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RDA LPM2100
AT command manual

V2.1

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Update records

version	Date	Author	Description
V1.0	2018-03-26	Liansp	Initial version
V2.1	2018-06-29	Liansp	Add telecommunication platform connection commands based on software version 2.1 revision
V2.2	2018-8-16	ZFF	Add MQTT related commands

Contents

Chapter 1. AT command overview

All command lines in this manual must be prefixed with "AT" or "at" and terminated with <CR>.

A/ is an exception. After receiving A/, the previous AT command is executed immediately and does not require <CR> to end.

The AT command responds to two basic situations:

If the AT command runs successfully, return the command result <CR><LF>OK<CR><LF>.

If the AT command fails, return the command result <CR><LF>ERROR<CR><LF>, and ERROR may also be +CME ERROR: <err>, AT+CMEE control.

AT commands can be divided into three types: basic commands, S-parameter commands, and extended commands:

Basic command

The format of such a command is AT<x><n> or AT&<x><n>, <x> is the command name, and <n> is the command parameter. For example, the command ATE<n>, this command controls whether the module echoes the received characters, and <n> is optional.

S parameter command

The format of this type of command is ATS<n>=<m>, <n> is the index of the S register, and <m> is the value to be set. <m> is optional, and the default value is used when there is no parameter.

Extended command

Most of the commands are such commands. There are several modes of operation for this type of command:

Execution command	AT+<x>
Setting command	AT+<x>=<…>
Query command	AT+<x>?
Test command	AT+<x>=?

This manual AT command syntax:

- ✧ The AT command line must be prefixed with "AT" or "at" and terminated with <CR>. The command in this manual will omit <CR>.
- ✧ The return result is generally "<CR><LF> response content <CR><LF>", and the result of this manual will omit <CR><LF>.

- The AT command name is not case sensitive and the parameters are case sensitive.
- The bold values in the parameter table are the default values.
- Parameters must be separated by commas.
- If a parameter is a string, the string must be enclosed in double quotes.
- <> is a required parameter, [] is an optional parameter. In actual use, <> [] does not have to be entered.

Chapter 2. General command

2.1 ATE: Set command echo

Syntax

Command	Response
ATE<n>	OK

Defined values

Parameter	values	Explain
<n>	0,1	Set whether the module echoes the received characters 0 --- Turn off echo 1 --- Turn on echo

Example

ATE0

OK

2.2 ATV: Set the response format

Syntax

Command	Response
ATV<n>	OK

Defined values

Parameter	values	Explain
<n>	0,1	Set whether the response result format is a number format or a string format, and set the head and tail format. 0 --- number format, text output <text><CR><LF>, result code output <numeric code><CR> 1 --- string format, text output <CR><LF><text><CR><LF>, result code output <CR><LF><verbose code><CR><LF>

Example

ATV0

OK

2.3 ATQ: Set the result code

Syntax

Command	Response
ATQ<n>	OK

Defined values

Parameter	values	Explain
<n>	0,1	Set whether the response outputs the final result code 0 --- Output result code 1 --- No output code is output

Example

```
ATQ0
OK

ATQ1

ATQ0
OK
```

2.4 AT+CMEE: Set the error code

Syntax

Command	Response
AT+CMEE=<mode>	OK
AT+CMEE?	+CMEE: <mode> OK
AT+CMEE=?	+CMEE: (<mode>list) OK

Defined values

Parameter	values	Explain
<mode>	0,1,2	Error result code format 0 --- Only ERROR is returned when an error occurs 1 --- Return +CME ERROR when error occurs: <err>, <err> is a number 2 --- Return +CME ERROR when error occurs: <err>, <err> is a

		string

Example

```
AT+CMEE=0
OK

AT+CMEE=5
ERROR

AT+CMEE=1
OK

AT+CMEE=5
+CME ERROR: 53
```

2.5 AT&F: Restore all settings to factory configuration

Syntax

Command	Response
AT&F	OK

Example

```
AT&F
OK
```

2.6 AT&W: Save current settings to user configuration

Syntax

Command	Response
AT&W	OK

Note:

- The user configuration is automatically loaded at boot time, ATZ manually loads the user configuration, and AT&F manually loads the factory configuration.

Example

AT&W

OK

2.7 ATZ: Restore all settings to user configuration

Syntax

Command	Response
ATZ	OK

Example

ATZ

OK

2.8 AT+GMI: Query manufacturer name

Syntax

Command	Response
AT+GMI	<manufacturer> OK
AT+GMI=?	OK

Defined values

Parameter	values	Explain
<manufacturer>		manufacturer name

Example

AT+GMI

YUGA

OK

2.9 AT+GMM: Query module model

Syntax

Command	Response

AT+GMM	<model> OK
AT+GMM=?	OK

Defined values

Parameter	values	Explain
<model>		module model

Example

AT+GMM
LPM2100
OK

2.10 AT+GMR: Query module version information

Syntax

Command	Response
AT+GMR	<SW Revision> OK
AT+GMR=?	OK

Defined values

Parameter	values	Explain
<SW Revision>		module version information

Example

AT+GMR
U02C-V2.3
OK

2.11 AT+GSN: Query Module IMEI

Syntax

Command	Response
AT+GSN	<sn>

	OK
AT+GSN=?	OK

Defined values

Parameter	values	Explain
<sn>		Module IMEI

Example

AT+GSN

357942050995895

OK

2.12 AT+CGMI: Query manufacturer name

Syntax

Command	Response
AT+CGMI	<manufacturer> OK
AT+CGMI=?	OK

Defined values

Parameter	values	Explain
<manufacturer>		manufacturer name

Example

AT+CGMI

YUGA

OK

2.13 AT+CGMM: Query module model

Syntax

Command	Response
AT+CGMM	<model> OK

AT+CGMM=?	OK

Defined values

Parameter	values	Explain
<model>		module model

Example

AT+CGMM

LPM2100

OK

2.14 AT+CGMR: Query module version information

Syntax

Command	Response
AT+CGMR	<SW Revision> OK
AT+CGMR=?	OK

Defined values

Parameter	values	Explain
<SW Revision>		module version information

Example

AT+CGMR

U02C-V2.3

OK

2.15 AT+CGSN: Query Module IMEI

Syntax

Command	Response
AT+CGSN	<sn> OK
AT+CGSN=?	OK

Defined values

Parameter	values	Explain
<sn>		Module IMEI

Example

AT+CGSN

357942050995895

OK

2.16 ATI: Query module basic information

Syntax

Command	Response
ATI	<info> OK

Defined values

Parameter	values	Explain
<info>		The module returns information, +GMI +GMM +GMR query information.

