
		1	be
<LIPA_indication>	Integer type indicating whether the PDP context is related to the LIPA PDN. This parameter cannot be set	0	clogged
		1	be

Examples:

Command (→)/Return (←)	an actual example
→	AT+CGCONTRDP=1
←	+CGCONTRDP: 1,5, "xz01.njm2mapn", "10.64.16.223", "", "10.64.16.223", "58.240.57.33", "221.6.4.66" OK

5.8 Carrier search and selection: AT+COPS

The set command is used to try to select and register a GSM/UMTS network operator. <mode> is used to select whether to register automatically (<oper> is ignored) or manually to <oper> (the value of <oper> is defined by <format>). If the manually selected operator <oper> is not available, then no other operator is registered either, unless <mode>=4.

When <mode>=2, it forces an exit and remains in the exit state until <mode> is set to 0, 1 or 4.

This command will not be executed if it is set when the network is being cancelled or withdrawn.

The query command returns the current <mode>, the currently registered operator <oper>, and the currently used Access Technology.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+COPS=<mode>[,<format>,<oper>[,<AcT>[,<Domain>]]]]	OK
Enquiry command	AT+COPS?	+COPS: <mode>[,<format>,<oper>[,<AcT>[,<Domain>]]]] OK
test	AT+COPS=?	+COPS: [[list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>[,<

command		AcT>]]s][,.(list of supported <mode>s),(list of supported <format>s)]
		OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<mode>	Operator Registration Model	0	Automatic mode; <oper> is ignored
		1	Manually register operators (<oper> must have, <AcT> can have)
		2	Manually exit the network and remain in the exit state until <mode> is set to 0,1,4
		3	Set <format> only (for query commands + COPS?); no attempt to register or logout (<oper> field can be ignored)
		4	Manual/Auto (<oper> field cannot be ignored); if manual selection fails, it will enter auto selection mode (<mode>=0)
<format>	Operator's format	0	Long string type <oper> (in alphanumeric format), up to 16 characters
		1	Short string type <oper> (in alphanumeric format), max. 8 characters
		2	Numeric String <oper>
<oper>	Operator values corresponding to <format>	-	Character type; <format> indicates whether the string is alphanumeric or numeric; numeric indicates the operator's method as MCC (3 bits) + MNC (2 bits), i.e. Mobile Country Code + Mobile Network Code
<stat>	Network Availability Status	0	uncharted
		1	available network
		2	current network
		3	disable network
<AcT>	Access Technology, Network Type	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
		8	UTRAN HSPA+

<Domain>	domain (taxonomy)	0	CS only
		1	PS only
		2	CS/PS both

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+COPS?	Query Network Information
←	+cops: 0,2, "46001",7 OK	
→	AT+COPS=3,1	Set <format>=1 short string type (use alphanumeric format)
←	OK	
→	AT+COPS?	Query Network Information
←	+cops: 0,1, "unicom",7 OK	
→	AT+COPS=3,0	Set <format>=0 long string type (use alphanumeric format)
←	OK	
→	AT+COPS?	Query Network Information
←	+COPS: 0,0, "CHN-UNICOM",7 OK	

5.9 Automatic time zone update: AT+CTZU

The query command queries whether to enable the function of updating module time via NITZ.

Default is enable. (Module can be set disabled/enabled by AT+CTZU=0/1)

Note: NITZ=Network Identity and Time Zone, which provides local time over the operator's network.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT+CTZU?	+CTZU: <fun> OK
test command	AT+CTZU=?	+CTZU: (list of supported <fun>s) OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<fun>	Time zone update status	1	Allow NITZ to automatically update

5.10 Turn on NITZ auto-reporting: AT+CTZR

Use this command to set whether to turn on NITZ URC auto-reporting.

This command does not support setting, only querying. The default is on.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT+CTZR?	+CTZR: <fun> OK
test command	AT+CTZR=?	+CTZR: (list of supported <fun>s) OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<fun>	Report status	0	NITZ URC reporting is not allowed
		1	Allow NITZ URC reporting

5.11 (URC) NITZ auto-reporting: +NITZ:<time>,<ds>

Grammatical rules:

URC
+NITZ:<time>,<ds>

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<time>	times	yy/mm/dd,hh:mm:ss±tz	tz :time zone, -48~+48 Example. +nitz:11/08/02,09:27:39+32,0
<ds>	daylight saving time	0	No adjustment for daylight saving time
		1	+1 hour (equal to 4 quarters in <tz>) adjusted to daylight saving time
		2	+2 hours (equal to 8 quarters <tz>) adjusted to daylight saving time

5.12 Setting the NITZ automatic time zone reporting: AT+NITZDISSET

>=1140 [Software version support](#).

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT+NITZDISSET?	+NITZDISSET: <zone>,<id>
Setup Commands	AT+NITZDISSET=<zone>,<id>	OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<zone>	East-West time zone	"e"	Eastern Time Zone
		"w"	Western Time Zone
<id>	time zone number	0-12	

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+NITZDISSET="e",8	Indicates that the URC displays the time in the Eighth Eastern Region
←	OK	

5.13 Query the current operating band: AT*BANDIND

The Set command turns on band auto-reporting.

The query returns the current operating band.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT*BANDIND[=<n>]	OK
Enquiry command	AT*BANDIND?	*BANDIND: <n>[,<band>,<Act>] OK
test command	AT*BANDIND=?	*BANDIND: (0,1) OK
URC	<n>=1 and band change is automatically reported	URC: *BANDIND: <band>, <Act>

Parameter Definition:

param etric	define	retrieve a value	Explanation of values	
<n>	<n>=1 and band change is automatically reported *BANDIND: <band>, <Act>	0	disable	
		1	enable	
<act>	Access Technology, Access Mechanisms	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	
<band>	(radio) band	0	PGSM 900	When <act>=0/1/3
		1	DCS GSM 1800	
		2	PCS GSM 1900	
		3	EGSM 900	
		4	GSM 450	
		5	GSM 480	
		6	GSM 850	
		0	UMTS BAND1	When <act>=2/4/5/6/8
		1	UMTS BAND2	
		2	UMTS BAND3	
		3	UMTS BAND4	
		4	UMTS BAND5	
		5	UMTS BAND6	
		6	UMTS BAND7	
		7	UMTS BAND8	

		8	UMTS BAND9	
		9	UMTS BAND10	
		10	UMTS BAND11	
		11	UMTS BAND12	
		12	UMTS BAND13	
		13	UMTS BAND14	
		14	UMTS BAND15	
		15	UMTS BAND16	
		16	UMTS BAND17	
		17	UMTS BAND18	
		18	UMTS BAND19	
		1	LTE BAND 1	
		2	LTE BAND 2	
		3	LTE BAND 3	
		4	LTE BAND 4	
		5	LTE BAND 5	
		6	LTE BAND 6	
		7	LTE BAND 7	
		8	LTE BAND 8	
		9	LTE BAND 9	
		10	LTE BAND 10	When <act>=7
		11	LTE BAND 11	
		12	LTE BAND 12	
		13	LTE BAND 13	
		14	LTE BAND 14	
		15	LTE BAND 15	
		16	LTE BAND 16	
		17	LTE BAND 17	
		18	LTE BAND 18	
		19	LTE BAND 19	

		20	LTE BAND 20	
		21	LTE BAND 21	
		22	LTE BAND 22	
		23	LTE BAND 23	
		24	LTE BAND 24	
		25	LTE BAND 25	
		26	LTE BAND 26	
		27	LTE BAND 27	
		28	LTE BAND 28	
		29	LTE BAND 29	
		30	LTE BAND 30	
		31	LTE BAND 31	
		32	LTE BAND 32	
		33	LTE BAND 33	
		34	LTE BAND 34	
		35	LTE BAND 35	
		36	LTE BAND 36	
		37	LTE BAND 37	
		38	LTE BAND 38	
		39	LTE BAND 39	
		40	LTE BAND 40	
		41	LTE BAND 41	

5.14 Query Access Technology: AT^CACAP

The query command returns the Access Technology of the current cell.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT^CACAP?	+CACAP: <act> OK
test command	AT^CACAP=?	+CACAP: (0-7)

		OK
--	--	----

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<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

5.15 Query current system information: AT^SYSINFO

This command queries the current system information, such as service status, service domain, roaming status and so on.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute the naming	AT^SYSINFO	^SYSINFO:<srv_status>,<srv_domain>,<roam_status>,<sys_mode>,<sim_state>,<sys_submode> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<srv_status>	service status	0	no service
		1	restricted service
		2	valid service
		3	Restricted area service
		4	power service
<srv_domain>	business domain	0	no service
		1	CS only
		2	PS only

		3	CS and PS
<roam_status>	roaming state	0	no roaming
		1	roaming
<sys_mode>	network paradigm	0	no service
		1	reserved
		2	reserved
		3	GSM/GPRS
		4	WCDMA
		5	TD_SCDMA
		17	LTE
<sim_state>	SIM card status	0	Invalid sim card
		1	sim card valid
		255	SIM not inserted or PIN not unlocked
<sys_submode>	network sub-model	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

5.16 Set the domain name and port of the base station location (LBS) server:

AT+GSMLOCFG

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+GSMLOCFG=<addr>,<port>	OK

s		
test command	AT+GSMLOCFG=?	+GSMLOCFG: (addr),(port) OK
Enquiry command	AT+GSMLOCFG?	+GSMLOCFG: bs.openluat.com:12411 OK

Parameter Definition:

parametric	define	retrieve value	Explanation of values
<addr >	server domain		Currently only company-specific adapted websites are supported
<port>	ports		Currently only company-specific adapted websites are supported

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+GSMLOCFG="bs.openluat.com",12411	Setting the server domain name and port
←	OK	
→	AT+GSMLOCFG?	Query server domain name and port
←	+GSMLOCFG: bs.openluat.com:12411 OK	

5.17 Reading base station positioning (LBS) information and time: AT+CIPGSMLOC

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPGSMLOC=<type>,<cid>	<p>If <type>=1. +CIPGSMLOC:<locationcode>[,<latitude>,<longitude>,<date>,<time>] OK</p> <p>If <type>=2. +CIPGSMLOC: <locationcode>[,<date>,<time>] OK</p> <p>If error is related to ME functionality. +CME ERROR: <err></p>

test command	AT+CIPGSMLOC=?	+CIPGSMLOC:(list of supported <type>s),(range of <cid>) OK
--------------	----------------	---

Parameter Definition:

parametric	define	retrieve value	Explanation of values
<type >	Type of operation	1	View Accuracy, Dimension and Time
		2	View only time
<cid>	as <cid> defined in +SAPBR	1-3	
<longitude>	Current longitude (in degrees)		Longitude (7 decimal places)
<latitude>	Current latitude, expressed in degrees		Latitude (7 decimal places)
<date>	The format is yy/mm/dd		For example, 2023/11/08
<time>	The format is hh/mm/ss		For example 15:47:26
<locationcode>		0	successes
		1	No data found
		6	parametric error
		7	unknown error
		404	not found
		408	Request timeout
		601	network error
		602	memory deficit
		603	DNS error
		604	stacks are busy
65535	Other errors		

Example.

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+SAPBR=3,1,"CONTYPE","GPRS"	Set the bearer type to GPRS
←	OK	

→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	Activating the GPRS PDP Context
←	OK	
→	AT+SAPBR=2,1	Check for activation
←	+SAPBR: 1,1,010.169.179.213 OK	An IP address in the return indicates successful activation
→	AT+CIPGSMLOC=1,1	Query location and time (timeout 30S)
←	+cipgsmloc: 0,034.7983328,114.3214505,2023/06/05,14:38:50 OK	
→	AT+CIPGSMLOC=2,1	Enquiry time only
←	+cipgsmloc: 0,2023/06/05,14:38:55 OK	
→	AT+SAPBR=0,1	De-activate the PDP context
←	OK	

5.18 Read WIFI positioning information and time: AT+WIFILOC

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+WIFILOC=<type>,<cid> [, <mode>]	<p>If <type>=1. +WIFILOC:<locationcode>[,<latitude>,<longitude>,<date>,<time>]</p> <p>OK</p> <p>If <type>=2. +WIFILOC: <locationcode>[,<date>,<time>]</p> <p>OK</p> <p>If error is related to ME functionality. +CME ERROR: <err></p>
test command	AT+WIFILOC=?	+WIFILOC:(list of supported <type>s),(range of <cid>)

		OK
--	--	----

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<type >	Type of operation	1		View Accuracy, Dimension and Time
		2		View only time
<cid>	as <cid> defined in +SAPBR	1-3		
<mode>	Scanning priority (default data first) >=V1143 version support	0		Data Priority
		1		Wifi scanning priority
<longitude>	Current longitude (in degrees)			Longitude (7 decimal places)
<latitude>	Current latitude, expressed in degrees			Latitude (7 decimal places)
<date>	The format is yy/mm/dd			For example, 2023/11/08
<time>	The format is hh:mm:ss			For example 15:47:26
<locationcode>		0		successes
		1		No data found
		2		faulty authority
		6		parametric error
		4 or 7		unknown error
		255		wifi success
		404		not found
		408		Request timeout
		601		network error
		602		memory deficit
		603		DNS error
		604		stacks are busy
65535		Other errors		

Example.

Command	an actual example	Explanations and clarifications
---------	-------------------	---------------------------------

(→)/Return (←)		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Set the bearer type to GPRS
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	Activating the GPRS PDP Context
←	OK	
→	AT+SAPBR=2,1	Check for activation
←	+SAPBR: 1,1,010.169.179.213 OK	An IP address in the return indicates successful activation
→	AT+WIFILOC=1,1	Query location and time (timeout 40S)
←	+WIFILOC: 0,034.7983328,114.3214505,2023/06/05,14:40:32 OK	
→	AT+WIFILOC=2,1	Enquiry time only
←	+wifiloc: 0,2023/06/05,14:40:32 OK	
→	AT+SAPBR=0,1	De-activate the PDP context
←	OK	

5.19 Get WIFI information: AT+WIFISCAN

Note: (Specified channel scanning function is not supported yet)

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Command	AT+WIFISCAN=<channel>	+WIFISCAN: <mac>, <rssi> OK	Specified Channel Scan
Enquiry command	AT+WIFISCAN?	+WIFISCAN: <mac>, <rssi>, <channel> OK	Query all channels in blocking mode

execute a command	AT+WIFISCAN	OK +WIFISCAN: <mac>, <rssi>, <channel>	Query all channels in a non-blocking way, return immediately, and report actively when the query is completed.
-------------------	-------------	---	--

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<channel>	reproach		
<mac>	MAC address		
<rssi>	Received Signal Strength Indication (RSSI)		

5.20 Flow query command: AT^DATAINFO

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT^DATAINFO=<n>,<period>	OK
Enquiry command	AT^DATAINFO? (Only available when open)	^DATAINFO: <n>,<period> OK
execute a command	AT^DATAINFO (Only available in open state, query usage traffic, unit byte, save on power down)	^DATAINFO: <upper row>, <lower row>. OK
test command	AT^DATAINFO=?	^DATAINFO: (0-1),(0,30-65535) OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<n>	Traffic Enquiry Switch (power-down save)	0	cloture
		1	show (a ticket)
<period>	Time interval for saving flow data	30-65535	Unit: seconds

5.21 (URC) System mode: ^MODE

Shows that there is a change in the system mode.

Grammatical rules:

URC
^MODE:<SysMainMode>,<SysMode>

Parameter Definition:

parametric	retrieve a value	account for
<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)
	0,0	no service

5.22 Cell information enquiry: AT+CCED

This command queries the information of this cell and up to 6 pro-cells.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CCED=<mode>,<requested dump>	OK
test command	AT+CCED=?	+CCED: (list of <mode>s),(list of <requested dump>s) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	0	One report
		1	Periodic reporting
		2	Closure of reporting
<requested dump>	Message Type	1	Main cell, i.e. service cell information
		2	Neighbourhood information If it is an LTE neighbourhood, it is reported:

		MCC,MNC,frequency,cellid,rsrp,rsrq,tac,SrxLev,pcid If it is a GSM neighbourhood, it is reported: mcc,mnc,lac,cellid,bsic,rxlev
	8	RSSI indication of the primary cell, i.e. Rxlev (0~31)

Examples:

```

<requested dump>=1 to report information about the primary or service cell:
Reported if currently in LTE mode:
+CCED:LTE current cell:MCC,MNC,imsi,roamingFlag,bandInfo,bandwidth,dIEarfcn,cellid,rsrp,rsrq,tac,SrxLev,pcid
Reported if currently in GSM mode:
+CCED:GSM current cell info:MCC,MNC,lac,cellid,bsic,rxlev,RxLevSub,Arfcn

Examples:
Query the current cell at once (LTE mode):
AT+CCED=0,1

+CCED:LTE current cell:460,00,460045926307603,0,40,n100,39148,140542123,51,29,6334,34,351

OK
Query the current cell at once (GSM mode):
AT+CCED=0,1

+CCED:GSM current cell info:460,00,18be,5045,13,63,63,6

OK
Current cell information is reported periodically (LTE mode):
AT+CCED=1,1

+CCED:LTE current cell:460,00,460045926307603,0,40,n100,39148,140542123,61,31,6334,44,351

OK

+CCED:LTE current cell:460,00,460045926307603,0,40,n100,39148,140542123,61,31,6334,44,351
+CCED:LTE current cell:460,00,460045926307603,0,40,n100,39148,140542123,61,31,6334,44,351
+CCED:LTE current cell:460,00,460045926307603,0,40,n100,39148,140542123,61,35,6334,44,351

Current cell information is reported periodically (GSM mode):
AT+CCED=1,1

+CCED:GSM current cell info:460,00,18be,5045,13,61,61,6

OK

+CCED:GSM current cell info:460,00,18be,5045,13,63,63,6

```

+CCED:GSM current cell info:460,00,18be,5045,13,63,63,6

+CCED:GSM current cell info:460,00,18be,5045,13,63,63,6

+CCED:GSM current cell info:460,00,18be,5045,13,63,63,6

<requested dump>=2 to report information about neighbouring cells:

Reported if currently in LTE mode:

+CCED:LTE neighbour cell: MCC,MNC,frequency,cellid,rsrp,rsrq,tac,SrxLev,pcid

Reported if currently in GSM mode:

+CCED:GSM neighbour cell info: MCC,MNC,lac,cellid,bsic,rxlev

Examples:

Query neighbouring cells at once (LTE mode):

AT+CCED=0,2

+CCED:LTE neighbour cell:460,00,38950,140541985,57,24,6334,36,351

+CCED:LTE neighbour cell:460,00,1300,26224401,48,24,6334,27,37

+CCED:LTE neighbour cell:460,00,1300,26224402,43,15,6334,22,38

+CCED:LTE neighbour cell:460,00,38400,26224397,42,23,6334,21,191

+CCED:LTE neighbour cell:460,00,40936,12793923,34,15,6334,13,191

+CCED:LTE neighbour cell:460,00,3590,26224415,44,9,6334,27,318

+CCED:LTE neighbour cell:460,00,3590,26224416,47,19,6334,30,319

OK

Query neighbouring cells at once (GSM mode):

AT+CCED=0,2

+CCED:GSM neighbour cell info:460,00,6334,20522,31,75

+CCED:GSM neighbour cell info:460,00,6334,0,21,80

+CCED:GSM neighbour cell info:460,00,6334,20521,30,91

OK

Neighbouring cell information is reported periodically (LTE mode):

AT+CCED=1,2

+CCED:LTE neighbour cell:460,00,38950,140541985,57,24,6334,36,351

+CCED:LTE neighbour cell:460,00,1300,26224401,48,24,6334,27,37

+CCED:LTE neighbour cell:460,00,1300,26224402,43,15,6334,22,38

+CCED:LTE neighbour cell:460,00,38400,26224397,42,23,6334,21,191

+CCED:LTE neighbour cell:460,00,40936,12793923,34,15,6334,13,191

+CCED:LTE neighbour cell:460,00,3590,26224415,44,9,6334,27,318

+CCED:LTE neighbour cell:460,00,3590,26224416,47,19,6334,30,319

OK

+CCED:LTE neighbour cell:460,00,38950,140541985,57,24,6334,36,351
+CCED:LTE neighbour cell:460,00,1300,26224401,48,24,6334,27,37
+CCED:LTE neighbour cell:460,00,1300,26224402,43,15,6334,22,38
+CCED:LTE neighbour cell:460,00,38400,26224397,42,23,6334,21,191
+CCED:LTE neighbour cell:460,00,40936,12793923,34,15,6334,13,191
+CCED:LTE neighbour cell:460,00,3590,26224415,44,9,6334,27,318
+CCED:LTE neighbour cell:460,00,3590,26224416,47,19,6334,30,319

Neighbouring cell information is reported periodically (GSM mode):

AT+CCED=1,2

+CCED:GSM neighbour cell info:460,00,6334,20522,31,76
+CCED:GSM neighbour cell info:460,00,6334,0,21,80
+CCED:GSM neighbour cell info:460,00,6334,20521,30,94

OK

+CCED:GSM neighbour cell info:460,00,6334,20522,31,85
+CCED:GSM neighbour cell info:460,00,6334,0,21,78
+CCED:GSM neighbour cell info:460,00,6334,20521,30,83

5.23 Query GSM/UMTS/LTE information in engineering mode: AT+EEMGINFO

Grammatical rules:

Command Type	vocabulary	come (or go) back
Enquiry command	AT+EEMGINFO?	+EEMGINFO:<state>,<nw_type> OK +EEMLTESVC:<info> +EEMLTEINTRA:<info> +EEMLTEINTER:<info>

Parameter Definition.

parametric	define	retrieve a value	account for
------------	--------	------------------	-------------

<state>	MT state	0	Idle status
		1	Dedicated status
		2	PS PTM status
		3	active state
<nw_type>	network type	0	GSM
		1	UMTS
		2	LTE

5.24 LTE engineering mode service cell information: +EEMLTESVC

Grammatical rules:

+EEMLTESVC: <mcc>, <length of mnc> , <mnc>, <tac>, <PCI>, <dlEuarfcn>, <ulEuarfcn>, <band>, <dlBandwidth>, <ci>, <transMode>, <rsrp>, <rsrq>, <sinr>, <MainRsrp>, <DiversityRsrp>, <MainRsrq>, <DiversityRsrq>, <rssi>, <cqi>, <currPuschTxPower>, <rankIndex>, <ErrorModeState>, <emmState>, <serviceState>, <IsSingleEmmRejectCause>, <EMMRejectCause>, <MmeGroupId>, <MmeCode>, <mTmsi>

Parameter Definition:

parametric	account for
<mcc>	Mobile Country Code
<length of mnc>	length of mnc
<mnc>	Mobile Network Code
<tac>	Tracking area code
<PCI>	Physical Cell Identifier
<dlEuarfcn>	downlink arfcn
<ulEuarfcn>	uplink arfcn
<band>	band
<dlBandwidth>	dlBandwidth
<ci>	cellId
<transMode>	transMode
<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
<currPuschTxPower>	current Pusch Tx Power in dBm
<rankIndex>	rankIndex
<ErrorModeState>	ErrorModeState
<emmState>	emmState

<serviceState>	serviceState
<IsSingleEmmRejectCause>	IsSingleEmmRejectCause
<EMMRejectCause>	EMMRejectCause
<MmeGroupId>	MmeGroupId
<MmeCode>	MmeCode
<mTmsi>	mTmsi

5.25 LTE Engineering Mode Co-frequency Information: +EEMLTEINTRA

Demonstrates information about the same frequency (intra frequency) in LTE engineering mode.

Grammatical rules:

URC
+EEMLTEINTRA: <p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>

Parameter Definition:

parametric	account for
<p1>	index of ENGMODE INTRAFREQ
<p2>	phyCellId
<p3>	euArfcn
<p4>	rsrp
<p5>	rsrq
<p6>	mcc
<p7>	mnc
<p8>	tac
<p9>	cellId

5.26 LTE engineering mode inter-frequency information: +EEMLTEINTER

Displays inter frequency (inter frequency) information in LTE engineering mode.

Grammatical rules:

+EEMLTEINTER: <p1>,<p2>,<p3>,<p4>,<p5>,<p6>,<p7>,<p8>,<p9>
--

Parameter Definition:

parametric	account for
<p1>	index of ENGMODE INTERFREQ
<p2>	phyCellId
<p3>	euArfcn
<p4>	rsrp
<p5>	rsrq
<p6>	mcc

<p7>	mnc
<p8>	tac
<p9>	cellId

5.27 (URC) network service type indication

URC	an explanation of the meaning of words or phrases
+E_UTRAN Service	Indicates access to 4G LTE network services
+GSM Service	Prompt to enter 2G GSM network service

6 Audio Related Commands

Note: The commands in this chapter are only supported by LSAT versions >= V1103

6.1 TTS (Text To Speech) function: AT+CTTS

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CTTS=<mode>[,<text>][,<pcm>]	OK
Enquiry command	AT+CTTS?	+CTTS: <status> OK
test command	AT+CTTS=?	OK
URC	When the TTS has finished playing, the following URCS are reported: +CTTS:0	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	TTS operating mode	0	Stop playing TTS
		1	Play TTS, <text> using UCS2 encoding
		2	Play TTS, <text> using GBK encoding (Chinese) and ASCII encoding (numbers)
		3	Play TTS, <text> using uft-8 encoding (supported by LSAT version >=V1103)
<text>	TTS Text		Chinese and numbers, maximum length 2047 bytes
<pcm>	TTS model	0	Play TTS
		1	Play TTS and output PCM data
<status>	TTS working status	0	TTS non-playing state
		1	TTS Playback Status

Note: <pcm> parameter with LSAT version >= V1111 support. (Default value is 0)

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CTTS=2, "123, welcome."	Play numbers and Chinese. Note: It is currently not possible to play English for the time being, the English pronunciation in <text> is not a word, but a separated letter one by one.
←	OK	
← (URC)	+CTTS:0	After playback, there will be this URC uploaded

→	AT+CTTS=0	You can also terminate playback during playback with this command
←	OK	

6.2 Setting the TTS playback mode: AT+CTTSPARAM

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CTTSPARAM=<volume>,<mode>,<pitch>,<speed>[,<channel>][,<codec>][,<papin>][,<codecstart>][,<pa_open>][,<codec_pa_close>]	OK
Enquiry command	AT+CTTSPARAM?	+CTTSPARAM:<volume>,<mode>,<pitch>,<speed>,<channel>,<codec>,<papin>,<codecstart>,<pa_open>,<codec_pa_close> OK
test command	AT+CTTSPARAM=?	OK

Parameter Definition.

parametric	define	retrieve a value	Explanation of values
<volume>	TTS Playback Volume	0-100	Default value is 50
<mode>	TTS playback mode, range: 0-3	0	Automatically reads numbers, first according to numerical rules
		1	Automatic reading of numbers, first according to telegraph rules
		2	Reading numbers according to telegraph rules
		3	Reading numbers according to numerical rules
<pitch>	TTS Playback Pitch	1-100	Default value is 50
<speed>	TTS playback speed	1-100	Default value is 50
<channel>	TTS Playback Channel	0	main channel
		1	subsidiary channel
<codec>	decoder chip	0	ES7149
		1	TM8211
		2	Built-in analogue audio mode
<papin>	Specific GPIO number		Refer to the corresponding hardware manual for the specific GPIO number of the PA pin.
<codecstart>	Duration of input blank sound		Default value is 0

	(ms)		
<pa_open>	How long after the command is turned on to open the PA (ms)		Default value is 0
<codec_pa_close>	The time (ms) between closing the pa and the codec after playback has finished.		Default value is 0
<p>Note: <codec> parameter, supported by LSAT version >= V1103. (Default value is 0) <papin> parameter with LSAT version >= V1121 support. (Built-in analogue audio mode playback method needs to be tested with a dedicated board for built-in analogue audio mode) <codecstart>, <pa_open>, <codec_pa_close> parameters, supported by LSAT version >= V1131.</p>			

6.3 Voice file playback: AT+CAUDPLAY

AUAT version >= V1146 version support

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CAUDPLAY=<mode>[,<filename>]	OK
Enquiry command	AT+CAUDPLAY?	+CAUDPLAY: <mode> OK
test command	AT+CAUDPLAY=?	+CAUDPLAY: (list of <mode> value ranges),<filename> OK
URC reporting	1)AT+CAUDPLAY=1,<filename> start playback, the module ends playback by itself after prompting +CAUDPLAY: 1,<duration> // <duration> is the playback duration 2) AT+CAUDPLAY=2 end playback, cue+CAUDPLAY: 1,<duration> //<duration> is the duration from start playback to stop playback 3) AT+CAUDPLAY=3 to pause playback, OK 4) AT+CAUDPLAY=4 Resume playback, prompt +CAUDPLAY after the module ends playback itself: 1,<duration> // <duration> is the duration from the start of playback to the stop of playback	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	usage pattern	1	Start playback (start)
		2	Stop
		3	Pause
		4	Resume Playback
<filename>	Audio file name		AMR,WAV,MP3 format. Need to add suffix, support 8K samples audio data

<duration>	Playback Duration		Unit: milliseconds
------------	-------------------	--	--------------------

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+FSCREATE="test.mp3"	Creating Audio Files
←	OK	
→	AT+FSWRITE="test.mp3",0,1268,20	Enter the audio file. The length 1268 here is just an example.
←	>	Here enter the contents of the audio file (in binary, i.e. hexadecimal)
←	OK	
→	AT+CAUDPLAY=1, "test.mp3"	Playing audio files Note: Audio file names need to be suffixed
←	OK	
←	+CAUDPLAY: 1,2585	End-of-play reporting

6.4 Local audio playback volume control: AT+CRSL

This command affects the **volume** of local audio playback on the device.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CRSL=<level>	OK
Enquiry command	AT+CRSL?	+CRSL:<level> OK
test command	AT+CRSL=?	+CRSL: (range of values for <level>) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<level>	audio channel	1~15	1 is the least loud and 15 is the loudest. The default value is 15

7 Short Message Command

7.1 Introduction to PDU SMS coding format

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)																

Chart 1 Figure 1: MO SMS PDU format

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 (Service Center Address)																3 ~ (1+n)	
R	UDHI		SRI				M	MS	MTI	OA length = m							(2+n)~ (3+n)
1	TON					NPI			OA (Originating Address)							(4+n)~(5+n)	
OA (Originating Address)																(6+n) ~ (5 + n + (m+1) / 2)	
PID								DCS								(6 + n + (m+1) / 2) ~ (7 + n + (m+1) / 2)	
SCTS (Service Center Time Stamp)																(8 + n + (m+1) / 2)~ (14 + s + n + (m+1) / 2)	
UDL (User Data Length) = x								UD (user data)								(15 + x + n + (m+1) / 2) ~ (16 + x + n + (m+1) / 2)	
UD (user data)																	

Chart 2 Figure 2: MT SMS PDU format

Parameter Definition:

parameters	define	Explanations and clarifications
MO	Mobile Originated	Module sent by the
MT	Mobile Terminated	The module receives the
SCA Length		Length of SMS centre address
TON	Type of Number	Number Type: 000: Unknown 001: International 010: Domestic 111: Reserved for expansion
NPI	Numbering Plan Identifier	Number Identification: 0000: Unknown 0001: ISDN/telephone number 1111: Retained for expansion
SCA	Short Message Centre Address	SMS Centre Address
MTI	Message Type Identifier	Type of information: Bit Explanation 11 Reserved 10 SMS-STATUS REPORT (SC => MS) 01 SMS-SUBMIT (MS => SC) 00 SMS-DELIVER (SC => MS)
RD	Reject Duplicate	Reject Repeat Text Messages
VPF	Validity Period Format	Expiry date format

SRR	Status Report Request	Status report request, set in MO SMS
SRI	Status Report Indication	Status report indication, indicates in the MT SMS whether the MT SMS is a status report or not
UDHI	User Data Header Indicator	User data header indication
RP	Reply Path	Response path

7.2 Select SMS Service:AT+CSMS

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CSMS=<service>	+CSMS:<mt>,<mo>,<bm> OK
Enquiry command	AT+CSMS?	+CSMS:<service>,<mt>,<mo>,<bm> OK
test command	AT+CSMS=?	+CSMS:(list of values for <service>) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<service>	SMS Service Level	<u>0</u>	GSM03.40 and 03.41 (AT command syntax for SMS is compatible with version 4.7.0 in GSM07.05 Phase 2; Phase 2+ features that do not require a new command syntax are supported (e.g., message routing using the new encoding scheme of Phase 2+))
		<u>1</u>	GSM03.40 and 03.41 (AT command syntax for SMS is compatible with GSM07.05 Phase 2+ release)
		<u>128</u>	The pdu mode operation is forward compatible with versions that are inconsistent with phase2. At this point it will be assumed that the SMS pdu does not contain the SMS centre number (not supported at this time)
<mt>	SMS-MO (texting)	<u>0</u>	unsupported
		<u>1</u>	support sth.
<mo>	SMS-MT (receiving text messages)	<u>0</u>	unsupported
		<u>1</u>	support sth.
<bm>	Cell Broadcast Message	<u>0</u>	unsupported
		<u>1</u>	adjuvant

7.3 Short Message Priority Storage Area Selection: AT+CPMS

This command sets the memory for reading, storing and other operations, including <mem1>, <mem2> and <mem3>.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS:<used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK
Enquiry command	AT+CPMS?	+CPMS.<mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>,<total3> OK
test command	AT+CPMS=?	+CPMS:(<mem1>value list),(<mem2>value list),(<mem3>value list) OK

Parameter Definition:

!

parametric	define	retrieve a value	Explanation of values
<mem1>	The memory used for reading and deleting messages involves the following three AT instructions: AT+CMGL AT+CMGR AT+CMGD	"SM"	SM is SIM card
		"ME"	ME for Modules
<mem2>	The memory used for writing, storing and sending messages involves the following 2 AT instructions: AT+CMSS and AT+CMGW	"SM"	SM is SIM card
		"ME"	ME for Modules
<mem3>	If no route to the TE is established, the received message is stored in this memory	"SM"	SM is SIM card
		"ME"	ME for Modules
<used1><used2><used3>	The number of currently stored messages in <mem1, 2, 3	-	integer type (math.)
<total1><total2><total3>	The total number of messages that can be stored in <mem1, 2, 3	-	integer type (math.)

