



HUAWEI ME909u-523 LTE LGA Module  
V100R001

# Application Guide

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## About This Document

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### Revision History

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| 01               | 2014-05-22 |         | Creation  |
| 02               | 2014-09-05 | 2.3.1   | Updated reference process                       |
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# 1 Overview

This document is intended to provide references for customers to choose appropriate command sequences to start using the ME909u-523 module in a faster manner. This document also contains examples and relevant description.

This document will be updated based on customers' requirements.

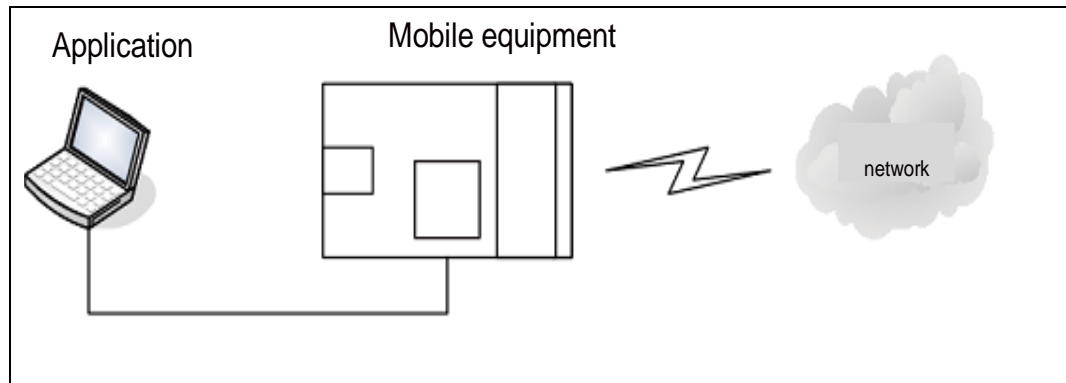
## 1.1 Conventions and Definitions

### 1.1.1 Conventions

| Convention | Description  |
|------------|--|
| <...>      | Value range of AT command parameters   |
| XXXX       | Personal Identification Number (PIN), Personal Unlock Key (PUK), or password |

### 1.1.2 Definitions

| Term       | Definition  |
|------------|---|
| Connected  | Indicates that a link has been set up between two modules or a module and a terminal. |
| Registered | Indicates that the module is registered with a LTE/UMTS/GSM network.                  |
| Module     | HUAWEI LTE module   |



## 1.2 Basic AT Command Processing Principles

### 1.2.1 Ports

The ME909u-523 module provides four ports to interact with its host:

- MODEM port: simulated using USB, for AT command interaction and establishing data connection.  
Port name: HUAWEI Mobile Connect-Modem
- PCUI port: simulated using USB, for AT command interaction only.  
Port name: HUAWEI Mobile Connect-PCUI Interface
- ECM port: simulated using USB, for establishing communication connection.  
Port name: CDC Ethernet Control Model (ECM)
- NMEA port: simulated using USB, sending unsolicited indications for NMEA positioning data and sending GPS AT command.  
Port name: HUAWEI Mobile Connect-GPS Interface



#### NOTE

The ME909u-523 module does not support the modem dialing-up.

The ME909u-523 also provides a port for debugging:

- DIAG port: Simulated using USB, for DIAG (diagnostic) command interaction (mainly used to debug modules at present).  
Port name: HUAWEI Mobile Connect-Application Interface

A host controls a module using AT commands. If AT commands are unavailable, a module can be deemed as unavailable.

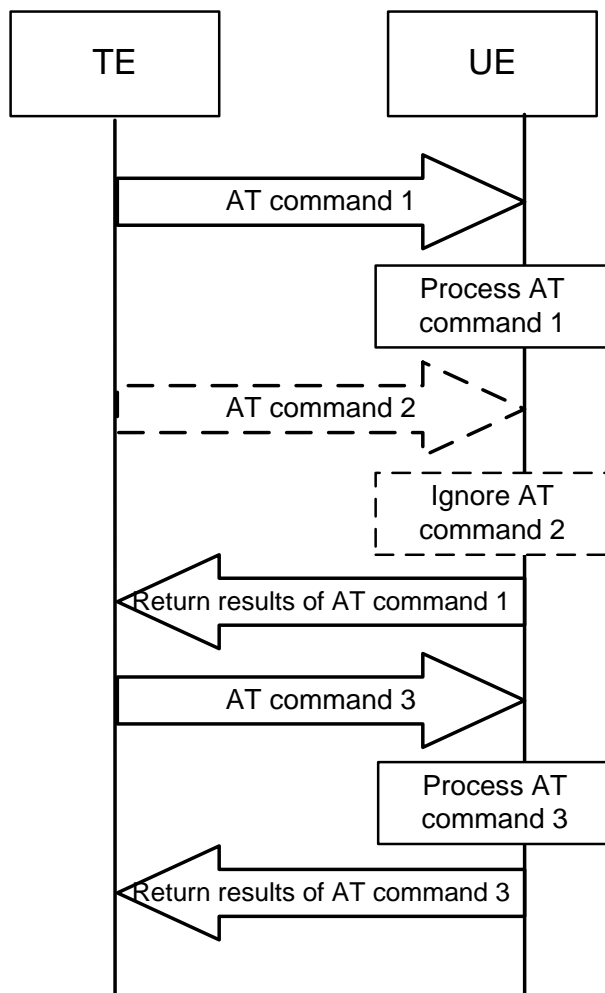
### 1.2.2 AT Command Processing Mechanism

A module processes AT commands from the ports (MODEM, PCUI, GPS and UART) in series. An AT command can be processed when and only when the previous AT command processing has been completed. If the module is processing an AT command, a new AT command from the same port will be ignored and other commands from other ports will be buffered until the current AT command is processed.

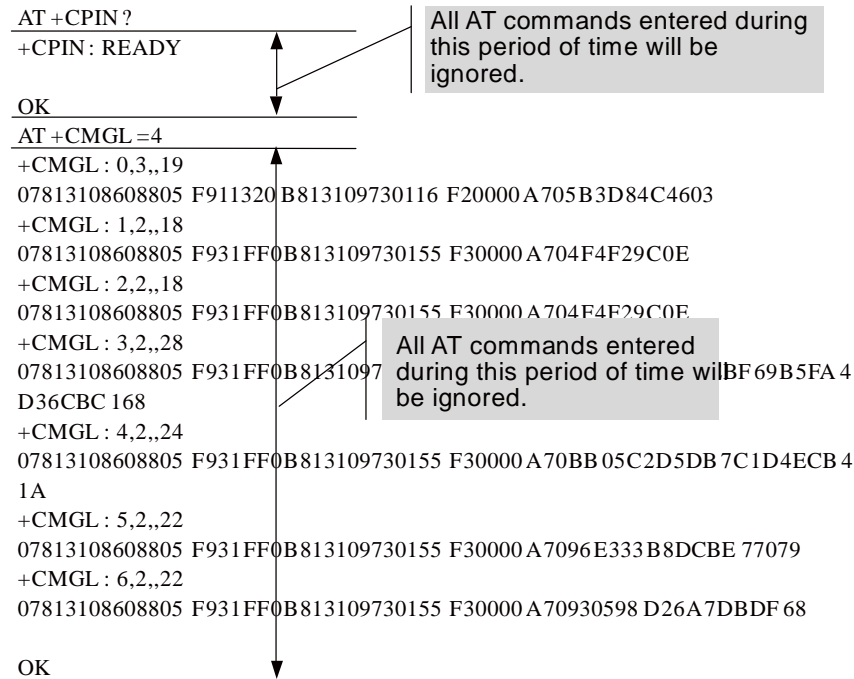
This rule also applies to COM ports converted from USB ports.

The processing of an AT command starts when the AT command is entered from the TE, and ends when the UE (the module) returns all the results in response the command.

**Figure 1-1** AT command processing sequence diagram



Example:



Some special AT commands can be aborted by new AT commands. Such special commands are called abortive commands.

The ME909u-523 supports the following abortive AT commands:

- The AT+COPS Set command
- AT+CLCK

Example:

```
AT+COPS=1,2,23415
OK
```

Before the results of AT+COPS is returned, enter any characters (such as "AT"), the module will terminate the processing of AT+COPS and return **OK**. The entered characters are used to abort the command only.

Some commands can be executed when SIM card is inserted. It would return to SIM failure if SIM card is not inserted. For more information, see Property Description of related AT in [HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification](#).

Example:

```
AT+CREG?
+CME ERROR: SIM failure
```



**NOTE**

SIM failure indicates that SIM card is not inserted.

### 1.2.3 Recommended Timeout Mechanism for AT Commands Processed by a Host

A module processes AT commands in series. Do not send another AT command before the result for the current command is returned or the current command times out (except when the current command is an abortive AT command). The following table lists AT command timeout durations (starting from the time when an AT command arrives at a port).

**Table 1-1** AT command timeout duration

| AT Command                                   | Timeout Duration |
|--|------------------|
| General AT commands                          | 30s              |
| AT+CMSS/AT+CMGS (used to send text messages) | 60s              |
| AT+COPS=? (used to search for networks)      | 120s             |

After an AT command times out, it is recommended that the host check whether the module is functioning normally. The following procedure is provided for your reference:

1. The host sends **AT** to the module.
2. If the module returns failure information, go to step 5.
3. If the module returns success information, the module is functioning normally.



4. If the host times out (the host waits for a response for over 30 seconds) three times when waiting for the response from the module, go to step 5. Otherwise go to step 1.
5. The host deems that the current module does not exist or is unavailable. Close the port, stop sending all AT commands, exit the procedure to determine whether the module is normal, and re-search for modules.