Example

ATI

YUGA

LPM2100

U02C-V2.3

OK

2.17 AT+CSCS: Set the character set

Syntax

Command	Response
AT+CSCS=<chset>	OK
AT+CSCS?	+CSCS: <chset>

	OK
AT+CSCS=?	+CSCS: (<chset>list)

Defined values

Parameter	values	Explain
<chset>		Character set, mainly used in phone book, short message, etc. "GSM": GSM 7bit "UCS2": 16bit UNICODE "HEX": hexadecimal "PCCP936": PC Chinese

Example

```
AT+CSCS=”HEX”
OK
```

2.18 AT+CCLK: query time

Syntax

Command	Response
AT+CCLK=<time>	OK
AT+CCLK?	+CCLK: <time> OK
AT+CCLK=?	OK

Defined values

Parameter	values	Explain
<time>		Format YY/MM/DD, hh:mm:ss+zz, indicating year/month/day, hour:minute:second+time zone

Example

```
AT+CCLK?
+CCLK: "18/06/29,19:05:30+32"
OK
```

Chapter 3. Serial interface command

3.1 AT+IPR: Set the baud rate

Syntax

Command	Response
AT+IPR=<rate>	OK
AT+IPR?	+IPR: <rate>
AT+IPR=?	+IPR: (<rate>list)

Defined values

Parameter	values	Explain
<rate>		Module baud rate, default baud rate 57600

Example

AT+IPR=57600

OK

AT+IPR?

+IPR: 57600

OK

3.2 AT+ICF: Set the frame format

Syntax

Command	Response
AT+ICF=<format>,<parity>	OK
AT+ICF?	+ICF: <format>, <parity> OK
AT+ICF=?	+ICF:(<format>list),(<parity>list)

Defined values

Parameter	values	Explain
<format>	2-6	Serial port format 2 --- 8 data bit 1 check bit 1 stop bit 3 --- 8 data bit 0 check bit 1 stop bit

		4 --- 7 data bit 0 check bit 2 stop bit 5 --- 7 data bit 1 check bit 1 stop bit 6 --- 7 data bit 0 check bit 1 stop bit
<parity>	0-3	Parity 0 --- Odd parity 1 --- Even parity 2 --- Standard 3 --- Empty

Example

AT+ICF?

+ICF: 3, 3

OK

3.3 AT+IFC: Set up flow control

Syntax

Command	Response
AT+IFC=<txfc>,<rxfc>	OK
AT+IFC?	+IFC: <txfc>,<rxfc>
AT+IFC=?	+IFC: (<txfc>list),(<rxfc>list)

Defined values

Parameter	values	Explain
<txfc>	0-2	Tx flow control 0 --- No flow control 1 --- XON/XOFF 2 --- RTS/CTS
<rxfc>	0-2	Rx flow control 0 --- No flow control 1 --- XON/XOFF 2 --- RTS/CTS

Example

AT+IFC=0,0

OK

AT+IFC?

+IFC: 0,0

OK

3.4 AT+CSCLK: Set serial port low power mode

Syntax

Command	Response
AT+CSCLK=<mode>	OK
AT+ CSCLK?	+ CSCLK: <mode>
AT+ CSCLK =?	+ CSCLK: (<mode>list)

Defined values

Parameter	values	Explain
<mode>	0-2	Low power mode 0 --- disable low power 1 --- DTR pin controls low power consumption, enables when level is high, disables when level is low 2 --- Automatic low power consumption, automatic low power consumption when no data is sent or received

Example

AT+CSCLK=2

OK

AT+CSCLK?

+CSCLK: 2

OK

Chapter 4. SIM interface command

4.1 AT+CIMI: Query IMSI

Syntax

Command	Response
AT+CIMI	<sn> OK

Defined values

Parameter	values	Explain
<sn>		SIM card IMSI

Example

AT+CIMI

460018391304828

OK

4.2 AT+CCID: Query ICCID

Syntax

Command	Response
AT+CCID	+CCID: <sn> OK

Defined values

Parameter	values	Explain
<sn>		SIM card ICCID, usually on the back of the card

Example

AT+CCID

+CCID: 89860113831002251075

OK

4.3 AT+CPIN: Check PIN

Syntax

Command	Response
AT+CPIN=<pin>[,<newpin>]	OK
AT+CPIN?	+CPIN:<code> OK
AT+CPIN=?	OK

Defined values

Parameter	values	Explain
<pin>		Password (string)
<newpin>		New password (string)
<code>		Current PIN status READY --- No longer need to provide a password SIM PIN --- Waiting for the PIN code of the SIM card SIM PUK --- Waiting for the PUK code of the SIM card SIM PIN2 --- Waiting for the PIN2 code of the SIM card SIM PUK2 --- Waiting for the PUK2 code of the SIM card

Notes:

- If the current password input request is PIN or PIN2, enter +CPIN=<pin> for verification.
- If the current password input request is PUK or PUK2, enter +CPIN=<pin>, <newpin> to unlock. The first parameter is SIM PUK or SIM PUK2, and the second parameter <newpin> is the new PIN code or PIN2 code.