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CPMS=?	
←	+CPMS: ("SM", "ME"), ("SM", "ME"), ("SM", "ME") OK	
→	AT+CPMS?	Query the current preferred storage area type
←	+CPMS: "sm",8,50, "sm",8,50, "sm",8,50 OK	Note: Currently only the "SM" storage type is supported. Please use it: AT+CPMS="SM", "SM", "SM" Set the SMS storage type.

7.4 SMS Centre Address: AT+CSCA

This command is applicable to PDU format and TEXT format, using the setting command, the level SMSC (Short Message Service Centre) address can be updated. Through this address, you can send SMS of mobile terminal, under TEXT mode, send command and write command can use this setting; under PDU mode, send and set command can also use this setting, but the condition is that the length of SMSC address after PDU encoding is equal to 0. It must be stated here that although users can set the address of service centre of short message on their own, but they can't do what they want, or the short message won't be sent out, therefore, before sending short message, first of all, the address of Short Message Service Center (SMSC) can be updated. Therefore, before sending a short message, you must first find out the address of the short message service centre to which the SIM card belongs.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CSCA=<sca>[,<tosca>]	OK
Enquiry command	AT+CSCA?	+CSCA:<sca>,<tosca> OK
test command	AT+CSCA=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<sca>	Short Message Centre Address (SMSC)	-	Character type; BCD numbers (or GSM default alphabetic characters) need to be converted to

			characters; format specified by <tosca>
<tosca>	SMS centre address format (Type of sca)	-	8-bit integer (see <toda> for default value) 129 ISDN/Telephone numbering method design, national/international unknown. 145 ISDN/Telephone Numbering Method Design, International Numbers. 161 ISDN/Telephone Numbering Method Design, Country's Number. 128~255 For other values refer to GSM 04.08 Chapter 10.5.4.7

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CSCA="+8613010314500",145	Setting up an SMS centre number for a Unicom SIM card
←	OK	
→	AT+CSCA?	Enquire about the setting of the SMS centre number
←	+CSCA: "+8613010314500",145 OK	It's been set up successfully.

7.5 Short message format: AT+CMGF

The set command is used to specify the format of the input and output of the short message, i.e., it tells the TA whether the input and output message format is PDU format or TEXT format.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CMGF=[<mode>]	OK
Enquiry command	AT+CMGF?	+CMGF: <mode> OK
test command	AT+CMGF=?	+CMGF: (list of <mode> values) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Displays the format used for message sending, lists, read and	<u>0</u>	PDU mode, default
		1	TEXT mode

	write commands, and proactive reporting when a message is received		
--	--	--	--

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CMGF?	Query current mode
←	+CMGF: 0 OK	Current mode is PDU mode

7.6 Setting SMS TEXT mode parameters: AT+CSMP

In text mode (i.e. AT+CMGF=1), this setup command is used to select the values of the additional parameters required when **sending** a short message to the network side or **storing** a short message in memory. In addition to this, the set command can be used to set the validity period from the time the SMSC receives the message (<vp> in the range 0... 255) or to define the end of the validity period. 255) or to define the absolute time at which the validity period ends (when <vp> is a string).

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CSMP=[<fo>[,<vp>[,<pid>[,<dc>]]]]	OK
Enquiry command	AT+CSMP?	+CSMP:<fo>,<vp>,<pid>,<dc> OK
test command	AT+CSMP=?	+CSMP: (<fo>value list), (<vp>value list), (<pid>value list), (<dc>value list) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values																
<fo>	SMS First Octet	17, 21, 33, 37, 49, 53	<p>The specific description of the <fo> byte is as follows (using SMS-SUBMIT as an example):</p> <table border="1"> <thead> <tr> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>RP</td> <td>UDHI</td> <td>SRR</td> <td colspan="2">VPF</td> <td>RD</td> <td colspan="2">MTI</td> </tr> </tbody> </table> <p>MTI: Message Type b1=0&b0=0 indicates SMS-DELIVER b1=0&b0=1 indicates SMS-SUBMIT For other message types please refer to GSM 03.40</p>	b7	b6	b5	b4	b3	b2	b1	b0	RP	UDHI	SRR	VPF		RD	MTI	
b7	b6	b5	b4	b3	b2	b1	b0												
RP	UDHI	SRR	VPF		RD	MTI													

			<p>VPF: Define the format of the valid time of the SMS message b4=1&b3=0: Relative format, where <vp> is a 1-byte integer. b4=1&b3=1: Absolute format, when <vp> is a 7-byte integer type</p> <p>SRR: Status Report Request, set whether SMS status report is required or not</p> <p>UDHI: User Data Header Indicator, indicates whether the User Data unit has a header or not</p> <p>RP: Reply Path, reply path</p> <p>RD: Reject Duplicate, Reject Duplicate Text Messages</p>										
<vp>	SMS Valid Period (Valid Period)		<p>The value is determined by the VPF of the <fo> field: If VPF=10(Binary), then <vp> is a relative mode, which corresponds to the effective time of the SMS as follows:</p> <table border="1"> <thead> <tr> <th><vp>value</th> <th>active time</th> </tr> </thead> <tbody> <tr> <td>0-143 (00 to 8F)</td> <td>(vp + 1) x 5 minutes</td> </tr> <tr> <td>144-167 (90 to A7)</td> <td>12 hours + ((vp - 143) x 30</td> </tr> <tr> <td>168-196 (A8 to C4)</td> <td>(vp - 166) x 1 day</td> </tr> <tr> <td>197-255 (C5 to FF)</td> <td>(vp - 192) x 1 week</td> </tr> </tbody> </table> <p>If VPF=11(Binary), then <vp> is in absolute mode and is a 7-byte character type indicating the point in time when the SMS validity period expires.</p>	<vp>value	active time	0-143 (00 to 8F)	(vp + 1) x 5 minutes	144-167 (90 to A7)	12 hours + ((vp - 143) x 30	168-196 (A8 to C4)	(vp - 166) x 1 day	197-255 (C5 to FF)	(vp - 192) x 1 week
<vp>value	active time												
0-143 (00 to 8F)	(vp + 1) x 5 minutes												
144-167 (90 to A7)	12 hours + ((vp - 143) x 30												
168-196 (A8 to C4)	(vp - 166) x 1 day												
197-255 (C5 to FF)	(vp - 192) x 1 week												
<pid>	TP-Protocol-Identification	0	Integer type, see GSM 03.40 for details.										
<dc>	SMS Content Encoding Scheme		<p>Integer type. refer to GSM 03.38. in general:</p> <p>0- 7bit GSM Default</p> <p>4- 8bit Data</p> <p>8- UCS2</p>										

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	at+csmp=17,11,0,0	<p>Set each parameter of TEXT mode SMS sending: <fo>=17 (default) for MTI=01 (binary)=SMS-SUBMIT and VPF=10 (binary)= Relative format <vp>=11, which means the effective time is (11+1) x 5 minutes = 1 hour <dc>=0, indicating that the encoding format is 7bit GSM Default</p>
←	OK	

7.7 To control the SMS header message display in TEXT mode: AT+CSDH

The set command controls whether to display detailed header information in the result code in text mode.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CSDH=[<show>]	OK
Enquiry command	AT+CSDH?	+CSDH:<show> OK
test command	AT+CSDH=?	+CSDH:<show> OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<show>	Whether to display header information	0	For SMS-DELIVER and SMS-SUBMIT, the parameters set by the +CSCA and +CSMP instructions are not displayed in the +CMT, +CMGL, +CMGR result codes (<sca>, <tosca>, <fo>, <vp>, <pid>, <dcsc>), nor <length>, <toda>, or <tooa>; for SMS-COMMAND in the result code of the +CMGR instruction, <pid>, <mn>, <da>, <toda> & gt;, <length>, <cdata>, <toda
		1	Show these values in the result code

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CSDH?	Query whether to display header information
←	+CSDH: 0 OK	The query result is: No relevant header information is displayed
→	AT+CMGR=8	Text message with query position 8 reading "good!"
←	+CMGR: "REC READ", "+86131*****56",, "12/08/08,10:43:04+32" Good! OK	Query result does not show <tooa>,<fo>,<pid>,<dcsc>,<sca>,<tosca>,<length>.
→	AT+CNMI=2,2,0,0,0	Set the SMS auto content to be reported directly to the TE without caching (just set the second parameter <mt> of +CNMI to 2)
←	OK	
← (URC)	+CMT: "+86131*****56",, "12/08/08,11:09:23+32"	Sends an SMS to the module with the content Report, the reported content does not show <fo>, <vp>, <pid> and <dcsc>, <sca>, <tosca>.

	Report	
→	AT+CSDH=1	Set <show>=1, i.e., show header information
←	OK	
→	AT+CMGR=8	Still enquiring about location 8 SMS
←	+CMGR: "REC UNREAD" , "+86131*****56",, "12/08/08,10:43:04+32",145,17,0,0, "+8613800210500",145,5 Good! OK	The query results show <tooa>,<fo>,<pid>,<dcsc>,<sca>, <tosca>,<length>.
← (URC)	+CMT: "+86131*****56",, "12/08/08,11:05:45+32",145,17,0,0, "+8613800210500",145,7 weather	Sends a text message to the module with the contents of weather, and the reported contents are displayed as <fo>, <vp>, <pid> and <dcsc>, <sca>, <tosca>.

7.8 New message indication: AT+CNMI

This command is used in PDU format and TEXT format, when the TE is in active state (e.g. DTR signal is in "ON" state), use the set command to set how the new message will be sent to the TE from the network side, if the TE is in standby state (e.g. DTR signal is in "OFF" state), the message receiving process should be in accordance with the provisions of GSM 03.38.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]]	OK
Enquiry command	AT+CNMI?	+CNMI:<mode>,<mt>,<bm>,<ds>,<bfr> OK
test command	AT+CNMI=?	+CNMI: (<mode>value list), (<mt>value list), (<bm>value list), (<ds>value list), (<bfr>value list) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Mode of transmission of SMS from TA to TE	0	Buffer the unsolicited result codes in the TA; if the TA result code buffer is full, the result code indications may be buffered and stored in other storage or the oldest unsolicited result code indications may be discarded and replaced with newly received indications.
		1	When the link between TA-TE is occupied (e.g., in online data mode), the

			result code indication is discarded and the unsolicited result code of the newly received message is rejected. Otherwise, it is forwarded directly to the TE.																				
		2	When the link between TA-TE is occupied (e.g., in online data mode), buffer the unsolicited result codes in the TA; when the link is released, send all result codes to the TE. otherwise, forward them directly to the TE.																				
		3	With the TA in data mode, the result code and data are transmitted simultaneously to the TE using a specific TA-TE connection technique.																				
<mt>	New SMS reporting methods	0	No SMS-DELIVER instructions are sent to the TE																				
		1	If the SMS-DELIVER is stored in the ME/TA, the storage location relies on the unsolicited result code + CMTI: <mem>,<index> to prompt the TE.																				
		2	SMS-DELIVER messages (messages of category 2 and messages located in the Message Waiting Indication Group (stored messages)) are sent directly to the TE. Use the unsolicited result code for the following command: +CMT: [<alpha>],<length><CR><LF><pdu> (PDU mode enabled) or +CMT: <oa>,<alpha>,<scts> ,<tooa >[,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data> (Enable TEXT mode. Whether the italicised part is displayed or not is determined by the +CSDH setup command) Note: If the AT command interface is used as the only display device, the ME must support the storage of category 0 messages and messages located in the Message Waiting Indication Group (Discard Message).																				
		3	The SMS-DELIVER message of category 3 is sent directly to the TE by using the unsolicited result code defined by <mt>=2. The results of the message display under all other data encoding schemes follow the definition of <mt>=1.																				
		Summary of the relationship between SMS-DELIVER result codes (+CMT, +CMTI)																					
		<table border="1"> <thead> <tr> <th><mt></th> <th>no class or class 1</th> <th>class 0 or messagewaiting indication group (discard)</th> <th>class 2 or messagewaiting indication group (store)</th> <th>class 3</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+CMTI</td> <td>[+CMTI1]</td> <td>+CMTI</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> </tbody> </table>				<mt>	no class or class 1	class 0 or messagewaiting indication group (discard)	class 2 or messagewaiting indication group (store)	class 3	1	+CMTI	[+CMTI1]	+CMTI	+CMTI	2	+CMT & +CNMA3)	+CMT [& +CNMA2]	+CMTI	+CMT & +CNMA3)	3	+CMTI	[+CMTI1]
<mt>	no class or class 1	class 0 or messagewaiting indication group (discard)	class 2 or messagewaiting indication group (store)	class 3																			
1	+CMTI	[+CMTI1]	+CMTI	+CMTI																			
2	+CMT & +CNMA3)	+CMT [& +CNMA2]	+CMTI	+CMT & +CNMA3)																			
3	+CMTI	[+CMTI1]	+CMTI	+CMT& +CNMA3)																			
<p>1) This result code is displayed when there is no other means of display except the AT command;</p> <p>2) When +CSMS <service>=1 and the ME has only one means of displaying AT commands, +CNMA confirmation is required.</p> <p>3) +CNMA acknowledgement required when +CSMS <service>=1</p> <p>Note: If there is no +CNMA confirmation within a certain period of time, MT will no longer send SMS alerts to TEs</p> <p>and acknowledgement (+CNMA):</p>																							

<bm>	Reporting of Cell Broadcast Short Messages	0	No CBM indication sent to TE
		2	The received CBM is sent directly to the TE using the following format: +CBM: <length><CR><LF><pdu> (PDU mode enabled) or +CBM: <sn>,<mid>,<dcs>,<page>,<pages><CR><LF><data>(TEXT mode enabled)
<ds>	SMS status report reporting method	0	No SMS-STATUS-REPORTS sent to TE.
		1	The SMS-STATUS-REPORT message is sent directly to the TE using the following format: +CDS: <length><CR><LF><pdu> (PDU mode enabled) or +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>, <dt>,<st>(TEXT mode enabled) Note: <dt>,<st> please refer to +CMGR
<bfr>		0	When <mode> is 1 to 3, the result code in the TA cache defined by this instruction is sent to the TE (OK should be received before sending)
		1	When <mode> is 1 to 3, the TA buffering of unsolicited result codes defined in this instruction will be cleared

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CNMI=?	Query parameter range
←	+CNMI: (0-3), (0-3), (0-3), (0-1), (0-1) OK	Module Search Results
→	AT+CNMI=2,1	Setting CNMI parameters
←	OK	

← (URC)	+CMTI: "SM",1	At this point an SMS is received, cached in <mem1>, and only the new SMS location index is reported using +CMTI
→	AT+CNMI=1,2	Set <mt>=2, i.e. new SMS is not cached and reported directly
←	OK	
→	AT+CSMS=1	The first parameter of +CSMS must be set to 1 to support the +CNMA command
←	OK	
→	AT+CMGF?	Query current SMS mode
←	+CMGF: 0 OK	It's PDU mode.
← (URC)	+CMT: ,24 0891683108200105f0040d91683129 634152f600002180804184422304f73 49b0d	At this point a PDU SMS is received, which is analysed as follows: +CMT: ,24 24-PUD length, SMS centre number does not count in PDUs 08- Length of SCA, SMS centre address length (in bytes, including 91) 91- TON/NPI of SMS centre address 683108200105F0- SMS centre address, need to be two by two reversed, reversed is 8613800210500. 04- First Octet, first byte of the PDU 0D-Source address length (number length) 91683129634152F6- Source Address. Needs to be reversed two by two, after reversing it is 8613923614256 00- PID (Protocol Identifier) 00- DCS (Data Coding Scheme), 0 means 7BIT GSM DEFAULT 21808041844223- SCTS (SM Center Time Stamp), the time stamp of the SMS centre, indicates that the SC received the SMS at 14:48:24,+8GMT on 8 August 12 04- Length of user data F7349B0D- 7BIT GSM DEFAULT coded wills
→	AT+CNMA	Immediately after receiving the SMS message, send the AT+CNMA command
←	OK	
→	AT+CMGF=1	Set to TEXT mode
←	OK	
	AT+CNMI=1,2	
← (URC)	+CMT: "+86131*****56",, "12/08/08,11:05:45+32",145,17,0,0, "+8613800210500",145,7 Will-go	Received a new text message in TEXT mode
→	AT+CNMA	Immediately after receiving the SMS message, send the AT+CNMA command
←	OK	

7.9 New short message confirmation: AT+CNMA

Use the execute command to verify that a new message (SMS-DELIVER or SMS-STATUS-REPORT) is correctly received, which is sent directly from the MT to the TE without caching.

SMS confirmation needs to be given via AT+CNMA in case 2 conditions are fulfilled at the same time:

- Set <service> to 1 by AT+CSMS=1;
- Set <mt> to 2 or <ds> to 1 by AT+CNMI command;

After the above 2 conditions are met, if the TE does not give an acknowledgement to the MT via AT+CNMA after receiving the SMS, the parameters <mt> and <ds> of the CNMI will be reset to 0 and the MT will no longer send an SMS to the TE.

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a 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 Note: <Ctrl+Z> means 1A in hexadecimal, <ESC> means 1B in hexadecimal.
test command	AT+CNMA=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Confirmation of SMS in PDU mode	0	This instruction performs similarly to the instruction defined in the text mode
		1	Send RP-ACK (or correctly received buffered result code)
		2	Send RP-ERROR (if the PDU is not given, the ME/TA sends an SMS-DELIVER-REPORT message with the GSM 03.40 TP-FCS value set to "FF" (non-requested error cause)).

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
		Refer to the +CNMI entry for specific examples

7.10 Send SMS: AT+CMGS

SMS (SMS-SUBMIT) can be sent from the TE to the network side using the set command. After successful sending, the message reference <mr> is returned to the TE.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	Text mode (AT+CMGF=1) case: AT+CMGS=<da>[,<toda>]<CR> >text to send<CTRL-Z/ESC>	Returns if sent successfully: +CMGS:<mr>
		OK Note: <CTRL-Z> i.e. 0x1A is sending, <ESC> i.e. 0x1B is terminating sending.
	PDU mode (AT+CMGF=0) case: AT+CMGS=<length><CR> >PDU to send <CTRL-Z/ESC>.	Returns if sending fails: +CMS ERROR:<err>
		Sent successfully, return: +CMGS:<mr>
test command	AT+CMGS=?	OK
		Note: <Ctrl+Z> is 1A in hex, <ESC> is 1B in hex. Returns if sending fails: +CMS ERROR: <err>

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<da>	Destination Address	-	GSM 03.40 TP-Destination-Address "Address-Value" field, character type; converts BCD values (or characters in default GSM alphabet format) to characters in the currently selected TE character set (see +CSCS command in TS 07.07); address type defined by <toda >address type defined by <toda
<toda>	Type of destination address (Type of <da>)	-	8-bit "type-address" field in GSM 04.11 TP-Destination-Address of integer type (default value is 145 when the first character of <da> is + (IRA 43); otherwise default value is 129)
<length>	TPDU SMS length	-	Integer type. This length does not take into account the length of the SMS centre number
<mr>	MessageReference	0~255	Integer GSM 03.40 TP-Message-Reference

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
Send TEXT mode English SMS:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	

→	AT+CSMP?	Query the current TEXT mode SMS parameters
←	+csmp: 17,11,0,0 OK	Current <dc> = 0 (GSM)
	AT+CSCS?	
	+CSCS: "IRA" OK	
→	AT+CMGS="139****6785 "	Send an English text message to the test mobile phone. Note: 139****6785 is the send destination number, please fill in according to the actual, do not copy!
←	>	This returns >
→	hello,world!	After returning to >, enter the content of the SMS, e.g. hello,world! Then enter <Ctrl+Z> i.e. 0x1A to send it out!
←	+CMGS: 108 OK	Sent successfully, <mr>=108
Send TEXT mode Chinese SMS:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CSMP?	
←	+csmp: 17,167,0,0 OK	
→	at+csmp=17,167,0,8	Modify the last parameter <dc>=8
←	OK	
→	AT+CMGS="139****6785"	Note: 139****6785 is the send destination number, please fill in according to the actual, do not copy!
←	>	This returns >
→	611F8C22<Ctrl+Z>	After return>, enter the SMS content 611F8C22, which is in hexadecimal format. That is: 0x610x1F0x8C0x22, <Ctrl+Z> to send, <Ctrl+Z> that is hexadecimal 1A
←	+CMGS: 73 OK	Sent successfully
Send Chinese SMS in PDU format:		
→	AT+CMGF=0	Set to PDU mode
←	OK	

→	AT+CMGS=19 >0011100D91683161450179F9000 80004611F8C22 [Ctrl+Z]	19 - is the length of the PDU string (SMS centre units should not be included) 00- Indicates that the length of the SMS centre is 0. In this case the SCA is taken directly from the SIM card when sending the SMS. the 00 is the SMS centre unit and is not counted as part of the PDU length 11- PDU SMS first byte <table border="1" style="margin: 10px 0;"> <tr> <th>b7</th><th>b6</th><th>b5</th><th>b4</th><th>b3</th><th>b2</th><th>b1</th><th>b0</th></tr> <tr> <td>RP</td><td>UDHI</td><td>SRR</td><td>VPF</td><td>RD</td><td>MTI</td><td></td><td></td></tr> <tr> <td>0</td><td>0</td><td>0</td><td>1 0</td><td>0</td><td>0 1</td><td></td><td></td></tr> </table> 10- TP-MR, Benchmark 0D- Destination Address (DA) Length 91683161450179F9- Destination address (recipient number) 00- Protocol Identifier (PID) 08- Data coding scheme (DCS), 8 for UCS2 00- Valid Period (VP) 04- Length of User Data 611F8C22- User Data, content of sent SMS (in this case "Thank you" in Chinese)	b7	b6	b5	b4	b3	b2	b1	b0	RP	UDHI	SRR	VPF	RD	MTI			0	0	0	1 0	0	0 1		
b7	b6	b5	b4	b3	b2	b1	b0																			
RP	UDHI	SRR	VPF	RD	MTI																					
0	0	0	1 0	0	0 1																					
←	+CMGS: 110 OK	Sent successfully																								

7.11 Write message to memory: AT+CMGW

Using the set command, an SMS (SMS-DELIVER or SMS-SUBMIT) can be sent from the TE to memory <mem2> and the storage location <index> parameter of the stored message is returned. Unless <stat> specifies another parameter, the status of the message will be set to "Stored Undelivered".

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	TEXT mode (AT+CMGF=1): AT+CMGW[=<oa/da>[,<tooa/toda>[,<stat>]]]<CR>text is entered<ctrl-Z/ESC>	Success, return: +CMGW: <index> OK Note: <Ctrl+Z> is 1A in hex, <ESC> is 1B in hex.
	PDU mode (AT+CMGF=0): AT+CMGW=<length>[,<stat>]<CR> > PDU is given<ctrl-Z/ESC>	Failure returns: +CMS ERROR: <err>
		Success, return: +CMGW: <index> OK Note: <Ctrl+Z> is 1A in hex, <ESC> is 1B in hex.
		Failure returns: +CMS ERROR: <err>

test command	AT+CMGW=?	Return: OK
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Parameter Definition:

parameters	define	retrieve value	Explanation of values
<da>	Destination Address	-	GSM 03.40 TP-Destination-Address "Address-Value" field, character type; converts BCD values (or characters in default GSM alphabet format) to characters in the currently selected TE character set (see +CSCS command in TS 07.07); address type defined by <toda >address type defined by <toda
<toda>	Type of destination address (Type of <da>)	-	8-bit "type-address" field in GSM 04.11 TP-Destination-Address of integer type (default value is 145 when the first character of <da> is + (IRA 43); otherwise default value is 129)
<oa>	Source Address (OriginatingAddresses)	-	GSM 03.40 TP-Originating-Address "Address-Value" field, character type; converts BCD values (or characters in default GSM alphabet format) to characters in the currently selected TE character set (see +CSCS command in TS 07.07); address type defined by <tooa >address type defined by <tooa
<tooa>	Type of source address (Type of <oa>)	-	8-bit "type-address" field in GSM 04.11 TP-Originating-Address of integer type (default value is 145 when the first character of <oa> is + (IRA 43); otherwise default value is 129)
<length>	PDU SMS length	-	Integer type. This length does not take into account the length of the SMS centre number
<stat>	SMS status	REC UNREAD	Received unread messages (in TEXT mode, i.e. +CMGF=1)
		REC READ	Received read messages (in TEXT mode, i.e. +CMGF=1)
		STO UNSENT	Store unsent messages (in TEXT mode, i.e. +CMGF=1)
		STO SENT	Stores sent messages (in TEXT mode, i.e. +CMGF=1)
		0	Received unread messages (in PDU mode, i.e. +CMGF=0)
		1	Received read messages (in PDU mode, i.e. +CMGF=0)
		2	Store unsent messages (in PDU mode, i.e. +CMGF=0)
		3	Store sent messages (in PDU mode, i.e. +CMGF=0)

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
Store a TEXT message (in English):		
→	AT+CMGF=1	Set to TEXT mode

←	OK	
→	AT+CSCS="GSM"	or AT+CSCS="IRA"
←	OK	
→	at+csmc=17,167,0,0	
←	OK	
→	AT+CMGW="139****6785"	Send SMS to destination number
←	>	This returns >
→	HI! <Ctrl+Z>	After returning >, enter the content of the SMS, then enter <Ctrl+Z> i.e. 0x1A to save the SMS
←	+CMGW: 6 OK	The returned index=6 means that the SMS is at the 6th position in the storage area
Store a TEXT message (Chinese):		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CSCS="GSM"	Setting the encoding format of characters in AT commands to UCS2
←	OK	
→	at+csmc=17,167,0,8	Dcs=8, indicating that the format of the SMS storage is UCS2 encoding
←	OK	
→	AT+CMGW="10086"	Destination address is 10086 (UCS2 encoding format) "Thank you" (UCS2 encoded format)
←	>	This returns >
→	611F8C22<Ctrl+Z>	After return>, input SMS content 611F8C22 (hex format), then input <Ctrl+Z> i.e. 0x1A to save the SMS
←	+CMGW: 7 OK	This SMS exists at index=7
Store a PDU SMS:		
→	AT+CMGF=0	Set to PDU format
←	OK	
→	AT+CMGW=19	
←	>	This returns >
→	0011100d91683161450179f900080004611f8c22 <Ctrl+Z>	PDU format SMS content is "Thank you". Then type <Ctrl+Z> i.e. 0x1A to save the SMS.
←	+CMGW: 8 OK	This SMS exists at index=8

7.12 Send SMS from memory: AT+CMSS

Using the set command, a message with a location value parameter <index> in the message memory <mem2> can be sent to the network side (SMS-SUBMIT or SMS-COMMAND). If the parameter <da> is given for the new reception address of the SMS-SUBMIT message, this parameter shall be used instead of the parameter of the stored message. The reference value <mr> shall be returned to the TE after successful transmission.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Command	AT+CMSS=<index>[,<da>[,<toda>]]	+CMSS:<mr> OK
test command	AT+CMSS=?	OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<index>	Address of the SMS to be sent in the memory	-	Integer; a value in the range of address numbers supported by the associated memory
<da>	Destination Address	-	GSM 03.40 TP-Destination-Address "Address-Value" field, character type; converts BCD values (or characters in default GSM alphabet format) to characters in the currently selected TE character set (see +CSCS command in TS 07.07); address type defined by <toda >address type defined by <toda
<toda>	Type of destination address (Type of <da>)	-	8-bit "type-address" field in GSM 04.11 TP-Destination-Address of integer type (default value is 145 when the first character of <da> is + (IRA 43); otherwise default value is 129)
<mr>	MessageReference	0~255	Integer GSM 03.40 TP-Message-Reference

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CSCS="GSM"	or AT+CSCS="IRA"
←	OK	
→	AT+CMSS=6	Send the SMS numbered 6 stored by the +CMGW in the +CMGW instance, the receiver's number

		remains the number stored by the +CMGW
←	+CMSS: 11 OK	Sent successfully, <mr>=11
→	AT+CMSS=7, "13192310560"	Send the Chinese SMS numbered 7 stored by the +CMGW in the +CMGW instance and change the receiver number to 13192310560
←	+CMSS: 12 OK	Sent successfully

7.13 SMS link control commands: AT+CMMS

The SET command controls the continuity of the link at the SMS Relay Protocol (RP) layer. When this feature is enabled and supported by the network, the link at the RP layer will always be present when sending multiple consecutive SMS messages without the need to go through the process of tearing down and building up the link again between each two SMS messages, and thus the sending speed will be much faster.

The READ command returns the current parameter values.

The TEST command returns the values of the parameters supported by the command.

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CMMS= [<n>]	OK
Enquiry command	AT+CMMS?	+CMMS: <n> OK
test command	AT+CMMS=?	+CMMS: (list of <n> values) OK

Parameter Definition.

parameter s	define	retriev e a value	Explanation of values
<n>	state of affairs	0	inhibit the use of energy
		1	Enable once. The interval between the return of the current sent SMS and the next sent SMS is less than 1-5 seconds (the exact value depends on the MS implementation), the RP link stays on. When more than 1-5 seconds have elapsed, the RP link is broken and the <n> value will be automatically set back to 0, i.e. it will not continue to be enabled.
		2	Always enabled. The interval between the return of the current

			sent SMS and the next sent SMS is less than 1-5 seconds (the exact value depends on the MS implementation), the RP link stays constantly enabled. When it exceeds 1-5 seconds, the RP link is broken and the <n> value remains at 2, i.e., it continues to be enabled
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7.14 Read SMS: AT+CMGR

With the set instruction, the message with index <index> in the message memory <mem1> is returned to the TE, and if the message is in the "received unread" state, its state is changed to "received read".

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CMGR=<index>	<p>PDU mode (AT+CMGF=0), return: +CMGR: <stat>,[<alpha>],<length><CR><LF><pdu></p> <p>OK</p> <p>If it is TEXT mode (AT+CMGF=1): For SMS-DELIVER: +CMGR: <stat>,<oa>,[<alpha>],<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data></p> <p>OK</p> <p>For SMS-SUBMIT: +CMGR: <stat>,<da>,[<alpha>][,<toda>,<fo>,<pid>,<dcs>,<vp>],<sca>,<tosca>,<length>]<CR><LF><data></p> <p>OK</p> <p>For SMS-STATUS-REPORT: +CMGR: <stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st></p> <p>OK</p> <p>For SMS-COMMAND: +CMGR: <stat>,<fo>,<ct>[,<pid>,[<mn>],[<da>],[<toda>],<length>]<CR><LF><data></p> <p>OK</p> <p>Note: Whether the above italicised characters are displayed or not is determined by the setting of +CSDH.</p>

test command	AT+CMGR=?	OK
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Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<da>, <oa>			Please refer to the AT+CMGW entry
<tda>, <tooa>			
<length>			
<stat>			
<alpha>	MT Phonebook record corresponding to <da> or <oa> display		character type
<pid>	Protocol Identification		Please refer to the AT+CSMP entries
<fo>	PDU SMS first byte		
<vp>	Valid Period		
<dc>	Data Coding System		
<scts>	Short Message Centre Time Stamp (SMSCTS)		Time-String GSM 03.40 TP-Service-Centre-Time-Stamp
<dt>	Discharge time		Time-String GSM 03.40 TP-Discharge-Time, appears in pairs with <st>.
<st>	Status		Integer GSM 03.40 TP-Status Describes the status of the last MO SMS that has been sent
<ct>	Command Type		Integer GSM 03.40 TP-Command-Type, default 0
<ra>	receiving address		String-type GSM 03.40 TP-Recipient-Address address-value field
<cdata>	Return of SMS-COMMAND in TEXT mode		TP-Command-Data (GSM 03.40)
<mr>	MessageReference		TP-Message-Reference (GSM 03.40), integer type
<mn>	Message number		TP-Message-Number(GSM 03.40), integer type

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
Read the SMS in TEXT mode:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CSCS="GSM"	The +CSCS command determines the encoding of the read SMS content
←	OK	
→	AT+CMGR=6	Read English SMS with index=6

←	+CMGR: "REC READ", "+86139*****9", "12/03/30,20:40:31+32" HI! OK	The English text message reads "HI."
→	AT+CMGR=1	Air720S series module reads a text message with Chinese content
←	+CMGR: "REC READ", "002B00380036003100330031003600320 03300310030003200360033",, "13/01/06,10:11:47+32" 611F8C2200310032 OK	Notes: TEXT mode Air720S series module receives a text message with Chinese characters, the display is the visible character form of UCS2 code of the text message content For example, this is the visible character form of the UCS2 code for "Thank you 12". TEXT mode if the Air720S series module receives a text message without Chinese, it will display the content directly
→	AT+CMGR=2	Air720U series module reads a text message with Chinese content
←	+CMGR: "REC READ", "002B00380036003100330031003600320 03300310030003200360033",, "13/01/06,10:11:47+32" Thanks to 34 OK	Notes: Air720U series module a content has Chinese text message, is used GB2312 encoding
Read an SMS in PDU mode:		
→	AT+CMGF=0	Set to PDU mode
←	OK	
→	AT+CMGR=9	Read SMS with index=9
←	+CMGR: 0,,24 0891683108200105f0240d916831614501 79f900082180904121102304611f8c22 OK	

7.15 List of short messages: AT+CMGL

With the set command, the message with the status value <stat> in the query preferred message memory <mem1> is displayed in the TE. If the message is in the "received unread" state, change its status to "received read".