# 2 Initialization Application Scenarios

## 2.1 Startup Indication ^SYSSTART

### 2.1.1 Reference Process

| Command          | Description  |
|------------------|--|
|                  | A module, without solicitation, presents <b>^SYSSTART</b> to its host to indicate that the module is starting. |
| <b>^SYSSTART</b> | Indicate that a module is starting.  |

 **NOTE**

- **^SYSSTART** is presented only when a module is starting and will not be presented after a module has started.
- **^SYSSTART** is presented only after the radio frequency (RF) initialization completes and will not be presented in offline mode.
- **^SYSSTART** is only report on URAT port, USB port not demanded.

### 2.1.2 Troubleshooting

| Scenario   | Possible Error Information               | Solution   |
|--|--|--|
| The module presents <b>^SYSSTART</b> during startup. After that, the module presents <b>^SYSSTART</b> again. | Indicate that the module has been reset. | If <b>^SYSSTART</b> is presented repeatedly, send the module to the specified repair center. |



## 2.2 Querying Basic Information

### 2.2.1 Reference Process

| Command                            | Description                                       |
|------------------------------------|---|
| <b>AT+GMR/CGMR</b>                 | Query software version.                           |
| <b>Software version</b>            | Software version. e.g. <b>11.430.37.00.00</b>     |
| <b>OK</b>                          |   |
| <b>AT+GMI/CGMI</b>                 | Query manufacturer identification.                |
| <b>Manufacturer Identification</b> | For example: <b>Huawei Technologies Co., Ltd.</b> |
| <b>OK</b>                          |   |
| <b>AT+GMM/CGMM</b>                 | Query model identification.                       |
| <b>Model identification</b>        | For example: <b>ME909u-523</b>                    |
| <b>OK</b>                          |   |
| <b>AT+GSN/CGSN</b>                 | Query product IMEI.                               |
| <b>IMEI</b>                        | For example: <b>865261010004010</b>               |
| <b>OK</b>                          |   |



#### NOTE

The previously listed commands are query commands and cannot be used to configure settings.

### 2.2.2 Troubleshooting

| Scenario           | Possible Error Information        | Solution   |
|--------------------|-----------------------------------|--|
| <b>AT+GSN/CGSN</b> | <b>+CME ERROR: memory failure</b> | This error occurs when a module's IMEI is not specified. This problem is solved after the IMEI is written into the module. |





## 2.3 Network Service Operations

### 2.3.1 Reference Process

| Command                                    | Description  |
|--|--|
| <b>AT+CFUN?</b>                            | Query a module's current mode. <b>1</b> indicates online mode.   |
| <b>+CFUN: 1</b>                            |  |
| <b>OK</b>                                  |  |
| <b>AT+CPIN?</b>                            | Query whether a module's SIM card is password protected. <b>READY</b> indicates that the SIM card is ready.                                      |
| <b>+CPIN: READY</b>                        |  |
| <b>OK</b>                                  |  |
| <b>AT^HCSQ?</b>                            | Query the network signal quality.  |
| <b>^HCSQ: "WCDMA",30,30,58</b>             |  |
| <b>OK</b>                                  |  |
| <b>AT+COPS?</b>                            | Return the current network selection mode, information about the operator with which the module is registered, and the wireless access standard. |
| <b>+COPS: "Network status information"</b> | For example: <b>+COPS: 1,0, "China Mobile Com"</b>   |
| <b>OK</b>                                  |  |
| <b>AT+COPS=0</b>                           | Automatically search for networks.   |
| <b>OK</b>                                  |  |
| <b>AT+CREG?</b>                            | Query the state of the currently registered network.   |
| <b>+CREG: 0,1</b>                          |  |
| <b>OK</b>                                  |  |
| <b>AT+CREG=1</b>                           | Set the <b>+CREG</b> unsolicited indication.   |
| <b>OK</b>                                  |  |



**AT+CGDCONT=1,"IP","CMNET"<sup>[1]</sup>** Set specific PDP context. It is an example of packet data service settings. Set the PDP context required by packet data service dial-up.

OK



**NOTE**

[1] Set the correct APN when data service is initialized.

## 2.3.2 Troubleshooting

| Scenario        | Possible Error Information     | Solution                                    |
|-----------------|--------------------------------|---|
| <b>AT+COPS?</b> | <b>+CME ERROR: SIM failure</b> | No SIM card is detected. Insert a SIM card. |
| <b>AT+CREG?</b> | <b>+CME ERROR: SIM failure</b> | No SIM card is detected. Insert a SIM card. |



# 3 Network Searching and Registration Application Scenarios

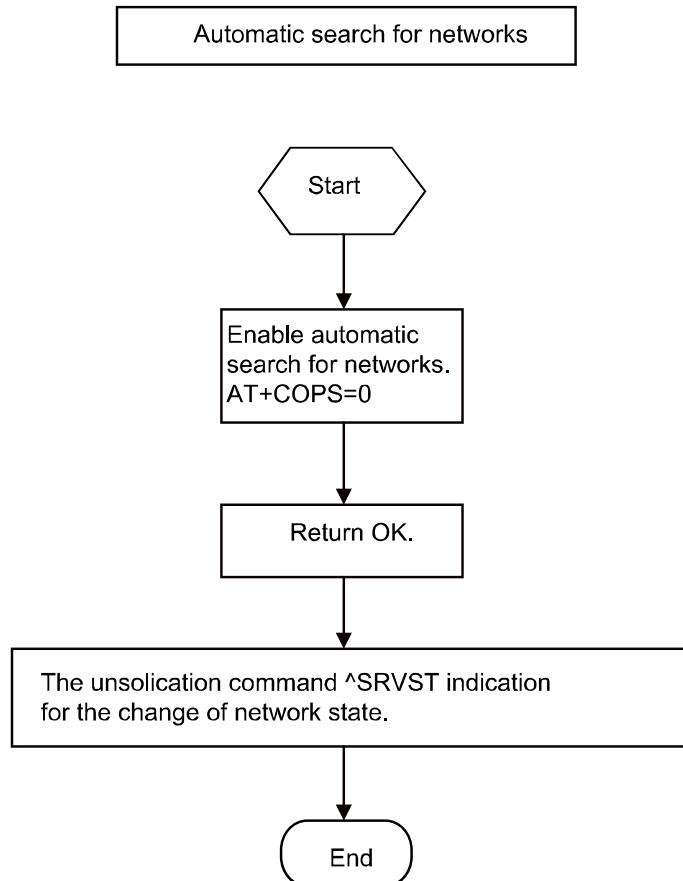
## 3.1 Searching and Registering Network

### 3.1.1 Reference Process

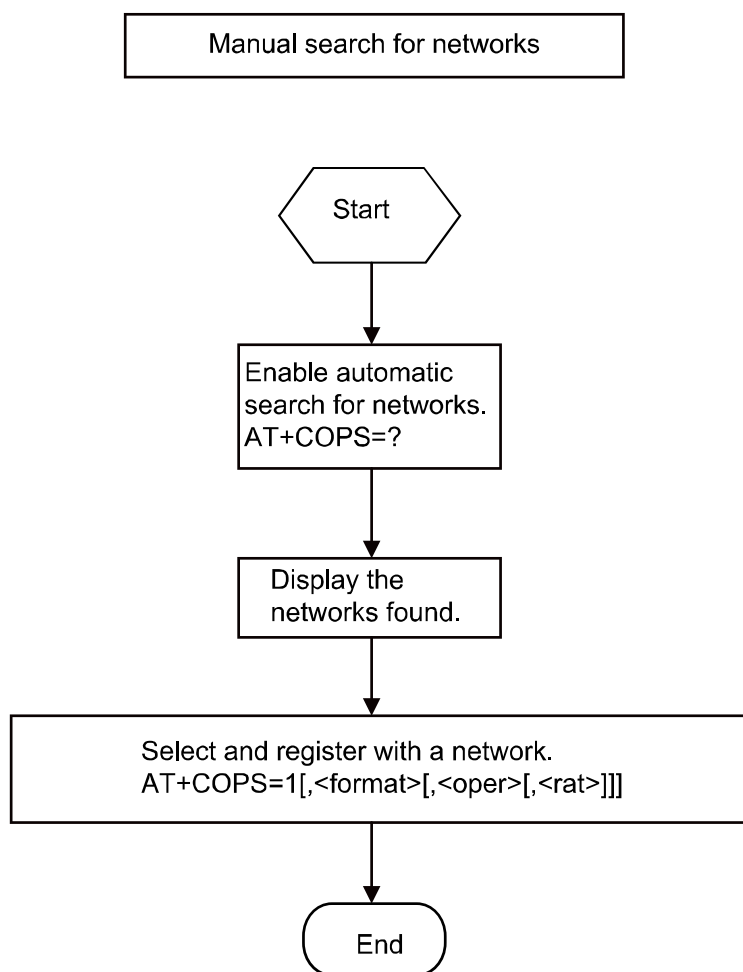
| Command   | Description   |
|---|---|
| <b>AT+COPS=0</b><br>OK  | Enable automatic search for networks.   |
| <b>AT+COPS=1,2,"46000"</b><br>OK  | Manual search for the appointed network.  |
| <b>AT+COPS=?</b><br>OK  | Search for all networks, and return the networks.   |
| <b>AT+CREG=2</b><br>OK  | Enable the unsolicited indication when network registration state changes.                              |
| <b>AT^SYSCFGEX="00",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF,,</b><br>OK                             | Set the system mode, network access order, frequency band, roaming support, domain, and other features. |
| <b>AT^SYSINFOEX</b><br><b>^SYSINFOEX:</b><br><b>1,0,1,255,,3,"WCDMA",41,"WCDMA"</b><br>OK | Query the system service state, domain, roaming status, and system mode.                                |
| <b>AT^HCSQ?</b>   | Query the signal quality.   |

| Command                              | Description |
|--------------------------------------|-------------|
| <code>^HCSQ: "WCDMA",15,12,46</code> |             |
| OK                                   |             |