Example

```
AT+CPIN=”1234”
OK

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

4.4 AT+CLCK: Locking device

Syntax

Command	Response

AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]	When <mode>=2 returns: +CLCK: <status>[,<class>] OK When <mode>≠2 returns: OK
AT+CLCK=?	+CLCK: (<fac>list) OK

Defined values

Parameter	values	Explain
<fac>		Locking mechanism "SC" --- SIM "FD" --- SIM fixed dialing
<mode>	0-2	Mode 0 --- Unlock 1 --- Locked 2 --- Query lock status
<passwd>		Device password, +CPWD command can be modified
<class>	1,2,4,8	Category 1 --- Voice 2 --- Data 4 --- Fax 8 --- Short message
<status>	0-1	Lock status 0 --- Inactive 1 --- Activate

Example

```
AT+CLCK=”SC”,2
+CLCK: 0
OK

AT+CLCK=”SC”,1,”1234”
OK

AT+CLCK=”SC”,2
+CLCK: 1
OK
```

4.5 AT+CPWD: Change password

Syntax

Command	Response
AT+CPWD=<fac>,<oldpwd>,<newpwd>	OK
AT+CPWD=?	+CPWD: (<fac>,<pwd length>)list

Defined values

Parameter	values	Explain
<fac>		Mechanism "SC" --- SIM PIN "P2" --- SIM PIN2
<oldpwd>		Character type, device password
<newpwd>		Character type, device password
<pwd length>		Integer type, the maximum password length supported by the device

Note:

- The setup command is used to modify the password (such as a PIN) for the device lock feature.

Example

AT+CPWD=”SC”,”1234”,”12345678”
OK

4.6 AT+CRSM: SIM card reading and writing

Syntax

Command	Response
AT+CRSM=<command>[,<fileid>[,<p1>,<p2>,<p3>[,<data>]]]	+CRSM: <sw1>,<sw2>[,<response>] OK
AT+CRSM=?	OK

Defined values

Parameter	values	Explain
<command>	176,178,179,192,214,220,242	176 --- Binary read 178 --- Record reading 179 --- USIM record reading

		192 --- Get the return result 214 --- binary write 220 --- Record writing 242 --- Status
<fileid>		SIM card basic data file
<p1>,<p2>,<p3>		Pass to SIM card parameters
<data>		Write SIM card data
<response>		The data returned by the SIM card

Chapter 5. Control commands

5.1 AT+CFUN: Set module status

Syntax

Command	Response
AT+CFUN=<fun>[,<rst>]	OK
AT+CFUN?	+CFUN: <fun> OK
AT+CFUN=?	+CFUN: (<fun>list),(<rst>list) OK

Defined values

Parameter	values	Explain
<fun>	0,1,4	Module status 0 --- Minimum function 1 --- Full function 4 --- Disable RF
<rst>	0,1	0 --- Do not restart the module before setting it to <fun> 1 --- Restart the module before setting it to <fun>

Example

```
AT+CFUN=0
OK

AT+CFUN?
+CFUN: 0
OK

AT+CFUN=1
OK
```

5.2 AT+CPOF: Module shutdown

Syntax

Command	Response

AT+CPOF	

Example

AT+CPOF

5.3 AT+TRB: Module restart

Syntax

Command	Response
AT+TRB	REBOOTING

Example

AT+TRB
REBOOTING

5.4 AT+NVSETPM: Set the module sleep level

Syntax

Command	Response
AT+NVSETPM=<mode>	OK
AT+ NVSETPM?	+ NVSETPM: <mode> OK
AT+ NVSETPM =?	+ NVSETPM: (<mode>list) OK

Defined values

Parameter	values	Explain
<mode>	0-2	Dormant level 0 --- Disable sleep 1 --- DRX shallow sleep 2 --- PSM deep sleep

Example

AT+NVSETPM=2
OK

5.5 AT+NVSETBAND: set the working frequency band

Syntax

Command	Response
AT+NVSETBAND=<total>[,<band1>,<band2>,…]	OK
AT+ NVSETBAND?	+NVSETBAND: <band>list OK
AT+ NVSETBAND =?	+ NVSETBAND: (<total>list, <band>list) OK

Defined values

Parameter	values	Explain
<total>		Total number of supported bands
<band>		Frequency band number

Example

```
AT+NVSETBAND=1,8
OK
```

Chapter 6. Network command

6.1 AT+CSQ: Query signal

Syntax

Command	Response
AT+CSQ	+CSQ: <rssi>,<ber> OK
AT+CSQ=?	CSQ: (<rssi>list),(<ber>list) OK

Defined values

Parameter	values	Explain
<rssi>	0-321,99	Signal strength 0 --- Less than or equal to -113dBm 1 --- -111dBm 2-30 --- -109 - -53dBm 31 --- Greater than or equal to -51dBm 99 --- No signal
<ber>	0-7,99	Bit error rate 0-7 --- Refer to GSM RXQUAL value 99 --- Unknown

Example

AT+CSQ

+CSQ: 22,99

OK

6.2 AT+CEREG: Query registration status

Syntax

Command	Response
AT+CEREG=<n>	OK
AT+CEREG?	+CEREG: <n>,<stat>[,<tac>,<ci>,<act>[,<cause_type>,<reject_cause>[,<psm_actTimer>,<psm_TAU>]]]
AT+CEREG=?	+CEREG: (<n>list) OK

Defined values

Parameter	values	Explain
<n>	0-5	Reporting control 0 --- Ban NB network URC 1 --- Enable NB network URC, format +CEREG: <stat> 2 --- Enable NB network URC, format +CEREG: <stat>, <tac>, <ci>, <act> 3 --- Enable NB Network URC, format +CEREG: <stat>,<tac>,<ci>,<act>[,<cause_type>,<reject_cause>] 4 --- Enable NB network URC, format +CEREG: <stat><tac>, <ci>, <act>[,,[,<psm_actTimer>,<psm_TAU>]] 5 --- Enable NB network URC, format +CEREG: <stat>,<tac>,<ci>,<act>[,<cause_type>,<reject_cause>[,<psm_actTimer>,<psm_TAU>]]
<stat>	0-5	NB network registration status 0 --- Not registered 1 --- Registered 2 --- Unregistered, searched 3 --- Registration is denied 4 --- Unknown 5 --- Registered, roaming network
<tac>		Tacking area code, 2 byte hexadecimal format
<ci>		Cell ID, 4 byte hex format
<act>	0,3,7	Network Type 0 --- Unknown 3 --- GPRS 7 --- LTE
<cause_type>		Registration failure type
<reject_cause>		Reason for registration failure
<psm_actTimer>		PSM sets Active Timer
<psm_TAU>		PSM sets TAU

Notes:

- Set the command to control the +CEREG report event URC. When the NB network registration status changes, the corresponding URC is reported.
- The query command returns the current URC settings and returns the network registration status.
- If the registration is successful, <cause_type>, <reject_cause> is not reported.
- If PSM is not turned on, <psm_actTimer>, <psm_TAU> is not reported.

Example