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CMGL=<stat>	If it is PDU mode (AT+CMGF=0), <stat> takes the following values: 0 Unread messages received 1 Received read messages 2 Stored unsent SMS 3 Stored Sent SMS 4 All text messages and returns the following:

		<p>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu><CR><LF>+CMGL:<index>&gt;,<stat>,[<alpha>],<length><CR><LF><pdu>[...]]</p> <p>OK</p> <p>In case of TEXT mode (AT+CMGF=1), <stat> takes the following values: "REC UNREAD" Received Unread Message "REC READ" Received Read Message "STO UNSENT" Stored Unsent Messages "STO SENT" Stored Sent Text Messages "ALL" All text messages</p> <p>Note: For the above values, all letters should be capitalised. Double quotes may or may not be added.</p> <p>For SMS-DELIVER or SMS-SUBMIT, it returns (note: whether or not italics are displayed is determined by the +CSDH setting): +CMGL:<index>,<stat>,<oa/da>,[<alpha>],[<scts>][,<tooa/toda>,<length>]<CR><LF>&gt;,<data>[<CR><LF>+CMGL:<index>,<stat>,<da/oa>,[<alpha>],[<scts>][,<tooa/toda>&gt;,<length>]<CR><LF><data>[...]]</p> <p>OK</p> <p>For SMS-STATUS-REPORT, it is returned: +CMGL:<index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[<CR>&lt;LF>+CMGL:<index>,<stat>,<fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st>[...]]</p> <p>OK</p> <p>For SMS-COMMAND, it is returned: +CMGL:<index>,<stat>,<fo>,<ct>[<CR><LF>+CMGL:<index>,<stat>,<fo>,<ct>[...]]</p> <p>OK</p>
test command	AT+CMGL=?	<p>+CMGL: (list of <stat> values)</p> <p>OK</p>

Parameter Definition:

parameters	define	retrieval	Explanation of values
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		value	
			All the parameters of this entry are described in detail in previous commands and will not be repeated here.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
Enumerate text messages in TEXT mode:		
→	AT+CMGF=1	Set to TEXT mode
←	OK	
→	AT+CMGL=?	Query the list of <stat> values
←	+CMGL: "rec unread", "rec read", "sto unsent", "sto sent", "all" OK	
→	AT+CMGL="ALL"	Query all SMS messages (note: ALL must be uppercase)
	+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" a ☺ OK	All SMS Index=1~7 was just deleted.
Enumerate the SMS in PDU mode:		
→	AT+CMGF=0	Set to PDU mode
←	OK	
→	AT+CMGL=?	
←	+CMGL: (0-4) OK	
→	AT+CMGL=4	Check all SMS
←	+CMGL: 8,1,,24 0891683108200105f0240d91683161320162f30 0002180800134402304d7a2930a +CMGL: 9,1,,24 0891683108200105f0240d91683161320162f30 0082180904121102304611f8c22 OK	Show enquiry results

7.16 Delete SMS: AT+CMGD

Using the set instruction, a message in the preferred message memory <mem1> with a location number parameter of <index> can be deleted.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CMGD=<index>	Return: OK Description: This setup command deletes the text message with index index in <mem>1.
	AT+CMGD=<index>,<delflag>	Return: OK Description: This setup command deletes all SMS messages with status <delflag>. When <delflag> is not equal to 0, the <index> parameter is ignored.
test command	AT+CMGD=?	+CMGD: (<index> list of values), (<delflag> list of values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<index>	SMS Location Index	-	Integer; a value in the range of address numbers supported by the associated memory
<delflag>	Deletion type, integer. The <index> parameter is ignored when <delflag> = 1, 2, 3, 4	0	Delete the SMS with <index> in the specified location.
		1	Deletes all read messages from the preferred memory, retaining unread messages and stored MO messages (whether sent or not). MO: Mobile Originated
		2	Deleting all read messages and sent MO short messages in the preferred memory, retaining unread as well as unsent stored MO short messages
		3	Delete all read short messages, sent and unsent stored MO short messages in the preferred memory, retain unread short messages
		4	Delete all short messages in the preferred memory including unread ones

Examples:

Command	an actual example	Explanations and clarifications
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(→)/Return (←)		
→	AT+CPMS="SM"	Setting the storage area to SIM
←	OK	
→	AT+CMGD=1	Delete the SMS with index=1
←	OK	
→	AT+CMGD=1,4	All text messages are deleted.
←	OK	

7.17 SMS Service Failure Result Code: **CMS ERROR: <err>**

The Short Message Service Failure Result Code describes a mobile device or network error. Its role is similar to that of an error result code. This code is often present when a command fails. The result code returned is: +CMS ERROR: <err>

Numeric <err> values	Redundant way of taking <err> values	account for
1	Unassigned (unallocated) number	
3	No route to destination	
6	Channel unacceptable	
8	Operator determined barring	
10	Call barred	
11	Reserved	
16	Normal call clearing	
17	User busy	
18	No user reponding	
19	User alerting,no answer	
21	Short message transfer rejected	
22	Number changed	
25	Pre-emption	
26	Non-selected user clearing	
27	Destination out of service	
28	Invalid number format (incomplete number)	
29	Facility rejected	
30	Response to STATUS ENQUIRY	
32	Normal,unspecified	
34	No circuit/channel available	
38	Network out of order	
41	Temporary failure	
42	Switching equipment Congestion	
43	Access information discarded	
44	Requested circuit/channel not available	
47	Resources unavailable, unspecified	

49	Quality of service unavailable	
50	Requested facility not subscribed	
55	Requested facility not subscribed	
57	Bearer capability not authorized	
58	Bearer capability not presently available	
63	Service or option not available, unspecified	
65	Bearer service not implemented	
68	ACM equal or greater than ACM maximum	
69	Requested facility not implemented	
70	Only restricted digital information bearer capability is available	
79	Service or option not implemented, unspecified	
81	Invalid transaction identifier value	
87	User not member of CUG	
88	Incompatible destination	
91	Invalid transit network selection	
95	Semantically mandatory information	
96	Invalid mandatory information	
97	Message type non-existent or not implemented	
98	Message type not compatible with protocol state	
99	Information element non-existent or not implemented	
100	Conditional information element error	
101	Message not compatible with protocol	
102	Recovery on timer expiry	
111	Protocol error, unspecified	
127	Interworking, unspecified	
128	Telematic interworking not supported	
129	Short message Type 0 not supported	
130	Cannot replace short message	
143	Unspecified TP-PID error	
144	Data coding scheme (alphabet) not supported	
145	Message class not supported	
159	Unspecified TP-DCS error	
160	Command cannot be acted	
161	Command unsupported	
175	Unspecified TP-Command error	
176	TPDU not supported	
192	SC busy	
193	No SC subscription	
194	SC system failure	
195	Invalid SME address	
196	Destination SME barred	
197	SM Rejected-Duplicate SM	
198	TP-VPF not supported	

199	TP-VP not supported	
208	SIM SMS storage full	
209	No SMS storage capability in SIM	
210	Error in MS	
211	Memory Capacity Exceeded	
212	SIM Application Toolkit Busy	
213	SIM data download error	
224	CP retry exceed	
225	RP trim timeout	
226	SMS connection broken	
255	Unspecified error cause	
300	ME failure	ME Error
301	SMS service of ME reserved	Reserve SMS service for ME
302	operation not allowed	operationally impermissible
303	operation not supported	Operation is not supported
304	invalid PDU mode parameter	Parameters not valid in PDU mode
305	invalid text mode parameter	Parameters not valid in TEXT mode
310	(U) SIM not inserted	SIM card not inserted
311	(U) SIM PIN required	Requires SIM card PIN
312	PH-(U)SIM PIN required	Requires PH-SIM card PIN
313	(U) SIM failure	SIM card failure
314	(U) SIM busy	SIM card busy
315	(U) SIM wrong	SIM error
316	(U) SIM PUK required	PUK requiring a SIM card
317	(U) SIM PIN2 required	Requires SIM card PIN2
318	(U) SIM PUK2 required	PUK2 with SIM card
320	memory failure	storage error
321	invalid memory index	Invalid storage index
322	memory full	Storage full
330	SMSC address unknown	SMS centre number unknown
331	no network service	no internet service
332	network timeout	network timeout
340	no +CNMA acknowledgement expected	Unanticipated +CNMA Confirmation
500	unknown error	unknown error
512	USER ABORT	(for cat1 modules)
513	UNABLE TO STORE	(for cat1 modules)
514	INVALID STATUS	(for cat1 modules)
515	INVALID ADDR CHAR	(for cat1 modules)
516	INVALID LEN	(for cat1 modules)
517	INVALID PDU CHAR	(for cat1 modules)
518	INVALID PARA	(for cat1 modules)
519	INVALID LEN OR CHAR	(for cat1 modules)
520	INVALID TXT CHAR	(for cat1 modules)
521	TIMER EXPIRED	(for cat1 modules)

528		Invalid (non-hexadecimal) characters in PDUs
529		Incorrect PDU length
530	SMS SEND FAIL	(for cat1 modules)
531		Varies according to manufacturer
532		Invalid (non-hexadecimal) character in address
533		invalid address
534		Incorrect PDU length (UDL)
536		SCA length incorrect
537		Invalid first 8-bit byte (should be 2 or 34)
538		Invalid command types
539		SRR bit not set
540		SRR Settings
604	unspecified parsing error	Unspecified parsing error

8 Grouping Domain Related Commands

8.1 GPRS network registration status: AT+CGREG

The Set command controls the display of the unsolicited result code about the GPRS registration status.

A URC of +CGREG:<stat> is reported when <n>=1 and the GPRS registration status of the MT changes.

When <n>=2 and or the GPRS registration status is changed or the registered cell is changed, there will be: +CGREG:<stat>[,<lac>,<ci>,<act>,<rac>] URC reported.

When <n>=3 and or the GPRS registration status is changed or the registered cell is changed, there will be:+CGREG:<stat>[,<lac>,<ci>,<act>,<rac>[,<cause_type>,& It;reject_cause>]] of the URC is reported.

The query command returns a display of the result code in the form <n> and a parameter <stat> that can indicate the status of the MT's network registration. The location information elements <lac> and <ci> are returned only if <n>=2 and the MT is registered in the network.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Command	AT+CGREG=[<n>]	OK
Enquiry command	AT+CGREG?	+CGREG:<n>,<stat>[,<lac>,<ci>] OK
test command	AT+CGREG=?	+CGREG:(list of <n> values) OK
URC reporting	+CGREG: <stat>	If <n>=1 is set, when the network registration status changes, there is a URC (unsolicited result code) like this
	+CGREG: <stat>[,<lac>,<ci>,<act>,<rac>]	If <n>=2 is set, when the network registration status or registered cell (ci) is changed, a URC is reported as follows
	+CGREG: <stat>[,<lac>,<ci>,<act>,<rac>[,<cause_type>,<reject_cause>]]	If <n>=3 is set, when the network registration status or registered cell (ci) is changed, a URC is reported as follows
	+CEREG: <stat>[,<tac>],<ci>[,<AcT>][, [,<Active Time>], [<Periodic-TAU>]]]	If <n>=4 is set, when the network registration status or registered cell (ci) is changed, a URC is reported as follows
	+CEREG:<stat>[,<tac>],<ci>[,<AcT>][, [,<cause_type>], [<reject_cause>][, [,<Active-Time>], [<Active-Time>], [<Periodic-TAU> [<Periodic-TAU>]]]	If <n>=5 is set, when the network registration status or registered cell (ci) is changed, a URC is reported as follows

Parameter Definition:

parameters	define	retrieval value	Explanation of values
<n>	Reporting status	0	Disable network registration of unsolicited result codes + CGREG.
		1	Enable network registration of unsolicited result codes + CGREG: <stat>
		2	Enable web registration and location information unsolicited result codes +CGREG: <stat>[,<lac>,<ci>,<act>,<rac>]
		3	Enable web registration and location information unsolicited result codes +CGREG: <stat>[,<lac>,<ci>,<act>,<rac>[,<cause_type>,<reject_cause>]]
		4	Enable web registration and location information unsolicited result codes +CEREG: <stat>[,<tac>],[<ci>],[<Act>][, [, [<Active Time>], [<Periodic-TAU>]]]
		5	Enable web registration and location information unsolicited result codes +CEREG:<stat>[,<tac>],[<ci>],[<Act>][, [<cause_type>],[<reject_cause>][, [<Active-Time>], [<Active-Time>], [<Periodic-TAU>][<Periodic-TAU>]]]
<stat>	Current Network Registration Status	0	Unregistered; ME No current search for new operators with registered operations
		1	Registered, local network
		2	Not registered but ME is searching for a new operator to register the service but there is currently no available Public Land Mobile Network (PLMN), once the PLMN is valid the UE will start GPRS attachment.
		3	Registration is denied. GPRS service is disabled and the UE is not allowed to attach to the GPRS network even if the user requests it.
		4	uncharted
		5	Registered, roaming
		6	Registering for "SMS only" services at the place of attribution
		7	Registering for "SMS only" service in roaming destinations
		8	Attachment of emergency bearer services only (See NOTE 2)
		9	Registration of "CSFB not preferred" business in the place of attribution
		10	Register for "CSFB not preferred" service in roaming locations

		11	Available for emergency operations only
<lac>	Location Area Code	-	Character type; 2-byte hexadecimal location area code (e.g., 00C3 is equivalent to 195 in decimal)
<ci>	Cell Id	-	Character type; 2-byte hexadecimal plot number
<rac>	Routing area code		
<cause_type>	Definition same as +CEREG		
<reject_cause>	Definition same as +CEREG		

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CGREG?	Query current GPRS registration status
←	+CGREG: 0,1 OK	<n>=0,<stat>=1
→	AT+CGREG=1	Set <n>=1 to have a URC reported when the module registration status changes +CGREG: <stat>
← (URC)	+CGREG: 1	When the module registration status changes
→	AT+CGREG=2	Set <n>=2 to have a URC reported when the module registration status changes +CGREG: <stat>[,<lac>,<ci>,<act>]
← (URC)	+cgreg: 5, "18be", "9363",7	A URC is reported when the module registration status changes, or when the module is moved so that the cell number where the module is located changes
→	AT+CGREG?	Check Registration Status
←	+cgreg: 2,1, "1863", "00a2c315",7 OK	

8.2 GPRS attachment separation: AT+CGATT

The set command is used to attach the MT to a GPRS service or to separate the MT from a GPRS service.

The query returns the current GPRS attachment status.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CGATT=<state>	OK
Enquiry command	AT+CGATT?	+CGATT: <state> OK

test command	AT+CGATT=?	+CGATT: (list of <state> values) OK
--------------	------------	--

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	GPRS Attachment	0	secession
	Status	1	adhere

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CGATT?	View current GPRS attachment status
←	+CGATT: 1 OK	<state>=1, indicating that GPRS is currently attached
→	AT+CGATT=?	See the range of values for <state>
←	+CGATT: (0-1) OK	Enquiry results

8.3 PDP context definition: AT+CGDCONT

The set command sets the PDP context parameter marked by cid.

The query command queries all PDP context definitions.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]	OK
Enquiry command	AT+CGDCONT?	[+CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<pd1>[,...[,pdN]]][<CR><LF>+CGDCONT:<cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp>[,<pd1 & gt;[,...[,pdN]]]] [...]] OK
test command	AT+CGDCONT=?	+CGDCONT. (<cid> list of values), <PDP_type>,,, (<d_comp> list of values), (<h_comp> list of values)

		OK
--	--	----

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<cid>	PDP context identifier to identify a PDP context definition	1~15		Integer type. This parameter is local to the TE-MT interface and can be used for other PDP context related commands
<PDP_type>	Packet Data Protocol Type; Character	"IP"		Support for "IP" Internet Protocol (IETF STD5), default value
		"IPV6"		Internet Protocol, version 6 (IETF RFC 2460)
		"PPP"		Point to Point Protocol (IETF STD 51)
<APN>	Access Point Name (APN)			String type to select the logical name of the GGSN or external packet data network. If the value of this parameter is null or omitted, a request for a contracted value is required.
<PDP_address>	packet data protocol address			Character type, this is the IP protocol address in the format: "<n>. <n>. <n>. <n>" where <n> = 0 to 255; used to identify the address space allocated by the MT for a particular PDP context. If this parameter is empty or equal to "0.0.0.0", the MT will be asked to assign a dynamic address. This assigned address can be read out using the +CGPADDR command.
<d_comp>	Used to control PDP data compression. For SMDCP only.	0		Disable PDP data compression (default)
		1		Turn on PDP data header compression (vendor-defined compression, not supported yet!)
		2		V.42bis
<h_comp>	Controls PDP header compression. Digital Parameters	0		Disable PDP header compression (default)
		1		RFC1144 (SMDCP only)
		2		RFC 2507 (not supported at this time)
<pd1>... <pdN>	Parameters associated with <PDP_type			string type

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CGDCONT?	Query the current PDP context after power-on registration
←	+CGDCONT: 1, "IP", "xz01.njm2mapn", "10.173.90.29",0,0 OK	By default, there is already a PDP context, which is used for module RNDIS NIC functions and data services such as TCPIP/HTTP/MQTT/FTP.
→	AT+CGDCONT=?	Query parameter value range
←	+cgdcont: (1-15),	Enquiry results

"ip",,,,,(0),(0,2),(0),(0),(0,1),(0),(0),(0,1),(0) +cgdcont: (1-15), "ipv6",,,,,(0),(0,2),(0),(0),(0,1),(0),(0),(0),(0) +cgdcont: (1-15), "ipv4v6",,,,,(0),(0,2),(0),(0),(0,1),(0),(0),(0,1),(0) +CGDCONT: (1-15), "Non-IP" ,,,,,(0),(0,2),(0),(0),(0,1),(0),(0),(0),(0),(0, 1) OK	
--	--

8.4 PDP context authentication parameters: AT+CGAUTH

This command is an extension of the AT+CGDCONT command and sets the authentication method for the relevant PDP context.

The query command queries all PDP context authentication information.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGAUTH=<cid>[,<auth_prot>[,<userid>[,<password>]]]]	OK
Enquiry command	AT+CGAUTH?	[+CGAUTH: <cid>,<auth_prot>,<userid>,<password>] [<CR><LF>+CGAUTH: <cid>,<auth_prot>,<userid>,<password>] [<CR><LF>+CGAUTH: <cid>,<auth_prot>,<userid>,<password> [. . .]]
test command	AT+CGAUTH=?	+CGAUTH: (range of supported <cid>s), (list of supported <auth_prot>s), (range of supported <userid>s), (range of supported <password>s)

Parameter Definition:

parameters	define	retrieve value	a	Explanation of values
<cid>	PDP context identifier to identify a PDP context definition			Integer type. This parameter is local to the TE-MT interface and can be used for other PDP context related commands
<auth_prot>	Type of Authentication	<u>0</u>		None
		1		PAP
		2		CHAP
<userid>	user ID			
<password>	cryptographic			

8.5 Display PDP address: AT+CGPADDR

With the set command, the PDP address identified by <cid> is returned;

Use this execute command to return a list of PDP addresses with the specified context identifier <cid>;

When the PDP context is not established, it is not possible to query and display the PDP address using this command.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CGPADDR=<cid>	+CGPADDR:<cid>,<PDP_addr> OK
execute a command	AT+CGPADDR	+CGPADDR:<cid>,<PDP_addr>[<CR><LF>+CGPADDR:<cid>,<PDP_addr>[...]] OK
test command	AT+CGPADDR=?	+CGPADDR: (list of <cid> values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<cid>	PDP context identifier	1 to 8	Integer type. This parameter is local to the TE-MT interface and can be used for other PDP context related commands
<PDP_address>	packet data protocol address		Character type, this is the IP protocol address in the format: "<n>. <n>. <n>. <n>" where <n> = 0 to 255; used to identify the address space allocated by the MT for a particular PDP context.

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CGACT?	Query the current PDP context activation status
←	+CGACT: 1,1 OK	<state>=1, indicating that the PDP context with <cid>=5 is in the already active state
→	AT+CGPADDR=1	Query the PDP address (i.e., IP address) corresponding to the PDP context with <cid>=5
←	+cgpaddr: 1, "10.162.229.248" OK	<cid>=5 IP address assigned by PDP context

8.6 PDP context activation: AT+CGACT

Use the Execute command to activate or de-activate the specified PDP context. After the successful execution of this command, the MT maintains the V.250ter command state. If the PDP context is already in the requested state, this state remains unchanged.

When the activated form of this command is executed, if the MT is not attached to GPRS, the MT first performs a GPRS attachment and then tries to activate the specified context.

If <cid> is not specified, the activated form of the directive activates all defined contexts. If <cid> is not specified, the deactivated form of the directive deactivates all activated contexts.

The query command returns information about all defined PDP contexts.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGACT=<state>,<cid>	OK
Enquiry command	AT+CGACT?	+CGACT:<cid>,<state>[<CR><LF>+CGACT:<cid>,<state>[...]] OK
test command	AT+CGACT=?	+CGACT: (list of <state> values) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<state>	PDP context active state	0	inactive
		1	activate
<cid>	PDP context identifier		Integer type. This parameter is local to the TE-MT interface and can be used for other PDP context related commands.

Examples:

Command (→) / Return (←)	an actual example	Explanations and clarifications
		Refer to the +CGPADDR entry for specific examples

8.7 Control of unsolicited GPRS event reporting: AT+CGEREP

The setup command enables or disables the URC Prompt +CGEV: XXX. when set to enable. this URC is reported

when certain events occur on the endpoint or network side of the data domain.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGEREP=<mode>[,<bfr>]	OK
Enquiry command	AT+CGEREP?	+CGEREP:<mode>,<bfr> OK
Test Command	AT+CGEREP=?	+CGEREP: (list of <mode> values), (list of <bfr> values) OK
URC reporting	+CGEV: XXX	If <mode>=1, this URC is reported when something happens on MT or network side

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Patterns of result code reporting	0	Buffers unsolicited result codes in the MT; if the MT result code buffer is full, the oldest result code is discarded. Does not forward the result code to the TE.
		<u>1</u>	When the MT-TE link is in a reserved state (e.g., in the online data state), the unsolicited result code is discarded; otherwise, the MT directly forwards the unsolicited result code to the TE.

8.8 (URC) Packet domain event URC reporting: +CGEV

This print is proactively reported when an event is reported on the packet domain or network side.

Grammatical rules:

URC
+CGEV: XXX

Incident reporting:

event	account for
-------	-------------

<p>+CGEV: NW DEACT <PDP_type>, [<PDP_addr>], <cid></p>	<p>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> and <cid> are found in command +CGDCONT. The format of the parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT.</p> <p>Examples.</p> <p>+CGEV: "IP", "10.0.0.0",1 +cgev: "ppp","",2 +CGEV: NW DETACH</p>
<p>+CGEV: ME DEACT <p_cid>, <cid></p>	<p>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 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</p>
<p>+CGEV: ME ACT <p_cid>, <cid></p>	<p>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</p>
<p>+CGEV: ME ACT <PDP_type>, <PDP_addr>, <cid></p>	<p>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</p>
<p>+CGEV: NW ACT <PDP_type>, <PDP_addr>, <cid></p>	<p>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> and <cid> are found in command +CGDCONT. parameters <PDP_type>, <PDP_addr> and <cid> are found in command +CGDCONT.</p>
<p>For network attachment, the following unsolicited result codes and the corresponding events are defined.</p>	
<p>+CGEV: NW DETACH</p>	<p>The network has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.</p>
<p>+CGEV: ME DETACH</p>	<p>The mobile termination has forced a PS detach. This implies that all active contexts have been deactivated. These are not reported separately.</p>
<p>For PDP context activation, the following unsolicited result codes and the corresponding events are defined.</p>	
<p>+CGEV: EPS PDN ACT <cid></p>	<p>The network has activated a PDN connection. The format of the parameter <cid> is found in command +CGDCONT</p>
<p>+CGEV: NW PDN ACT <cid></p>	<p>The network has activated a PDN connection. The context represents a Primary PDP context in GSM/UMTS. The <cid> for this context is provided to the TE. The format of the parameter <cid> is found in command +CGDCONT. Note: the event is not applicable for EPS</p>

<p>+CGEV: ME PDN ACT <cid>[,<reason>[,<cid_other>]]</p>	<p>The mobile termination has activated a context. The context represents a PDN connection in LTE or a Primary PDP context in GSM/UMTS. The <cid> for This event is sent either in result of explicit context activation request (+CGACT), or in result of implicit context activation request associated to attach request (+CGACT). This event is sent either in result of explicit context activation request (+CGACT), or in result of implicit context activation request associated to attach request (+CGATT=1). The format of the parameters <cid> and <cid_other> are found in command +CGDCONT</p> <p><reason>: integer type; indicates the reason why the context activation request for PDP type Ipv4v6 was not granted. This parameter is only included if the requested PDP type associated with <cid> is Ipv4v6, and the PDP type assigned by the network for <cid> is either Ipv4 or Ipv6.</p> <p>0 Ipv4 only allowed 1 Ipv6 only allowed 2 single address bearers only allowed. 3 single address bearers only allowed and MT initiated context activation for a second address type bearer was not successful.</p> <p><cid_other>: integer type; indicates the context identifier allocated by MT for an MT initiated context of a second address type. MT shall only include this parameter if <reason> parameter indicates single address bearers only allowed, and MT supports MT initiated context activation of a second address type without additional commands from TE, and MT has activated the PDN connection or PDP context associated with <cid_other>.</p>
<p>+CGEV: EPS PDN DEACT <cid></p>	<p>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. command +CGDCONT.</p>
<p>+cgev: me pdn deact <cid></p>	<p>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. found in command +CGDCONT</p>
<p>+CGEV: EPS DED ACT <p_cid>, <cid></p>	<p>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 associated MT allocated secondary context identifier <cid> is provided to the TE in addition to the PDN connection associated</p>

	<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>. 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 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
ForPDPcontextmodification,thefollowingunsolicitedresultcodesandthe correspondingeventsaredefined.	
+CGEV:NW MODIFY<cid>,<change_reason>,<event_type>	The network has modified a context.The format of the parameter <cid> is found in command +CGDCONT or +CGDSCONT. The format of the parameters <event_type> and <change_reason> are defined above. event_type> and <change_reason> are defined above.
+CGEV:NW ME <cid>,<change_reason>,<event_type>	The mobile termination has modified a context.The format of the parameter <cid> is found in command +CGDCONT or +CGDSCONT. The format of the parameters <event_type> and <change_reason> are defined above. The format of the parameter <cid> is found in command +CGDCONT or +CGDSCONT.

Examples:

URCs	account for
+CGEV: "IP", "10.0.0.0",1	
+cgev: "ppp","",2	
+CGEV: NW DETACH	

8.9 Query local IP address by cid: AT*GETIP

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT*GETIP=<cid>	+GETIP: <ip>,<gateway> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<cid>	Carrying scenario id	<u>1</u>	PDP context identifier

9 NTP Related Commands

Network Time Protocol (NTP) is used to synchronise computer Time Synchronisation NTP is a protocol that allows computers to synchronise their servers or clock sources (e.g., quartz clocks, GPS, etc.), provides highly accurate time corrections (less than 1 millisecond from the standard on the LAN and tens of milliseconds on the WAN), and prevents nefarious protocol attacks through cryptographic confirmation. Time is propagated by NTP server class. All servers are grouped into Stratum (layers) according to their proximity to external UTC sources.

The module supports SNTP protocol (Simple Network Time Protocol) and has a set of AT commands for network time synchronisation.

9.1 Set GPRS bearer scene ID: AT+CNTPCID

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CNTPCID=<cid>	OK
Enquiry command	AT+CNTPCID?	+CNTPCID: <cid> OK
test command	AT+CNTPCID=?	+CNTPCID: (range of values for <cid>) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<cid>	Carrying scenario id	1-3	The value is the same as <cid> of the +SAPBR command.

9.2 Synchronised network time: AT+CNTP

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CNTP=<NTP server>[,<time zone>]	OK
execute a command	AT+CNTP	OK +CNTP: <code>

Enquiry command	AT+CNTP?	+CNTP: <NTP server>,<time zone>,<time out>. OK
test command	AT+CNTP=?	OK
caveat	After the network time is synchronised successfully, you can use the AT+CCLK? command to query the current time of the module	

Parameter Definition:

parameters	define	retrieve value	Explanation of values
<NTP server>	NTP server	domain name or ip address	
<time zone>	local time zone	-47~+48	Unit: 1/4 time zone. The time zone is -12~+12, but some countries use half time zone or even 1/4 time zone, in order to take these countries into account, the time zone unit is: 1/4 time zone. A minus sign indicates a western time zone and a plus sign indicates an eastern time zone.
<code>	opcode	1	Network Time Synchronisation Successful
		61	network error
		62	DNS resolution error
		63	connection error
		64	Service Response Error
		65	Service response timeout
<time out>	timeout		The unit is second, if not set the default 5 seconds

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+SAPBR=3,1, "Contype", "GPRS"	Activating PDP is a prerequisite for synchronising time using the CNTP command
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	

→	AT+SAPBR=1,1	Activate PDP with <cid>=1
←	OK	
→	AT+CNTPCID=1	Set <cid>=1 for the PDP used
←	OK	
→	AT+CNTP	
←	OK +CNTP:1	
→	AT+CCLK?	
←	+CCLK: "18/05/16,15:49:28+32" OK	

11 File system read and write commands

11.1 Create a file: AT+FSCREATE

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSCREATE=<filename>	OK maybe ERROR
Enquiry command	AT+FSCREATE=?	OK maybe ERROR

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filename>	filename		String type, without double quotes, no more than 64 bytes

11.2 Read file: AT+FSREAD

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSREAD=<filename>,<mode>,<filesize>,<position>	<data> OK maybe ERROR
Enquiry command	AT+FSREAD=?	OK maybe ERROR

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filename>	filename		String type, without double quotes, no more than 64 bytes
<mode>	Mode of reading a file	0	Reading a file from the beginning of the file
		1	Reads a file starting from the <position> position of the file

<filesize>	The length of the file to be read		Cannot be greater than 10240 bytes. If the actual length of the file is less than this value, the read is the actual length of the file.
<position>	Starting position of the read file		This value should be less than the size of the file. This value is invalid when <mode>=0.
<data>	File data read		

11.3 Whether to return the header when reading a file: AT+FSREADHEAD

Note: This command is >= supported by version V1118.

After sending AT+FSREADHEAD=1, AT+FSREAD reads the file with the extra header +FSREAD:

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSREADHEAD=<mode>	OK maybe ERROR
Enquiry command	AT+FSREADHEAD?	+FSREADHEAD: <mode> OK maybe ERROR

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Whether to return header information when reading a file	0	Do not show +FSREAD: headers
		1	Show +FSREAD: header information

11.4 Write file: AT+FSWRITE

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSWRITE=<filename>,<mode>,<filesize>,<inputtime>	> (Write data after > appears) OK maybe ERROR

		maybe TimeOut
Enquiry command	AT+FSDWRITE=?	OK maybe ERROR
caveat	Automatically writes when the length of the input data reaches <filesize>. or if the time to input data exceeds <inputtime>, return TimeOut	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filename>	filename		String type, without double quotes, no more than 64 bytes
<mode>	Mode of writing files	0	Write the file from the beginning of the file
		1	Write the file from the end of the file
<filesize>	The length of the data to be written		Cannot be larger than 10240 bytes
<inputtime>	Input duration	1~4294967295	Unit: seconds

11.5 Get disc drive: AT+FSDRIVE

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+FSDRIVE=<n>	+FSDRIVE: <drive> OK
Enquiry command	AT+FSDRIVE=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Type of disc drive	0	local disk drive letter (computing)
		1	SD card disc letter
<drive>	disk drive number (A: or B: in Microsoft DOS and Windows system)		String type. With or without double quotes. If it is local storage, the disc letter is C; if it is an SD card, the disc letter is D

11.6 Display file directory list: AT+FSLS

Grammatical rules:

Command Type	vocabulary	come (or go) back
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Setup Comman ds	AT+FSL= <filepath>	list of subdirectories/files OK
Enquiry command	AT+FSL=?	OK
caveat	1) If the last character of the returned result is \, then it is a directory name, otherwise it is a file name 2) To query the local FLASH root directory of the module use: AT+FSL="/" or AT+FSL="C:/" 3) To query the root directory of the external TF card use: AT+FSL="D:/"	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filepath>	file path		String type, without double quotes, no more than 64 bytes.