**Figure 3-1** Automatic search for networks



**Figure 3-2** Manual search for networks



### 3.1.2 Troubleshooting

| Scenario | Possible Error Information     | Solution                                    |
|----------|--------------------------------|---|
| AT+COPS? | <b>+CME ERROR: SIM failure</b> | No SIM card is detected. Insert a SIM card. |
| AT+CREG? | <b>+CME ERROR: SIM failure</b> | No SIM card is detected. Insert a SIM card. |



# 4 ECM Application Scenarios

## 4.1 ECM Dialing

### 4.1.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT^NDISDUP=?</b>                                   | Check the parameter range supported by the command.  |
| <b>^NDISDUP: (1-16),(0-1)</b>                         |  |
| <b>OK</b>   |  |
| <b>AT^NDISDUP=1,1,"1234"</b>                          | Set up a dial-up connection using the APN provided by the network server.  |
| <b>OK</b>   | The command is successfully executed.  |
| <b>^NDISSTAT: 1,,,"IPV4"</b>                          | Report the dial-up connection state.   |
| <b>AT^NDISDUP=1,1,"4321","huawei",<br/>"huawei",1</b> | Set up a dial-up connection using the account, password, and authentication mode provided by the network server. |
| <b>OK</b>   | The command is successfully executed.  |
| <b>^NDISSTAT: 1,,,"IPV4"</b>                          | Report the dial-up connection state.   |

The process of obtaining the IP address:

1. After host application sending AT^NDISDUP command to launch or terminal the ECM connection, Huawei module will report the ^NDISSTAT command to indicate the connection state.
2. Host application can get the connection state from ^NDISSTAT report, if the connection state updated, the host application should to launch the dhcp client to update the ECM IP address or disable the ECM.



- Host application also can send AT command AT^NDISSTATQRY? to query the current ECM connection state, and determine to update or disable the ECM by the dhcp client.

## 4.1.2 Troubleshooting

| Scenario                                     | Possible Error Information                      | Solution  |
|--|---|---|
| AT^NDISDUP=1,1,"1234"                        | +CME ERROR: SIM failure                         | No SIM card is detected. Insert a SIM card.   |
| AT^NDISDUP=1,1,"4321",<br>"huaei","huawei",1 | OK<br>^NDISSTAT: 0,33,, "IPV4"<br>^NDISEND:1,29 | <b>NDISEND</b> indicates the failure reason during the dial-up.<br><b>29</b> indicates that the authenticated information is not correct.   |
| AT^NDISDUP=1,1,"abcd"                        | OK<br>^NDISSTAT: 0,33,, "IPV4"<br>^NDISEND:1,33 | <b>NDISEND</b> indicates the failure reason during the dial-up.<br><b>33</b> indicates that request service is not specified.<br>In this case, the network don not support this APN "abcd". |

## 4.2 Querying the Dial-up Connection State

### 4.2.1 Reference Process

| Command                    | Description                               |
|----------------------------|---|
| AT^NDISSTATQRY?            | Query the dial-up connection state.       |
| ^NDISSTATQRY: 0,0,, "IPV4" | Report that the connection is not set up. |
| OK                         |   |
| AT^NDISSTATQRY?            | Query the dial-up connection state.       |
| ^NDISSTATQRY: 1,,, "IPV4"  | Report that the connection is set up.     |
| OK                         |   |



## 4.2.2 Troubleshooting

None

## 4.3 Disconnecting the Dial-up Connection

### 4.3.1 Reference Process

| Command                           | Description  |
|-----------------------------------|--|
| <code>AT^NDISDUP=1,0</code>       | Disconnect the dial-up connection.                               |
| <code>OK</code>                   | The command is successfully executed.                            |
| <code>^NDISSTAT:0,,,"IPV4"</code> | IPv4 changes from the connected state to the disconnected state. |

### 4.3.2 Troubleshooting

None



# 5 SMS Application Scenarios

## 5.1 Overview

Short Message Service (SMS) is a text messaging service using a service center (SC) to transfer short text messages between MEs and Short Message Entities (SMEs).

A message must contain the following information before it is sent:

For a PDU mode message:

- Length of TPDU package
- Message content: To compose or send a PDU mode message, the message must contain all the message attributes and be encoded in PDU format. A PDU consists of the following:
  - Service Center Address (SCA): composed of the address length, SCA type and SCA reverse byte.
  - First octet: contains the message type indicator, TP-RP, TP-UDHI, TP-SRR, TP-VPF, TP-RD, and TP-MTI.
  - Short text message statement.
  - Destination address: consisting of the destination address, address length and destination address type.
  - Protocol identifier.
  - Data encoding scheme.
  - Validity duration.
  - Data length.
  - User data: consisting of the user data header and the data encoded in PDU format.

Figure 5-1 shows an example of data encoded in PDU format of submitted type.

**Figure 5-1** Example of data encoded in PDU format of submitted type

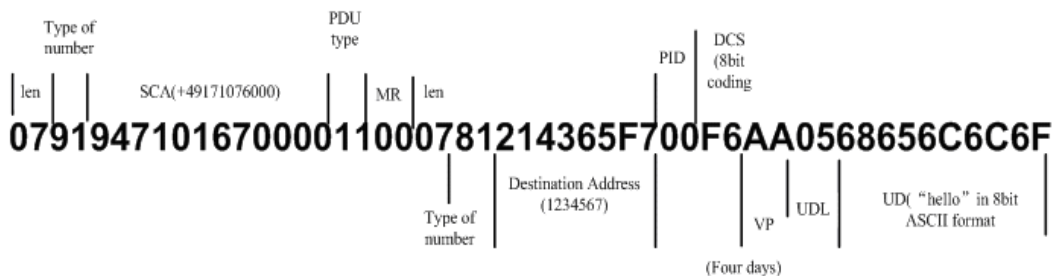
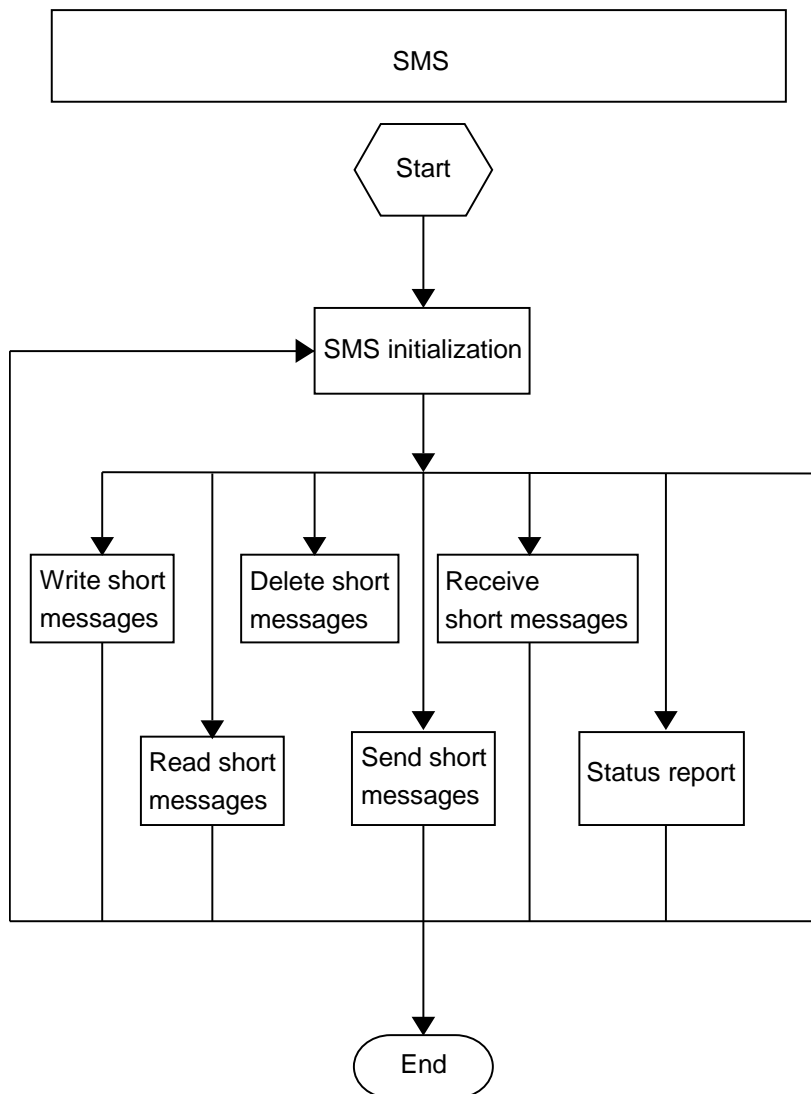


Figure 5-2 shows the general SMS process.

**Figure 5-2** General SMS process





## 5.2 Initializing SMS

### 5.2.1 Reference Process

| Command  | Description  |
|--|--|
| <b>AT+CSCA?</b>                                | Query the SMSC address.  |
| <b>+CSCA:</b><br><b>"13800688509",129</b>      |  |
| <b>OK</b>                                      |  |
| <b>AT+CSCA="+8613800755500"</b>                | Set the SMSC address to the SMSC number of China Mobile's Shenzhen Branch. |
| <b>OK</b>                                      |  |
| <b>AT+CSMS?</b>                                | Query the short message service type.                                      |
| <b>+CSMS: 0,1,1,1</b>                          |  |
| <b>OK</b>                                      |  |
| <b>AT+CNMI?</b>                                | Query the configuration of the new message indications to TE.              |
| <b>+CNMI: 0,0,0,0,0</b>                        |  |
| <b>OK</b>                                      |  |
| <b>AT+CNMI=2,1,2,2,0</b>                       | Configure the new message indications to TE.                               |
| <b>OK</b>                                      |  |
| <b>AT+CPMS?</b>                                | Query the preferred short message storage.                                 |
| <b>+CPMS: "SM",12,20,"SM",12,20,"SM",12,20</b> |  |
| <b>OK</b>                                      |  |
| <b>AT+CPMS="SM"</b>                            | Set SM as short message storage medium.                                    |
| <b>OK</b>                                      |  |
| <b>AT+CGSMS?</b>                               | Query the MO SMS bearer domain.  |
| <b>+CGSMS: 1</b>                               |  |
| <b>OK</b>                                      |  |
| <b>AT+CMGF?</b>                                | Query the short message format.  |
| <b>+CMGF: 0</b>                                |  |

| Command          | Description                          |
|------------------|--------------------------------------|
| OK               |                                      |
| <b>AT+CMGF=0</b> | Set the short message format to PDU. |
| OK               |                                      |

Use the **AT+CMGF** command to set short message format: **AT+CMGF=0** sets the short message format to PDU.