```
AT+CEREG=3
OK

AT+CEREG?
+CEREG: 3, 1,"5be3","b169cd30",7
OK
```

6.3 AT+COPS: Query operator

Syntax

Command	Response
AT+COPS=<mode>[,<format>[,<oper>]]	OK
AT+COPS?	+COPS: <mode>[,<format>,<oper>,<sys>]

Defined values

Parameter	values	Explain
<mode>	0-3	Operator selection mode 0 --- Automatic selection 1 --- Manual selection 2 --- Log out of the network 3 --- Set only <format> for query command AT+COPS? (ignore <oper>)
<format>	0-2	<oper> format 0 --- Long character format 1 --- Short character format 2 --- Digital format
<oper>		Operator name
<sys>	0,9	Network type 0 --- GSM network 9 --- NB network

Example

```
AT+COPS?
+COPS: 0,2,"46011", 9
OK
AT+COPS=3,0
OK
```

AT+COPS?
+COPS: 0,0,"ChinaTelecom", 9
OK

6.4 AT+CPSMS: Set PSM

Syntax

Command	Response
AT+CPSMS=<mode>[,,[,<PSM_TAU>[,<PSM_actTimer>]]]	OK
AT+CPSMS?	CPSMS: <mode>,,,<PSM_TAU>,<PSM_actTimer> OK
AT+CPSMS=?	+CPSMS: (<mode>list),,,(<PSM_TAU>list),(<PSM_actTimer>list) OK

Defined values

Parameter	values	Explain
<mode>	0,1	0 --- Disables PSM 1 --- Enabled PSM
<PSM_TAU>		Cycle request timer (T3412), string type, 8 bit format, such as "00001010" for 100 minutes. Bits 1-5 --- binary coding value Bits 6-8 --- numerical unit Bit8 Bit7 Bit6 0 0 0 10 minutes 0 0 1 1 hours 0 1 0 10 hours 0 1 1 2 seconds. 1 0 0 30 seconds. 1 0 1 1 minutes
<PSM_actTimer>		Activation timer (T3324), string type, 8 bit format, for example, "00100100" indicates 4 minutes. Bits 1-5 --- binary coding value Bits 6-8 --- numerical unit Bit8 Bit7 Bit6 0 0 0 2 seconds. 0 0 1 1 minutes 0 1 0 6 minutes 0 1 1 timer is not activated.

Notes:

- When PSM is enabled, if the module is idle, the activation timer is started with a value of <PSM_actTimer>. After the timer has expired, the module enters PSM mode; during PSM, the module does not accept any network pages; only when the periodic request timer expires with a value of <PSM_TAU>, the module will exit PSM mode.
- The actual values of <PSM_TAU> and <PSM_actTimer> are configured by network and module negotiation.

Example

```
AT+CPSMS=1,,,”00000100”,”00001111”
OK

AT+CPSMS=0
OK
```

6.5 AT+CEDRXS: Set eDRX

Syntax

Command	Response
AT+CEDRXS=<mode>,<act_type>,<req_value>	OK
AT+CEDRX?	+CEDRXS: <mode>,<act_type>,<req_value> OK
AT+CEDRX=?	+CEDRXS: (<mode>list),(<act_type>list),(<req_value>list) OK

Defined values

Parameter	values	Explain
<mode>	0-3	0 --- Disable eDRX 1 --- Enable eDRX 2 --- Enables eDRX and URC to report, format +CEDRXP: <act_type>, <req_value>, <prov_value>, <ptw_value> 3 --- Disable eDRX and restore eDRX factory settings.
<act_type>	0,5	Air interface technology only supports 5 0 --- Unused 5 --- NB network

<req_value>		Module request eDRX value, string type, 4 bit format Bit4 Bit3 Bit2 Bit1 0 0 0 0 5.12 seconds 0 0 0 1 10.24 seconds, 5.12*2 0 0 1 0 20.48 seconds, 5.12*4 0 0 1 1 40.96 seconds, 5.12*8 0 1 0 0 61.44 seconds, 5.12*12 0 1 0 1 81.92 seconds, 5.12*16 0 1 1 0 102.4 seconds, 5.12*20 0 1 1 1 122.88 seconds, 5.12*24 1 0 0 0 143.36 seconds, 5.12*28 1 0 0 1 163.84 seconds, 5.12*32 1 0 1 0 327.68 seconds, 5.12*64 1 0 1 1 655.36 seconds, 5.12*128 1 1 0 0 1310.72 seconds, 5.12*256 1 1 0 1 2621.44 seconds, 5.12*512 1 1 1 0 5242.88 seconds, 5.12*1024 1 1 1 1 10485.76 seconds, 5.12*2048			

Notes:

- eDRX is an extension of the DRX mechanism. Each eDRX cycle contains several DRX paging cycles, which form a paging time window.
- The actual value of eDRX is configured by network and module negotiation.

Example

```
AT+CEDRXS=1,5,”0010”
OK

AT+CEDRXS=0
OK
```

6.6 AT+CEDRXRDP: Query eDRX status

Syntax

Command	Response
AT+CEDRXRDP	+CEDRXP: <act_type>[,<req_value>,<prov_value>,<ptw_value>] OK
AT+ CEDRXRDP =?	OK

Defined values

Parameter	values	Explain
<act_type>	0,5	Air interface technology 0 --- Unused 5 --- NB network
<req_value>		Reference AT+CEDRXS
<prov_value>		Network configuration eDRX value, refer to <req_value>
<ptw_value>		Paging Time Window, string type, 4-bit format Bit4 Bit3 Bit2 Bit1 0 0 0 0 2.56 seconds 0 0 0 1 5.12 seconds, 2.56*2 0 0 1 0 7.68 seconds, 2.56*3 0 0 1 1 10.24 seconds, 2.56*4 0 1 0 0 12.8 seconds, 2.56*5 0 1 0 1 15.36 seconds, 2.56*6 0 1 1 0 17.92 seconds, 2.56*7 0 1 1 1 20.48 seconds, 2.56*8 1 0 0 0 23.04 seconds, 2.56*9 1 0 0 1 25.6 seconds, 2.56*10 1 0 1 0 28.16 seconds, 2.56*11 1 0 1 1 30.72 seconds, 2.56*12 1 1 0 0 33.28 seconds, 2.56*13 1 1 0 1 35.84 seconds, 2.56*14 1 1 1 0 38.4 seconds, 2.56*15

Note:

- If eDRX is not enabled, return to +CEDRXP: 0

Example