11.7 Get free space size: AT+FSMEM

The execute command is used to obtain the size of the remaining space on the file system.

Grammatical rules:

Comman d Type	vocabulary	come (or go) back
execute a command	AT+FSMEM	+FSMEM: <size> OK
Enquiry command	AT+FSMEM=?	OK maybe ERROR

Parameter Definition:

paramete rs	define	retrieve a value	Explanation of values
<size>	The amount of space available on the file system		Unit: bytes

11.8 Create directory: AT+FSMKDIR

Grammatical rules:

Comman d Type	vocabulary	come (or go) back
Setup Comman ds	AT+FSMKDIR= <dir_name>	OK maybe ERROR
Enquiry command	AT+FSMKDIR=?	OK maybe

		ERROR
--	--	-------

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<dir_name>	catalogue name		String type, without double quotes, no more than 64 bytes

11.9 Delete directory: AT+FSRMDIR

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSRMDIR=<dir_name>	OK maybe ERROR
Enquiry command	AT+FSRMDIR=?	OK maybe ERROR

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<dir_name>	filename		String type, without double quotes, no more than 64 bytes

11.10 Delete files: AT+FSDEL

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+FSDEL=<filename>	OK maybe ERROR
Enquiry command	AT+FSDEL=?	OK maybe ERROR

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filename>	filename		String type, without double quotes, no more than 64

			bytes
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11.11 Get file size: AT+FSFLSIZE

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+FSFLSIZE=<filename>	+FSFLSIZE: <size> OK
Enquiry command	AT+FSFLSIZE=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<filename>	filename		String type, without double quotes, no more than 64 bytes
<size>	file size		Unit: bytes

11.12 Example of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
How to use the local file system read and write commands:		
→	AT+FSMKDIR="/testdir"	Creating a first-level catalogue
←	OK	
→	AT+FSMKDIR="/testdir/testdir"	Creating a secondary directory
←	OK	
→	AT+FSCREATE="/testdir/test.txt"	Creation of files in one level of catalogue
←	OK	
→	AT+FSLS="/testdir"	Display a list of first-level catalogues
←	testdir\ test.txt OK	
→	AT+FSWRITE="/testdir/test.txt",0,10,10	write a file
→	>1234567890	When ">" appears, enter the data written: 1234567890.

←	OK	
→	AT+FSREAD="/testdir/test.txt",0,10,10	Read file data
←	1234567890 OK	
→	AT+FSMEM	Get the amount of free space on the file system
←	+FSMEM: 1304000 bytes OK	
→	AT+FSFLSIZE="/testdir/test.txt"	Get file size
←	+FSFLSIZE: 10 OK	
→	AT+FSDEL="/testdir/test.txt"	Delete file
←	OK	
→	AT+FSRMDIR="/testdir/testdir"	Delete Directory
←	OK	
How to use the SD card file system read and write commands:		
→	AT+FSMKDIR="D:/testdir"	Creating a first-level catalogue
←	OK	
→	AT+FSMKDIR="D:/testdir/testdir"	Creating a secondary directory
←	OK	
→	AT+FSCREATE="D:/testdir/test.txt"	Creation of files in one level of catalogue
←	OK	
→	AT+FSL="D:/testdir"	Display a list of first-level catalogues
←	testdir\ test.txt OK	
→	AT+FSWRITE="D:/testdir/test.txt",0,10,10	write a file
→	>1234567890	When ">" appears, enter the data written: 1234567890.
←	OK	
→	AT+FSREAD="D:/testdir/test.txt",1,5,2	Read file data
←	34567 OK	
→	AT+FSFLSIZE="D:/testdir/test.txt"	Get file size
←	+FSFLSIZE: 10 OK	
→	AT+FSDEL="D:/testdir/test.txt"	Delete file
←	OK	
→	AT+FSRMDIR="D:/testdir/testdir"	Delete Directory
←	OK	

12 Embedded TCPIP Commands

12.1 Initiating multi-IP connections: AT+CIPMUX

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPMUX=<n>	OK
Enquiry command	AT+CIPMUX?	+CIPMUX: <n> OK
test command	AT+CIPMUX=?	+CIPMUX: (0,1) OK
caveat	<ul style="list-style-type: none"> The setup commands in this command are successful only in the IP initial state. 	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Multi-Connect	0	Single connection (default)
	Switch	1	multiplex

12.2 Start the task and set the access point APN, username and password:

AT+CSTT

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CSTT=<apn>[,<username>[,<password>]]	OK
Enquiry command	AT+CSTT?	+CSTT: <apn>,<user name>,<password> OK
test command	AT+CSTT=?	+cstt: "apn", "user", "pwd" OK
caveat	1) The setup command and the execute command are valid only when executed in the IP INITIAL state. After executing the setup command, the status changes to IP START.	

	2) After the module registers with the network, it will automatically get an <apn> from the network and activate a PDP context for RNDIS Internet use (this <apn> can be queried by AT+CGDCONT?), so you can directly enter AT+CSTT, and the module will set the APN of the CSTT in accordance with the automatically obtained <apn>.
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Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<apn>	GPRS Access Point Name	-	String parameters (double quotes can be added or not), no more than 128 characters
<user name>	GPRS User Name	-	String parameters (double quotes can be added or not), no more than 32 characters
<password>	GPRS Password	-	String parameters (double quotes can be added or not), no more than 32 characters

12.3 Dedicated network card set APN, user name, password and authentication method: AT+CPNETAPN

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CPNETAPN=<mode>,<apn>,<user>,<pwd>,<authmode>	OK
Enquiry command	AT+CPNETAPN?	MODE:<mode> APN:<apn> USR:<user> PWD:<password> AUTHMODE:<authmode> OK
test command	AT+CPNETAPN=?	+CPNETAPN: setmode=[2,3], "apn", "Username", "Password", authtype=[0,1,2] OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>		2	Saved and effective immediately
		3	Delete saved parameters
<apn>	GPRS Access Point Name		String parameter (double quotes can be added or not), no more than 128 characters.

			Note: This parameter cannot be empty
<user>	GPRS User Name		String parameter (double quotes may or may not be added), no more than 32 characters. If it is empty, it is denoted as ""
<pwd>	GPRS Password		String parameter (double quotes may or may not be added), no more than 32 characters. If it is empty, it is denoted as ""
<authmode>		0	no authentication
		1	PAP
		2	CHAP

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CPNETAPN=2,jscmiot,u9682,iot98765,2	Set the APN of the private network card. please fill in each parameter according to the facts, don't copy it. The module will automatically set AT+AUTOAPN to 0 when you set this command, so you do not need to enter AT+AUTOAPN=0 in advance.
←	OK	Setting is successful. After successful setup the parameters are saved to NV and the module automatically restarts the stack
	<p>After reboot the default PDP bearer (<cid>=1) is already the set APN and is already in an active and available state. This default PDP bearer is used for the module RNDIS NIC functionality and data services such as TCP/IP/HTTP/MQTT/FTP.</p> <p>AT+CGDCONT?</p> <p>+CGDCONT: 1, "IP", "jscmiot", "10.67.64.153",,,,,,,,,,,,,,</p> <p>OK</p> <p>When setting the APN for CSTT or SAPBR in the later data application, you only need to set the APN to empty or set <private network apn>, and you do not need to set <user> and <pwd> again.</p> <p>Example:</p> <p>AT+CSTT=jscmiot</p> <p>AT+CSTT</p> <p>AT+SAPBR=3,1, "APN", "jscmiot"</p> <p>AT+SAPBR=3,1, "APN", ""</p>	

12.4 To activate a mobile scene (or initiate a GPRS or CSD wireless connection): AT+CIICR

Grammatical rules:

Command	vocabulary	Returns and notes
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Type		
execute a command	AT+CIICR	Returns if activation was successful: OK Returns if activation fails: ERROR
test command	AT+CIICR=?	Return: OK
caveat	<ul style="list-style-type: none"> AT+CIICR The mobile scene can only be activated in the IP START state, and the state changes to IP CONFIG after execution. After the module accepts the activate scene operation, if the mobile scene is activated successfully and the status changes to IPGPRSACT, it returns OK, otherwise it returns ERROR. 	

12.5 Query local IP address: AT+CIFSR

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	AT+CIFSR	<IP address>
test command	AT+CIFSR=?	OK
caveat	The local IP address can be queried by AT+CIFSR only when the mobile scene is activated: IP GPRSACT, TCP/UDPCONNECTING, CONNECT OK, IP CLOSE, otherwise it returns ERROR.	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<IP address>	IP address	-	String parameters (strings need to be quoted)

12.6 Setting TCP to use SSL function: AT+CIPSSL

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPSSL=<n>	OK
Enquiry command	AT+CIPSSL?	+CIPSSL: <n> OK
test command	AT+CIPSSL=?	+CIPSSL: (0-1) OK
caveat	Enter the setup command AT+CIPSSL=1 before CIPSTART to turn on the SSL feature. When the SSL feature is turned on, the module automatically performs SSL authentication after a TCP connection is established.	

	Currently only supported as an SSL Client application.
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Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	SSL function switch	0	Disable SSL
		1	Open SSL

12.7 Configure TCP SSL parameters: AT+SSLCFG

The set command is used to set the SSL version, SSL encryption algorithms (ciphersuites), security level, CA certificate (Certificate Authority Certificate), client certificate and client key. client key). These parameters are used during the handshake of the SSL protocol.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+SSLCFG="sslversion",<n>[,<sslversion>]	<p>If <sslversion> is missing, query the SSL version corresponding to <n>: +SSLCFG: "sslversion",<n>,<sslversion></p> <p>OK</p> <p>Otherwise, set the SSL version corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	AT+SSLCFG="ciphersuite",<n>[,<ciphersuites>]	<p>If <ciphersuites> is missing, query <n> for the corresponding encryption algorithm: +SSLCFG: ciphersuite",<n>,<ciphersuites></p> <p>OK</p> <p>Otherwise, set the encryption algorithm corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the directory format or parameters are incorrect: ERROR</p>

	<p>AT+SSLCFG="cacert",<n>[,<cacertpath>]</p>	<p>If the <cacertpath> parameter is missing, the CA certificate path corresponding to <n> is queried: +SSLCFG: "cacert",<n>,<cacertpath></p> <p>OK</p> <p>Otherwise, set the CA certificate path corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the directory format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="clientcert",<n>[,<client_cert_path>]</p>	<p>If the <client_cert_path> parameter is missing, the client certificate path corresponding to <n> is queried: +SSLCFG: "clientcert",<n>,<client_cert_path></p> <p>OK</p> <p>Otherwise, set the client certificate path corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="clientkey",<n>[,<client_key_path>]</p>	<p>If <client_key_path> is missing, it is a query for the client key path corresponding to <n>: +SSLCFG: "clientkey",<n>,<client_key_path></p> <p>OK</p> <p>Otherwise, set the client key path corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="secllevel",<n>[,<secllevel>]</p>	<p>If the <secllevel> parameter is missing, it is a query for the security level associated with <n>: +SSLCFG: "secllevel",<n>,<secllevel></p> <p>OK</p>

		<p>Otherwise, set the security level corresponding to <n>:</p> <p>Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="hostname",<n>[,<hostname>]</p>	<p>If the <hostname> parameter is missing, it is a query for the domain name associated with <n>:</p> <p>+SSLCFG: "hostname",<n>,<hostname></p> <p>OK</p> <p>Otherwise, set the hostname corresponding to <n>:</p> <p>Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="ignorelocaltime",<n>[,<ignorelocaltime>]</p>	<p>If <ignorelocaltime> is missing, the setting for the <n>-related certificate expiration time check is queried:</p> <p>+SSLCFG: "ignorelocaltime",<n>,<ignorelocaltime></p> <p>OK</p> <p>Otherwise, set the certificate expiration time check parameter corresponding to <n>:</p> <p>Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
	<p>AT+SSLCFG="negotiatetimeout",<n>[,<negotiate_time>]</p>	<p>If the <negotiate_time> parameter is missing, it is a query for the maximum SSL negotiation time corresponding to <n>:</p> <p>+SSLCFG: "negotiatetimeout",<n>,<negotiate_time></p> <p>OK</p> <p>Otherwise, set the maximum SSL write-up negotiation time corresponding to <n>:</p> <p>Returns if the format and parameters are correct: OK</p>

	Returns if the command format or parameters are incorrect: ERROR
AT+SSLCFG="clientrandom",<n>[,<randbytes>]	<p>If <randbytes> is missing, it is a query for the random number associated with <n>: +SSLCFG: "clientrandom",<n>,<randbytes></p> <p>OK Otherwise, set the random number corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
AT+SSLCFG="premaster",<n>[,<premaster>]	<p>If <premaster> is missing, it is a query for <n> related <premaster>: +SSLCFG: "premaster",<n>,<premaster></p> <p>OK Otherwise, set the premaster corresponding to <n>: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
AT+SSLCFG="verifymode",<n>[,<verifymode>]	<p>If <verifymode> is missing, query <n> for the associated certificate verification mode, at which point it is returned: +SSLCFG: "verifymode",<n>,<verifymode></p> <p>OK Otherwise, set whether the certificate authentication mode is root certificate authentication or other certificate authentication: Returns if the format and parameters are correct: OK</p> <p>Returns if the command format or parameters are incorrect: ERROR</p>
AT+SSLCFG="XXXXXX",<n>,	<p>Erase the corresponding parameters." XXXXX" means: "sslversion", "ciphersuite", "cacert" and other keywords. Note: <n> must be followed by a comma; if <n> is not followed by a comma, it is just a query.</p>

Test Command	AT+SSLCFG=?	OK
caveat	For examples of TCP SSL functionality, refer to the examples later in this chapter.	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	SSL context id	0~5,34,88,153	Integer type. TCP function when bound to <n> in CIPSTART. For example, when the link number is set to 1 in CIPSTART in multiple links, the SSL context id is also 1. SSL context id fixed to 0 in TCP single link. FTP function when <n>=34 (decimal) MQTT functionality when <n>=88 (decimal) HTTP function when <n>=153 (decimal)
<sslversion>	SSL version	0	SSL3.0
		1	TLS 1.0
		2	TLS 1.1
		3	TLS 1.12
		4	ALL above
<ciphersuites>	SSL ciphersuites	0X0035	TLS_RSA_WITH_AES_256_CBC_SHA
		0X002F	TLS_RSA_WITH_AES_128_CBC_SHA
		0X0005	TLS_RSA_WITH_RC4_128_SHA
		0X0004	tls_rsa_with_rc4_128_md5
		0X000A	TLS_RSA_WITH_3DES_EDE_CBC_SHA
		0X003D	TLS_RSA_WITH_AES_256_CBC_SHA256
		0XFFFF	ALL above
<cacertpath>	Trusted CA Certificate Path		string type
<client_cert_path>	Client certificate path		string type
<client_key_path>	Client Key Path		string type
<secllevel>	security level	0	No authentication
		1	server authentication
		2	Server authentication and client authentication (if requested by the server)
<hostname>	hostname (of a networked computer)		
<ignoreltime>	This parameter determines how expired certificates are treated	0	Concerns about the expiry of certificates
		1	Ignore certificate expiration time

<negotiate_time>	Maximum time for SSL negotiation phase	10~300	Unit: seconds
<clientrandom>	Random numbers, strings of hexadecimal numbers, supports 56 and 64 bytes	Combinations of numbers and letters	String type, double quotes can be added or not, the range of numbers: 0~9, the range of letters: ABCDEF (case insensitive). For example, 56 bytes: 101B12C3141516171F19202122232425262728293031323334353637
<premaster>	premaster		
<verifymode>	Certificate Validation Mode	0	root cause authentication
		1	Other certifications

12.8 Configure the local TCP port: AT+CLPORT

Grammatical rules:

Comm and Type	vocabulary	come (or go) back	
Setup Commands	Single link: AT+CLPORT=<mode>,<port> Multi-Links: AT+CLPORT=<n>,<mode>,<port> >	OK maybe ERROR	
Enquiry command	AT+CLPORT?	+CLPORT: <TCP port>,<UDP port>. OK	Single link (CIPMUX=0)
		+CLPORT: 0,<TCP port>,<UDP port>. +CLPORT: 1,<TCP port>,<UDP port>. +CLPORT: 2,<TCP port>,<UDP port>. +CLPORT: 3,<TCP port>,<UDP port>. +CLPORT: 4,<TCP port>,<UDP port>. +CLPORT: 5,<TCP port>,<UDP port>. OK	Multiple links (CIPMUX=1)
test command	AT+CLPORT=?	+CLPORT: ("TCP", "UDP"),(0-65535) OK	Single link (CIPMUX=0)
		+CLPORT: (0-5),("TCP", "UDP"),(0-65535) OK	Multiple links (CIPMUX=1)

Parameter Definition:

<n>	Link No.	0~5	Integer type, indicates the connection number
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<mode>	Connection type, string (with or without double quotes)	"TCP"	Establishing a TCP connection
		"UDP"	Establishing a UDP connection
<port>	Module Service Port	1~65535	integer type (math.)

12.9 To establish a TCP connection or register a UDP port number: AT+CIPSTART

Grammatical rules:

Comma and Type	vocabulary	Returns and notes
Setup Commands	<p>For single circuit connection (+CIPMUX=0):</p> <p>AT+CIPSTART=<mode>,<server>,<port></p>	<p>Returns if the format is correct and in IP INITIAL or IP STATUS or TCP/UDP CLOSE state:</p> <p>OK</p> <p>Otherwise return: +CME ERROR <err></p> <p>Immediately after that there will be a URC upload, which will be as follows:</p> <p>Returns if the connection already exists: ALREADY CONNECT</p> <p>Returns if the connection was successful (not passthrough): CONNECT OK</p> <p>Returns if the connection was successful (passthrough): CONNECT</p> <p>Otherwise returns. STATE: <sl_state></p> <p>CONNECT FAIL</p>
	<p>When multiplexed (+CIPMUX=1):</p> <p>AT+CIPSTART=<n>,<mode>,<server>,<port></p>	<p>Returns if the format is correct and in IP STATUS or IP PROCESSING:</p> <p>OK</p> <p>Otherwise return: +CME ERROR <err></p> <p>Immediately after that there will be a URC upload, which will be as follows:</p> <p>If the connection already exists, return: <n>,ALREADY CONNECT</p> <p>Returns if the connection was successful: <n>,CONNECT OK</p> <p>Otherwise returns. <n>,CONNECT FAIL</p>
test command	AT+CIPSTART=?	Returns on single connection (+CIPMUX=0): +CIPSTART: (<mode> value list),(IP address range),(port range)

d		+CIPSTART: (list of <mode> values), (domain name), (port range) OK Returns on multiplex connection (+CIPMUX=1): +CIPSTART: (<n> list of values), (<mode> list of values), (IP addressrange), (port range) +CIPSTART: (<n>value list), (<mode>value list), (domain name), (portrange) OK
caveat	<ul style="list-style-type: none"> ● This command should be used to establish a TCP/UDP connection; ● The current status can be queried with AT+CIPSTATUS; ● It can be executed only when the current state is IP INITIAL or IP STATUS or TCP/UDP CLOSE for a single connection, or when the current state is IP STATUS or IP PROCESSING for a multiple connection; ● If the current state is not the executable state as described above, execute AT+CIPSHUT before starting to establish a connection; ● For multiple connections, the commands AT+CSTT, AT+CIICR,AT+CIFSR must be executed before setting this command. 	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<n>	Link No.	0~5	Integer type, indicates the connection number
<mode>	Connection type, string (with or without double quotes)	"TCP"	Establishing a TCP connection
		"UDP"	Establishing a UDP connection
<server>	Remote server IP address or domain name	Maximum 128 bytes	String parameters (with or without double quotes)
<port>	remote service port	1~65535	integer type (math.)
<sl_state>	single attachment state (computing)	IP INITIAL	initialisation
		IP START	Initiate tasks
		IP CONFIG	Configuration Scenarios
		IP GPRSACT	Scene activated
		IP STATUS	Get local IP status
		TCP CONNECTING/UDP CONNECTING/SERVER LISTENING	TCP connection in progress / UDP port registration in progress / server listening in progress
		CONNECT OK	Connection established successfully
		TCP CLOSING/UDP CLOSING	TCP connection is being closed, UDP port is being logged off
		TCP CLOSED/UDP CLOSED	Connection disconnected /UDP port logged off

	PDP DEACT	The scene is released
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12.10 Select TCPIP application mode: AT+CIP MODE

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPMODE=<mode>	OK
Enquiry command	AT+CIPMODE?	+CIPMODE: <mode> OK
test command	AT+CIPMODE=?	+CIPMODE: (0-NORMAL MODE,1-TRANSPARENT MODE) OK
caveat	This command can only be set in the IP INITIAL state Transparent transmission mode is only supported for TCP single links	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	TCPIP application model	0	non-transparent transfer mode
		1	transparent transfer mode

12.11 Select non-transparent data sending mode: AT+CIPQSEND

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPQSEND=<n>	OK
Enquiry command	AT+CIPQSEND?	+CIPQSEND: <n> OK
test command	AT+CIPQSEND=?	+cipqsend: (0,1,2) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Non-transparent data sending mode	0	Default value. Fast Send Mode 0. When the server receives the data, the module returns. SEND OK (single link) or

			<n>, SEND OK (multiple links)
		1	Fast Send Mode 1: When the data is sent to the module, the terminal returns: DATA ACCEPT:<length> (single link) DATA ACCEPT:<n>,<length> (multiple links)
		2	slow onset mode When the server receives the data, the module returns. SEND OK (single link) or <n>, SEND OK (multiple links)

Notes:

- Slow send mode requires confirmation from the server side for every data sent, while fast send is sent to the module on the fly, no confirmation from the server is required. It is recommended to use 0 or 1, i.e. fast sending mode;
- There is no difference in the implementation mechanism of these two fast sending modes, the difference only lies in the fact that after sending the data, mode 0 prompts SEDN OK and mode 1 prompts DATA ACCEPT;
- It is recommended that you use the CIPACK command to query whether each piece of data has been received by the opposite end.

12.12 Set whether to automatically add a carriage return line feed at the end of the received data: AT+CIPRXF

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPRXF=<n>	OK
Enquiry command	AT+CIPRXF?	+CIPRXF:<n> OK
test command	AT+CIPRXF=?	+CIPRXF: (list of values for <n>) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	paradigm	0	A carriage return line feed (\r\n) is automatically added at the end of each received data entry.
		1	No carriage return line feed added at the end of each received data (\r\n)

12.13 Configuring transparent transmission mode: AT+CIPCCFG

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CIPCCFG=<NmRetry>,<WaitTm>,<SendSz>,<esc>[,<Rxmode>,<RxSize>,<Rxtimer>,<BufClean>];	OK
Enquiry command	AT+CIPCCFG?	+CIPCCFG: <NmRetry>,<WaitTm>,<SendSz>,<esc>,<Rxmode>,<RxSize>,<Rxtimer>,<BufClean> 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),(BufClean:0,1) OK
caveat	This command can be set only in the case of a single connection (AT+CIPMUX=0) and AT+CIPMODE=1	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<NmRetry>	Number of retransmissions of an IP packet	3~8	Default value is 5
<WaitTm>	delayed sending time	2~10	The unit is 100ms and the default value is 2.
<SendSz>	Number of data bytes sent at a time	1~1460	Default value is 1024
<esc>	Whether to enable escape sequences [The escape function is not supported on the software, so please ignore the meaning of this parameter.]	<u>1</u>	Turn on escape sequences
		0	Do not turn on escape sequences, default
<Rxmode>	Interval setting for receiving data from the serial port	1	Set the time interval, the interval is <Rxtimer>.
		<u>0</u>	No time interval
<RxSize>	Length of each received data	<u>50-1460</u>	In bytes
<Rxtimer>	Time interval for receiving	20-1000	Unit is ms, default value is 50ms

	data from the serial port		
<BufClean>	Whether to clear the send buffer after exiting passthrough.	0	Do not empty the buffer Retains the buffered data after automatically exiting the pass-through mode in case of an error. The next time it reconnects into pass-through mode, it will send the data in the previous buffer to the server.
		1	Empty the cache The buffer is emptied after automatically exiting the pass-through mode in case of an error. The next time you reconnect and enter pass-through mode, you will not send the previously emptied buffer to the server.

12.14 Send data: AT+CIPSEND

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	Single connection (AT+CIPMUX=0): AT+CIPSEND=<length>	<p>This command is used to send data of non-variable length in single-link mode.</p> <p>1) Normally returns > (followed by a space).</p> <p>If you enter <length> length of data after >(space), the data is sent out automatically.</p> <p>If it is fast sending mode 0 or slow sending mode, the following is returned after the data is sent successfully: SEND OK</p> <p>If it is Fast Send Mode 1, the data is sent successfully with the following return: DATA ACCEPT:<length></p> <p>If data sending fails, the following is returned: SEND FAIL</p> <p>2) Returns if the connection was not established or if the connection was disconnected: +CME ERROR <err></p>
	Multiple connections (+CIPMUX=1): AT+CIPSEND=<n>[,<length>]	<p>When <length> is omitted, this command is used to send data of variable length in multi-connection mode. Response ">", At this time Input data and execute CTRL+Z(0x1A) to send, or execute ESC(0x1B) to abort the operation;</p> <p>When <length> is not omitted, this command is used to send data of non-variable length in multi-connection mode. In response to ">", > followed by the input of <length> length data, the data is automatically sent out.</p> <p>Returns if the connection was not established or if the connection was disconnected: +CME ERROR <err></p> <p>If it is fast sending mode 0 or slow sending mode, the following is returned after the data is sent successfully: <n>,SEND OK</p> <p>If it is Fast Send Mode 1, the data is sent successfully with the</p>

		<p>following return: DATA ACCEPT: <n>,<length></p> <p>Returns if data sending failed: <n>,<SEND FAIL</p>
execute a command	AT+CIPSEND	<p>This command is used to send variable-length data in single-link mode.</p> <p>Response ">", at this time Input data and execute CTRL+Z(0x1A) to send, or execute ESC(0x1B) to abort the operation</p> <p>Returns if the connection has not been established or has been disconnected: +CME ERROR <err></p> <p>If it is in slow send mode, the data is sent successfully with the following return: SEND OK</p> <p>If it is the fast send mode, there is the following return after the data is sent successfully: DATA ACCEPT:<length></p> <p>Returns if data sending failed: SEND FAIL</p>
Enquiry command	AT+CIPSEND?	<p>Single connection (AT+CIPMUX=0) returns: + CIPSEND: <size></p> <p>OK</p> <p>Multiple connections (AT+CIPMUX=1) returned: + CIPSEND: <n>,<size></p> <p>OK</p>
test command	AT+CIPSEND=?	<p>Single connection (AT+CIPMUX=0) returns: + CIPSEND: <length></p> <p>OK</p> <p>Multiple connections (AT+CIPMUX=1) returned: + CIPSEND: <0-7>,<length></p> <p>OK</p>
caveat		<ul style="list-style-type: none"> ● The maximum length of data to be sent is determined by the network. ● With AT+CIPATS it is possible to send data automatically for a set period of time. ● Data can only be sent if the connection has been established. ● The maximum number of bytes that can be sent at one time is not greater than the <size> value ● Slow hair mode is not recommended! ● The send command AT+CIPSEND or AT+CIPSEND=<length> ends with \r or \r\n. If the user ends with \r, if the first byte of the sent data happens to be \n, the module will judge that the send command ends with \r\n, resulting in the first character \n of the sent data being swallowed. Therefore, at this time, it is recommended that the user sends data ending in \r\n with CIPSEND. <p>Example: AT+CIPSEND\r >\n123456</p> <p>The module will judge it as AT+CIPSEND\r\n and will eat the first character \n in the data.</p>

	<p>The data received on the server side is 123456. the solution is:</p> <pre>AT+CIPSEND\r\n >\n123456</pre> <p>Another example:</p> <pre>AT+CIPSEND=7\r >\n123456</pre> <p>The module will judge it as AT+CIPSEND\r\n, which will eat the first character \n in the data, resulting in the data being one character short, and it will be sent out all the time. The solution is:</p> <pre>AT+CIPSEND=7\r\n >\n123456</pre>
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Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Link No. Consistent with the definition of <n> in +CIPSTRAT	0~5	Integer type, indicates the connection number
<length>	Send Data Length	-	integer type, which must be less than <size>.
<size>	Maximum data value per transmission	-	Integer type, currently 1460 bytes

12.15 Setting the timing time before sending data automatically: AT+CIPATS

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPATS=<mode>[,<time>]	OK
Enquiry command	AT+CIPATS?	+CIPATS: <mode>,<time> OK
test command	AT+CIPATS=?	+CIPATS: (list of <mode> values), (list of <time> values) OK

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<mode>	Whether to set the automatic sending time, integer type	0	Automatic data sending not set (default)
		1	Setting up automatic data sending

<time>	How many seconds before the data will be sent	1~100	Integer, in seconds
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12.16 Set whether to display '>' when sending data and send status prompt: AT+CIPSPRT

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+CIPSPRT=<send prompt>	OK
Enquiry command	AT+CIPSPRT?	+CIPSPRT: <send prompt> OK
test command	AT+CIPSPRT=?	+CIPSPRT: (list of <send prompt> values) OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<send prompt>	Whether or not to display '>' and send status prompt (i.e. 'SEND OK' or 'DATA ACCEPT') after executing AT+CIPSEND. integer type (math.)	0	Does not display '>' but returns "SEND OK" or "DATA ACCEPT" Note: The return "SEND OK" or "DATA ACCEPT" is determined by the setting of the AT+CIPQSEND command.
		<u>1</u>	Display '>' and return "SEND OK" or "DATA ACCEPT". default value Note: The return value of "SEND OK" or "DATA ACCEPT" is determined by the setting of the AT+CIPQSEND command.
		2	Does not display '>', does not return "SEND OK" or "DATA ACCEPT".

12.17 Query current connection status: AT+CIPSTATUS

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	AT+CIPSTATUS	If it is a single connection (AT+CIPMUX=0), return: OK

		STATE: <sl_state> Returns if multiplexed (AT+CIPMUX=1): OK STATE:<ml_state> C:<n>,<bearer>, <TCP/UDP>, <IP address>, <port>, <client state>
query instruction	AT+CIPSTATUS=<n> (Supported for multiple connections)	Multiplex connection (AT+CIPMUX=1), return: <n>,<bearer>, <TCP/UDP>, <IP address>, <port>, <client state>.
test command	AT+CIPSTATUS=?	Return: OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Link No.	0~5	Integer type, indicates the connection number Consistent with the definition of <n> in +CIPSTRAT
<bearer>	GPRS bearer	0~1	Default is 0
<IP address>	IP address	-	String parameters (strings need to be quoted)
<port>	port number	-	integer type (math.)
<sl_state>	single attachment state (computing)	IP INITIAL	initialisation
		IP START	Initiate tasks
		IP CONFIG	Configuration Scenarios
		IP GPRSACT	Scene activated
		IP STATUS	Get local IP status
		TCP CONNECTING/UDP CONNECTING/SERVER LISTENING	TCP connection in progress / UDP port registration in progress / server listening in progress
		CONNECT OK	Connection established successfully
		TCP CLOSING/UDP CLOSING	TCP connection is being closed, UDP port is being logged off
		TCP CLOSED/UDP CLOSED	Connection disconnected /UDP port logged off
		PDP DEACT	The scene is released
<ml_state>	multilink state	IP INITIAL	initialisation
		IP START	Initiate tasks
		IP CONFIG	Configuration Scenarios
		IP GPRSACT	Scene activated
		IP STATUS	Get local IP status
		IP PROCESSING	IP Data Phase
		PDP DEACT	The scene is released

<client state>	Client Status	INITIAL	initialisation
		CONNECTING	Connecting.
		CONNECTED	connected
		REMOTE CLOSING	peer-to-peer switch-off
		CLOSING	Closing
		CLOSED	Closed

12.18 Query connected data transfer status: AT+CIPACK

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	Multiple connections (+CIPMUX=1): AT+CIPACK=<n>	+CIPACK: <txlen>, <acklen>, <nacklen> OK
execute a command	Single connection (AT+CIPMUX=0): AT+CIPACK	+CIPACK: <txlen>, <acklen>, <nacklen> OK
test command	AT+CIPACK=?	OK
caveat	When the link is established, query AT+CIPACK, the initial values of the three parameters <txlen>, <acklen>, and <nacklen> are all 0, and these three parameters are cumulatively increased for each data sent. After AT+CIPSHUT or reconnecting after a link break, query AT+CIPACK and all three parameters are reset to 0	

Parameter Definition:

parameter	define	retrieve a value	Explanation of values
<n>	Link No.	0~5	Integer type indicating the connection sequence number. Consistent with the definition of <n> in +CIPSTRAT
<txlen>	Cumulative number of data bytes sent since link <n> was created	-	integer type (math.)
<acklen>	Cumulative number of bytes of data that the server has acknowledged receipt of since the link <n> was created	-	integer type (math.)
<nacklen>	Number of bytes of data not acknowledged by the server since the link <n> was established.	-	integer type (math.)