The SMSC address provided by the service provider must be specified. In PDU mode, the SMSC address is contained in the PDU packets. Therefore, in PDU mode, the **AT+CSCA** command is optional.

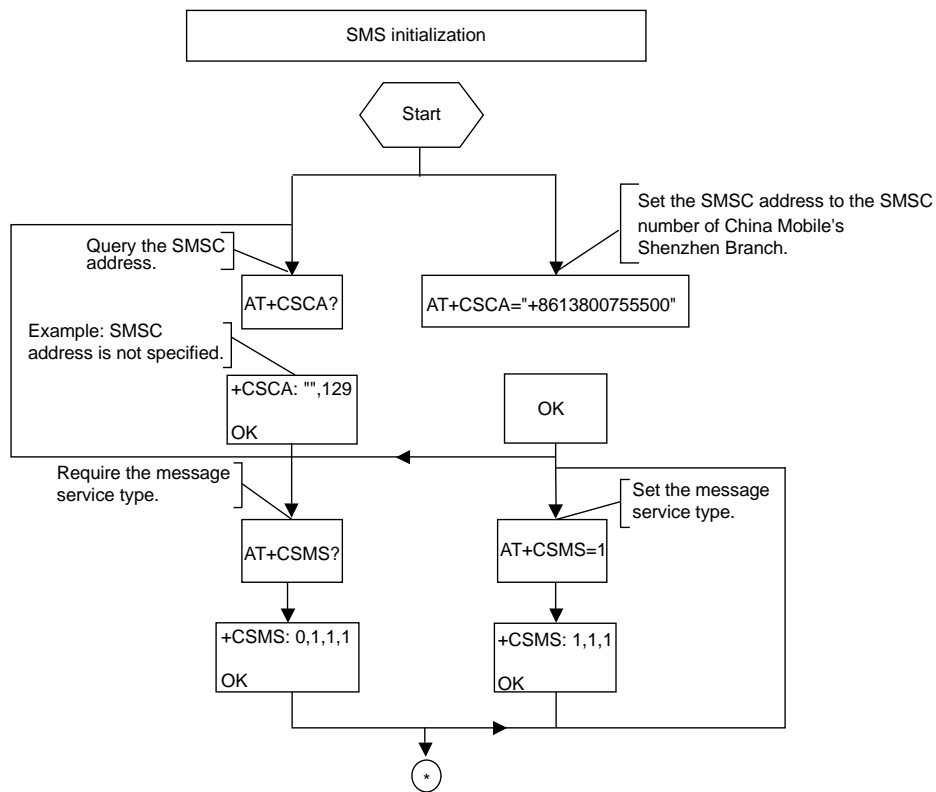
To use the SMS features specified in the GSM 07.05 Phase 2+, the **AT+CSMS** command must be used to enable the features.

Use the **AT+CNMI** command to set the unsolicited indications.

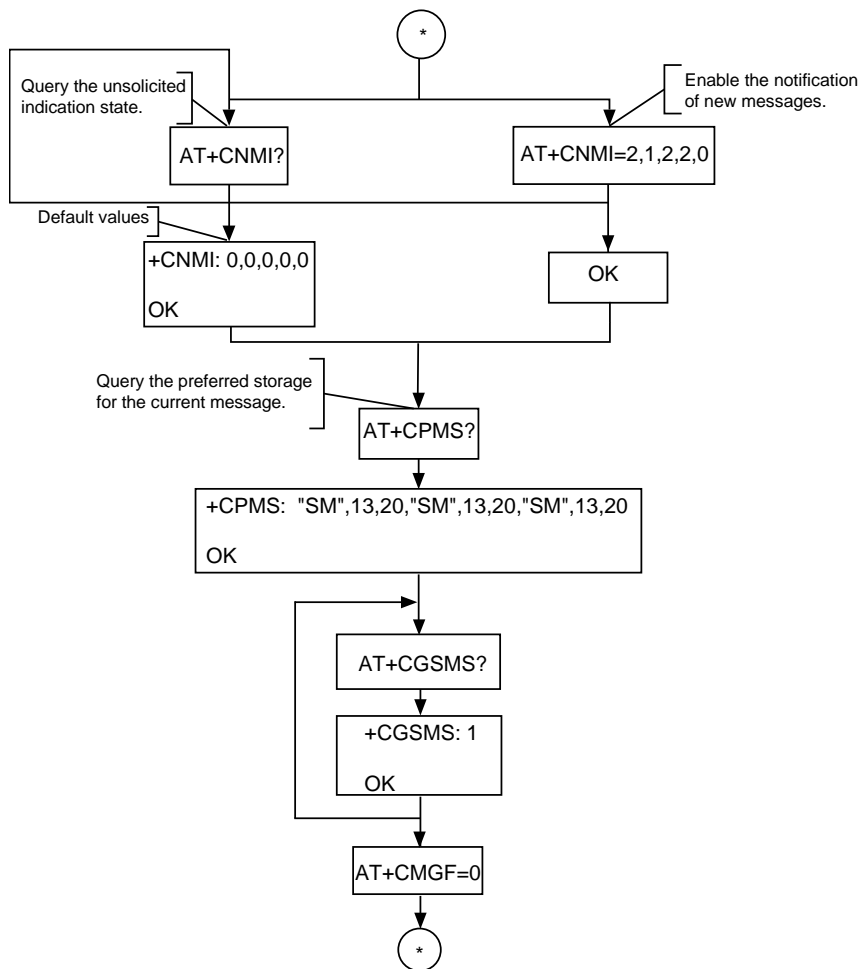
Use the **AT+CPMS** command to select the preferred short message storage (SIM or ME). The ME909u-523 supports only the SM (SIM card) storage.

Use the **AT+CGSMS** command to select the MO SMS bearer domain (PS or CS domain). For ME909u-523, the CS domain is the preferred MO bearer domain.

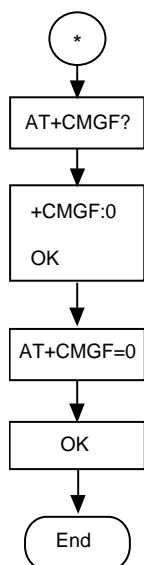
**Figure 5-3** SMS initialization process – part 1



**Figure 5-4** SMS initialization process – part 2



**Figure 5-5** SMS initialization process – part 3





## 5.2.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution  |
|--|-------------------------------------|---|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.                                      |
|  | <b>+CMS ERROR: SIM busy</b>         | SIM card initialization has not completed. Try again later. |