```
AT+CEDRXRDP
+CEDRXRDP: 5, 000, 0000, 0000
OK
```

6.7 AT+CSCON: Query connection status

Syntax

Command	Response
AT+CSCON=<n>	OK
AT+CSCON?	+CSCON: <n>,<mode>[,<state>] OK

AT+CSCON=?	+CSCON: (<n>list> OK

Defined values

Parameter	values	Explain
<n>	0-3	URC report format when the connection status changes 0 --- Close report to URC 1 --- Open the report URC, format +CSCON: <mode> 2 --- Open the report URC, format +CSCON: <mode>[,<state>] 3 --- Open the report URC, format +CSCON: <mode>[,<state>[,<access>]]
<mode>	0,1	Signaling connection status 0 --- Idle 1 --- Connected
<state>	7	RRC connection status 7 --- Connected

Example

```
AT+CSCON?
+CSCON: 1, 1
OK
```

Chapter 7. Data field command

7.1 AT+CGATT: network attachment

Syntax

Command	Response
AT+CGATT=<state>	OK
AT+CGATT?	+CGATT: <state> OK
AT+CGATT=?	+CGATT: (<state>list> OK

Defined values

Parameter	values	Explain
<state>	0-1	0 --- Data field is attached 1 --- Data field attachment

Note：

- After the network registration is successful, the automatic data domain attachment will occur.

Example

```
AT+CGATT?
+CGATT: 1
OK
```

7.2 AT+CGDCONT: Define PDP

Syntax

Command	Response
AT+CGDCONT=<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>]]]]]	OK
AT+CGDCONT?	+CGDCONT: <cid>,<PDP_type>,<APN>,<PDP_addr>,<d_comp>,<h_comp> OK
AT+CGDCONT=?	+CGDCONT: (<cid>list),(<PDP_type>

	list),(<d_comp>list),(<h_comp>list) OK

Defined values

Parameter	values	Explain
<cid>		Value, specifying a specific PDP context
<PDP_type>	IP IPv6 PPP	Packet protocol type IP --- IPv4 protocol IPV6 --- IPv6 protocol PPP --- PPP protocol
<APN>		Access point name
<PDP_addr>		IP address assigned by PDP
<d_comp>	0,1	Packet compression control 0 --- Turn off compression 1 --- Turn on compression
<h_comp>	0,1	Packet header compression control 0 --- Turn off compression 1 --- Turn on compression

Example

AT+CGDCONT=1,”IP”,”ctnb”
OK

AT+CGDCONT?
+CGDCONT:1,"IP","ctnb","0.0.0.0",0,0
OK

7.3 AT+CGACT: Activate PDP

Syntax

Command	Response
AT+CGACT=<state>[,<cid>]	OK
AT+CGACT?	+CGACT: <cid>,<state> OK
AT+CGACT=?	+CGACT: (<state>list) OK

Defined values

Parameter	values	Explain
<state>	0,1	0 --- Deactivate 1 --- Activate
<cid>		Reference AT+CGDCONT

Example

```
AT+CGACT=1
OK

AT+CGDCONT?
+CGDCONT:1,"IP","ctnb","10.160.71.41",0,0
OK
```

7.4 AT+CGPADDR: Query PDP address

Syntax

Command	Response
AT+CGPADDR	+ CGPADDR: <cid>,<PDP_addr> OK

Defined values

Parameter	values	Explain
<cid>		Reference AT+CGDCONT
<PDP_addr>		Dynamic address assigned to the PDP after activation

Example

```
AT+CGPADDR
+CGPADDR: 1,"10.250.0.173"
OK
```

7.5 AT+CDNSCFG: Configure DNS server

Syntax

Command	Response
AT+CDNSCFG=<pri_dns>,<sec_dns>	OK
AT+CDNSCFG?	PrimaryDns: <ip>

	SecondaryDns: <ip> OK
AT+CDNSCFG=?	+CDNSCFG: “PrimaryDNS”,”SecondaryDNS” OK

Defined values

Parameter	values	Explain
<pri_dns>		Primary DNS
<sec_dns>		Secondary DNS

Notes:

- Returns 0.0.0.0 when DNS is empty
- Generally, the network will configure DNS after activating the PDP.

Example

```
AT+CDNSCFG?
PrimaryDns: <218.4.4.4>
SecondaryDns: <218.2.2.2>
OK
```

7.6 AT+CDNSGIP: Domain Name Resolution

Syntax

Command	Response
AT+CDNSGIP=<domain name>	(Successful analysis) OK +CDNSCFG: 1, <domain name>,<ip> (Parsing failure) OK +CDNSCFG: 0, <error code>
AT+CDNSGIP=?	OK

Defined values

Parameter	values	Explain
<domain name>		Domain name

<ip>		IP address, there may be multiple
<error code>	3,8	DNS failure code 8 --- General error 3 --- Network error

Example

AT+CDNSGIP=”www.qq.com”

OK

+CDNSGIP: 1,"www.qq.com","180.163.26.39"

Chapter 8. TCP/IP command

8.1 AT+CIPMUX: Set the connection mode

Syntax

Command	Response
AT+CIPMUX=<n>	OK
AT+CIPMUX?	+CIPMUX:<n>
AT+CIPMUX=?	+CIPMUX:(<n>list)

Defined values

Parameter	values	Explain
<n>	0,1	IP connection mode 0 --- Single connection mode 1 --- Multiple connection mode

Example

AT+CIPMUX=1

OK

8.2 AT+CIPSTATUS: Query IP connection status

Syntax

Command	Response
AT+CIPSTATUS	(Single connection mode) OK <state>
	(Multiple connection mode) OK <state> C: <n>,<bearer>,<TCP/UDP>,<addr>,<port>,<state>
(Multi-IP mode) AT+CIPSTATUS=<n>	+CIPSTATUS: <n>,<bearer>,<TCP/UDP>,<addr>,<port>,<state> OK
AT+CIPSTATUS=?	OK

Defined values

Parameter	values	Explain
<n>	0-7	0-7 --- connection number
<state>		Connection Status IP INITIAL IP START IP CONFIG IP GPRSACT IP STATUS TCP CONNECTING / UDP CONNECTING CONNECT OK TCP CLOSING / UDP CLOSING TCP CLOSED / UDP CLOSED PDP DEACT
<bearer>	0-1	0-1，default is 0

Example