12.19 Set to CSD or GPRS connection mode: AT+CIPCSGP

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CIPCSGP=<mode>,[<apn>,<user>,<pwd>]	OK
Enquiry command	AT+CIPCSGP?	+CIPCSGP: <mode>, <apn>, <user>, <pwd> OK
test command	AT+CIPCSGP=?	+CIPCSGP: 0-CSD,DIAL NUMBER,USER NAME,PASSWORD,RATE(0-3) +cipcsGP: 1-gprs,apn,user name,password OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Wireless connection mode	<u>1</u>	GPRS connection
		<u>2</u>	<u>CSD Connect</u>
Parameters to be set under GPRS:			
<apn>	GPRS Access Point Name	-	String parameters (strings need to be quoted)
<username>	GPRS User Name	-	String parameters (strings need to be quoted)
<password>	GPRS Password	-	String parameters (strings need to be quoted)

12.20 Configuring Domain Name Server DNS: AT+CDNSCFG

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CDNSCFG=<pri_dns>[,<sec_dns>[,<cid>]]	OK
Enquiry command	AT+CDNSCFG?	PrimaryDns: <pri_dns> SecondaryDns: <sec_dns> OK
test command	AT+CDNSCFG=?	+CDNSCFG: ("Primary DNS"), ("Secondary DNS") OK

Parameter Definition:

parameters	define	retrieve value	Explanation of values
<pri_dns>	IP address of the primary name server		String parameters (strings need to be quoted)
<sec_dns>	IP address of the backup name servers		String parameters (strings need to be quoted)
<cid>	Definition same as <cid> in +SAPBR	1~3	After activating the pdp bearer using SAPBR, set up the DNS servers if necessary using the command with <cid> again

Examples:

Command (→) Return (←)	an actual example	Explanations and clarifications
+CDNSCFG commands to query and modify domain name servers scenario application 1 (TCPIP, MQTT application):		
→	AT+CREG?	Query current GPRS registration status
←	+CREG: 0,1 OK	<n>=0, indicating that URC reporting is disabled <stat>=1, identifies that a GPRS network has been registered and that it is a local network
→	AT+CSTT	
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	
←	10.113.72.66	
→	AT+CDNSCFG?	Query Default DNS Servers
←	PrimaryDns: 211.136.112.50 SecondaryDns: 211.136.150.66 OK	
→	AT+CDNSCFG=ip1,ip2	Customers can modify the DNS servers if required Please input ip1 and ip2 according to the actual dns server address, ip1 and ip2 can be added double brackets, you can also do not add the
←	OK	
→	AT+CIPSTART=TCP,<server domain>,<port>	Connects a domain address. All parameters can be enclosed in double brackets or not. This is an example of TCPIP application. If it is an MQTT application, you can enter the following commands: AT+MCONFIG, AT+MIPSTART, AT+MCONNECT, etc., please refer to Example of MQTT usage
←	OK CONNECT OK	

+CDNSCFG query and modify domain name servers scenario application 2 (HTTP,FTP application).		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	
←	OK	
→	AT+SAPBR=3,1, "APN", ""	
←	OK	
→	AT+SAPBR=1,1	Activate PDP context with cid=1
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213	
	OK	
→	AT+CDNSCFG=ip1,ip2,1	
←	OK	
→	AT+CDNSCFG?	Query DNS servers. For this application scenario, you must first execute the +CDNSCFG setup command to query the
←	PrimaryDns: ip1 SecondaryDns: ip2	The above ip1,ip2 are the actual DNS domain name server ip address, you can add double brackets or not.
	OK	
→	<p>HTTP application, enter the commands: AT+HTTPIPINIT, AT+HTTPIPADDR, AT+HTTPIPACT in order: Examples of HTTP usage</p> <p>FTP application, enter the commands: AT+FTPCID, AT+FTPSERV, AT+FTPUN, AT+FTPPW in order, please refer to the details: Example of FTP usage</p>	

12.21 Domain name resolution: AT+CDNSGIP

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CDNSGIP=<domain name>	<p>If the command is correct and the domain name resolves successfully, the response: OK</p> <p>+CDNSGIP: 1, <domain name>,<IPaddress></p> <p>If the command is correct, but the domain name resolution fails, the response: OK</p> <p>+CDNSGIP:0,<dns error code></p> <p>If the command syntax is incorrect, the response: ERROR</p>
test command	AT+CDNSGIP=?	Return: OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<domain name>	Domain names registered on the Internet	-	String parameters (strings need to be quoted), no more than 128 bytes
<IPAddress>	IP address of the domain name	-	String parameters (strings need to be quoted)
<dns error code>	DNS-related error codes	10	GENERAL ERROR
		11	MAX RETRIES
		12	NO SERVER ADDR
		13	NO MEMORY
		14	INVALID NAME
		15	INVALID RESP
		the rest	Some other error codes

12.22 Set whether to display the sender's IP address and port number when receiving data over a single link: AT+CIPSRIP

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPSRIP=<mode>	OK
Enquiry command	AT+CIPSRIP?	+CIPSRIP: <mode> OK
test command	AT+CIPSRIP=?	+CIPSRIP: (list of <mode> values) OK
caveat	This command is valid only in single connection mode (+CIPMUX=0)	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	Whether to display the sender's IP address and port number	0	No prompts are displayed (default)
		1	Display a prompt with the following format: RECV FROM:<IP ADDRESS>:<PORT>

12.23 Set whether to display IP header when receiving data from single link: AT+CIPHEAD

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPHEAD=<mode>	OK
Enquiry command	AT+CIPHEAD?	+CIPHEAD: <mode> OK
test command	AT+CIPHEAD=?	+CIPHEAD: (list of <mode> values) OK
caveat	This command is valid only in single connection mode (+CIPMUX=0).	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Whether to add an IP header prompt when receiving data	0	IP header not set
		1	Set the IP header in the format "+IPD,data length:"

12.24 Set whether single-link received data shows transport protocol in IP header: AT+CIPSHOWTP

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CIPSHOWTP=<mode>	OK
Enquiry command	AT+CIPSHOWTP?	+CIPSHOWTP: <mode> OK
test command	AT+CIPSHOWTP=?	+CIPSHOWTP: (list of <mode> values) OK
caveat	This command is valid only in single connection mode (+CIPMUX=0) and AT+CIPHEAD=1.	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Whether to display the transport protocol in the IP header when receiving data	0	Transmission protocol not displayed (default)
		1	Display the transport protocol in the format "+IPD,<data Size>,<TCP/UDP>:<data>"

12.25 Receive data in case of multiple links: +RECEIVE

Grammatical rules:

Command Type	vocabulary	Returns and notes
URC reporting	+RECEIVE,<n>,<length>. Received data	Note: Received data is the data received, separate from +RECEIVE,<n>,<length> on a separate line.

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<n>	Link No. Consistent with the definition of <n> in +CIPSTRAT	0~5	Integer type, indicates the connection number
<length>	Length of received data	-	integer type (math.)

12.26 Save TCPIP application context: AT+CIPSCONT

The execution command save for this command contains the corresponding TCPIP AT command parameters, i.e., the TCPIP application context, which are automatically loaded when the system reboots. The query command queries the current TCPIP application context settings.

Grammatical rules:

Command Type	vocabulary	Returns and notes
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Enquiry command	AT+CIPSCONT?	+CIPSCONT:<value> +CIPCSGP:<mode> Gprs Config APN:<apn> Gprs Config UserId: <user name> Gprs Config Password:<password> +CIPHEAD:<mode> +CIPSHOWTP:<mode> +CIPSRIP:<mode> +CIPATS:<mode>,<time> +CIPSPRT:<send prompt> +CIPQSEND:<n> +CIPMODE:<mode> +CIPCCFG:<NmRetry>,<WaitTm>,<SendSz>,<esc>,<Rxmode> ,<RxSize>,<Rxtimer> +CIPMUX:<n> +CIPDPDP:<mode>,<interval>,<timer> +CIPRXGET:<mode> +ciprdtimer: 2000,3500 OK
execute a command	AT+CIPSCONT	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<value>	Whether to save the context	0 1	Saving the TCPIP Application Context Default value, indicating that the TCPIP application context is not saved

12.27 Manual acquisition of network data: AT+CIPRXGET

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	Single link (AT+CIPMUX=0) when: AT+CIPRXGET=<mode>[,<len>]]	Turn on the manual data acquisition function: AT+CIPRXGET=1 (or 5) OK When set to 1, the first time the data is reported there will be a URC of +CIPRXGET:1 reported, and then later the data will not be reported until AT+CIPRXGET=2 or 3 comes to read it,

		<p>and then it will be reported again.</p> <p>When set to 5, every incoming data is reported, regardless of whether the last data was read or not.</p> <p>Received +CIPRXGET:1 Enter the following command to read the data manually: AT+CIPRXGET=2,<len></p> <p>+CIPRXGET:2,<cnlen>,<rlen> data</p> <p>OK</p> <p>Received +CIPRXGET:1 can also be read in hexadecimal: AT+CIPRXGET=3,<len></p> <p>+CIPRXGET:3,<cnlen>,<rlen> data</p> <p>OK</p> <p>Queries how much data is still unread: AT+CIPRXGET=4</p> <p>+CIPRXGET:4,<rlen> OK</p>
	<p>For multiple links (AT+CIPMUX=1):</p> <p>AT+CIPRXGET=<mode>,<n>[,<len>]</p>	<p>Turn on the manual data acquisition function input: AT+CIPRXGET=1 (or 5)</p> <p>OK</p> <p>Subsequent incoming data will be reported with a URC of +CIPRXGET:1</p> <p>Received +CIPRXGET:1 Enter the following command to read the data manually: AT+CIPRXGET=2,<n>,<len></p> <p>+CIPRXGET:2,<n>,<cnlen>,<rlen> data</p> <p>OK</p> <p>Received +CIPRXGET:1 can also be read in hexadecimal: AT+CIPRXGET=3,<n>,<len></p> <p>+CIPRXGET:3,<n>,<cnlen>,<rlen> data</p> <p>OK</p> <p>Queries how much data is still unread: AT+CIPRXGET=4,<n></p> <p>+CIPRXGET:4,<n>,<rlen> OK</p>
Enquiry command	AT+CIPRXGET?	+CIPRXGET:<mode> OK
test command	AT+CIPRXGET=?	OK
URC reporting	+CIPRXGET:1	Single link, after setting AT+CIPRXGET=1 or 5, when network data is received, a URC is reported as such, indicating that the data was received
	+CIPRXGET:1,<n>	Multilink, after setting AT+CIPRXGET=1 or 5, when network data is received, a URC is reported as such, indicating that the

		data is received
--	--	------------------

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	paradigm	0	Disables manual data acquisition. Default value.
		1	Enable manual data acquisition. After setting to 1, the first time the data is reported there will be a URC of +CIPRXGET:1 reported, and then later the data will not be reported until AT+CIPRXGET=2 or 3 to read it, and then it will be reported again
		2	retrieve data
		3	Read data (hexadecimal)
		4	How much data is unread?
		5	Enable manual data acquisition. When set to 5, every incoming data is reported.
<n>	Link id for multiple links	0-5	Definition is the same as the <n> of the +CIPSTART command.
<len>	The length of the data to be read	1-1460	When reading in normal character mode
		1-730	When reading in HEX mode
<cnlen>	Data already read		Unit: bytes
<rln>	Data not yet read		Unit: bytes

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
How to read network data manually when single link		
→	AT+CIPRXGET=1	Enable manual acquisition of network data
←	OK	
→	AT+CGREG?	Query current GPRS registration status
←	+CGREG: 0,1 OK	<n>=0, indicating that URC reporting is disabled <stat>=1, identifies that a GPRS network has been registered and that it is a local network
→	AT+CIPSTART="TCP", "36.9.88.120",6001	Connecting to the server (single link)
←	OK	
← (URC)	CONNECT OK	It's connected.
← (URC)	+CIPRXGET: 1	We're getting data from the server.
→	AT+CIPRXGET=2,150	Read the data, read 150 characters in the normal way of characters
←	+ciprxget: 2,10,0 1234567890	Read 10 data: 1234567890, there are still 0 data not yet read

	OK	
→	AT+CIPRXGET=4	Check how much data is unread.
←	+ciprxget: 4,0	0 unread
	OK	
← (URC)	+CIPRXGET: 1	The server's sending data again.
→	AT+CIPRXGET=3,150	Read data, read 150 characters as HEX
←	+ciprxget: 3,5,0 48454C4C4F OK	5 data read: HELLO, 0 data not yet read
How to read the network data manually in case of multiple links		
→	AT+CIPRXGET=1	Enable manual acquisition of network data
←	OK	
→	AT+CIPMUX=1	
←	OK	
→	AT+CSTT	After registering with the network, the module will automatically get an <apn> from the network and activate a PDP context (this <apn> can be queried by AT+CGDCONT?), so you can just type AT+CSTT, and the module will set the APN of CSTT according to the <apn> it gets automatically.
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	
←	OK	
→	AT+CIPSTART=3, "36.9.88.120",6001	"TCP", Creating multiple links
←	OK	
← (URC)	3, CONNECT OK	
← (URC)	+ciprxget: 1,3	Data received from the server on the link with id=3
→	AT+CIPRXGET=2,3,10	Read the data from link 3, read 10 characters, in the normal way of characters
←	+ciprxget: 2,3,5,0 AAAAA OK	Read 5 characters on link 3: AAAAA and 0 unread
→	AT+CIPRXGET=4,3	Check how much data is unread on link 3
←	+ciprxget: 4,3,0 OK	0 unread

12.28 Close TCP or UDP connection: AT+CIPCLOSE

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	For single connection AT+CIPCLOSE=<id>	Return: CLOSE OK
	Multiple connections AT+CIPCLOSE=<n>[,<id>]	Return: <n> ,CLOSE OK
execute a command	AT+CIPCLOSE	Returns if the closure was successful: CLOSE OK Returns if the closure fails: ERROR
test command	AT+CIPCLOSE=?	Return: OK
caveat	<ul style="list-style-type: none"> The Execute command is only valid for single links, and returns ERROR in multi-link mode. Execute the command AT+CIPCLOSE The connection is closed only if the TCP/UDP CONNECTING or CONNECT OK state is present; otherwise, it is considered that the closure has failed and returns ERROR. In single connection mode, the state after shutdown is IP CLOSE 	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<id>	shutdown mode	0	Slow Off (default)
		1	switch off quickly
<n>	Link No.	0~5	Integer type indicating the connection sequence number. Consistent with the definition of <n> in +CIPSTRAT

12.29 To close a moving scene: AT+CIPSHUT

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute a command	AT+CIPSHUT	Returns if the closure was successful: SHUT OK Returns if the closure fails: ERROR
test command	AT+CIPSHUT=?	Return: OK

caveat	<ul style="list-style-type: none"> You can close the mobile scene normally with AT+CIPSHUT, and the status is IPINITIAL after closing. Execute AT+CIPSHUT for multiple connections and all IP connections will be closed. If "+PDP:DEACT" is reported, it identifies that the GPRS is released by the network, and it is still necessary to perform AT+CIPSHUT to change the state.
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12.30 Modify the RNDIS card gateway IP address: AT+ROUTEIP

>=V1140 [version support](#)

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+ROUTEIP=<ip>	OK
Enquiry command	AT+ROUTEIP?	<ip> OK
test command	AT+ROUTEIP=?	OK

Parameter Definition:

parameters	define	retrieve value	Explanation of values
<ip>	Current RNDIS NIC gateway IP address		IP address, double quotes can be added or not, only support 192.168.X.2

12.31 Ping echo request command:AT+CIPPING

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CIPPING=<IPaddr>[,<retry Num>[,<dataLen>[,<timeout>[,<tTl>]]]]	+CIPPING: <replyId>,<Ip Address>,<replyTime>,<tTl>[<CR><LF> +CIPPING: <replyId>,<Ip Address>,<Ip Address>,<replyTime>,<tTl> [...]] OK
Enquiry 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 & It;tTl>s) OK
caveat	<ul style="list-style-type: none"> • The GPRS PDP context needs to be activated before sending the PING command. • When a ping is sent with no response, the message returned shows <replyTime>=600 and <tTl>=255. • When executing this command, if the GPRS PDP context is de-activated for some reason, such as dropping the network, then this command terminates immediately. 	

Parameter Definition:

parameters	define	retrieve value	Explanation of values
<IPAddr>	Destination server address for PING. either IP address or domain name is supported.	ip address	
		Domain name	
<retryNum>	Number of PINGs to be sent	1-100	Default value:4
		0	The maximum number of pings can reach 0xffffffff. >=V1120 version support
<dataLen>	Length of the PING request	0-1024	Default value:32
<timeout>	The timeout waiting for a single Echo Reply	1-600	Unit: 100 ms
<tTl>	time to live	1-255	Default value: 64
<replyId>	Echo Reply serial number		
<Ip Address>	IP Address of the remote host		
<replyTime>	time to receive the response		Unit: 1ms

Examples:

Comman d (→) / Return (←)	an actual example	Explanations and clarifications
→	AT+CSTT	
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	
←	10.207.9.213	
→	AT+CIPPING="www.baidu.com"	
←	+CIPPING: 1, "36.152.44.96", 35, 54 +CIPPING: 2, "36.152.44.96", 20, 54	

	+CIPPING: 3, "36.152.44.96", 20, 54 +CIPPING: 4, "36.152.44.96", 35, 54 OK	
→	AT+CIPPING="www.baidu.com",0	The maximum number of pings can reach 0xffffffff. >=V1120 version support
←	+CIPPING: 1, "112.80.248.76", 40, 54 +CIPPING: 2, "112.80.248.76", 45, 54 +CIPPING: 3, "112.80.248.76", 35, 54 +CIPPING: 4, "112.80.248.76", 35, 54 +CIPPING: 5, "112.80.248.76", 40, 54 +CIPPING: 6, "112.80.248.76", 35, 54 ...	

12.32 Setting TCP keep-alive parameters: AT+CIPTKA

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT+CIPTKA=<mode>[,<keepIdle>[,<keepInterval>[,<keepCount>]]]	OK
Enquiry command	AT+CIPTKA?	+CIPTKA:<mode>,<keepIdle>,<keepInterval>,<keepCount> OK
test command	AT+CIPTKA=?	+CIPTKA:(listofsupported<mode>s),(listofsupported<keepIdle>s),(listofsupported<keepInterval>s),(listofsupported<keepCount>s) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	Whether to enable TCP keep-alive	0 <u>1</u>	cloture opens
<keepIdle>	If there is no data interaction on the link within the <keepIdle> time, send an initial keep-alive probe (initial keep-alive probe)	30~7200	Unit is in seconds, default value is 7200
<keepInterval>	Interval between retransmissions of inactivated probes	30~600	In seconds, default value is 75

<keepCount>	Maximum number of live probes to be sent	1 to 9	Unit is times, default value is 9
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12.33 Heartbeat packet parameter setting:AT^HEARTCONFIG

This command is used to configure heartbeat related parameters (whether to allow sending heartbeat packets, socket id, heartbeat interval).

Grammatical rules:

Command Type	vocabulary	Returns and notes
Setup Commands	AT^HEARTCONFIG=<option>,<socket_id>,<heartbeat_time>	OK
Enquiry command	AT^HEARTCONFIG?	^HEARTCONFIG: <enable>,<socket_id>,<heartbeat_time> OK
test command	AT^HEARTCONFIG=?	OK
caveat	Currently only one way link setting heartbeat packet is supported.	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<option>	Whether to enable the heartbeat packet function	0	disabled
		1	enabled
<socket_id>	Connection id, defined as <n> in +CIPSTART	0~5	Fixed to 0 if single link In case of multiple links, the value is 0~5.
<heartbeat_time>	heart interval	5~600	In seconds, default value is 120

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT^HEARTCONFIG?	Query the current heartbeat configuration
←	^heartconfig: 0,0,120 OK	The default configuration is: heartbeat is off, heartbeat interval is 120 seconds
→	at^heartconfig=1,0,180	Enable the heartbeat function with cid=0 and

		set the heartbeat interval to 180 seconds
←	OK	
→	AT^HEARTCONFIG?	Re-query heartbeat settings
←	^heartconfig: 1,0,180 OK	The heartbeat packet function has been turned on, when a cid=0 link is established with the server (can be a single link or multiple links), a heartbeat packet will be sent automatically, and the heartbeat packet content will be the IMEI of the module by default.

12.34 Set heartbeat packet content:AT^HEARTBEAT

This command sets the content of the heartbeat packet. The default state uses your own IMEI as the heartbeat packet content.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup		
Command	AT^HEARTBEAT=<socket_id>,<data>	OK
Enquiry command	AT^HEARTBEAT?	^HEARTBEAT: <socket_id>,<data> OK
test command	AT^HEARTBEAT=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<socket_id>	Connection id, defined as <n> in +CIPSTART	0~5	Fixed to 0 if single link In case of multiple links, the value is 0~5.
<data>	Heartbeat Pack Contents		String type, up to 256 bytes long

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT^HEARTBEAT?	Query the current heartbeat content
←	^heartbeat: 0,866714044915436	Default heartbeat is IMEI

	OK	
→	AT^HEARTBEAT=0,TCP-heart	Setting up a new heartbeat
←	OK	
→	AT^HEARTBEAT?	Re-enquiry
←	^HEARTBEAT: 0,TCP-heart	
	OK	

12.35 Setting the contents of a heartbeat packet in HEX encoding format:AT^HEARTBEATHEX

This command sets the content of the heartbeat packet to hexadecimal data.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	If single link (i.e. AT+CIPMUX=0) AT^HEARTBEATHEX=<len>,<data>	OK
	If multiple links (i.e. AT+CIPMUX=1) AT^HEARTBEATHEX=<socket_id>,<len>,<data>	>After returning, the content of the set heartbeat packet is automatically sent out
Enquiry command	AT^HEARTBEATHEX?	^HEARTBEATHEX: <socket_id>,<data> OK
test command	AT^HEARTBEATHEX=?	OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<socket_id>	Connection id, defined as <n> in +CIPSTART	0~5	Fixed to 0 if single link In case of multiple links, the value is 0~5.
<len>	data length		
<data>	Heartbeat Pack Contents		String type, up to 256 bytes long

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+CIPMUX=1	Set to multiple links
←	OK	

→	AT+CSTT	
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	
←	10.134.100.30	
→	AT+CIPSTART=5, "TCP", "116.28.164.159",40117	Connect to a loopback server (i.e. what you send it, what it sends back) Note: The address and port are arbitrary, please do not copy!
←	OK 5, CONNECT OK	
→	at^heartconfig=1,5,120	Turn on the heartbeat for connection 5.
←	OK	
→	AT^HEARTBEATHEX=5,6,414243444546	Set the content of the new heartbeat to ABCDEF
←	OK	
←	+RECEIVE,5,6. ABCDEF	

12.36 Query heartbeat packet delivery: AT^HEARTINQUIRE

This command queries the heartbeat packet sending status.

Grammatical rules:

Command Type	vocabulary	Returns and notes
Enquiry command	AT^HEARTINQUIRE?	^HEARTINQUIRE: <suctime>,<nexttime>,<heartbeat_time> OK
Test Command	AT^HEARTINQUIRE=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<suctime>	How many seconds ago did you send a successful message?		Unit: seconds
<nexttime>	How many seconds left to send the next one?		Unit: seconds

<heartbeat_time>	How many messages have you sent?		Unit: Article
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Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	at^heartconfig=1,0,120	Setting the Heartbeat Packet feature on
←	OK	
→	AT+CIPSTART="TCP", "36.6.*.*",12345	Connecting to a server Please fill in the server address and port according to your own actual situation, do not copy!
←	OK CONNECT OK	
→	AT^HEARTINQUIRE?	Querying Heartbeat Packet Delivery
←	^heartinquire: 115,5,8 OK	
→	AT^HEARTCONFIG=0	Setting Heartbeat Packet Function Off
←	OK	
→	AT^HEARTINQUIRE?	Querying Heartbeat Packet Delivery
←	^HEARTINQUIRE: 0,0,0 OK	The statistics have been cleared.

12.37 Switching from data mode or PPP online mode to command mode:

++++

The +++ character sequence allows the TA to ignore the current AT interface data transfer and switch to command mode. It allows the TA to enter AT commands while maintaining a data connection to the remote server.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute command	+++	OK Note: The following steps need to be followed to avoid ++++ being incorrectly recognised as data: 1. No character is entered for T1 time (1 second) before "++++" is entered.

		<p>2. Enter three consecutive + signs within 0.5 second, with no other characters between each + sign.</p> <p>3. No character is entered within T1 time (0.5 seconds) after "++++" is entered.</p> <p>4. Switch to Command Mode, otherwise re-enter step 1.</p>
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Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	ATD*99#	data dialling
←	CONNECT	Data dialling successful
→	+++	+++ Exits data mode and returns to command mode
←	OK	OK appears, indicating that you have returned to command mode
→	ATH	Hang up the data link, otherwise you can't data dial again next time
←	OK	Hang up successfully.

12.38 Switching from command mode to data mode: ATO

Grammatical rules:

Command Type	vocabulary	Returns and notes
execute command	a ATO	<p>Successfully, returns. CONNECT</p> <p>Description: TA continues the data transfer connection, i.e. switches back from command mode to data mode</p> <p>Returns if it is not possible to revert to data mode: NO CARRIER</p>

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	ATD*99#	data dialling
←	CONNECT	successes
→	+++	Cut to AT command mode
←	OK	successes
→	ATO	Cut to data mode again.
←	CONNECT	successes

12.39 TCP/UDP error codes

If an error occurs during a TCP application, it will be reported as TCP ERROR:<err code>.

TCP error code:

Error code <err code>	Chinese Interpretation	Interpretation in English
0	successes	No error
1	TCPIP threads are not used	TCPIP is idle
2	No tsapi available	No tsapi
3	Invalid tsapi	Invalid tsapi
4	lack of space	No buffer
5	network error	Network error
6	Remote host unreachable	Remote host is unreachable
7	Address in use	The address is already in use
8	Invalid address	The address is not available
9	Carrying too much or too little data	The supplied buffer is too large or small
10	Invalid parameter	Invalid parameter
11	Remote host refuses to connect	Remote host has rejected the connection
12	overtime pay	Time out
13	Connection terminated	An established connection is aborted
14	Connection reset	Remote host has reset the connection
15	Socket connection established.	The socket is already connected
16	The socket is not connected.	The socket is not connected
17	The socket connection has been disconnected.	The socket has been shutdown
18	unknown error	Undefined error

If an error occurs during a UDP application, it will be reported as UDP ERROR:<err code>.

UDP error code:

Error code <err code>	Chinese Interpretation	Interpretation in English
0	successes	No error
1	TCPIP threads are not used	TCPIP is idle
2	No tsapi available	No tsapi
3	Invalid tsapi	Invalid tsapi
4	Callbacks are not registered	The callback has not been registered
5	lack of space	No buffer
6	network error	Network error
7	Remote host refuses to connect	Remote host has rejected the connection
8	Remote host unreachable	Remote host is unreachable

9	Address in use	The address is already in use
10	Invalid address	The address is not available
11	Carrying too much or too little data	The supplied buffer is too large or small
12	Invalid parameter	Invalid parameter
13	TCPIP thread busy	TCPIP is busy
14	unknown error	Undefined error
15	Socket connection established.	The socket is already connected

12.40 state machine

When TCPIP related commands are entered, the status of the module is migrated accordingly. The command to query the status is AT+CIPSTATUS.

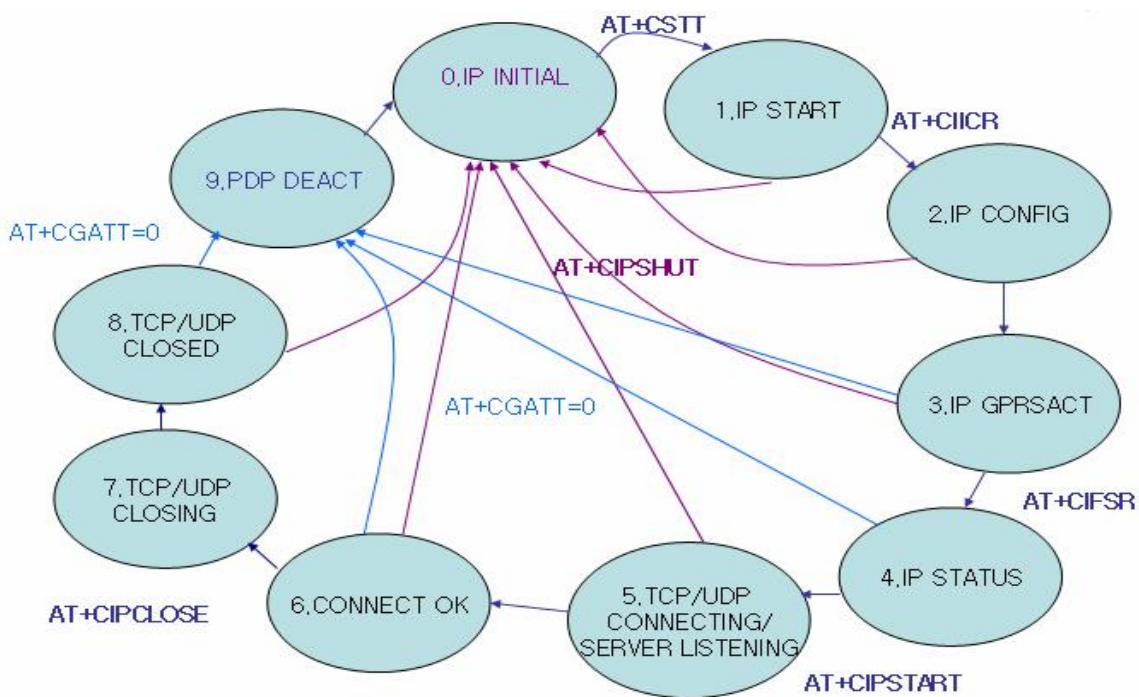


Figure 1: State machine with single link

A few notes on single-connected state machines:

- ◆ Input AT+CIICR, it will enter the IP CONFIG state immediately, and when it returns OK, it will enter the IP GPRSACT state;
- ◆ After entering AT+CIPSTART, it will immediately enter the IP/UDP CONNECTING state. If the subsequent module reports CONNECT OK this URC, it indicates that the connection to the server is successful, and then it enters the CONNECT OK state;
- ◆ Enter AT+CIPCLOSE and immediately enter the TCP/UDP CLOSING state. At this time, if the module reports

CLOSE OK, it indicates that the connection with the server is closed successfully, and the module enters the TCP/UDP CLOSED state at this time;

- ◆ If the module reports +PDP DEACT this URC, it signifies that the module releases the PDP context and enters the PDP DEACT state;
- ◆ Entering AT+CGATT=0 in the IP GPRSACT, IP STATUS, CONNECT OK, and TCP/UDP CLOSED states also causes the module to release the context and enter the PDP DEACT state;
- ◆ The module enters the PDP DEACT state and still needs to enter AT+CIPSHUT to enter the IP INITIAL state;
- ◆ The module can enter the IP INITIAL state by entering AT+CIPSHUT in all states.