## 5.3 Sending Short Messages

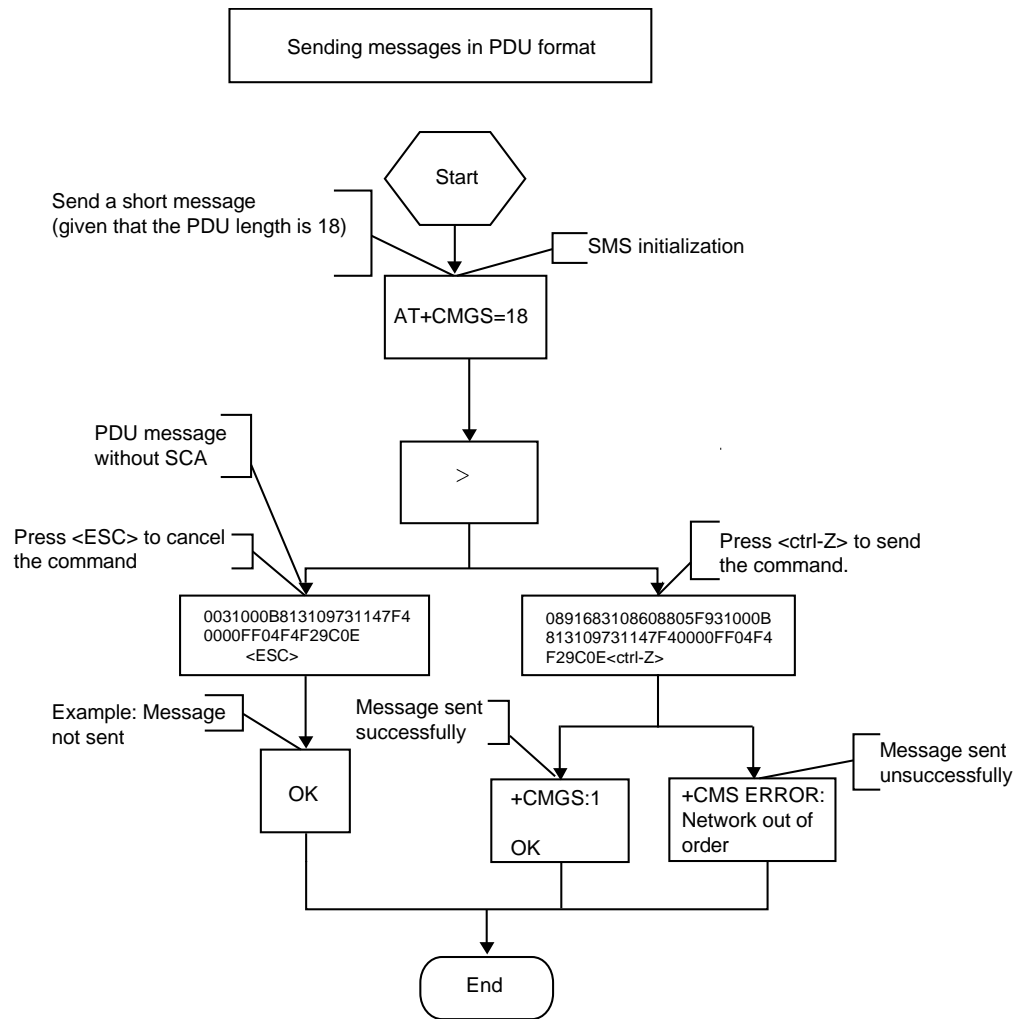
### 5.3.1 Reference Process

| Command  | Description   |
|--|---|
| <b>AT+CMGF=0</b>   | Set the short message format to PDU.  |
| <b>OK</b>  |   |
| <b>AT+CSCA?</b>  | Query the SMSC address.   |
| <b>+CSCA: "13800688509",129</b>  |   |
| <b>OK</b>  |   |
| <b>AT+CMGS=18</b><br><b>&gt;0031000B813109731147F4</b><br><b>0000FF04F4F29C0E\x0A</b>                            | Send a PDU message without the service center address. The value of SMSC address is the setting of +CSCA command. |
| <b>+CMGS: 168</b>  | The message is successfully sent.   |
| <b>OK</b>  |   |
| <b>AT+CMGS=18</b><br><b>&gt;0891683108608805F93100</b><br><b>0B813109731147F40000FF0</b><br><b>4F4F29C0E\x1A</b> | Send a PDU message with the correct service center address.   |
| <b>+CMGS: 169</b>  | The message is successfully sent.   |
| <b>OK</b>  |   |
| <b>AT+CMGS=18</b><br><b>&gt;0891683108608805F03100</b><br><b>0B813109731147F40011FF0</b><br><b>4F4F29C0E\x1A</b> | Send a PDU message with the wrong service center address.   |

| Command                                 | Description                         |
|---|-------------------------------------|
| <b>+CMS ERROR: Network out of order</b> | The message is unsuccessfully sent. |

Messages in PDU format must be converted using external tools or users' software. Tools for encoding and parsing messages in PDU format are available on the Internet.

**Figure 5-6** Sending short messages in PDU format





## 5.3.2 Troubleshooting

| Scenario   | Possible Error Information                  | Solution  |
|--|---|---|
| Error information is returned in response to one of the previous commands. | <b>+CMS ERROR:<br/>Network out of order</b> | Check the validity of the service center address or the state of the current network. |

## 5.4 Reading Short Messages

### 5.4.1 Reference Process

| Command  | Description   |
|--|---|
| <b>AT+CMGL=0</b>   | List all received unread messages.                                    |
| <b>+CMGL: 2,0,,48</b><br><b>0891683108608805F9040D916831</b><br><b>09732097F2000001432619001001</b><br><b>F506215744FD3D1A0E930C8429</b><br><b>6D9EC370BFDE86C2F23228FFA</b><br><b>EFF00</b>                   | The format of short messages can refer to the <b>AT+CMGL</b> command. |
| <b>+CMGL: 4,0,,64</b><br><b>0891683108608805F9040D916831</b><br><b>09732097F2000001403261310500</b><br><b>32506215744FD3D1A0E930C8429</b><br><b>6D9EC370BFDBE83C2B0380F6A</b><br><b>97416FF7B80C6AVFE5E510</b> |   |
| <b>OK</b>  |   |
| <b>AT+CMGR=4</b>   | Read the message stored in the message storage location 4.            |
| <b>+CMGR: 1,,64</b><br><b>0891683108608805F9040D916831</b><br><b>09732097F2000001403261310500</b><br><b>32506215744FD3D1A0E930C8429</b><br><b>6D9EC370BFDBE83C2B0380F6A</b><br><b>97416FF7B80C6AVFE5E510</b>   | The format of short messages can refer to the <b>AT+CMGR</b> command. |
| <b>OK</b>  |   |

There are two methods to read short messages:





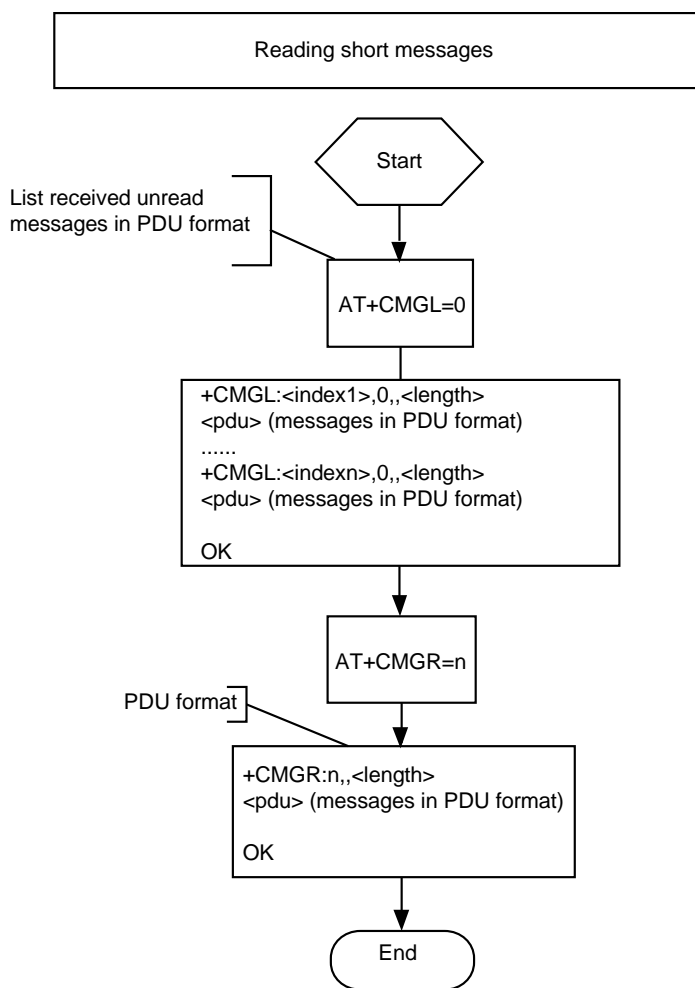
- Method 1: Use the **AT+CMGL** command to list the messages that are in specified state and stored in the preferred message storage. The following table describes the message states. If the message state is received unread messages, the REC UNREAD state will be changed to REC READ after the **AT+CMGL** command is executed.

| Message State            | PDU Mode |
|--------------------------|----------|
| Received unread messages | 0        |
| Received read messages   | 1        |
| Stored unsent messages   | 2        |
| Stored sent messages     | 3        |
| All messages             | 4        |

- Method 2: Use the **AT+CMGR** command to read a message from a specified storage location in the message storage. If the message is a received unread message, its state will be changed to REC READ after it is read using the **AT+CMGR** command.

You can use the **AT+CMGL** command to list all short messages so that you can view the messages' storage locations.

**Figure 5-7** Reading short messages



## 5.4.2 Troubleshooting

| Scenario   | Possible Error Information              | Solution                         |
|--|---|----------------------------------|
| Error information is returned in response to one of the previous commands. | <b>+CMS ERROR: invalid memory index</b> | Check the validity of the index. |