```
AT+CIPSTATUS
OK
STATE:IP INITIAL
```

8.3 AT+CIPMODE: Set the transmission mode

Syntax

Command	Response
AT+CIPMODE=<mode>	OK
AT+CIPMODE?	+CIPMODE:<mode>
AT+CIPMODE=?	+CIPMODE:(<mode>list)

Defined values

Parameter	values	Explain
<mode>	0,1	0 --- AT mode 1 --- Transparent transmission mode, in the transparent transmission mode, input "+++" to return to AT mode

Example

```
AT+CIPMODE=0
OK
```

8.4 AT+CIPSTART: Initiate an IP connection

Syntax

Command	Response
(Single connection mode) AT+CIPSTART=<mode>,<addr>,<port> (Multiple connection mode) AT+CIPSTART=<n>,<mode>,<addr>,<port>	OK CONNECT OK
AT+CIPSTART=?	+CIPSTART: (<mode>list),(<addr>list),(<port>list) OK

Defined values

Parameter	values	Explain
<n>	0-7	0-7, connection number
<mode>		"TCP" --- Establish a TCP connection "UDP" --- Establish a UDP connection
<addr>		IP address of the other party
<port>		Counter port

Example

```
AT+CIPSTART="TCP","121.41.100.43",1234
OK
CONNECT OK
```

8.5 AT+CIPSEND: Send data

Syntax

Command	Response
AT+CIPSEND data to send <CTRL-Z/ESC>	> SEND OK
(Single connection mode) AT+CIPSEND=<length> data to send	> SEND OK

(Multiple connection mode) AT+CIPSEND=<n>,<length> data to send	

Sending is completed in two steps. First, the command is issued, waiting for the module to reply "><SPACE>"; then the data is sent. If there is no length parameter, it ends with <CTRL-Z>, and there is a length parameter to send the specified length data.

Defined values

Parameter	values	Explain
<n>		0-7, connection number
<length>		Pending data length

Example

```
AT+CIPMUX?
+CIPMUX:0
OK

AT+CIPSEND
> test123<CTRL-Z>
SEND OK

AT+CIPSEND=5
> test1
SEND OK
```

8.6 AT+CIPACK: Send data statistics

Syntax

Command	Response
(Single connection mode) AT+CIPACK	
(Multiple connection mode) AT+CIPACK=<n>	+CIPACK: <txlen>,<actlen>,<nacklen> OK
AT+CIPACK=?	OK

Defined values

Parameter	values	Explain
<n>		0-7, connection number
<txlen>		Total data sent
<actlen>		Send successful data
<nacklen>		Send failed data

Example

AT+CIPACK

+CIPACK:14,14,0

OK

8.7 AT+CIPRXGET: Receive data

Syntax

Command	Response
(Single connection mode) AT+CIPRXGET=<mode>[,<reqLength>]	OK
(Multiple connection mode) AT+CIPRXGET=<mode>[,<n>,<reqLength>]	OK
AT+CIPRXGET?	+CIPRXGET: <mode>
AT+CIPRXGET=?	+CIPRXGET:(<mode>list),(<reqLength>list)

To use manual reception, you must first set it to 1; then use 2 or 3 to receive, use 4 to query.

Defined values

Parameter	values	Explain
<mode>	0-4	Receive data mode 0 --- Receive data direct output 1 --- Enable manual reception 2 --- Module cache data, up to 1460Bytes, return format: +CIPRXGET:2, <reqLength>,<cnfLength> <data> OK 3 --- Same as 2, the data is in HEX format, the maximum is 730Bytes, and the return format is:

		+CIPRXGET:3, <reqLength>,<cnfLength> <data> OK 4 --- How many data is received by the query, return format: +CIPRXGET: 4, <cnfLength>
<reqLength>		The size of the request to receive data
<cnfLength>		Actual cached data size
<n>		0-5, connection number

Example

```
AT+CIPRXGET=1
OK

….

AT+CIPRXGET=4
+CIPRXGET:4,7
OK

AT+CIPRXGET=2,7
+CIPRXGET:2,7,7
test678
OK
```

8.8 AT+CIPCLOSE: End IP connection

Syntax

Command	Response
(Single connection mode) AT+CIPCLOSE	CLOSE OK
(Multiple connection mode) AT+CIPCLOSE=<n>	<n>, CLOSE OK
AT+CIPCLOSE=?	OK

Defined values

Parameter	values	Explain
<n>		0-7, connection number

Example

AT+CIPCLOSE

CLOSE OK

8.9 AT+CIPSHUT: End network connection

Syntax

Command	Response
AT+CIPSHUT	SHUT OK
AT+CIPSHUT=?	OK

Example

AT+CIPSHUT

SHUT OK

8.10 AT+CLPORT: Set local port

Syntax

Command	Response
(Single connection mode) AT+CLPORT=<mode>,<port>	OK
(Multiple connection mode) AT+CLPORT=<n>,<mode>,<port>	OK
AT+CLPORT?	(Single connection mode) +CLPORT:<TCP port>,<UDP port> (Multiple connection mode) +CLPORT:<n>,<TCP port>,<UDP port> OK
AT+CLPORT=?	+CLPORT:(<n>list),(<mode>list),(<port>list) OK

Defined values

Parameter	values	Explain
<n>		0-7, connection number

<mode>		"TCP" --- TCP connection "UDP" --- UDP connection
<port>	0-65536	0-65536, local port. The default is 0, dynamic allocation

Example

AT+CLPORT=”TCP”,23400

OK

AT+CLPORT?

+CLPORT:TCP:23400,UDP:0

OK

8.11 AT+CIPSPRT: Set send prompt

Syntax

Command	Response
AT+CIPSPRT=<mode>	OK
AT+CIPSPRT?	+CIPSPRT:<mode> OK
AT+CIPSPRT=?	+CIPSPRT:(<mode>list) OK

Defined values

Parameter	values	Explain
<mode>	0-2	0: No “>”Spoken, “SEND OK” after successful delivery 1: There is a “>” prompt, and the display will show“SEND OK” after successful delivery. 2: No “>” Prompt, no SEND OK’ after successful delivery

Example

AT+CIPSPRT=1

OK

8.12 AT+CIPHEAD: Set the receive header format

Syntax

Command	Response

AT+CIPHEAD=<mode>	OK
AT+CIPHEAD?	+CIPHEAD: <mode> OK
AT+CIPHEAD=?	+CIPHEAD: (<mode>list) OK

Defined values

Parameter	values	Explain
<mode>	0,1	0 --- None 1 --- Increase the receiving head Single connection mode format + IPD, <length>: <data> Multi-connection mode format +IPD, <n>, <length>:<data>

Example