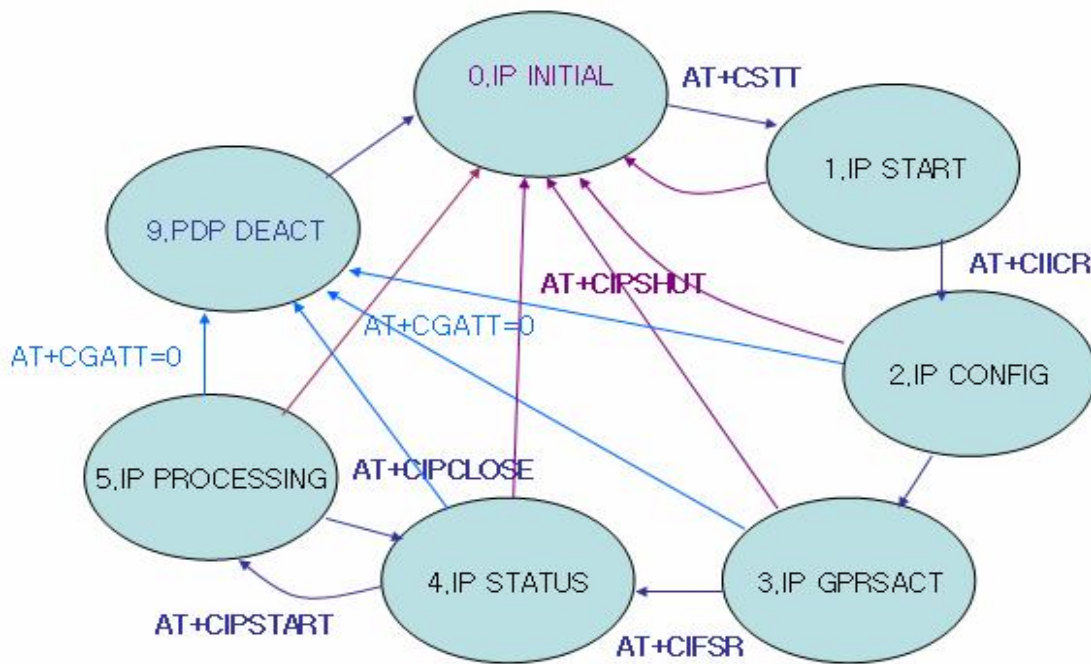


Figure 2: State machine for multiple links

12.41 Example of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
<p>TCP non-transparent application 1 : module as client, single link, send data (In fact, there are two types of TCP sending methods, fast and slow, which are set by the +CIPQSEND command. The difference is: slow send every send data need to server side of the confirmation, while fast send to the module can be sent, do not need to server confirmation. (Slow send may not respond for a long time and the AT channel is blocked, so fast send mode is recommended)</p>		
→	AT+CREG?	Query current GPRS registration status
←	+CREG: 0,1 OK	<n>=0, indicating that URC reporting is disabled <stat>=1, identifies that a GPRS network has been registered and that it is a local network
→	AT+CGATT?	View current GPRS attachment status
←	+CGATT: 1 OK	<state>=1, indicating that GPRS is currently attached
→	AT+CIPMUX=0	Set to single link mode
←	OK	
→	AT+CIPQSEND=1	Setting to fast send mode (this mode is recommended)
←	OK	
→	AT+CSTT	Start the task, set the APN After registering with the network, the module will automatically get an <apn> from the network and activate a PDP context (this <apn> can be queried by AT+CGDCONT?), so you can just enter AT+CSTT, and the module will internally set the APN of CSTT in accordance with the <apn> it automatically gets.
←	OK	
→	AT+CIICR	Activate the mobile scene and get the IP address
←	OK	
→	AT+CIFSR	Query the assigned IP address
←	010.083.172.111	
→	AT+CIPSTATUS	Check link status
←	OK STATE: IP STATUS	

→	AT+CIPSTART="TCP", "60.166.18.9",7500 maybe AT+CIPSTART="TCP", "60.166.18.9", "7500"	Among them: "TCP" is the protocol type of the link. "60.166.18.9" is the IP address of the end server. 7500 is the TCP port number of the other server. Note: CIPSTART sets all the parameters of the command, and the double brackets can be used or not.
←	OK	
← (URC)	CONNECT OK	If the link is successful, this is how the URC will be reported
→	AT+CIPSTATUS	Check link status
←	OK STATE: CONNECT OK	Link established successfully
→	AT+CIPSEND	Send data (variable length, sent manually)
→	>1234567890<CTRL-Z>	When ">" appears, enter the data to be sent: 0123456789. <CTRL-Z> is used to send the data, sending the hexadecimal number 0x1A is equivalent to sending <CTRL-Z>.
←	DATA ACCEPT:10	Sent successfully and received by the server on the other end
→	AT+CIPACK	Every time you send a message, you can check the status of the message to see if the server has received the last message.
←	+cipack: 10,10,0 OK	The first 10, indicates the number of data bytes that have been sent, the second 10 indicates the number of data bytes received by the server, and 0 indicates the number of data bytes that have not yet been received by the server
→	AT+CIPSEND=10	Send data (determine length)
→	>1234567890	
←	DATA ACCEPT:10	Input data up to 10 bytes, no need to send <CTRL-Z>. That is, 1A in hexadecimal, which will automatically send the
→	AT+CIPATS=1,10	Set up automatic sending, the timing of automatic sending is 10S
←	OK	
→	AT+CIPSEND	Send data
→	>1234567890	
←	DATA ACCEPT:10	10s timer overflow, no need to send <CTRL-Z> i.e. 1A in hex, data will send itself
→	AT+CIPSEND=100	
→	>123	
←	DATA ACCEPT:3	10s timer overflow, input content does not have to reach 100 bytes or send <CTRL-Z> i.e. 1A in hexadecimal, the data will send itself
→	AT+CIPCLOSE	Close TCP link
←	CLOSE OK	Closed successfully
→	AT+CIPSTATUS	Check link status

←	OK	TCP link is down.
	STATE: TCP CLOSED	
→	AT+CIPSHUT	Closing the mobile scene
←	SHUT OK	Closed successfully
→	AT+CIFSR	Query current module IP
←	ERROR	The IP address is no longer available.
TCP non-transparent application 2: module as a client, single link, send data, open SSL function		
→	AT+CIPMUX=0	Set to single link mode
←	OK	
→	AT+CIPQSEND=1	Send mode is fast
←	OK	
→	AT+CIPSTATUS	Check Link Status
←	OK	
	STATE: IP INITIAL	
→	AT+CIPSSL=1	Turn on SSL (neither party needs to verify the certificate in this example)
←	OK	
→	AT+CIPSTART="TCP", "60.166.18.9",7500	When the module is set to single link and the status is IP INITIAL, the connection can also be established directly with CIPSTART without having to enter CSTT CIICR CIFSR first. Please write the actual server address and port, don't copy it!
←	OK	
← (URC)	CONNECT OK	If the link is successful, this is how the URC will be reported
→	AT+CIPSEND	Send data
→	>1234567890<CTRL-Z>	<CTRL-Z> is used to send data, sending the hexadecimal number 0x1A is equivalent to sending <CTRL-Z>.
←	DATA ACCEPT:10	Indicates that the module received 10 bytes of pending data input from TE
	.....	+CIPCLOSE,+CIPSHUT, without further ado
TCP non-transparent application 3: module as a client, single link, send data, turn on SSL function (two-way certificate validation)		
→	AT+CIPMUX=0	Set to single link mode
←	OK	
→	AT+CIPQSEND=1	Set to fast send
←	OK	
→	AT+CIPSSL=1	Enable SSL function switch is on
←	OK	
→	AT+FSCREATE="ca.crt"	Creating a CA certificate file

←	OK	
→	AT+FSCREATE="client.crt"	Creating a client certificate file
←	OK	
→	AT+FSCREATE="client.key"	Creating a Client Key File
←	OK	
→	at+fswrite="ca.crt",0,2080,15	File length 2080 is only an example, to be filled in according to the actual. The same as below.
←	>	Enter the CA certificate file here
←	OK	
←	AT+FSWRITE="client.crt",0,128,10	
→	>	Enter the client certificate file here
←	OK	
→	AT+FSWRITE="client.key",0,188,10	
←	>	Enter the client key file here
←	OK	
→	AT+SSLCFG="cacert",0, "ca.crt"	Setting the Server CA Certificate SSL context id, defaults to 0 in the case of a single link
←	OK	
→	AT+SSLCFG="clientcert",0, "client.crt"	Setting the client certificate
←	OK	
→	AT+SSLCFG="clientkey",0, "client.key"	Setting the Client KEY
←	OK	
→	AT+SSLCFG="seclevel",0,2	Setting the security level
←	OK	
→	AT+SSLCFG="ciphersuite",0,0X0035	Setting up the encryption suite
←	OK	
→	AT+SSLCFG="clientrandom",0,101B12C31415161 71F1920212223242526272829303132333435363 7	Setting the random number
←	OK	
→	AT+CIPSTART=TCP,tcplab.openluat.com,57513	
←	OK	
← (URC)	CONNECT OK	
→	AT+CIPSEND=10	Send data (determine length)
→	>1234567890	
←	DATA ACCEPT:10	Input data reaches 10 bytes, no need to send <CTRL-Z> i.e. 1A in hexadecimal, the data will be sent automatically.
→	AT+CIPSHUT	
←	OK	
→	AT+CIPSSL=0	Disable SSL function
←	OK	
UDP non-transparent application 1: module as a client, single link, data sending		

→	AT+CIPMUX=0	Set to single link mode
←	OK	
→	AT+CIPQSEND=1	Set to fast fire mode
←	OK	
→	AT+CSTT	Start the task, set the APN After registering with the network, the module will automatically get an <apn> from the network and activate a PDP context (this <apn> can be queried by AT+CGDCONT?), so you can just enter AT+CSTT, and the module will internally set the APN of CSTT in accordance with the <apn> it automatically gets.
←	OK	
→	AT+CIICR	Activate the mobile scene and get the IP address
←	OK	
→	AT+CIFSR	Query the assigned IP address
←	010.083.172.111	
→	AT+CIPSTART="UDP", "60.166.18.9",6100	Establish a UDP link where: "UDP" is the protocol type of the link. "60.166.18.9" is the IP address of the end server. 6100 is the UDP port number of the peer server
←	OK	
← (URC)	CONNECT OK	If the link is successful, this is how the URC will be reported
→	AT+CIPSEND	Send data
→	>1234567890<CTRL-Z>	<CTRL-Z> i. e. hexadecimal 1A
←	DATA ACCEPT:10	Successfully sent data to the module
	.....	+CIPCLOSE,+CIPSHUT, without further ado

**Multi-connection application 1: module as a client, multi-link, send data, SSL certificate two-way authentication function open (fast send)
Note: This example is linking two different servers at the same time.**

→	AT+CIPSSL=1	Enable SSL function switch
←	OK	
→	AT+CIPMUX=1	
←	OK	
→	AT+FSCREATE="server1.crt"	Creating the CA certificate file of server1
←	OK	
→	AT+FSCREATE="server2.crt"	Creating the CA certificate file of server2
←	OK	
→	AT+FSCREATE="client.crt"	Creating a client certificate file
←	OK	
→	AT+FSCREATE="client.key"	Creating a Client Key File
←	OK	
→	AT+FSWRITE="server1.crt",0,2080,15	File length 2080 is only an example, to be filled in according to the actual.

		The same as below.
←	>	Enter the CA certificate file for Server 1 here
←	OK	
→	AT+FSWRITE="server1.crt",0,1962,15	
←	>	Enter the CA certificate file for Server 2 here
←	OK	
←	AT+FSWRITE="client.crt",0,128,10	
→	>	Enter the client certificate file here
←	OK	
→	AT+FSWRITE="client.key",0,188,10	
←	>	Enter the client key file here
←	OK	
→	AT+SSLCFG="cacert",1, "server1.crt"	Setting the CA certificate of Server 1 The SSL context id of a multilink is bound to the link id of the multilink, and the SSL context id of link 1 is also 1
←	OK	
→	AT+SSLCFG="cacert",2, "server2.crt"	Setting the CA certificate of Server 2
←	OK	
→	AT+SSLCFG="clientcert",1, "client.crt"	Setting the client certificate for SSL context 1 (i.e. link 1)
←	OK	
→	AT+SSLCFG="clientcert",2, "client.crt"	Setting the client certificate for SSL context 2 (i.e. link 2)
←	OK	
→	AT+SSLCFG="clientkey", 1, "client.key"	Set the client KEY for SSL context 1 (i.e., link 1)
←	OK	
→	AT+SSLCFG="clientkey", 2, "client.key"	Set the client KEY for SSL context 2 (i.e., link 2)
←	OK	
→	AT+SSLCFG="secllevel",1,2	Setting the security level of SSL context 1 (i.e. link 1): two-way authentication
←	OK	
→	AT+SSLCFG="secllevel",2,2	Setting the security level of SSL context 2 (i.e. link 2): two-way authentication
←	OK	
→	AT+SSLCFG="ciphersuite",1,0X0035	Setting the cipher suite for SSL context 1 (i.e. link 1)
←	OK	
→	AT+SSLCFG="ciphersuite",2,0X0035	Setting up the cipher suite for SSL context 2 (i.e. link 2)
←	OK	
→	AT+SSLCFG="clientrandom",1,10B12C3141516171F19202122232425262728293031323334353637D	Setting the random number for link 1
←	OK	

→	AT+SSLCFG="clientrandom",2,581B12C3141516171F1920214A23249C262728293031323334353632	Setting the random number for link 2
←	OK	
→	AT+CIPQSEND=1	Set to fast fire mode
←	OK	
→	AT+CSTT	Setting the module APN After registering with the network, the module will automatically get an <apn> from the network and activate a PDP context (this <apn> can be queried by AT+CGDCONT?), so you can just enter AT+CSTT, and the module will internally set the APN of CSTT in accordance with the <apn> it automatically gets.
←	OK	
→	AT+CIICR	
←	OK	
→	AT+CIFSR	
←	010.083.172.111	
→	AT+CIPSTART=1, "TCP", "60.166.12.210",7500	
←	OK	
← (URC)	1,CONNECT OK	The TCP link with Id=1 was successfully established.
→	AT+CIPSTART=2, "TCP", "60.166.13.215",6100	
←	OK	
← (URC)	2,CONNECT OK	The TCP link with Id=2 was successfully established.
→	AT+CIPSTATUS	Query the current link status
←	OK STATE: IP PROCESSING C: 0,,,"", "INITIAL" c: 1,0, "tcp", "60.166.12.210", "7500", "connected" c: 2,0, "tcp", "60.166.12.210", "7500", "connected" c: 3,,,"", "initial" c: 4,,,"", "initial" c: 5,,,"", "initial"	
→	AT+CIPSEND=1	Sending data over a TCP 1 link
→	>1234567890<CTRL-Z>	<CTRL-Z> i.e. hexadecimal 1A
←	DATA ACCEPT:1,10	
→	AT+CIPSEND=2	Sending data over a TCP 2 link
→	>1234567890<CTRL-Z>	<CTRL-Z> i.e. hexadecimal 1A
←	DATA ACCEPT:2,10	
	.....	Other actions to send data
→	AT+CIPSHUT	If you want to close all connections

←	SHUT OK	
→	AT+CIPMUX=0	If you want to switch off the multi-connection mode, you must do so after AT+CIPSHUT
←	OK	
→	AT+CIPSSL=0	Disable the SSL function.
←	OK	
Multi-connection application 2: module as client, multiple links, send data, SSL not enabled		
→	AT+CIPMUX=1	Set to multi-link mode
←	OK	
→	AT+CIPQSEND=1	Set to fast fire mode
←	OK	
	.....	Imitation TCP non-transparent application 1 example , send the three commands CSTT CIICR CIFSR in order.
→	AT+CIPSTART=4, "TCP", "60.166.12.210",7500	
←	OK	
← (URC)	4, CONNECT OK	The TCP link with Id=6 was successfully established.
→	AT+CIPSTART=5, "UDP", "60.166.12.210",6100	
←	OK	
← (URC)	5, CONNECT OK	The UDP link with Id=7 was successfully established.
→	AT+CIPSEND=4,10	Sending data over a TCP link, fixed-length sending
→	>1234567890	
←	DATA ACCEPT:4,10	
→	AT+CIPSEND=5	Sending data over a UDP link, indeterminately long
→	>1234567890<CTRL-Z>	<CTRL-Z> i.e. hexadecimal 1A
←	DATA ACCEPT:5,10	
→	AT+CIPATS=1,10	Set to send automatically, and the timer is set to 10S, starting when the command returns OK.
←	OK	
→	AT+CIPSEND=4	Send data on TCP link with id=6
→	>TEST Auto fast send	Enter the string to be sent (it is not necessary to enter <CTRL-Z> i.e. 1A in hexadecimal)
←	DATA ACCEPT:4,19	Data is automatically sent when the 10S timer arrives
	.....	+CIPCLOSE,+CIPSHUT, without further ado
Receive data when single link is not passthrough:		
	.....	Establishing a TCP link, as described in detail earlier, will not be repeated here.
→	AT+CIPHEAD=1	Set to receive data with a data header
←	OK	
← (UCR)	+IPD,4:TEST	The module receives a string of character

		data from the SERVER side: TEST
→	AT+CIPSHOWTP=1	Setting the protocol used to display data when receiving data
←	OK	
← (UCR)	+IPD,4,TCP:TEST	The module receives data from the SERVER side: TEST. the protocol used is also displayed. If it is a UDP link, it is displayed: +ipd,4,udp:test
→	AT+CIPSRIP=1	Setting the IP address and port of the sender to be displayed when receiving data
←	OK	
← (URC)	+RECV FROM: 60.166.12.210:7500 +IPD,4:TEST	Receive data from the server, it is a character "TEST", the length is 4.
→	AT+CIPSHOWTP=0	Do not display the protocol type in the receive data header
←	OK	
→	AT+CIPHEAD=0	Data header not displayed
←	OK	
→	AT+CIPSRIP=0	The IP address and port of the data transmitter are not displayed.
←	OK	
← (URC)	TEST	Data received at this time:TEST
Receive data when the multilink is not passthrough:		
	.....	Imitation <u>TCP non-transparent application 1</u> example , send the three commands CSTT CIICR CIFSR in sequence and establish a TCP link with connection number 0 and a UDP link with connection number 1.
← (URC)	+RECEIVE,0,7. TEST123	A 7-character string is received on the TCP link at link 0: TEST123
← (URC)	+RECEIVE,1,10. TEST123456	Received a 10 character string on the UDP link at link 1: TEST123456
Transparent Transport Application 1: TCP Data Transfer		
→	AT+CIPMODE=1	Setting a TCPIP application to transparent transmission mode
←	OK	
→	AT+CIPSTART="TCP", "60.166.18.9",7500	Establish a TCP link where: "TCP" is the protocol type of the link. "60.166.18.9" is the IP address of the end server. 7500 is the TCP port number of the other server.
←	OK	
← (URC)	CONNECT	If the link is successful, this is how the URC will be reported

→/←	.....	Transmission starts, input data here and transmit, you can also receive data from the server at this time.
→	.....+++	If you want to return to AT command mode, enter ++++ after the data Note: +++ needs to fulfil certain conditions to be considered as an escape sequence by the module, otherwise it will be considered as data: 1, 1000ms interval required before the first + 2, 500ms interval required after the last + 3, the interval between three + cannot exceed 500ms
←	OK	OK indicates that you have returned to the AT command mode
→	ATO	ATO for return data mode
←	CONNECT	CONNECT indicates entry into pass-through mode
→/←	.....	At this point you can start transmitting data again
←	TCP ERROR:×× or CLOSED	When a protocol stack error occurs in the transmission, it goes to the AT command state and reports this error code
→	AT+CIPSHUT	When this happens, +CIPSHUT closes the connection. If no error occurs, ++++ returns to the AT command status, then +CIPSHUT closes the connection
←	SHUT OK	
Transparent Transport Application 2: UDP Data Transfer		
→	AT+CIPMODE=1	Setting a TCPIP application to transparent transmission mode
←	OK	
→	AT+CSTT	Setting the module APN After registering with the network, the module will automatically get an <apn> from the network and activate a PDP context (this <apn> can be queried by AT+CGDCONT?), so you can just enter AT+CSTT, and the module will internally set the APN of CSTT in accordance with the <apn> it automatically gets.
←	OK	
→	AT+CIICR	Activate the mobile scene and get the IP address
←	OK	
→	AT+CIFSR	Query the assigned IP address
←	010.083.172.111	
→	AT+CIPSTART="UDP", "60.166.18.9",6100	Establish a UDP link where: "UDP" is the protocol type of the link. "60.166.18.9" is the IP address of the end server. 6100 is the UDP port number of the peer server

←	OK	
← (URC)	CONNECT	If the link is successful, this is how the URC will be reported
→/←	.....	Transmission starts, input data here and transmit, you can also receive data from the server at this time.
←	UDP ERROR: × ×	When a protocol stack error occurs in the transmission, it goes to the AT command state and reports this error code
→	AT+CIPSHUT	When this happens, +CIPSHUT closes the connection. If no error occurs, ++++ returns to the AT command status, then +CIPSHUT closes the connection
←	SHUT OK	
←	OK	

Domain name resolution:

Note: This command works properly only after executing at+csstt, at+ciicr, and at+cifsr. Please refer to the input method of these three commands: [TCP Non-Transparent Application 1](#) for an example of the

→	AT+CDNSGIP="WWW.SINA.COM.CN"	Resolve Sina.com's domain name
←	OK +cdnsgip:1, "www.sina.com.cn", "221.179.180.76"	Return IP address

Summary of send and receive formats.

Data sending (multilink mode, with link number <n>=5 as an example)

	link agreement	snapshot	slow onset
single link	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
multilink	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 reception (Multi-link mode with link number <n>=1 as an example)

	link agreement	AT+CIPHEAD=0	AT+CIPHEAD=1	
			+CIPSHOWTP=0	+CIPSHOWTP=1
single link	TCP	TEST123	+IPD,7:TEST123	+ipd,7,tcp:test123
	UDP	TEST123	+IPD,7:TEST123	+ipd,7,udp:test123
multilink	TCP	+RECEIVE,1,7.	+RECEIVE,1,7.	+RECEIVE,1,7.
		TEST123	TEST123	TEST123
	UDP	+RECEIVE,1,7.	+RECEIVE,1,7.	+RECEIVE,1,7.
		TEST123	TEST123	TEST123

What to do if the module has a context de-activated active upload:

← (URC)	+PDP DEACT	PDP de-activation, at which point a PDP context needs to be re-activated to continue using TCPIP AT commands
→	AT+CIPSHUT	Closing the mobile scene
←	OK	
	There are two ways to handle this, see right	1) AT+CFUN=0, after AT+CFUN=1, then re-establish the connection 2) AT+RESET reboot the module and then re-establish the connection

13 IP Application Related Commands

13.1 IP application setup: AT+SAPBR

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a 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
		the rest OK
test command	AT+SAPBR=?	+SAPBR: (0-4),(1-3), "ConParamTag", "ConParamValue" OK
URC reporting	+SAPBR <cid>: DEACT	This is reported when the mobile scene goes to activation
caveat	The SAPBR needs to pay attention to the following things when setting the bearer parameter APN: After the module registers to the network, it will get <apn> from the network automatically and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so you can directly input AT+SAPBR=3,<cid>, "APN","", "", and the module will set the APN internally according to the The module will set the APN according to the <apn> it gets automatically.	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<cmd_type>	Command Type	0	Closing the bearer
		1	Open the bearer
		2	Query Bearer Status
		3	Setting the load parameters
		4	Getting the bearer parameters
<cid>	host context identifier	1~3	
<Status>	carrier state	0	Connecting.
		1	connected
		2	Closing

		3	Closed
<IP_Addr>	Carrier IP address		
<ConParamTag>	Carrying parameters	"CONTYPE"	Internet connection type. Refer to parameter <ConParamValue_ConType> for values.
		"APN"	Access point name, up to 50 characters long
		"USER"	User name: up to 50 characters
		"PWD"	Password: up to 50 characters
		"PHONENUM"	CSD phone number
		"RATE"	CSD connection rate. See <ConParamValue_Rate> for values.
<ConParamValue>			
<ConParamValue_ConType>	Type of Internet connection	"CSD"	CSD, Circuit Switched Data Services
		"GPRS"	GPRS, General Packet Radio Service Note: GPRS is only compatible with the input format of the 2G module commands, and will not be forced to switch to the GPRS network, the real data carrier network depends on the network system registered by the module at that time.
<ConParamValue_Rate>	CSD connection rate	0	2400
		1	4800
		2	9600
		3	14400

14 HTTP Related Commands

14.1 Initialise HTTP service: AT+HTTPINIT

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute command	AT+ HTTPINIT	OK
test command	AT+HTTPINIT=?	OK
caveat	1. Before using the HTTP service, you should initialise the HTTP stack with the AT+HTTPINIT command 2. If you are using https, you need to set the certificate, encryption suite, encryption level, etc. Please refer to the SSLCFG command.	

14.2 Enable SSL: AT+HTTPSSL

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPSSL=<n>	OK
retrieve command	AT+HTTPSSL?	+ HTTPSSL: <n> OK
test command	AT+HTTPSSL=?	+HTTPSSL: (0-1) OK

parameters	define	retrieve a value	Explanation of values
<n>	HTTP SSL function switch	0	Disable SSL function
		1	Enabling SSL

14.3 Set HTTP parameter values: AT+HTTTPARA

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+HTTTPARA=<HTTPParamTag> ,<HTTPParamValue>	OK

nds		
Enquiry command	AT+HTTPPARA?	+HTTPPARA: list of <HTTPParamTag>:<HTTPParamValue> OK
Test Command	AT+HTTPPARA=?	+HTTPPARA: "HTTPParamTag"," HTTPParamValue" OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<HTTPParamTag> :HTTP parameters to include:			
"CID"	Bearer context number (mandatory parameter)	1~3	
"URL"	HTTP or HTTPS URL (mandatory parameter) Note: Both HTTPS and HTTP URLs are supported.	"http://server/path:tcpPort " Or: "https://server/path:tcpPort " Maximum length 500 bytes	Server: FQDN or IP-address Path: path of file or directory tcpPort: If the parameter is omitted, connects the service to the HTTP default port 80. Refer to "IETF-RFC 261.
"UA"	The application must set up a user agent to recognise the mobile terminal. Usually operating system and software version information is set up with a browser identifier.	-	The default value is:AM_MODULE
"PROIP"	IP address of the HTTP proxy server	-	
"PROPORT"	PORT of the HTTP proxy server	-	
"REDIR"	This flag is used to control the redirection mechanism when acting as an HTTP client. If this flag is set to 1, the client automatically sends a new HTTP request when the server sends	-	Default value is 0 (no orientation)

	a redirection code (in the range 30x)		
"BREAK"	Parameters of the HTTP method "GET", integer type.	-	Gets a portion of the data from the breakpoint to the end point. note that not all HTTP servers support the <BREAK> parameter. the minimum value of BREAK is 0.
"BREAKEND"	Used in conjunction with "BREAK" for the break function. Integer type.	-	If "BREAKEND" is greater than "BREAK", the range of continuation is from "BREAKEND" to "BREAK". If "BREAKEND" is less than "BREAK", the range of continuation is from "BREAK" to the end of the file. If both "BREAKEND" and "BREAK" are 0, the transfer will not continue.
"TIMEOUT"	Setting the timeout for http requests	-	The unit is seconds, default 120 seconds
"CONTENT"	Setting the data type of the request entity data sent	-	Content-Type
"USER_DEFINED"	User-defined parameters in order to be compatible with the Hapag-Lloyd 2G module		The value of the user-defined parameter. Example: AT+HTTTPARA="USER_DEFINED", "Content-type: json-user-define" Note: If multiple user-defined parameters need to be set, enter them one by one. Subsequent entries will not overwrite previous ones.
"USERDATA"	User-defined parameter, same as "USER_DEFINED", for compatibility with SIMCOM modules.		User-defined parameter values. For example: AT+HTTTPARA="USERDATA", "Content-type: json-user-define" Note: If you want to set more than one user-defined parameter, the multiple parameters can be connected with \r\n. Example: AT+HTTTPARA="USERDATA", "Content-Type:application/json\r\n APPKEY:FW" It is necessary to write \r\n in the MCU programme as \\r\\n

		<p>It is worth mentioning that some PC serial port tools, such as SSCOM, will treat \r and \n as control characters, so it is also necessary to write \r\n as \\r\\n</p> <p>Other tools, such as XCOM, do not treat \r and \n as control characters, so type \r\n directly.</p>
<p><HTTPParamValue> : i.e. the value of <HTTPParamTag>.</p>		
<p>Note: Double quotes embedded in "USER_DEFINED" and "USERDATA" are expressed in \22.</p>		

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
→	AT+HTTPPARA?	
←	+HTTPPARA. CID: 1 URL. UA: AM_MODULE PROIP: 0.0.0.0 PROPORT: 0 REDIR: 0 BREAK: 0 BREAKEND: 0 TIMEOUT: 120 CONTENT. USERDATA. OK	

14.4 Write data: AT+HTTPDATA

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPDATA=<size>,<time>	DOWNLOAD OK

test command	AT+HTTPDATA=?	+HTTPDATA: (<size> list of values), (<time> list of values) OK
--------------	---------------	---

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<size>	Size of POST data	0-3356	AT version Maximum length 3356
		0-130048	LSAT version Maximum length 130048
		0	The latter parameter is not judged and is equivalent to clearing out the contents of the
<time>	Maximum time to enter data	1000-120000	Unit: ms

Note: It is strongly recommended to set the time <time> to be able to enter all the data, and the real size of the downloaded data should not be larger than <size>.

14.5 HTTP method activation: AT+HTTPACTION

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPACTION=<method>	OK Followed by Unsolicited Result Code. +HTTPACTION: <Method>,<StatusCode>,<DataLen> or returned if the error is related to the ME function: +CME ERROR: <err> Followed by Unsolicited Result Code. +HTTPACTION: <Method>,<StatusCode>,<DataLen>
test command	AT+HTTPACTION=?	+HTTPACTION: (0-2) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<Method>	HTTP Method Description	0	GET
		1	POST
		2	HEAD
<DataLen>	Length of data obtained	-	integer type (math.)
<StatusCode>	HTTP status code, responded to by the	100	Continue
		101	Switching Protocols

remote server, referenced in TTP1.1 (RFC2616).	200	OK
	201	Created
	202	Accepted
	203	Non-Authoritative Information
	204	No Content
	205	Reset Content
	206	Partial Content
	300	Multiple Choices (Multiple Choices)
	301	Moved Permanently
	302	Find (Found)
	303	See Other
	304	Not Modified
	305	Use Proxy Server (Use Proxy)
	307	Temporary Redirect)
	400	Bad Request
	401	Unauthorised
	402	Payment Required
	403	forbidden
	404	Not Found
	405	Method not Allowed
	406	Not Acceptable
	407	Proxy AuthenticationRequired
	408	Request Time-out
	409	Conflict
	410	The requested resource is not valid on the server and the forwarding address is not known (Gone)
	411	Length Required
	412	Precondition Failed
	413	Request Entity Too Large
	414	Request-URI Too Large
	415	Unsupported Media Type
	416	Requested range not satisfiable
	417	Expectation Failed
	500	Internal Server Error
	501	Not Implemented
	502	Bad Gateway
	503	Service Unavailable
	504	Gateway Time-out
	505	HTTP Version not supported
	600	Not HTTP PDU format (Not HTTP PDU)
	601	Network Error
602	No memory	
603	DNS Error	
604	Stack Busy	

		605	SSL failed to establish channel
		606	SSL communication warning error

14.6 HTTP method activation (extension): AT+HTTPEXACTION

Note: This command is supported by version >=V1106.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPEXACTION=<method>[,<len>]	OK or returned if the error is related to the ME function: +CME ERROR: <err>
test command	AT+HTTPEXACTION=?	+HTTPEXACTION: (0-1) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<Method>	HTTP Method Description	0 1	GET POST
<len>	Length of POST	-	integer type (math.)

14.7 Query HTTP service response: AT+HTTPREAD

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPREAD=<start_address>,<byte_size>	+HTTPREAD:<date_len><data> OK
execute a command	AT+HTTPREAD	+HTTPREAD:<date_len><data> OK Reads all response data from the AT+HTTPEXACTION=0 or AT+HTTPDATA command for all response data. The execute command is used to output the response from

		the HTTP server to the UART or to output data ready to be POSTed to the server.
test command	AT+HTTPREAD=?	+HTTPREAD: (list of supported <start_address>s),(list of supported<byte_size>s) OK

Parameter Definition:

parameters	define	retrieve value	a	Explanation of values
<date_len>	Actual output data length			
<data>	HTTP server response data to AT+HTTPACTION=0 command			
<start_address>	Starting point for output data	0~3356		Unit: bytes
<byte_size>	Length of output data	1~3356		Unit: bytes

14.8 Get HTTP service response data: AT+HTTPGET

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+HTTPGET=<path>	+HTTPGET:<date_len> OK

Parameter Definition:

parameters	define	retrieve value	a	Explanation of values
<date_len>	Actual output data length			
<path>	http download file path			An ASCII string whose length does not exceed 255.

14.9 Get HTTP service response data (extension): AT+HTTPEXGET

Note: This command is supported by version >=V1106.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+HTTPEXGET[=<len>]	+HTTPGET:<date_len> date OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<len>	GET data length		
<date_len>	Actual output data length		

14.10 Get HTTP POST data (extension): AT+HTTPEXPOST

Note: This command is supported by version >=V1106.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPEXPOST=<len>[,<timeout>]	> OK +HTTPEXPOST: len

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<len>	Size of POST data	Cannot exceed the length set in the httpexaction.	The length cannot exceed the length set in the httpexaction.
<timeout>	Maximum time to enter data	1-120000	Unit: ms

14.11 Downloading files and saving them to the file system:

AT+HTTPGETTOFS

Note: This command is supported by version >=V1148.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPGETTOFS=<loc>,<filename>	OK ERROR
Enquiry command	AT+HTTPGETTOFS?	+HTTPGETTOFS: <status>,<writelen>,<totalLength> OK
URC reporting	+HTTPGETTOFS: <response code>,<writelen>	+HTTPGETTOFS: <HTTP response code>,<writer>
test command	AT+HTTPGETTOFS=?	OK

d		
caveat	If the same filename is used for both downloads, the contents of the last download will be overwritten	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<status>	operating mode	0	Not in the HTTPGETTOFS process
		1	In the HTTPGETTOFS process
<loc>	The location where the file is saved.	0	Save to ROM, folder fixed to "/USER/HTTP".
<filename>	filename		String type, up to 64 characters long
<writelen>	How much data is currently saved to the file system		
<totalLength>	Total data saved to the file system		
<error>	error code		HTTP error code

14.12 Query HTTP header information: AT+HTTPHEAD

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+HTTPHEAD	+HTTPREAD:<date_len> <data> OK
test command	AT+HTTPHEAD=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<date_len>	Actual length of the header		
<data>	header (computing)		

14.13 Save HTTP application context: AT+HTTPSCONT

The Execute command saves the HTTP application context containing the AT command parameters, which are automatically loaded when the system reboots.

The query command returns the HTTP application context.