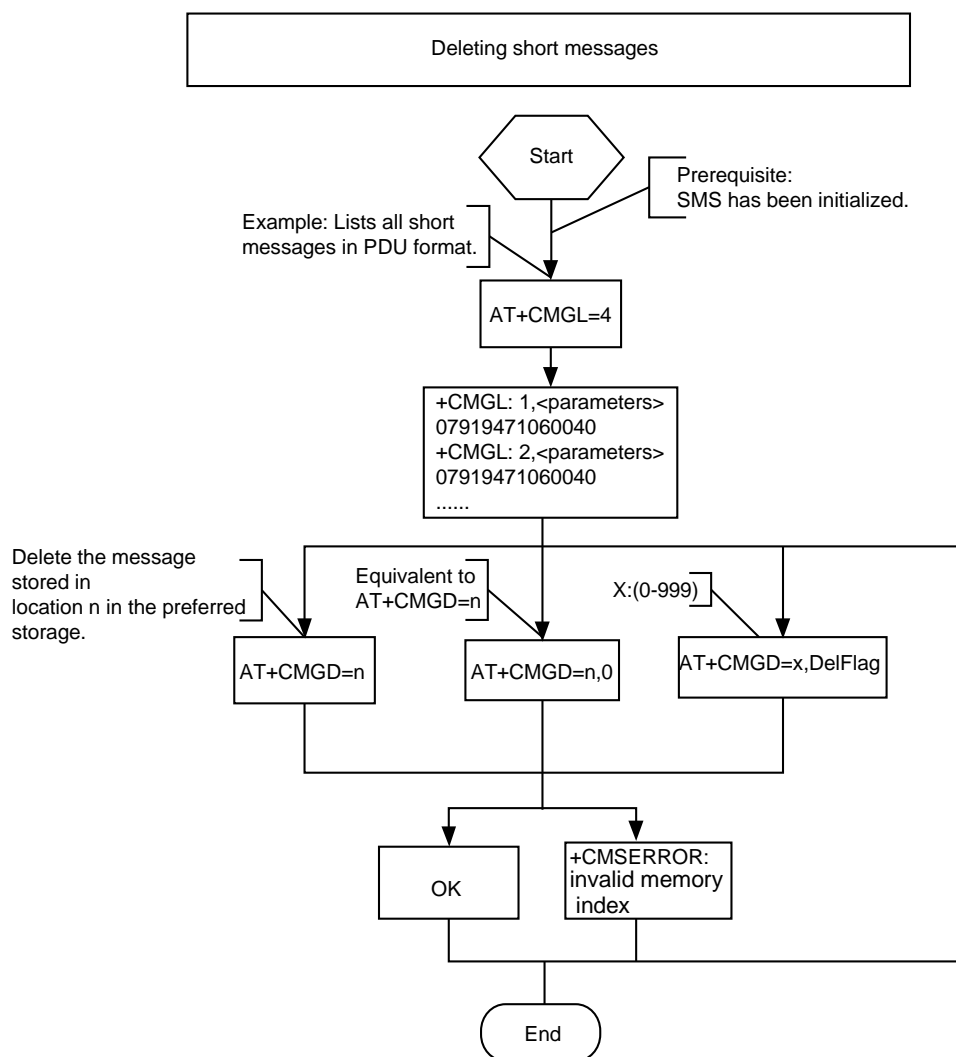
## 5.5 Deleting Short Messages

### 5.5.1 Reference Process

| Command  | Description                                      |
|--|--|
| <b>AT+CMGF=0</b>   | Set the message format to PDU mode.              |
| <b>OK</b>  |  |
| <b>AT+CMGL=4</b>   | List all short messages (PDU mode).              |
| <b>+CMGL: 6,2,,30</b><br><b>0011000A9171798762130000A713C8329BFD6681D0EF3B282C2F83F2EFFA0F</b><br><b>+CMGL: 11,1,,36</b><br><b>0791947106004013240C9194715982699000003080413115748013C8329BFD66</b><br><b>81D0EF3B282C2F83F2EFFA0F</b> |  |
| <b>OK</b>  |  |
| <b>AT+CMGD=1</b>   | Delete the message stored in storage location 1. |
| <b>OK</b>  |  |

- Either all messages stored in the preferred message storage or a message stored in the specified storage location in the preferred message storage can be deleted.
- All read or unread messages that have been received can be deleted.
- If no messages are stored in the preferred message storage, "OK" is returned when the action to delete messages is completed.
- Meanings of the DelFlag value:
  - 1: Delete all read messages in the preferred message storage, and keep the unread, sent and unsent messages.
  - 2: Delete all read and sent messages in the preferred message storage, and keep the unread and unsent messages.
  - 3: Delete all read, sent, and unsent messages in the preferred message storage, and keep the unread messages.
  - 4: Delete all messages in the preferred message storage, including the unread messages.

**Figure 5-8** Deleting short message



## 5.5.2 Troubleshooting

| Scenario   | Possible Error Information              | Solution                         |
|--|---|----------------------------------|
| Error information is returned in response to one of the previous commands. | <b>+CMS ERROR: invalid memory index</b> | Check the validity of the index. |



# 6 Phonebook Application Scenarios

## 6.1 Overview

As a product embedded into a host, the phonebook scenarios include that read, write, query and delete the phonebook entries in the SIM card.

Read Phonebook: use the **AT+CPBR** command to read phonebook entries.

Write phonebook: use the **AT+CPBW** command to save the phonebook entries into the SIM card.

Delete phonebook: use **AT+CPBW** command to delete the phonebook entries in the SIM card.

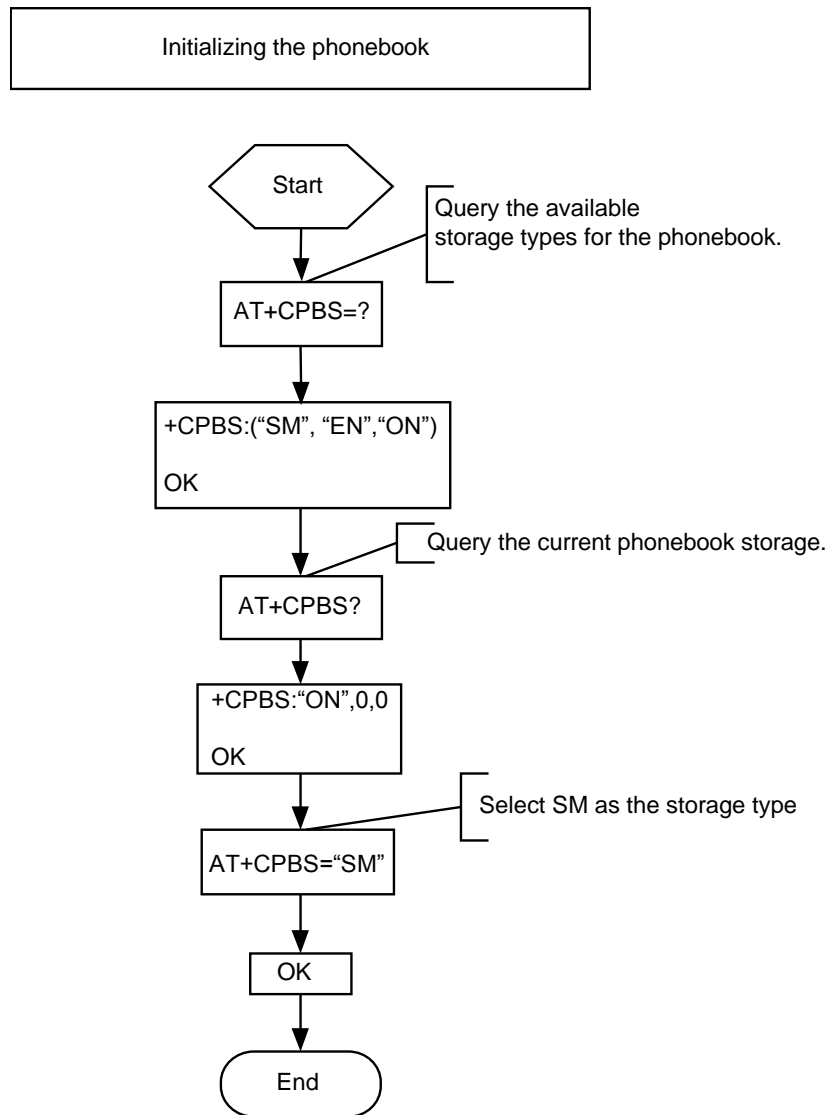
## 6.2 Memory Operations

### 6.2.1 Reference Process

| Command   | Description   |
|---|---|
| <b>AT+CPBS=?</b><br><b>+CPBS: ("SM","EN","ON")</b><br><br><b>OK</b> | Query the current storage type.   |
| <b>AT+CPBS="SM"</b><br><br><b>OK</b>                                | Set the current storage type to "SM".   |
| <b>AT+CPBS?</b><br><br><b>+CPBS: "SM",241,250</b><br><br><b>OK</b>  | <b>241</b> indicates that 241 entries have been stored in the storage. <b>250</b> indicates that the maximum storage capacity of the current storage ("SM") is 250 entries. |

Note that the AT commands for reading and writing phonebook entries can be used only after the phonebook storage is selected. To select a phonebook storage, use the **AT+CPBS** command.

**Figure 6-1** Initializing the phonebook



## 6.2.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution   |
|--|-------------------------------------|--|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM busy</b>         | Phonebook initialization has not completed. Try again later. |
|  | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.                                       |



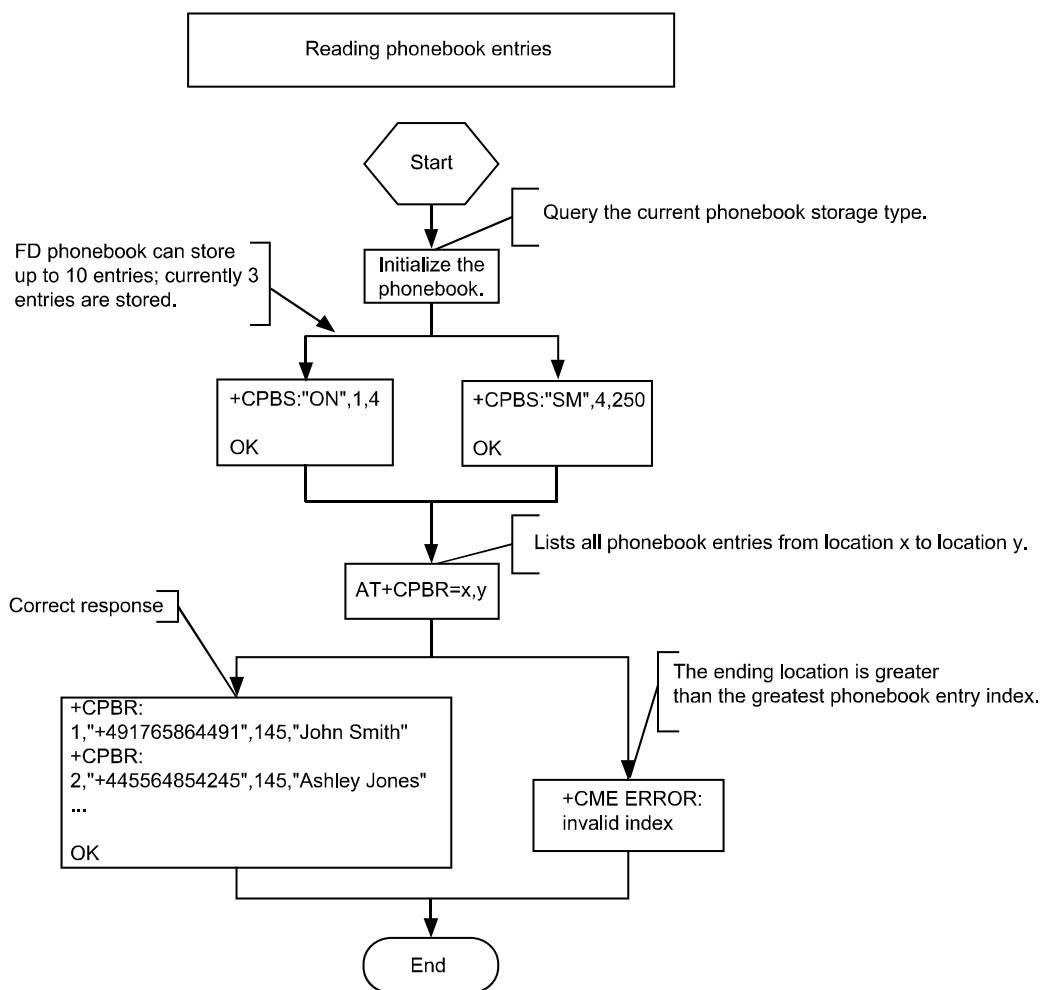
| Scenario | Possible Error Information          | Solution               |
|----------|-------------------------------------|------------------------|
|          | <b>+CME ERROR: SIM PUK required</b> | Enter the correct PUK. |