```
AT+CIPHEAD=1
OK

+IPD,7:test123
```

8.13 AT+CIPSHOWTP: Set the receiver display protocol

Syntax

Command	Response
AT+CIPSHOWTP=<mode>	OK
AT+CIPSHOWTP?	+CIPSHOWTP:<mode> OK
AT+CIPSHOWTP=?	+CIPSHOWTP:(<mode>list) OK

Defined values

Parameter	values	Explain
<mode>		0 --- None 1 --- Increase the protocol type to the receiving header Single connection mode format + IPD, <length>, <proto>: <data> Multi-connection mode format +IPD, <n>, <length>, <proto>: <data>

Example

AT+CIPSHOWTP=1

OK

+IPD,7,TCP:test123

8.14 AT+CIPSRIP: Set the display IP address

Syntax

Command	Response
AT+CIPSRIP=<mode>	OK
AT+CIPSRIP?	+CIPSRIP:<mode> OK
AT+CIPSRIP=?	+CIPSRIP:(<mode>list) OK

Defined values

Parameter	values	Explain
<mode>	0-1	0 --- None 1 --- When receiving data, the other party's IP and PORT are displayed. Single connection mode format +RECV FROM:<ip>:<port> Multi-connect mode format +RECV FROM:<n>,<ip>:<port>

Example

AT+CIPSRIP=1

OK

+RECV FROM:121.41.100.43:1234

+IPD,7,TCP:test123

8.15 AT+CIPCCFG: Set the transparent transmission parameters

Syntax

Command	Response
AT+CIPCCFG=<NmRetry>,<WaitTm>,<SendSz>,<esc>[,<Rxmod	OK

e>,<RxSize>,<Rxtimer>]	
AT+CIPCCFG?	+CIPCCFG:<NmRetry>,<WaitTm>,<SendSz>,<esc>,<Rxmode>,<RxSize>,<Rxtimer>
AT+CIPCCFG=?	+CIPCCFG:(<NmRetry>list),(<WaitTm>list),(<SendSz>list),(<esc>list),(<Rxmode>list),(<RxSize>list),(<Rxtimer>list)

Defined values

Parameter	values	Explain
<NmRetry>		The number of attempts to send, default 5
<WaitTm>		Receive data interval from the serial port, the unit is 100ms, the default is 2
<SendSz>		Receive the largest packet of data from the serial port, the default is 1024
<esc>	0-1	Whether to enable the switch, enabled by default 0 --- Disabled 1 --- Enabled
<Rxmode>	0-1	Receive data mode 0 --- Received data is immediately sent to the serial port 1 --- Received data sent to the serial port after <Rxtimer> time
<RxSize>		Receive data maximum package, default 1460
<Rxtimer>		Waiting time for receiving time, default 50ms

Example

```
AT+CIPCCFG?
+CIPCCFG:5,2,1024,1,0,1460,50
OK
```

8.16 AT+CIPTKA: Set TCP heartbeat parameters

Syntax

Command	Response
AT+CIPTKA=<mode>[,<keepIdle>[,<keepInterval>[,<keepCount>]]]	OK
AT+CIPTKA?	+CIPTKA:<mode>,<keepIdle>,<keepInterval>,<keepCount> OK

AT+CIPTKA=?	+CIPTKA:(<mode>list),(<keepIdle>list),(<keepInterval>list),(<keepCount>list) OK

Defined values

Parameter	values	Explain
<mode>	0-1	0 --- Disable TCP heartbeat 1 --- Enable TCP heartbeat
<keepIdle>		Enable idle interval of heartbeat packets, in seconds, default 7200
<keepInterval>		Heartbeat interval, in seconds, default 75
<keepCount>		Number of heartbeat packets, default 9

Example

AT+CIPTKA?

+CIPTKA: <0>,<7200>,<75>,<9>

OK

Chapter 9. UDP command

9.1 AT+TPING: Send PING package

Syntax

Command	Response
AT+TPING=<raddr>[,<p_size>[,<timeout>]]	+TPING: <raddr>,<ttl>,<rtt>

Defined values

Parameter	values	Explain
<raddr>		IP address of the other party
<p_size>		PING packet data size, range 8-1460, default 8
<timeout>		Response timeout, range 10-60000, default 1000, unit ms
<ttl>		Default 255
<rtt>		The length of time from the time the packet is sent to the time the response is received, in ms

Example

AT+TPING=”111.205.140.139”

OK

+TPING: 111.205.140.139, 255, 579

9.2 AT+TSOCR: Create a UDP Socket

Syntax

Command	Response
AT+TSOCR=<type>,<protocol>,<port>[,<recv_ctr>]	<sock_id> OK
AT+TSOCR?	<sock_id>list OK

Defined values

Parameter	values	Explain
<type>		Socket type, only supports "DGRAM"
<protocol>		Protocol, UDP is 17

<port>		Local port number, 0-65635 (except 5683)
<recv_ctr>		Receiving control 0 --- Disable data reception 1 --- Enable data reception, report +TSONMI after receiving data The default is 1
<sock_id>		Created socket id

Example

AT+TSOCR=”DGRAM”,17,56,1

1

OK

9.3 AT+TSOST: Send UDP data

Syntax

Command	Response
AT+TSOST=<sock_id>,<radd r>,<rport>,<length>,<data>	<sock_id>,<length> OK

Defined values

Parameter	values	Explain
<sock_id>		Reference AT+TSOCR
<raddr>		IP address of the other party
<rport>		Port of the other party
<length>		Pending packet length
<data>		Packet, data can be HEX format or quoted string

Example

AT+TSOST=1,”111.205.140.139”,7000,7,”test123”

1,7

OK

AT+TSOST=1,”111.205.140.139”,7000,3,1A2B3C

1,3

OK

9.4 AT+TSORF: Receive UDP data

Syntax

Command	Response
AT+TSORF=<sock_id>,<req_length>	<sock_id>,<raddr>,<rport>,<length>,<data>

Defined values

Parameter	values	Explain
<sock_id>		Reference AT+TSOCR
<req_length>		Maximum receiving data
<raddr>		IP address of the other party
<rport>		Port of the other party
<length>		Receive packet length
<data>		Packet, HEX format

Example

AT+TSORF=1,128

1,111.205.140.139,7000,2,7465

OK

9.5 AT+TSOCL: End UDP Socket

Syntax

Command	Response
AT+TSOCL=<sock_id>	OK

Defined values

Parameter	values	Explain
<sock_id>		Reference AT+TSOCR

Example

AT+TSOCL=1

OK

9.6 +TSONMI: UDP message reporting indication

Syntax

Command	Response
+TSONMI: <sock_id>,<length>	OK

Defined values

Parameter	values	Explain
<sock_id>		Reference AT+TSOCR
<length>		Received UDP data length

Example