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+HTTPSCONT	+HTTPREAD: (list of supported <start_address>s),(list of supported<byte_size>s) OK
Enquiry command	AT+HTTPSCONT?	+HTTPSCONT:<mode> CID:<value> URL: <value> UA: <value> PROIP: <value> PROPORT: <value> REDIR: <value> BREAK: <value> BREAKEND: <value> USERDATA:<data> OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	HTTP context-saving mode	0	Saved, value taken from NVRAM
		1	Unsaved, value taken from RAM

14.14 Terminate HTTP task: AT+HTTPTERM

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+HTTPTERM	OK
test command	AT+HTTPTERM=?	OK

14.15 HTTP Error Code: ERROR: <err code>

HTTP error codes are reported as ERROR:<err code>.

<err code> definition:

retrieve a value	Description in English	Chinese Description
0	Unknown session id	Unknown session ID

1	File is too short	The content of the document is too short
2	DNS is fail	Domain name resolution failure
3	HTTP is busy	HTTP mission is busy.
4	Socket is wrong	socket failure
5	Connect fail	connection failure
6	File is error	documentation error
7	Connection is closed	Connection closed
8	Connection is destroyed	Connection destroyed
9	HTTP header is not found	HTTP header does not exist
10	HTTP authentication scheme is not supported	HTTP authentication mechanism is not supported
11	PDP active is wrong	PDP activation failure
12	Param is wrong	The parameters are wrong.
13	No buffer	buffer underrun
14	PDP deactive is wrong	PDP de-activation failed

14.16 Example of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
HTTP GET command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type for HTTP functions
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting the APN of pdp bearer parameters After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module

→	AT+HTTPIPINIT	HTTP stack initialisation
←	OK	
→	AT+HTTTPARA="CID",1	Set HTTP session parameters: CID
←	OK	
→	AT+HTTTPARA="URL", "airtest.openluat.com"	Set HTTP session parameters: URL
←	OK	
→	AT+HTTPACTION=0	GET Start
←	OK	
←	+HTTPACTION: 0,200,285	The presence of these URC reports indicates that the GET data was successful, waiting for the READ
→	AT+HTTPREAD	Reading data from HTTP server GETs
←	+HTTPREAD: 285 OK	..... Indicates HTTP data
→	AT+HTTPTERM	Ending the HTTP service
←	OK	
HTTP POST command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type for HTTP functions SAPBR is to activate the PDP context
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting the APN After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+HTTPIPINIT	HTTP stack initialisation
←	OK	
→	AT+HTTPSSL=1	Setting up to use an SSL connection (no certificate validation required)
←	OK	
→	AT+HTTTPARA="CID",1	Set HTTP session parameters: CID
←	OK	
→	AT+HTTTPARA="URL",	Set HTTP session parameters: URL

	"http://httpbin.org/post"	
←	OK	
→	AT+HTTPDATA=4,100000	Input 4 bytes, wait time is 10S, input time should be set large enough to ensure data input.
←	DOWNLOAD	DOWNLOAD indicates that the data is ready to be entered.
→	sino	Enter China (the word China takes up 4 bytes)
←	OK	OK appears to indicate the end of input
→	AT+HTTPACTION=1	POST Start
←	OK	
←	+HTTPACTION: 1,200,389	Indicates that POST was successful
→	AT+HTTPREAD	Read content
←	+HTTPREAD: 389 { "args": {}, "data": "data:application/octet-stream;base64,1tC5+g==", "files": {}, "form": {}, "headers": { "Accept": "*//*", "Content-Length": "4", "Host": "httpbin.org", "User-Agent": "AM_MODULE", "X-Amzn-Trace-Id": "Root=1-64b780a7-55229ee24bfef1ca66010740" }, "json": null, "origin": "122.97.220.43", "url": "http://httpbin.org/post" }	
←	OK	
→	AT+HTTPTERM	Ending the HTTP service
←	OK	The download HTTP session starts from AT+SAPBR=2,1, if this command queries the IP address is still there, then HTTPINIT HTTPPARA is executed in sequence
HTTPS process with SSL certificate validation:		
→	AT+FSCREATE="ca.crt"	Create server-side CA certificate file
←	OK	
→	AT+FSCREATE="client.crt"	Creating a client certificate file
←	OK	

→	AT+FSCREATE="client.key"	Creating a Client Key File
←	OK	
→	at+fswrite="ca.crt",0,2080,15	File length 2080 bytes is just an example, to fill in according to the actual. The same as below.
←	>	Enter the CA certificate file here
←	OK	
←	AT+FSWRITE="client.crt",0,128,10	
→	>	Enter the client certificate file here
←	OK	
→	AT+FSWRITE="client.key",0,188,10	
←	>	Enter the client key file here
←	OK	
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213 OK	
→	AT+HTTPSSL=1	Enable SSL function switch is on
←	OK	
→	AT+SSLCFG="cacert",153, "ca.crt"	Setting the Server CA Certificate SSL context id, defaults to 0 in the case of a TCP single link; 153 under the HTTPS link, same below
←	OK	
→	AT+SSLCFG="clientcert",153, "client.crt"	Setting the client certificate
←	OK	
→	AT+SSLCFG="clientkey",153, "client.key"	Setting the Client KEY
←	OK	
→	AT+SSLCFG="seclevel",153,2	Setting the security level
←	OK	
→	AT+SSLCFG="ciphersuite",153,0X0035	Setting up the encryption suite
←	OK	
→	AT+SSLCFG="clientrandom",153,01B12C31 41516171F19202122232425262728293031	Setting the random number

	323334353637D	
←	OK	
→	AT+HTTPINIT	HTTP stack initialisation
←	OK	
→	AT+HTTTPARA="CID",1	Set HTTP session parameters: CID
←	OK	
→	AT+HTTTPARA="URL", "https://**. ***. ***"	Set HTTP session parameters: URL Please write the specific URL instead of copying it!
←	OK	
→	AT+HTTPACTION=0	GET Start
←	OK	
←	+httpaction:0,200,1348 +httpaction:0,200,1348 +httpaction:0,200,1348	The presence of these URC reports indicates that the GET data was successful, waiting for the READ
→	AT+HTTPREAD	Reading data from HTTP server GETs
←	+HTTPREAD:1592 OK	..... Indicates HTTP data
→	AT+HTTPTERM	Ending the HTTP service
←	OK	
HTTP HEAD process:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	
←	OK	
→	AT+SAPBR=3,1, "APN", ""	
←	OK	
→	AT+SAPBR=1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213 OK	
→	AT+HTTPINIT	
←	OK	
→	AT+HTTTPARA="CID",1	
←	OK	
→	AT+HTTTPARA="URL", "https://**. ***. ***"	Set HTTP session parameters: URL Please write the specific URL instead of copying it!
←	OK	
→	AT+HTTPACTION=2	AT+HTTPACTION=0 is also possible
←	OK	

→	AT+HTTPHEAD	
←	+HTTPHEAD: <date_len> ---data-- OK	<date_len> is the specific number, ---data-- is the specific header information
HTTP HTTPACTION & HTTPGET & HTTPPOST procedures:		
Note: This command is supported by version >=V1106.		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	
←	OK	
→	AT+SAPBR=3,1, "APN", ""	
←	OK	
→	AT+SAPBR=1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1,010.169.179.213 OK	
→	AT+HTTPINIT	
←	OK	
→	AT+HTTPPARA="CID",1	
←	OK	
→	AT+HTTPPARA="URL", "http://*. *. *. *. *"	Set HTTP session parameters: URL Please write the specific URL instead of copying it!
←	OK	
→	AT+HTTPACTION=1,10	HTTP POST, 10 bytes
←	OK +HTTPPOST	
→	AT+HTTPPOST=10,10000	Wait for 10 bytes of data, timeout 10s
←	>	> indicates that the data is ready to be entered
→	0123456789	Enter 0123456789
←	OK	OK appears to indicate the end of input
←	+HTTPPOST: 10	POST Successful
←	+HTTPGET	The server sends the HTTP response
→	AT+HTTPGET	Read HTTP response
←	+HTTPGET: <date_len> ---data-- OK	<date_len> is the specific number, ---data-- is the specific data
←	+HTTPACTION: 1,200	HTTP response has been read, session ended
→	AT+HTTPTERM	
←	OK	
HTTP HTTPGETOFS procedure:		
Note: This command is supported by version >=V1148.		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	

←	OK	
→	AT+SAPBR=3,1, "APN", ""	
←	OK	
→	AT+SAPBR=1,1	
←	OK	
→	AT+SAPBR=2,1	
←	+SAPBR: 1,1, "10.74.31.148"	
	OK	
→	AT+HTTPINIT	
←	OK	
→	AT+HTTPPARA="CID",1	
←	OK	
→	AT+HTTPPARA="URL", "http://*. *. *. *. *"	Set HTTP session parameters: URL Please write the specific URL instead of copying it!
←	OK	
→	AT+HTTPGETTOFS=0, "test"	// will create a file with path /USER/HTTP/test
←	+HTTPGETTOFS: 200,39968	// download completion reported, 200 is the http status code, 39968 is the total length of the download
→	AT+FSL= /USER/HTTP/	Query saved documents
←	test	
	OK	

15 FTP Related Commands

15.1 Setting the FTP control port: AT+FTPPORT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPORT=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPPORT?	+FTPPORT:<value> OK	
test command	AT+FTPPORT=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP control port number	1~65535	Default value is 21

15.2 Set FTP active or passive mode: AT+FTP MODE

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPMODE=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPMODE?	+FTPMODE:<value> OK	
test command	AT+FTPMODE=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP active-passive mode	0	Active mode (not supported yet)
		<u>1</u>	passive mode

15.3 Set FTP data transfer type: AT+FTP TYPE

Grammatical rules:

Command	vocabulary	come (or go) back	clarification
---------	------------	-------------------	---------------

Type			
Setup Commands	AT+FTPTYPE=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPTYPE?	+FTPTYPE:<value>	
		OK	
test command	AT+FTPTYPE=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP Data Transfer Types	"A"	FTP ASCII character set
		"I"	FTP Binary Character Set

15.4 Set FTP input type: AT+FTPPUTOPT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPUTOPT=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPPUTOPT?	+FTPPUTOPT:<value>	
		OK	
test command	AT+FTPPUTOPT=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP Data Transfer Types	"APPE"	Add file
		"STOU"	Storing unique files
		" <u>STOR</u> "	Storage of documents

15.5 Set FTP bearer ID: AT+FTPCID

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPCID=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPCID?	+FTPCID:<value>	
		OK	

test command	AT+FTPCID=?	OK	
--------------	-------------	----	--

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP Bearer ID	1~3	Same as <cid> definition in +SAPBR. Default value is 1.

15.6 Setting up FTP download renewal: AT+FTPREST

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPREST=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPREST?	+FTPREST:<value> OK	
Test Command	AT+FTPREST=?	OK	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<value>	Breakpoints to be renewed		

15.7 Set FTP server address: AT+FTPSERV

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPSERV=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPSERV?	+FTPSERV:<value> OK	
test command	AT+FTPSERV=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP server address, IP or domain name		32-bit decimal numbers, separated by . Separated by the form: xxx.xxx.xxx.xxx.

			In the case of DNS, an ASCII string up to 49 in length.
--	--	--	---

15.8 Set FTP user name: AT+FTPUN

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPUN=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPUN?	+FTPUN:<value> OK	
test command	AT+FTPUN=?	OK	

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<value>	FTP User Name			is an ASCII string up to 49 in length.

15.9 Set FTP password: AT+FTPPW

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPW=<pw>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPPW?	+FTPPW:<pw> OK	
test command	AT+FTPPW=?	OK	

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<pw>	FTP Password			is an ASCII string up to 49 in length.

15.10 Set FTP download file name: AT+FTPGETNAME

Sets the name of the server-side destination file.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPGETNAME=<name>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPGETNAME?	+FTPGETNAME:<name> OK	
test command	AT+FTPGETNAME=?	OK	

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<name>	FTP download file name			is an ASCII string up to 99 in length.

15.11 Set FTP download file path: AT+FTPGETPATH

This command sets the path of the target file on the server side.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPGETPATH=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPGETPATH?	+FTPGETPATH:<value> OK	
test command	AT+FTPGETPATH=?	OK	

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<value>	FTP download file path			An ASCII string whose length does not exceed 255.

15.12 Set FTP upload file name: AT+FTPPUTNAME

Sets the name to save the file after uploading it to the server.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPUTNAME=<value>	OK	Normal return
		ERROR	Incorrect input format

Enquiry command	AT+FTPPUTNAME?	+FTPPUTNAME:<value> OK	
test command	AT+FTPPUTNAME=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP Upload File Name		An ASCII string up to 99 in length.

15.13 Set FTP upload file path: AT+FTPPUTPATH

Sets the directory where files are saved after being uploaded to the server.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPUTPATH=<value>	OK	Normal return
		ERROR	Incorrect input format
Enquiry command	AT+FTPPUTPATH?	+FTPPUTPATH:<value> OK	
test command	AT+FTPPUTPATH=?	OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<value>	FTP Upload File Path		An ASCII string up to 99 in length.

15.14 Creating a file directory on a remote server: AT+FTPMKD

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
execute a command	AT+FTPMKD	OK +FTPMKD: 1,0	Created successfully
		OK +FTPMKD: 1,<error>	Creation Failure
		+CME ERROR: <err>	If it's a command error
test command	AT+FTPMKD=?	OK	

caveat	The file directory created by the execution command is defined by the command AT+FTPGETPATH
--------	---

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<error>	error code			Same <error> definition as AT+FTPGET command

15.15 Delete file directory on remote server: AT+FTPRMD

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
execute a command	AT+FTPRMD	OK +FTPRMD: 1,0	Deleted successfully
		OK +FTPRMD: 1,<error>	Failed to delete
		+CME ERROR: <err>	If it's a command error
test command	AT+FTPRMD=?	OK	
caveat	The directory of files to be deleted by the command AT+FTPGETPATH is defined by the command		

Parameter Definition:

parametric	define	retrieve value	a	Explanation of values
<error>	error code			Same <error> definition as AT+FTPGET command

15.16 Download file: AT+FTPGET

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPGET=<mode>[,<reqlength>]	OK	Input the return of AT+FTPGET=1.
		+FTPGET:2,<cnlength> Data	Input: AT+FTPGET=2, <reqlength> return of the
		OK	
URC	+FTPGET:1,1	After entering AT+FTPGET=1, there is this report,	

reporting		indicating that there is data, the first parameter 1 means <mode> is 1
	+FTPGET:1,<error>	After inputting AT+FTPGET=1, there is this report, indicating that the FTP download fails, the first parameter 1 means <mode> is 1
	+FTPGET:1,0	Indicates the end of data transfer, the first parameter 1 indicates that <mode> is 1
test command	AT+FTPGET=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	1	Opening an FTP session
		2	Read FTP download data
<reqlength>	Length of data requested to be read	1~1460	
<cnlength>	Confirm the length of the read data	1~1460	May be less than <reqlength>. 0 means there is no data to read in.
<error>	error code	61	Net error
		62	DNS error DNS error
		63	connect error
		64	Timeout timeout
		65	Server error
		66	operation not allowed
		70	reply 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 download error
80~84	FTP SSL connection error		
85	documentation error		
86	voluntary withdrawal		

15.17 Uploading files: AT+FTPPUT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPPUT=<mode>[,<reqlength>]	OK	Return of input AT+FTPPUT=1
		+FTPPUT:2,<cnlength> //input data here	Input: AT+FTPPUT=2, <reqlength> return of the
		OK	
		OK +FTPPUT: 1,0	Input: AT+FTPPUT=2,0 return of the
URC reporting	+FTPPUT:1,1,<maxlength>	After entering AT+FTPPUT=1, there is this upload, indicating that the data can be uploaded At this point, upload the data by typing AT+FTPPUT=2,<reqlength>. The first parameter 1 indicates that <mode> is 1	
	+FTPPUT:1,0	Indicates the end of the data transfer session. The first parameter 1 indicates that <mode> is 1	
	+FTPPUT:1,<error>	If <mode>=1 and the FTP session failed. Please refer to AT+FTPGET error code <error> definition.	
test command	AT+FTPPUT=?	OK	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	FTP upload working mode	1	Opening an FTP session
		2	Write FTP upload data
<reqlength>	Length of data requested to be uploaded	0-<maxlength>	
<cnlength>	Confirm the length of data that can be uploaded		
<maxlength>	Maximum length of a single upload, depending on the network status.		

15.18 Download file (extension): AT+FTPEXTGET

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPEXTGET=<mode>	OK	When <mode>=0 or 1
	AT+FTPEXTGET=<mode>,<filename>	+FTPEXTGET:2,<totalLength> OK	When <mode>=2

	AT+FTPEXTGET=<mode>,<readpos>,<readlen>	+FTPEXTGET:3,<outputLength> // here is the output to the serial port OK	When <mode>=3
	AT+FTPEXTGET=<mode>	OK +FTPEXTGET: 4,<outputLength> //outputLength	When <mode>=4 AT+FTPEXTGET=4,outputLength //Read data
Enquiry command	AT+FTPEXTGET?	+FTPEXTGET: <status>[,<receivedLength>] OK	
test command	AT+FTPEXTGET=?	OK	
URC reporting	+FTPEXTGET:1,0	<mode>=1 and FTPEXTGET ends, it will be reported as follows	
	+FTPEXTGET:1,<error>	<mode>=1 and FTPEXTGET error is reported as such. Please refer to AT+FTPGET error code <error> definition.	
	+FTPEXTGET:2,<totalLength>	<mode>=2	
	+FTPEXTGET:3,<outputLength>	<mode>=3	
	+FTPEXTGET:4,<outputLength>	<mode>=4	
caveat	<p>1) This command is not available when FTPEXTPUT<mode>=1.</p> <p>2) If the file size (<receivedLength>) is <300KB, you can use this command; if the file size (<receivedLength>) is >=300KB, please use the default FTPGET method (AT+FTPEXTGET=0)</p> <p>3) For the usage of this command, please refer to the last part of this chapter: Usage Examples.</p> <p>4) <mode>=4 only for Hapag-Lloyd 4G CAT1 modules (Air780E / Air600E series) >=V1106 version support</p>		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	0	Use the default FTPGET method
		1	Using the extended FTPGET method
		2	Save downloaded data to a file
		3	Output downloaded data to serial port
		4	Streaming data acquisition
<filename>	filename		String type, up to 64 characters long. Note: you only need to specify the

			file name, do not specify the path, because the path to save is determined C:/USER/FTP
<totalLength>	Length of all data saved to file for mode 2	<302512	Unit: bytes
<outputLength>	Length of data output to the serial port for mode 3 or 4	<302512	Unit: bytes
<readpos>	Start position of the file data to be read for mode 3		0
<readlen>	Read length for mode 3		Unit: bytes
<status>	Status of FTPEXTGET	0	Not in the FTPEXTGET process
		1	In the FTPEXTGET process
<receivedLength>	Length of downloaded data		Unit: bytes
<error>	error code		Same <error> definition as AT+FTPGET command

15.19 Upload file (extension): AT+FTPEXTPUT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPEXTPUT=<mode>[,<pos>,<len>,<timeout>]	OK	When <mode>=0 or 1
		+FTPEXTPUT: <pos>,<len> // Input data from the serial port here OK	When <mode>=2
test command	AT+FTPEXTPUT=?	OK	
caveat	For the usage of this command, please refer to the last part of this chapter: Usage Examples.		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	<u>0</u>	Use the default FTTPUT method
		1	Using the extended FTTPUT method
		2	PUT data to RAM
<pos>	Start position of each PUT	0-300K	Unit: byte
<len>	Length of data per PUT	0-300K	Unit: byte
<timeout>	Timeout for serial data transfer	1000-1000000	Unit: ms

15.20 Downloading files and saving them to the file system: AT+FTPGETTOFS

Grammatical rules:

Command Type	vocabulary	come (or go) back	
Setup Commands	AT+FTPGETTOFS=<loc>,<filename>[,<num>,<time>]	OK	successes
		ERROR	fail (e.g. experiments)
Enquiry command	AT+FTPGETTOFS?	+FTPGETTOFS: <status>[,<rcvlen>,<writelen>]	
URC reporting	+FTPGETTOFS:0,<totalLength>	If the download is successful	
	+FTPGETTOFS:<error>	If the download fails	
test command	AT+FTPGETTOFS=?	OK	
caveat	After reconnecting, the transfer will be intermittent. If the same filename is used for both downloads, the contents of the last download will be overwritten		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<status>	operating mode	0	Not in the FTPGETTOFS process
		1	In the FTPGETTOFS process
<loc>	The location where the file is saved.	0	Save to ROM, folder fixed to "C:/USER/FTP".
<filename>	filename		String type, up to 64 characters long
<num>	Number of automatic reconnections	0-255	Default: 3
<time>	How many seconds to wait for automatic reconnection?	0-60	Unit: seconds, default: 5
<rcvlen>	How much data is currently GET from the FTP server		
<writelen>	How much data is currently saved to the file system		
<totalLength>	Total data saved to the file system		
<error>	error code		Same <error> definition as AT+FTPGET command

15.21 Uploading files from the file system to the server: AT+FTPPUTFRMFS

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+FTPPUTFRMFS=<filepath>[,<num>,<time>]	OK
Enquiry command	AT+FTPPUTFRMFS?	+FTPPUTFRMFS: <status>[,<putLength>] OK
test command	AT+FTPPUTFRMFS=?	OK
URC reporting	+FTPPUTFRMFS:0,<totalLength>	When the upload is finished, there is this upload
	+FTPPUTFRMFS:<error>	When an upload goes wrong, there is this to report. For <error> definition, please refer to <error> definition of AT+FTPGET command.
caveat	Auto-reconnect and resume from break point	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<filepath>	filename		String type, consisting of numbers and letters, up to 128 bytes long
<num>	Number of automatic reconnections	0-255	Default: 3
<time>	How many seconds to wait for automatic reconnection?	0-60	Unit: seconds, default: 5
<status>	FTP Upload Status	0	Not in upload status
		1	In upload status
<putLength>	How much data is currently uploaded from the file system		Unit: bytes
<totalLength>	How much data was uploaded from the file system		Unit: bytes

15.22 Load from file system into RAM and upload with FTPPUT: AT+FTPPUT

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Command	AT+FTPPUT=<mode>[,< filename >]	OK
test command	AT+FTPPUT=?	OK
caveat	This command is not available when the FTPEXTPUT command <mode>=1.	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	0	End loading from file system to RAM
		1	Begin loading from the file system into RAM and uploading
<filename>	filename	0-128 bytes	The filename must be filled in when mode is 1, but not when it is 0.

15.23 Get the directory of files on the remote server: AT+FTPLIST

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+FTPLIST=<mode>[,<reqlen>]	<p>If <mode>=1, the command format is: AT+FTPLIST=1</p> <p>The return value is: OK or +CME ERROR: <err></p> <p>If <mode>=2, the command format is: AT+FTPLIST=2,<reqlen></p> <p>The return value is: +FTPLIST: 2,<cnflen> Data ... OK</p>
test command	AT+FTPLIST=?	OK

URC reporting	After entering AT+FTPLIST=1, the
	If it is a successful FTP session, the following URC is subsequently reported: +FTPLIST:1,1
	If it is the end of an FTP data transfer, the following URC is subsequently reported: +FTPLIST:1,0
	If the FTP session fails, the following URC is subsequently reported: +FTPLIST:1,<error>

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	operating mode	1	Open FTP for a file directory session
		2	Read FTP to get data from file directories
<reqlen>	Length of the requested data	1~1460	
<cnflen>	Actual data length	1~1460	
<error>	Same as <error> definition in +FTPGET		

15.24 Get the file size on the remote server: AT+FTPSIZE

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
execute a command	AT+FTPSIZE	OK +FTPSIZE: 1,0,<size>	Get file size successfully
		OK +FTPSIZE: 1,<error>,0	Failed to get file size
		+CME ERROR: <err>	If it's a command error
test command	AT+FTPSIZE=?	OK	
caveat	The file is specified by the commands AT+FTPGETNAME and AT+FTPGETPATH		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<size>	file size		Unit: bytes
<error>	error code		Same <error> definition as AT+FTPGET command

15.25 Get FTP status: AT+FTPSTATE

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+FTPSTATE	+FTPSTATE: <state> OK
test command	AT+FTPSTATE=?	OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<state>	operating state	0	Idle
		1	FTP session in progress, including FTPGET, FTPPUT, FTPDELE

15.26 Save FTP application context: AT+FTPSCONT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Enquiry 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	
execute a command	AT+FTPSCONT	OK	Save the FTP context, and when the module is restarted, the context

			parameters will be automatically loaded and take effect
--	--	--	---

15.27 Delete the specified file on the server: AT+FTPDELE

Grammatical rules:

Command Type	vocabulary	come (or go) back	
execute a command	AT+FTPDELE	OK	
test command	AT+FTPDELE=?	OK	
URC reporting	+FTPDELE:1,0	Indicates successful deletion. The first parameter 1 indicates that the FTP session is open	
	+FTPDELE:1,<error>	Indicates that FTP file deletion failed. Please refer to AT+FTPGET error code <error> definition.	
caveat	The file is specified by the commands AT+FTPGETNAME and AT+FTPGETPATH		

15.28 Exit the current FTP session: AT+FTPQUIT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+FTPQUIT	OK	successes
		ERROR	fail (e.g. experiments)
test command	AT+FTPQUIT=?	OK	

15.29 Example of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
How to use the FTPGET command:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function

←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After registering the module to the network it will automatically get an <apn> from the network and activate a PDP context for RNDIS internet use. (This <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" and the module will internally set the APN according to the automatically acquired <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	Setting the cid
←	OK	
→	AT+FTPSERV="36.7.2.150"	Set the server ip address, you can also use the domain name. This article is just an example, please fill in your own server address, do not copy.
←	OK	
→	AT+FTPUN="user556"	Set the server user name. Please fill in your own FTP server username, don't copy it!
←	OK	
→	AT+FTPPW="222333"	Enter the password. Please fill in your own FTP server's password, don't copy it!
←	OK	
→	AT+FTPGETPATH="/"	Setting the path to the downloaded file
←	OK	
→	AT+FTPLIST=1	
←	OK +FTPLIST: 1,1	
→	AT+FTPLIST=2,1460	
←	+FTPLIST: 2,1460 drwxr-xr-x 1 ftp ftp 0 Feb 24 2018 .1 -rw-r--r-- 1 ftp ftp 107 Jul 10 17:08 1.txt drwxr-xr-x 1 ftp ftp 0 Apr 27 2018 11 -rw-r--r-- 1 ftp ftp 0 Sep 19 2018 111.txt drwxr-xr-x 1 ftp ftp 0 Dec 19 2018 1221 -rw-r--r-- 1 ftp ftp 7 Apr 25 2019 1222.txt -rw-r--r-- 1 ftp ftp 18380 May 07 2018 12220.txt	drwxr-xr-x The first letter indicates the file type. d:Documents catalogue -:Common documents Each subsequent three characters are viewed as a group, i.e. rwx , r-x , r-x. The first group, rwx, is the root group's permissions on the file; The second r-x is the general user (user group) permissions on the file; The third r-x is the other user's

	<pre>-rw-r--r-- 1 ftp ftp 0 Apr 26 2019 12222.txt -rw-r--r-- 1 ftp ftp 10 Apr 28 2018 122343.txt -rw-r--r-- 1 ftp ftp 254 Sep 04 2018 123456.txt -rw-r--r-- 1 ftp ftp 601283 Jul 21 2018 2018_7_21.sdl -rw-r--r-- 1 ftp ftp 8 Apr 26 2019 33333.txt -rw-r--r-- 1 ftp ftp 14 Oct 13 2017 66.txt -rw-r--r-- 1 ftp ftp 11525352 Mar 13 2019 Air720_CSDK_demo_flash.blf -rw-r--r-- 1 ftp ftp 65536 Jul 31 2018 app2_flash.bin -rw-r--r-- 1 ftp ftp 0 Sep 29 2017 ccc.txt -rw-r--r-- 1 ftp ftp 65536 Jan 18 2018 demo_ota_flash.bin -rw-r--r-- 1 ftp ftp 65536 Jul 30 2018 demo_timer_flash.bin -rw-r--r-- 1 ftp ftp 131072 Oct 10 2017 demo_timer_flash_org.bin -rw-r--r-- 1 ftp ftp 534110 Feb 24 2018 FM320X 纒e 浚.pdf -rw-r--r-- 1 ftp ftp 16384 Mar 26 2019 FOTA_APP_720D.bin -rw-r--r-- 1 ftp ftp 5103616 Mar 26 2019 FOTA_CORE_APP_720D.bin drwxr-xr-x 1 ftp ftp 0 Dec 12 2018 get OK</pre>	<p>permissions on the file</p> <p>r is readable, w is writable, and x is executable. rwx means readable, writable, executable; r-x is readable, executable, not writable;</p> <p>Ditto: r-- is readable, not writable, not executable rw- is readable, writable, not executable</p>
→	AT+FTPQUIT	Exit the FTPLIST session in order to start a subsequent session. There are two ways to exit an FTPLIST session, either by waiting for +FTPLIST:1,0 to report, or by actively exiting the FTPLIST session
←	OK +FTPLIST: 1,86	The active exit from the FTPLIST session is used here
→	AT+FTPGETNAME="1.txt"	Setting the name of the downloaded file
←	OK	
→	AT+FTPGET=1	Start FTP download session
←	OK	
←	+FTPGET: 1,1	This is a URC report. It means there's data.
→	AT+FTPGET=2,20	Read 20 data
←	+FTPGET: 2, 10 ?? / ?? / OK	Make sure the read is 10 data
← (URC)	+FTPGET: 1,0	Wait for a while and you will be prompted that the FTP download session is over.