## 6.3 Reading Phonebook Entries

### 6.3.1 Reference Process

| Command  | Description   |
|--|---|
| <b>AT+CPBS?</b><br><br><b>+CPBS: "SM",9,20</b><br><br><b>OK</b>  | Query the phonebook storage selection and the maximum number of entries that can be stored. |
| <b>AT+CPBR=1,20</b><br><br><b>+CPBR: 1,"+491765864491",145,"John Smith"</b><br><b>+CPBR: 2,"+44545896638",145,"Paul Williams"</b><br><b>+CPBR: 3,"+44556565657",145,"Joe Anderson"</b><br><b>+CPBR: 4,"+445636934485",145,"Oscar Thomso"</b><br><b>+CPBR: 5,"+445565656899",145,"Hannah Adams"</b><br><b>+CPBR: 6,"+447982865563",145,"Samantha Young"</b><br><b>+CPBR: 7,"+449585315798",145,"Alexis Wright"</b><br><b>+CPBR: 8,"+445415454646",145,"Abigail Cox"</b><br><b>+CPBR: 12,"+446565689115",145,"Kyla Clark"</b><br><br><b>OK</b> | List all phonebook entries by their indexes.  |

**Figure 6-2** Reading phonebook entries



### 6.3.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution  |
|--|-------------------------------------|---|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM busy</b>         | Phonebook initialization has not completed. Try again later.            |
|  | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.  |
|  | <b>+CME ERROR: SIM PUK required</b> | Enter the correct PUK.  |
| <b>AT+CPBR=&lt;index1&gt;</b>  | <b>+CME ERROR: invalid index</b>    | The index is invalid. Check that index 1 is within the supported range. |





| Scenario                                     | Possible Error Information       | Solution   |
|--|----------------------------------|--|
| <b>AT+CPBR=&lt;index1&gt;,&lt;index2&gt;</b> | <b>+CME ERROR: invalid index</b> | The index is invalid. Check that index 1 and index 2 are within the supported range and that index 1 is not greater than index 2.                        |
| <b>AT+CPBR=&lt;index1&gt;</b>                | <b>+CME ERROR: not found</b>     | No entries are found in the storage locations in index 1. Check that there have been entries successfully written into these locations.                  |
| <b>AT+CPBR=&lt;index1&gt;,&lt;index2&gt;</b> | <b>+CME ERROR: not found</b>     | No entries are found in the storage locations between index 1 and index 2. Check that there have been entries successfully written into these locations. |

## 6.4 Writing/Deleting Phonebook Entries

### 6.4.1 Reference Process

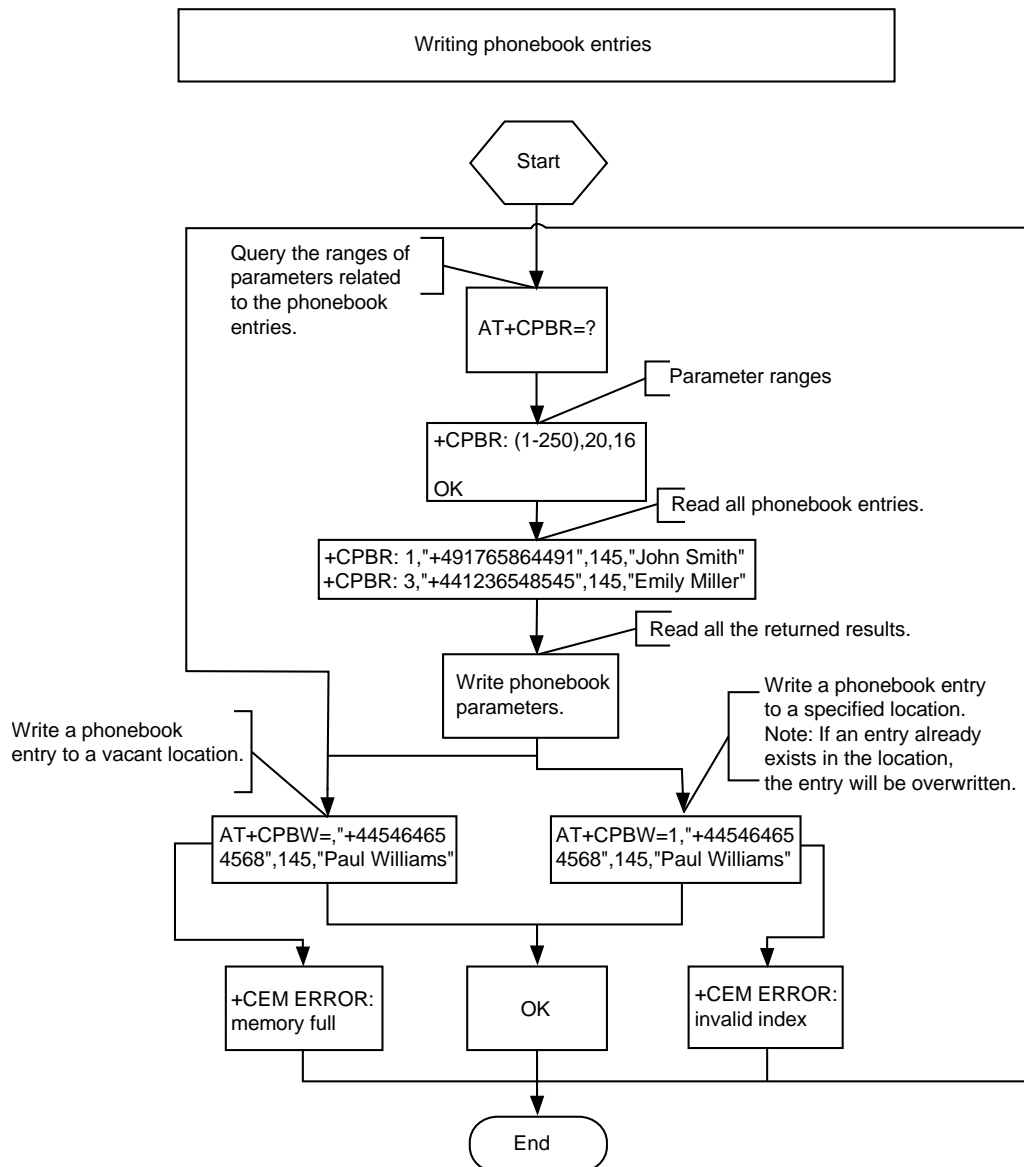
| Command                                  | Description  |
|--|--|
| <b>AT+CPBR=?</b>                         | Query the ranges of parameters related to the phonebook entries. |
| <b>+CPBR: (1-250),24,14</b>              |  |
| <b>OK</b>                                |  |
| <b>AT+CPBW="5","13903702805",,"test"</b> | Write a phonebook record.  |
| <b>OK</b>                                |  |
| <b>AT+CPBW=1</b>                         | Delete the entry in index 1 in the phonebook.                    |
| <b>OK</b>                                |  |

There are two methods to edit phonebook entries using the **AT+CPBW** command:

- Write an entry to a specified location. This method edits the location where a phonebook entry exists or writes a new entry to a vacant location.
- Write a new phonebook entry to the next location of a location that already has a phonebook entry. This method does not require a specified storage location. The

**AT+CPBW** command can be used to edit phonebook entries of the "SM" or "ON" type.

**Figure 6-3** Writing phonebook entries



## 6.4.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution   |
|--|-------------------------------------|--|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM busy</b>         | Phonebook initialization has not completed. Try again later. |
|  | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.                                       |



| Scenario   | Possible Error Information                           | Solution  |
|--|--|---|
|  | <b>+CME ERROR: SIM PUK required</b>                  | Enter the correct PUK.  |
| Error information is returned when writing an entry into the phonebook.    | <b>+CME ERROR: dial string too long</b>              | Check that the phone number is not too long.  |
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: invalid index</b>                     | Check that the location index and phone number type are valid.  |
| Error information is returned when writing an entry into the phonebook.    | <b>+CME ERROR: invalid characters in dial string</b> | The phone number to be written into the phonebook contains invalid characters. Delete the invalid characters and try again. |
| AT+CPBW=,"12345678901234567890123",128,"80534E4E3A"                        | <b>+CME ERROR: memory full</b>                       | The storage is full. Delete some entries and try again.   |

## 6.5 Searching for Phonebook Entries

### 6.5.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT+CPBF=&lt;findtext&gt;</b><br><br><b>+CBPF: &lt;index1&gt;,&lt;number&gt;,&lt;type&gt;,&lt;text&gt;</b><br><b>+CBPF: &lt;index2&gt;,&lt;number&gt;,&lt;type&gt;,&lt;text&gt;</b><br>...<br><br><b>OK</b> | Search the current storage for phonebook entries that contain the <findtext> field.                        |
| <b>AT+CPBF=?</b><br><br><b>+CPBF: &lt;nlength&gt;,&lt;tlength&gt;</b><br><br><b>OK</b>  | Return the maximum phone number length and maximum name length supported by the current phonebook storage. |