```
+TSONMI: 1,14
OK
```

Chapter 10. Telecom COAP command

10.1 AT+NCDPOPEN: Connect to the CDP server

Syntax

Command	Response
AT+NCDPOPEN=<ip>[,<port>[,<psk>]]	OK
AT+NCDPOPEN=?	OK

Defined values

Parameter	values	Explain
<ip>		CDP server IP address
<port>		CDP server port, default is 5683
<psk>		Secure connection psk code

Notes:

- The module's IMEI must be registered to the server first.

Example

```
AT+NCDPOPEN="180.101.147.115"
OK
```

10.2 AT+NCDPCLOSE: End connection to CDP server

Syntax

Command	Response
AT+NCDPCLOSE	OK

Example

```
AT+NCDPCLOSE
OK
```

10.3 AT+NMGS: Send COAP data

Syntax

Command	Response
AT+NMGS=<length>,<data>	OK

Defined values

Parameter	values	Explain
<length>		Pending packet length
<data>		Packet, data can be HEX format or quoted string

Example

AT+NMGS=3,313233
OK

AT+NMGS=3,”123”
OK

10.4 AT+NMGR: Receive COAP data

Syntax

Command	Response
AT+NMGR	<length>,<data> OK

Defined values

Parameter	values	Explain
<length>		Receive packet length
<data>		Packet, HEX format

Example

AT+NMGR
3,313233
OK

10.5 AT+NNMI: Set COAP message reporting

Syntax

Command	Response
AT+NNMI=<mode>	OK
AT+NNMI?	+NNMI:<mode>

	OK

Defined values

Parameter	values	Explain
<mode>	0-2	New data reporting mode 0 --- No report 1 --- Data is reported directly, format +NNMI:<length>, <data> 2 --- Escalation notice, format +NNMI

Example

```
AT+NNMI=1
OK
```

Chapter 11. MQTT command

11.1 AT+MQTTCONN Create MQTT connection

Syntax

Command	Response
AT+MQTTCONN=<host>,<port>,<clientid>,<keepalive>,<cleansession>,[<username>],[<password>]	OK

Defined values

Parameter	values	Explain
<host>		host name of MQTT server
<port>		port of MQTT server
<clientid>		client ID
<keepalive>		keep-alive of mqtt connection; time in milliseconds
<cleansession>		whether clean session
<username>		user name
<password>		password.

11.2 AT+MQTTSUBUNSUB Subscribe or Unsubscribe a MQTT topic

Syntax

Command	Response
AT+MQTTSUBUNSUB=<topic>,<sub flag>,<qos>	OK

Defined values

Parameter	values	Explain
<topic>		topic of mqtt, max length is 255
<sub flag>	0-1	1 --- subscribe 0 --- unsubscribe
<qos>	0-2	quality of service values include 0, 1, 2

11.3 AT+MQTTPUB Publish a MQTT message on topic

Syntax

Command	Response

AT+MQTTPUB=<topic>,<message>,<qos>,<duplicate>,<retain>	OK

Defined values

Parameter	values	Explain
<topic>		topic of MQTT, max length is 255
<message>		message to publish, max length is 255
<qos>		quality of service values include 0, 1, 2
<duplicate>		duplicate flag of MQTT, value inclue 0, 1
<retain>		retain flag of MQTT, value include 0, 1

11.4 AT+MQTTDISCONN Disconnect the MQTT connection

Syntax

Command	Response
AT+MQTTDISCONN	OK

11.5 Examples to use MQTT

1. Craete MQTT connection

AT+MQTTCONN="203.156.205.55",61613,"11111111",60,0,"admin","password"

OK

2. Subscribe a MQTT topic

AT+MQTTSUBUNSUB="home/garden/fountain11",1,0

OK

3.Publish a MQTT message on topic

AT+MQTTPUB="home/garden/fountain11","hello yuge",0,0,0

OK

4.Receive subscription messages

+MQTTPUBLISH:1,home/garden/fountain11,10,hello yuge

5.Unsubscribe a MQTT topic

AT+MQTTSUBUNSUB="home/garden/fountain11",0

OK

6.Disconnect MQTT connection

AT+MQTTDISCONN

OK

Appendix A: +CME ERROR Error Code

When the +CMEE setting is non-zero, the AT command error uses +CME ERROR: <err> to return a specific error.

The following table is a list of +CME ERROR error codes

<err>Number	<err>Character
0	phone failure
1	no connection to phone
2	phone-adapter link reserved
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	Memory full
21	invalid index
22	not found
23	Memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string

30	no network service
31	Network timeout
32	Network not allowed emergency calls only
40	Network personalization PIN required
41	Network personalization PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required
48	PH-SIM PUK required
49	The excute command not support
50	Excute command failure
51	no memory
52	The command not support,check your input,pls
53	parameters are invalid
54	REG not exit in flash
55	SMS not eixt in flash
56	Phone book not eixt in flash
57	file system not eixt in flash
58	invalid command line
103	Illegal MS
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	Service option not supported
133	Requested service option not subscribed

134	Service option temporarily out of order
148	Unspecified GPRS error
149	PDP authentication failure
150	Invalid mobile class