→	AT+FTPREST=6	If the FTP connection or session is closed unexpectedly, it is also possible to resume the download at the point of disconnection . Start the download from the point where it was disconnected.
←	OK	
→	AT+FTPGET=1	
←	OK +FTPGET: 1,1	+FTPGET: 1,1 means there is data to read
→	AT+FTPQUIT	It is also possible to actively exit the current FTP session with AT+FTPQUIT before the +FTPGET: 1,0 prompt.
←	OK +FTPGET: 1,86	
FTPPUT command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer After the module registers to the network, it will automatically get <apn> from the network and activate a PDP context for RNDIS to use on the Internet (this <apn> can be queried by AT+CGDCONT?), so enter AT+SAPBR=3,<cid>, "APN", "" that is, the module will set the APN according to the automatic. The module will set the APN according to the <apn> it gets automatically.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server ip address, you can also use the domain name. This article is just an example, please fill in your own server address, do not copy.
←	OK	
→	AT+FTPUN="test112"	Set the server user name. Please fill in your own FTP server username, don't copy it!
←	OK	
→	AT+FTPPW="777888"	Enter the password. Please fill in your own FTP server's password, don't copy it!
←	OK	

→	AT+FTPPUTNAME="1222.txt"	Setting the name of the uploaded file
←	OK	
→	AT+FTPPUTPATH="/11/"	Setting the path for uploading files
←	OK	
→	AT+FTPPUT=1	
←	OK	
←	+ftpput:1,1,1360	This is the URC upload, indicating that the data can be uploaded, the maximum length of a single upload is 1360
→	AT+FTPPUT=2,7	
←	+FTPPUT: 2,7 //Enter 7 characters at this time OK	After entering 7 characters, it will return OK, indicating that the input is finished and it has been uploaded.
(URC)	+FTPPUT: 1,0	If you wait for a period of time without action, you will be prompted to end the FTP PUT session.
→	AT+FTPQUIT	It is also possible to proactively end the session with AT+FTPQUIT before prompting +FTPPUT: 1,0
←	OK +FTPPUT: 1,86	
FTPEXTGET command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server IP address, you can also use the domain name

←	OK	
→	AT+FTPUN="test112"	Setting the user name
←	OK	
→	AT+FTPPW="777888"	enter a password
←	OK	
→	AT+FTPGETNAME="TEST2.txt"	Set the name of the downloaded file (please note: FTPEXTGET command only supports the download of files smaller than 300K)
←	OK	
→	AT+FTPGETPATH="/11/"	Setting the folder where the downloaded files are located
←	OK	
→	AT+FTPEXTGET=1	Start FTP download
←	OK	
→	AT+FTPEXTGET?	Check how many bytes have been downloaded
←	+FTPEXTGET: 1,246840 OK	
← (URC)	+FTPEXTGET: 1,0	With this URC reported, it means that the file has been downloaded and is ready to be saved or read
→	AT+FTPEXTGET=2,hello	The saved file name is hello
←	+FTPEXTGET: 2, 296895 OK	
→	AT+FTPEXTGET=3,0,296895	Display data on the serial port
←	+FTPEXTGET: 3, 296895 Here is the data displayed on the serial port OK	
→	AT+FTPEXTGET=0	Setting FTPEXTGET mode off
←	OK	
→	AT+FTPEXTGET=4	Supported only by Air780E series modules >= V1106 version
←	OK	
← (URC)	+FTPEXTGET: 4,1460	Data reporting available
→	AT+FTPEXTGET=4,1460	read data
→	+FTPEXTGET: 4,1460 Here is the data displayed on the serial port OK	
FTPEXTPUT Usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a

		PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server IP address, you can also use the domain name
←	OK	
→	AT+FTPUN="test112"	Setting the user name
←	OK	
→	AT+FTPPW="777888"	enter a password
←	OK	
→	AT+FTPPUTPATH="/11/"	
←	OK	
→	AT+FTPPUTNAME="TEST8861.txt"	
←	OK	
→	AT+FTPEXTPUT=1	
←	OK	
→	AT+FTPEXTPUT=2,0,5,10000	Inputs file data from the serial port to the module RAM. The 2nd parameter is offset, the 3rd parameter is the data length, and the 4th parameter is a timeout of 10s
←	+FTPEXTPUT: 0,5 // Enter 5 characters here: 12345 OK	
→	AT+FTPEXTPUT=2,5,7,10000	This time the offset is 5 and the length is 7.
←	+FTPEXTPUT: 5,7 // Enter 7 characters here: 67890AB OK	
→	AT+FTPPUT=1	Transferring files in RAM to an FTP server
←	OK	
← (URC)	+FTPPUT: 1,0	Wait a while and you will be prompted for

		the end of the FTP upload session. At this point, check the server /11/TEST8861.txt, see the content is: 1234567890AB
→	AT+FTPEXTPUT=0	Change to normal FTP PUT mode
←	OK	
FTPGETTOFS command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server IP address, you can also use the domain name
←	OK	
→	AT+FTPUN="test112"	Setting the user name
←	OK	
→	AT+FTPPW="777888"	enter a password
←	OK	
→	AT+FTPGETNAME="TEST.mp3"	
←	OK	
→	AT+FTPGETPATH="/11/"	
→	OK	
→	AT+FTPGETTOFS=0, "TEST-1.mp3"	Start the download and store it in the local ROM. You can only specify the filename, not the path, because the path is fixed. This download method supports automatic intermittent transfer
←	OK	
→	AT+FTPGETTOFS?	Enquire about downloads

←	+FTPGETTOFS: 1,245900,207715 OK	245900 bytes have been downloaded, 207715 bytes have been stored in the file system.
← (URC)	+FTPGETTOFS: 0,245900	The download was successful and how many bytes were downloaded in total. Files can be manipulated with file system commands
→	AT+FSLC=C:/USER/FTP/	Query saved documents
←	Hello. TEST-1.mp3 OK	
→	AT+CAUDPLAY=1, "C:/USER/FTP/TEST-1.mp3"	Playing saved files
←	OK	
← (URC)	+CAUDPLAY: 1,600	End of playback
FTPPUTFRMFS command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server IP address, you can also use the domain name
←	OK	
→	AT+FTPUN="test112"	Setting the user name
←	OK	
→	AT+FTPPW="777888"	enter a password
←	OK	
→	AT+FTPPUTPATH="/"	

←	OK	
→	AT+FTPPUTNAME="TEST001.txt"	The file transferred to the server is stored under the name TEST001.txt.
←	OK	
→	AT+FTPPUTFRMFS="C:/USER/FTP/TEST-1.txt"	Transfer the file C:\USER\FTP\TEST-1.txt to the server.
←	OK	End of upload
	+FTPPUTFRMFS: 0,41580	
FTPFILEPUT command usage:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
	OK	
→	AT+FTPCID=1	
←	OK	
→	AT+FTPSERV="36.7.33.111"	Set the server IP address, you can also use the domain name
←	OK	
→	AT+FTPUN="test112"	Setting the user name
←	OK	
→	AT+FTPPW="777888"	enter a password
←	OK	
→	AT+FTPPUTPATH="/"	
←	OK	
→	AT+FTPPUTNAME="TEST_80.txt"	Name of the file saved after transmission to the server
←	OK	
→	AT+FTPFILEPUT=1, "C:/USER/FTP/TEST-1.txt"	Loading C:\USER\FTP\TEST-1.txt into memory
←	OK	

→	AT+FTPPUT=1	Start uploading
←	OK	
←	+FTPPUT: 1,0	End of upload
→	AT+FTPFILEPUT=0	End FTPFILEPUT mode
←	OK	
FTP remote creation/deletion of directories or files:		
→	AT+SAPBR=3,1, "CONTYPE", "GPRS"	Setting the bearer type of FTP function
←	OK	
→	AT+SAPBR=3,1, "APN", ""	Setting APN parameters for PDP bearer When the module registers with the network it automatically obtains an <apn> from the network and activates a PDP context for RNDIS Internet use. This <apn> can be queried via AT+CGDCONT? Enter AT+SAPBR=3,<cid>, "APN", "" here, and the module will set the APN according to the automatically obtained <apn>.
←	OK	
→	AT+SAPBR=1,1	Activate the GPRS PDP context for this bearer
←	OK	
→	AT+SAPBR=2,1	Enquire about the status of the bearer
←	+SAPBR: 1,1,010.169.179.213 OK	The first parameter 1 indicates the cid The second parameter 1 indicates that the connection has been made The third parameter indicates the IP address obtained by the module
→	AT+FTPCID=1	Setting the cid
←	OK	
→	AT+FTPSERV="36.7.87.100"	Set the server ip address, you can also use the domain name
←	OK	
→	AT+FTPUN="user"	Setting the user name
←	OK	
→	AT+FTPPW="123456"	enter a password
←	OK	
→	AT+FTPGETPATH="/test"	Set the directory of the file to be created
←	OK	
→	AT+FTPMKD	Create a catalogue
←	OK	
←	+FTPMKD: 1,0	
→	AT+FTPRMD	Delete Directory
←	OK	
←	+FTPRMD: 1,0	
→	AT+FTPGETPATH="/"	
←	OK	
→	AT+FTPGETNAME="HI.txt"	

←	OK	
→	AT+FTPDELE	Delete the file HI.txt.
←	OK +FTPDELE: 1,0	

16 MQTT Related Commands

16.1 Setting MQTT-related parameters: AT+MCONFIG

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Command	AT+MCONFIG=<clientid>[,<username>,<password>[,<will_qos>,<will_retain>,<will_topic>,<will_message>]]	OK	Normal return
		ERROR	Incorrect input format
test command	AT+MCONFIG=?	+MCONFIG: <clientid>[,<username>,<password>[,<(0-2)>,<(0,1)>,<will_topic>,<will_message>]] OK	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<clientid>	client identity	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not." (Can't be the same or the last one just connected to the server will be kicked off)
<username>	User name to log in to the server	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not."
<password>	Password for logging in to the server	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not."
<will_qos>	QOS	0	at most once
		1	At least once.
		2	Make sure it's only once.
<will_retain>	Retention of symbols	0	If the will_topic field is not set, this field also needs to be set to 0 If the will_topic field is set, the server must publish the will message as a non-reserved message

		1	If the will_topic field is set, the server must post the will information as reserved information
<will_topic>	Topics for probate messages	string (computer science)	Maximum 256 bytes. Needs to be enclosed in " ". (The subject of the will can't be the same or you won't receive a will message)
<will_message>	Content of the will message	string (computer science)	Maximum 1360 bytes. Needs to be enclosed in " ".

16.2 Establish TCP connection: AT+MIPSTART

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	<p>General Links: AT+MIPSTART=<svraddr>,<port></p> <p>SSL Link: AT+SSLMIPSTART=<svraddr>,<port></p>	OK	Normal return
		ERROR	Incorrect input format
		<p>After entering this setup command, a subsequent URC will be reported.</p> <p>1) Single link (AT+CIPMUX=0)</p> <p>If the link is successfully established, it is reported: CONNECT OK</p> <p>If the link already exists, it is reported: ALREADY CONNECT</p> <p>If the link fails, it is reported: STATE:<state> CONNECT FAIL</p> <p>2) Multiple links (AT+CIPMUX=1)</p> <p>If the link is successfully established, it is reported: 7,CONNECT OK</p> <p>If the link already exists, it is reported: ALREADY CONNECT</p> <p>If the link fails, it is reported:</p>	

		7, CONNECT FAIL
test command	AT+MIPSTART=?	+MIPSTART: "(0,255). (0,255). (0,255). (0,255)",(1-65535) +MIPSTART: "DOMAIN NAME",(1-65535) OK
	AT+SSLMIPSTART=?	+SSLMIPSTART:"(0,255). (0,255). (0,255). (0,255)",(1-65535) +SSLMIPSTART: "DOMAIN NAME",(1-65535) OK
caveat	When using an SSL link for data transfer, the link command is: AT+SSLMIPSTART=<svraddr>,<port> The rest is the same as the regular link. Please be aware of this!	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<svraddr>	Server IP address or DNS address	domain name or XXX.XXX.XXX.XXX	XXX Range of values: 0 to 255 May be enclosed in "" or not."
<port>	server port	1-65535	May be enclosed in "" or not."

16.3 Client requests a session connection from the server: AT+MCONNECT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MCONNECT=<clean_session>,<keepalive>	OK	Setting up successfully
test command	AT+MCONNECT=?	+MCONNECT:(0-1),(1-65535) OK	The test commands return a range of values for <clean_session> and <keepalive>
URC	After the setup command is set successfully and returns OK, subsequent URCs are automatically reported based on the connection: Returns if the connection is successful: CONNACK OK Returns if the connection fails: ERROR		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
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<clean_session>		0	The server MUST resume communication with the client based on the state of the current session (identified using the client identifier). If there is no session associated with this client identifier, the server MUST create a new session. After a connection has been disconnected, the client and server MUST save session information when the connection is disconnected [MQTT-3.1.2-4]. After a connection is disconnected for a session with a clean session flag of 0, the server MUST save subsequent QoS 1 and QoS 2 level messages as part of the session state if they match any subscriptions the client had at the time of disconnection [MQTT-3.1.2-5]. The server MAY also save QoS 0 messages that meet the same conditions.
		1	Both client and server discard the previous session and create a new one. The session lasts as long as the network connection lasts. The session state data associated with this session is not used in the post-sequence session.
<keepalive>	Shelf life	1-65535	Time unit: second The device side is required to send at least one message, including a PING request, during the keep-alive time. If the server side does not receive any messages within the keep-alive time, it will disconnect and the device side needs to initiate a reconnection. It is recommended to take a value of 300s or more.

16.4 Published: AT+MPUB

This command transmits application messages from the client to the server.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MPUB=<topic>,<qos>,<retain>,<message>	OK	qos=0
		OK	qos=1
		PUBACK	
		OK	
		PUBREC	qos=2
		PUBCOMP	
		ERROR	fail (e.g. experiments)

test command	AT+MPUB=?	+MPUB:<topic>,(0-2),(0-1),<message> OK	
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Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<qos>	QOS	0	at most once
		1	At least once.
		2	Make sure it's only once.
<retain>	Reservation mark	0	The server cannot store this message nor can it remove or replace any existing reserved messages.
		1	The server must store this application message and its Quality of Service Level (QOS) so that it can be distributed to future subscribers with matching subject names.
<topic>	Message Subject	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not."
<message>	Message	string (computer science)	<p>Maximum 4100 bytes. String type, must be enclosed in double quotes.</p> <p>Note: For double quotes embedded in the message, please use \22; for the control character carriage return \r (0x0D), please use \0D; for the control character line feed \n (0x0A), please use \0A; for the control character backslash \ (0x5C), please use \5C.</p> <p>If the MCU is sending a message, it may need to be expressed in terms of \\22, \\0D, \\0A, \\5C, i.e. \ needs to be escaped into \\</p>

16.5 Release of fixed-length messages: AT+MPUBEX

This command transmits application messages in fixed-length from the client to the server.

Note: Only supports sending and receiving up to 4100 bytes.

Grammatical rules:

Comma	vocabulary	come (or go) back	instructio
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nd Type			ns
Setup Comma nds	AT+MPUBEX=<topic>,<qos>,<retain>,[len]	<p>First return a ></p> <p>1) If len is specified, when the length is greater than or equal to len, it exits data mode and sends data to return OK.</p> <p>2) If len is not specified, then 1A is used as the terminator, or 5s timeout (more than 5s between two data intervals) sends the data and returns OK.</p>	qos=0
		<p>First return a ></p> <p>1) If len is specified, when the length is greater than or equal to len, it exits data mode and sends data to return OK.</p> <p>2) If len is not specified, then 1A is used as the terminator, or 5s timeout (more than 5s between two data intervals) sends the data and returns OK.</p>	qos=1
		<p>PUBACK</p> <p>First return a ></p> <p>1) If len is specified, when the length is greater than or equal to len, it exits data mode and sends data to return OK.</p> <p>2) If len is not specified, then 1A is used as the terminator, or 5s timeout (more than 5s between two data intervals) sends the data and returns OK.</p>	qos=2
		<p>PUBREC</p> <p>PUBCOMP</p>	
		<p>ERROR</p>	Failure. Generally caused by grammatical errors or unconditional availability
test comman d	AT+MPUBEX=?	+MPUBEX:<topic>,(0-2),(0-1),<len>	
		OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
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<qos>	QOS	0	at most once
		1	At least once.
		2	Make sure it's only once.
<retain>	Reservation mark	0	The server does not store this message nor can it remove or replace any existing reserved messages.
		1	The server must store this application message and its Quality of Service Level (QOS) so that it can be distributed to future subscribers with matching subject names.
<topic>	Message Subject	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not."
<len>	data length	1~4100	

16.6 Subscription Topic: AT+MSUB

This command is used from the client to the server for one or more subscription topics.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MSUB=<topic>,<qos>	OK	successes
		SUBACK ERROR	fail (e.g. experiments)
test command	AT+MSUB=?	+MSUB:<topic>,(0-2) OK	
URC	<p>When the setup command is successful, if an MQTT message is received there will be a corresponding URC reported: If AT+MQTTMSGSET=0 has been set, receipt of an MQTT message is reported: +MSUB: <topic>,<len>,<message></p> <p>If AT+MQTTMSGSET=1 has been set, receipt of an MQTT message is reported: +MSUB: <store_addr></p>		

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<topic>	Message Subject	string	Maximum 256 bytes. Can be enclosed in "" or

		(computer science)	not."
<qos>	QOS	0	at most once
		1	At least once.
		2	Make sure it's only once.
<len>	Receive data length		Unit: bytes
<message>	Data content	string (computer science)	Maximum 4100 bytes
<store_addr>		0-3	Location of the cache when receiving messages

16.7 Unsubscribe from thread: AT+MUNSUB

This command goes from the client to the server and is used to unsubscribe from a topic.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MUNSUB=<topic>	OK	successes
		UNSUBACK	
		ERROR	fail (e.g. experiments)
test command	AT+MUNSUB=?	+MUNSUB:<topic> OK	successes

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<topic>	Message Subject	string (computer science)	Maximum 256 bytes. Can be enclosed in "" or not."

16.8 Print all subscription messages received: AT+MQTTMSGGET

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
execute	AT+MQTTMSGGET	[+MSUB: <topic>,<len>,<message>]	Executing the command

a command		[+MSUB: <topic>,<len>,<message>] [+MSUB: <topic>,<len>,<message>] [+MSUB: <topic>,<len>,<message>] OK	will print the received topic subscription messages saved in the cache. After execution, <status> will become invalid.
Enquiry command	AT+MQTTMSGGET?	+MQTTMSGGET: 0,<status> +MQTTMSGGET: 1,<status> +MQTTMSGGET: 2,<status> +MQTTMSGGET: 3,<status> OK	
test command	AT+MQTTMSGGET=?	OK	
caveat	When AT+MQTTMSGSET=1, execute the command to print subscription messages. A maximum of 4 are printed at a time. If more than 4 are reported at a time, the latest 4 will be printed and the oldest one will be overwritten.		

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<topic>	Message Subject	string (computer science)	Maximum 256 bytes.
<len>	Receive message length		Unit: bytes
<message>	Message	string (computer science)	Maximum 4100 bytes.
<status>	message state	VALID	valid data, the AT+MQTTMSGGET execution module can print these messages
		INVALID	Invalid data

16.9 Setting the print mode for subscription messages: AT+MQTTMSGSET

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MQTTMSGSET=<mode>	OK	successes
		ERROR	fail (e.g. experiments)
Enquiry command	AT+MQTTMSGSET?	+MQTTMSGSET:<mode>	

d		OK	
test comman d	AT+MQTTMSGSET=?	+MQTTMSGSET:(0,1) OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	Message Upload Mode	0	Active reporting to the serial port. The reported URC is when there is a new subscription message: +MSUB: <topic>,<len>,<message>
		1	Cache Mode. The reported URC when there is a new subscription message: +MSUB: <store_addr> Then read the message with AT+MQTTMSGGET

16.10 MQTT message encoding format switch: AT+MQTTMODE

This command sets the encoding format of MQTT published messages, whether ASCII or HEX.

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Comman nds	AT+MQTTMODE=<mode>	OK	successes
		ERROR	fail (e.g. experiments)
Enquiry comman d	AT+MQTTMODE?	+MQTTMODE: <mode> OK	
test comman d	AT+MQTTMODE=?	+MQTTMODE: (0,1) OK	

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<mode>	Encoding Format for MQTT Publishing Messages	0	ASCII format
		1	HEX format

Examples:

Command (→)/Retu	an actual example	Explanations and clarifications

rn (←)		
→	AT+MQTTMODE=1	Set the format for publishing MQTT messages to: HEX
←	OK	
→	AT+MPUB="test",0,0, "313233"	For example, if the content of the published message is 123, the format of the publication is the visible mode in hexadecimal format, and the actual message receiver receives the message content as 123
←	OK	
→	AT+MQTTMODE=0	Set the format for publishing MQTT messages to: ASCII
←	OK	
→	AT+MPUB="test",0,0, "123"	Content of the message 123
←	OK	

16.11 Close TCP connection: AT+MIPCLOSE

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MIPCLOSE	OK	successes
		ERROR	fail (e.g. experiments)
test command	AT+MIPCLOSE=?	OK	Returns OK, indicating that this command is supported

16.12 Close the MQTT connection: AT+MDISCONNECT

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+MDISCONNECT	OK	successes
		ERROR	fail (e.g. experiments)
test command	AT+MDISCONNECT=?	OK	Returns OK, indicating that this command is supported

16.13 Query MQTT connection status: AT+MQTTSTATU

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
execute a command	AT+MQTTSTATU	+MQTTSTATU :<state>	successes
		OK	
test command	AT+MQTTSTATU=?	ERROR	fail (e.g. experiments)
test command	AT+MQTTSTATU=?	OK	Returns OK, indicating that this command is supported

Parameter Definition:

parameter	define	retrieve value	Explanation of values
<state>	MQTT Connection Status	0	offline (computing)
		1	Already logged in and authenticated to PUB data
		2	Not authenticated yet, need to send MCONNECT command

16.14 Example of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
Normal process and SSL without certificate validation process:		
→	AT+CGREG?	Query current GPRS registration status
←	+CGREG: 0,1 OK	<n>=0, indicating that URC reporting is disabled <stat>=1, identifies that a GPRS network has been registered and that it is a local network
→	AT+CGATT?	View current GPRS attachment status
←	+CGATT: 1 OK	<state>=1, indicating that GPRS is currently attached
→	AT+MCONFIG=<clientid>,XXXX,\$\$\$	Attention: XXXX is the user name \$\$\$\$ is the password Please ask the developer to write the real <clientid>, username and password, don't copy them, these three parameters with or without double quotes are fine. If username and password are empty, you can write: AT+MCONFIG=<clientid>,"",""
←	OK	
→	AT+MIPSTART="ip or domain", "port"	Here, fill in the IP address or domain address of

		<p>the user's own mqtt server, and the port number</p> <p>Notes:</p> <p>1) There is an active PDP bearer by default after the module is registered on power-up. query AT+CGDCONT? you can see an IP. at this time you can use the AT command of MQTT directly.</p> <p>2) When using SSL link for data transfer (without certificate verification), the link command format is:</p> <p>AT+SSLMIPSTART=<svraddr>,<port></p> <p>The rest is the same as the regular link. Please be aware of this!</p>
←	OK	
← (URC)	CONNECT OK	
→	AT+MCONNECT=1,60	Creating an mqtt session
←	OK	<p>Note: The MCONNECT command can only be sent after MIPSTART returns CONNECT OK, and it must be sent immediately, otherwise it will be kicked off by the server.</p> <p>Do not post a message until you receive a CONNACK OK!</p>
	CONNACK OK	
→	AT+MSUB="mqtt/topic",0	subscribe to
←	OK	
	SUBACK	
→	AT+MPUB="mqtt/topic",0,0, "SSSSddddd"	Publishing, the message format defaults to ASCII format
←	OK	
→	AT+MQTTMODE=1	Setting the message format to HEX
←	OK	
→	AT+MPUB="mqtt/topic",0,0, "313233"	Send message "123" to topic "mqtt/topic"
←	OK	
← (URC)	+MSUB: 0	The upload method is cache, which needs to be read with +MQTTMSGGET
→	AT+MQTTMSGGET?	
←	+mqttmsgget: 0,valid +MQTTMSGGET: 1,INVALID +MQTTMSGGET: 2,INVALID +MQTTMSGGET: 3,INVALID	
	OK	
→	AT+MQTTMSGGET	
←	+MSUB: mqtt/topic,9 byte,SSSSddddd	
	OK	
→	AT+MQTTMSGSET=0	Set to report messages directly

←	OK	
→	AT+MPUB="mqtt/topic",0,0, "SSSSddddd"	
←	OK	
← (URC)	+MSUB: "mqtt/topic",9 byte,SSSSddddd	
→	AT+MDISCONNECT	The module closes the MQTT connection first
←	OK	
→	AT+MIPCLOSE	Close TCP link
←	OK	
SSL with certificate validation process (one-way authentication):		
→	AT+CGATT?	View current GPRS attachment status
←	+CGATT: 1	<state>=1, indicating that GPRS is currently attached
	OK	
→	AT+FSCREATE="ca.crt"	Creating a CA certificate file
←	OK	
→	at+fswrite="ca.crt",0,1282,15	1282 is the length of the certificate file, 15 is the timeout, here is an example, please fill in the actual data, do not copy the
←	OK	
→	AT+SSLCFG="cacert",88, "ca.crt"	Set the CA certificate file name, ca.crt is the CA certificate file name
←	OK	
→	AT+SSLCFG="seclevel",88,1	Set the authentication mode to server-only authentication
←	OK	
→	AT+MCONFIG=<clientid>,XXXX,\$\$\$	Attention: XXXX is the user name \$\$\$\$ is the password Please ask the developer to write the real <clientid>, username and password, don't copy them, these three parameters with or without double quotes are fine. If username and password are empty, you can write: AT+MCONFIG=<clientid>,"",""
←	OK	
→	AT+SSLMIPSTART=<svraddr>,<port>	<svraddr>,<port>Please change to real MQTT server and port.
←	OK	
→	AT+MCONNECT=1,60	Creating an mqtt session
←	OK	Note: The MCONNECT command can only be sent after MIPSTART returns CONNECT OK, and it must be sent immediately, otherwise it will be kicked off by the server.
	CONNACK OK	
		Do not post a message until you receive a CONNACK OK!
		The latter process is the same as the normal process above
SSL with certificate validation process (two-way authentication):		
→	AT+FSCREATE="ca.crt"	Creating a CA certificate file
←	OK	
→	at+fswrite="ca.crt",0,1282,15	1282 is the length of the certificate file, 15 is the

		timeout, here is an example, please fill in the actual data, do not copy the
	>Input CA certificate file content here, 1282 bytes	
←	OK	
→	AT+FSCREATE="client.crt"	Creating a client certificate file
←	OK	
→	AT+FWRITE="client.crt",0,1026,15	
	>Enter client certificate file here, 1026 bytes	
←	OK	
→	AT+FSCREATE="client.key"	Creating a client key file
←	OK	
→	AT+FWRITE="client.key",0,1706,15	
	>Input client key file content here, 1706 bytes	
←	OK	
→	AT+SSLCFG="cacert",88, "ca.crt"	Set the CA certificate file to ca.crt
←	OK	
→	AT+SSLCFG="clientcert",88, "client.crt"	Set the client certificate file to client.crt
←	OK	
→	AT+SSLCFG="clientkey",88, "client.key"	Set the client key file to client.key
←	OK	
→	AT+SSLCFG="seclvl",88,2	Set authentication mode to two-way authentication
←	OK	
→	AT+MCONFIG=<clientid>,XXXX,\$\$\$	Attention: XXXX is the user name \$\$\$\$ is the password Please ask the developer to write the real <clientid>, username and password, don't copy them, these three parameters with or without double quotes are fine. If username and password are empty, you can write: AT+MCONFIG=<clientid>,"", ""
←	OK	
→	AT+SSLMIPSTART=<svraddr>,<port>	<svraddr>,<port>Please change to real MQTT server and port.
←	OK	
→	AT+MCONNECT=1,360	Creating an mqtt session
←	OK	
	CONNACK OK	Note: The MCONNECT command can only be sent after MIPSTART returns CONNECT OK, and it must be sent immediately, otherwise it will be kicked off by the server. Do not post a message until you receive a CONNACK OK!
		The latter process is the same as the normal process above

What to do if the module has an active report of a TCP broken link:

← (URC)	CLOSED	TCP breaks
→	AT+MQTTSTATU	Querying MQTT Connection Status
←	+MQTTSTATU :0	0 for offline
	OK	
		Reconnect from MIPSTART at the back.

What to do if the module has a context de-activated active upload:

← (URC)	+PDP DEACT	PDP de-activation, at which point a PDP context needs to be re-activated to continue using MQTT's AT commands
→	AT+CIPSHUT	Closing the mobile scene
←	OK	
	There are three ways to handle this at this point, see right	3) AT+CGDCONT=5, "IP","<apn>"//<apn>please fill in the actual APN AT+CGACT=1,5 Starting again with MIPSTART 4) AT+CFUN=0, then AT+CFUN=1 5) AT+RESET restart module

18 GPS-related commands

Note: This command applies only to the Hopu 4G CAT1 module (Air780EG series).

18.1 GPS Switch: AT+CGNSPWR

Grammatical rules:

Command Type	vocabulary	come (or go) back	instructions
Setup Commands	AT+CGNSPWR=<status>	OK	The switch is working.
		ERROR	Switch Failure
Enquiry command	AT+CGNSPWR?	+CGNSPWR: <status> OK	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<status>	switching state	0	cloture
		1	show (a ticket)

18.2 Reading GNSS information: AT+CGNSINF

Grammatical rules:

Command Type	vocabulary	come (or go) back
execute a command	AT+CGNSINF	+CGNSINF: <GNSS run status>,<Fix status>, <UTC date & Time>, <Latitude>,<Longitude>, <MSL Altitude>,<Speed Over Ground>, <CourseOver Ground>, <Fix Mode>,< Reserved1>,<HDOP>,<PDOP>, <VDOP>,<Reserved2>,<GNSS Satellites in View>, <GNSS Satellites Used>,< GLONASS Satellites Used>,<Reserved3>,<C/N0 max>, < HPA>, <VPA> OK

Parameter Definition:

parameters	define	retrieve a value	Explanation of values
<GNSS run status>	GNSS operational status	0	GNSS OFF
		1	GNSS ON
<Fix status>	position state	0	not fixed position
		1	fixed position

<UTC date & Time>	UTC time	yyyyyMMddhhmmss	yyyy: [1980,--] MM : [1,12] dd: [1,31] hh: [0,23] mm: [0,59] ss:[0,60]
<Latitude>	longitude	±dd.dddddd	[-90.000000,90.000000]
<Longitude>	longitudes	±ddd.dddddd	[-180.000000,180.000000]
<MSL Altitude>	altitude		Unit: metres
<Speed Over Ground>	Ground speed	0~999.99	Unit: Km/hour
<Course Over Ground>	course towards the earth	0~360.00	Unit: degress
<Fix Mode>	positioning mode	1	1 for unpositioned
		2	2 Positioning for 2D
		3	3 Positioning for 3D
<Reserved1>	Retention 1		
<HDOP>	Horizontal accuracy factor	0~99.9	
<PDOP>	Positional accuracy factor	0~99.9	
<VDOP>	Vertical accuracy factor	0~99.9	
<Reserved2>	Reservation 2		
<GNSS Satellites in View>	Visual GNSS satellite	0~99	
<GNSS Satellites Used>	Use of GNSS satellites	0~99	
<GLONASS Satellites Used>	Use of GLONASS satellites	0~99	
<Reserved3>	Reservation 3		
<C/N0 max>	Maximum Signal-to-Noise Ratio	0~55	Unit: dBHz
<HPA>		0~9999.9	Unit: metres
<VPA>		0~9999.9	Unit: metres

18.3 Open GNSS URC uplink: AT+CGNSURC

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSURC=<period_time>	OK
	OK	+CME ERROR:<err>
Enquiry command	AT+CGNSURC?	+CGNSURC: <period_time> OK
test command	AT+CGNSURC=?	+CGNSURC: (0-255) OK
URC	Same return format as AT+CGNSINF: +CGNSINF: <GNSS run status>,<Fix status>, <UTC date & Time>,<Latitude>,<Longitude>, <MSL Altitude>,& It;Speed Over Ground>, <Course Over Ground>, <Fix Mode>,<Reserved1>,<HDOP>,<PDOP>, <VDOP>,< Reserved2>,<GNSS Satellites in View>, <GNSS Satellites Used>,<GLONASS Satellites Used>,<Reserved3>,<C/N0 max>,<HPA>,<VPA>	

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<period_time>		0	Turn off navigation data URC reporting
		1~255	Enable navigation data URC cycle reporting and set cycle time

18.4 Send the read GNSS data to the AT port: AT+CGNSTST

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSTST=<mode>	OK
	OK	+CME ERROR:<err>
test command	AT+CGNSTST?	+CGNSTST:<mode> OK
test command	AT+CGNSTST=?	+CGNSTST:(0-1) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	switchgear	0	switch off
		1	switch on

18.5 Sending control commands to GNSS: AT+CGNSCMD

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSCMD=<cmdType>,<cmdString>,<CmdHeadString>]	OK
		+CME ERROR:<err>
test command	AT+CGNSCMD=?	+CGNSCMD:(0-1), "cmdString"
		OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<cmdType>	Command Type	0	NMEA style command. only this is currently supported.
		1	HEX style command.
<cmdString>	command string		string type
<CmdHeadString>	Response characteristics		Fill in the characteristic characters of the response, used to capture the result of the command

18.6 Setting up secondary positioning: AT+CGNSAID

Seconds positioning is done by 3 parameters: time-assisted positioning <time>, EPO file-assisted <epo>, and location-assisted <loc>. After these three aids are enabled, AT+CGNSPWR=1 turns on the gps and runs the second positioning process.

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSAID=<mode>,<time>,<epo>,<loc>	OK
		+CME ERROR:<err>
test command	AT+CGNSAID=?	+cgnsaid: (0-31)(0-1)(0-1)(0-1)(0-1)
		OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
------------	--------	------------------	-----------------------

<mode>	Parameter retention	0-31	This parameter does not work at the moment
<time>	Whether to synchronise GNSS UTC time	0	disable
		1	Enable (recommended)
<epo>	Whether or not to synchronise epo (Extended Prediction Orbit) files	0	disable
		1	Enable (recommended)
<loc>	Whether or not to enable position-assisted positioning	0	disable
		1	Enable (recommended)

18.7 Deletion of EPO files: AT+CGNSDEL

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSDEL=<mode>	+CGNSDEL: <mode>,0,0 OK +CME ERROR: <err>

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
<mode>	paradigm	1	1 and 2 reserved 3 Deleting EPO files
		2	
		3	

18.8 Defining NMEA Resolution: AT+CGNSSEQ

Grammatical rules:

Command Type	vocabulary	come (or go) back
Setup Commands	AT+CGNSSEQ="str	OK +CME ERROR: <err>
Enquiry command	AT+CGNSSEQ?	+CGNSSEQ: %s OK
test command	AT+CGNSSEQ=?	+CGNSSEQ: (GGA,GSA,RMC,GSV) OK

Parameter Definition:

parametric	define	retrieve a value	Explanation of values
str	string (computer science)		string type

18.9 Examples of methods of use

Because the commands in this section are highly relevant, the application routines for each command are described together.

Examples:

Command (→)/Return (←)	an actual example	Explanations and clarifications
Examples of use		
→	AT+CGNSPWR?	Check if GPS is switched on
←	+CGNSPWR: 0 OK	0 is unopened
→	AT+CGNSPWR=1	Turn on the GPS.
←	OK	
→	at+cgnsaid=31,1,1,1	Enable location-assisted positioning (the command returns OK immediately, and depending on the signal strength, the positioning will be successful in about 2-10 seconds)
←	OK	
→	AT+CGNSINF	Query GNSS information
←	+cgnsinf: 1,1,20201110032427,31.820789,117.117390,78.500,0.00,130.07,3,,1.79,0.89,4.00,,12,11,,34,, OK	
→	AT+CGNSURC=1	Set up automatic reporting of location information, every 5 fixes.
←	OK	
← (URC)	+ugnsinf: 1,1,20201110031835,31.820751,117.117314,63.900,0.00,0.00,3,,1.50,0.89,4.00,,13,13,,39,, +ugnsinf: 1,1,20201112031836,31.820751,117.117314,63.400,0.00,0.00,3,,1.50,0.89,4.00,,13,13,,38,, +ugnsinf: 1,1,20201110031837,31.820754,117.117314,63.000,0.00,0.00,3,,1.50,0.89,4.00,,13,13,,38,,.....	Report every 5th position.
→	AT+CGNSURC=0	Disable automatic reporting of location information
←	OK	