## 6.5.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution  |
|--|-------------------------------------|---|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM busy</b>         | Phonebook initialization has not completed. Try again later.  |
|  | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.  |
|  | <b>+CME ERROR: SIM PUK required</b> | Enter the correct PUK.  |
| AT+CPBF=<findtext>   | <b>+CME ERROR: not found</b>        | No matches were found. Check whether the current phonebook storage has entries that match the search criterion. |

## 6.6 Querying User Number

### 6.6.1 Reference Process

| Command  | Description           |
|--|-----------------------|
| <b>AT+CNUM</b>   | Query the SIM number. |
| <b>+CNUM: [&lt;alpha1&gt;],&lt;number1&gt;,&lt;type1&gt;</b> |                       |
| <b>+CNUM: [&lt;alpha2&gt;],&lt;number2&gt;,&lt;type2&gt;</b> |                       |
| ...  |                       |
| <b>OK</b>  |                       |

### 6.6.2 Troubleshooting

| Scenario   | Possible Error Information          | Solution   |
|--|-------------------------------------|--|
| Error information is returned in response to one of the previous commands. | <b>+CME ERROR: SIM busy</b>         | Phonebook initialization has not completed. Try again later. |
|  | <b>+CME ERROR: SIM PIN required</b> | Enter the correct PIN.                                       |



| Scenario | Possible Error Information          | Solution               |
|----------|-------------------------------------|------------------------|
|          | <b>+CME ERROR: SIM PUK required</b> | Enter the correct PUK. |

## 6.7 Setting the TE's Character Sets

### 6.7.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT+CSCS=?</b><br><br><b>+CSCS: ("IRA","GSM","UCS2")</b><br><br>OK        | Query the character sets supported by the UE.  |
| <b>AT+CSCS?</b><br><br><b>+CSCS: "IRA"</b><br><br>OK                        | Query the current character set.   |
| <b>AT+CPBR=1</b><br><br><b>+CPBR: 1,"0123456789",129,"HUAWEI"</b><br><br>OK | Read the first phonebook entry. The TE character set is the International Reference Alphabet (IRA). The content of the first entry's name field is "HUAWEI". |
| <b>AT+CSCS="UCS2"</b><br><br>OK   | Set the TE's character set to UCS alphabet.  |
| <b>AT+CPBW=1,"0123456789",129,"004800550041005700450049"</b><br><br>OK      | The character set is the UCS alphabet. The content of the phonebook entry's name field is 004800550041005700450049, which is "HUAWEI" in the IRA.            |



| Command   | Description  |
|---|--|
| <b>AT+CPBR=1</b>  | Read the first phonebook entry. The TE character set is UCS alphabet. The content of the first entry's name field is 004800550041005700450049 ("HUAWEI" in the IRA). |
| <b>+CPBR: 1,"0123456789",129,"004800550041005700450049"</b> |  |
| OK  |  |

## 6.7.2 Troubleshooting

None

# 7 SIM Operation Application Scenarios

## 7.1 PIN Operations

### 7.1.1 Reference Process

| Command                              | Description   |
|--------------------------------------|---|
| <b>AT+CLCK="SC",1,"&lt;pwd&gt;"</b>  | Enable PIN authentication. (<pwd> specifies the PIN. See note 1.) |
| <b>OK</b>                            |   |
| <b>AT+CLCK="SC",2</b>                | Request the SIM card state.                                       |
| <b>+CLCK: 1</b>                      | " <b>+CLCK: 1</b> " means that the SIM card is not blocked.       |
| <b>OK</b>                            |   |
| <b>AT+CLCK="SC",0," &lt;pwd&gt;"</b> | Disable the SIM card lock. (<pwd> specifies the PIN. See note 1.) |
| <b>OK</b>                            |   |
| <b>AT+CLCK="SC",2</b>                | Request the SIM card state.                                       |
| <b>+CLCK: 0</b>                      | " <b>+CLCK: 0</b> " means that the SIM card is not blocked.       |
| <b>OK</b>                            |   |
| <b>AT+CLCK="SC",1,"&lt;pwd&gt;"</b>  | Enable PIN authentication. (<pwd> specifies the PIN. See note 1.) |
| <b>OK</b>                            |   |
| <b>AT+CPIN="&lt;pwd&gt;"</b>         | Request the PIN after the module restarts.                        |
| <b>OK</b>                            |   |
| <b>AT+CPIN?</b>                      | Request the PIN state.  |

| Command                                   | Description   |
|---|---|
| <b>+CPIN: READY</b>                       |   |
| <b>OK</b>                                 |   |
| <b>AT+CLCK="SC",2</b>                     | Request the SIM card state.   |
| <b>+CLCK: 1</b>                           | " <b>+CLCK: 1</b> " means that the SIM card is not blocked.             |
| <b>OK</b>                                 |   |
| <b>AT+CPWD="SC",&lt;oldpwd&gt;,"1234"</b> | Change the PIN (1234 will be the new PIN).                              |
| <b>OK</b>                                 |   |
| <b>AT+CPWD="SC","1113","1233"</b>         | Enter an incorrect PIN (first attempt).                                 |
| <b>+CME ERROR: incorrect password</b>     |   |
| <b>AT+CPWD="SC","3333","1233"</b>         | Enter an incorrect PIN (second attempt).                                |
| <b>+CME ERROR: incorrect password</b>     |   |
| <b>AT+CPWD="SC","4711","1233"</b>         | Enter an incorrect PIN (third attempt).                                 |
| <b>+CME ERROR: SIM PUK required</b>       |   |
| <b>AT+CPIN?</b>                           | Check whether the password is requested.                                |
| <b>+CPIN: SIM PUK</b>                     |   |
| <b>OK</b>                                 |   |
| <b>AT+CPIN="12345678","0000"</b>          | Enter the SIM PUK and specify the new SIM PIN (activate new "SC" lock). |
| <b>OK</b>                                 |   |



**NOTE**

- After PIN authentication is enabled using **AT+CLCK**, the module must be restarted for the change to take effect.
- Either **AT^CPIN** or **AT+CPIN** can be used to authenticate the PIN.





## 7.1.2 Troubleshooting

| Scenario  | Possible Error Information               | Solution   |
|---|--|--|
| Enable PIN authentication.<br><b>AT+CLCK="SC",1,"&lt;pwd&gt;"</b>         | <b>+CME ERROR: operation not allowed</b> | If PIN authentication has been enabled, it cannot be enabled again. Check whether PIN authentication has been enabled.   |
| Enter the PIN.<br><b>AT+CPIN="&lt;pwd&gt;"</b>                            | <b>+CME ERROR: incorrect password</b>    | Enter the correct PIN. The original PIN is provided by the operator.   |
|   | <b>+CME ERROR: SIM PUK required</b>      | Incorrect PINs have been entered three times and the SIM card is blocked. Run <b>AT+CPIN="&lt;PUK&gt;","&lt;pwd&gt;"</b> to enter the PUK to unblock the SIM card. The PUK is provided by the operator and cannot be changed by users. If incorrect PUKs are entered 10 times, the SIM card will be permanently blocked. |
| Changes the PIN.<br><b>AT+CPWD="SC","&lt;oldpwd&gt;","&lt;newpwd&gt;"</b> | <b>+CME ERROR: incorrect password</b>    | <oldpwd> must be the current PIN. Like the PIN authentication, if incorrect PINs are entered three times, the PUK will be required. If incorrect PUKs are entered 10 times, the SIM card will be permanently blocked.  |

## 7.2 CRSM Command

### 7.2.1 Reference Process

| Command                              | Description   |
|--------------------------------------|---|
| <b>AT+CRSM=176,12258,0,0,10</b>      | Read the file EFiccid with a transparent structure. (12258 is 0X2FE2, the EFiccid file's FID).  |
| <b>+CRSM: 144,0,"&lt;record&gt;"</b> | After the command is processed successfully, the EFiccid file's content (<record>) is returned. |
| <b>OK</b>                            |   |



| Command   | Description   |
|---|---|
| <b>AT+CRSM=178,28476,1,4,176,, "7F10"</b>           | Use an absolute path to read the first entry from the EFsms file on the SIM card's DFtelecom folder.                    |
| <b>+CRSM: 144,0,"&lt;record&gt;"</b>                | <record> is the content of the first entry. The length of <record> is 176 bytes.  |
| <b>OK</b>   |   |
| <b>AT+CRSM=192,12258</b>                            | Get response of EFiccid.  |
| <b>+CRSM: 144,0,"&lt;response&gt;"</b>              | <response> is the response data of EFiccid. For details about <response>, refer to the <i>ETSI TS 102.221</i> protocol. |
| <b>OK</b>   |   |
| <b>AT+CRSM=214,28421,0,0,2, "0012"</b>              | Update the content of the transparent structure EFli file on the SIM card.  |
| <b>+CRSM: 144,0,""</b>                              | Update succeeded.   |
| <b>OK</b>   |   |
| <b>AT+CRSM=220,28476,1,4,176, "1111", "7F10"</b>    | Update the content of the linear fixed structure EFsms file on the SIM card.  |
| <b>+CRSM: 144,0,""</b>                              | Update succeeded.   |
| <b>OK</b>   |   |
| <b>AT+CRSM=242</b>                                  | Obtain the current directory information.   |
| <b>+CRSM: 108,"&lt;length&gt;","&lt;status&gt;"</b> | <length> indicates <status>'s length in byte.   |
| <b>OK</b>   | <status> indicates the current directory status by hexadecimal.   |

 **NOTE**

- To read or update a file, appropriate commands must be used according to the file's structure type (for details, refer to the description of file properties in the 3GPP TS 31.102 protocol). For transparent structure files, use 176 (Read Binary) and 214 (Update Binary). For linear fixed structure files, use 178 (Read Record) and 220 (Update Record).
- If <pathid> is not contained in the command, the module will prefer to access the files with the same FID in the current directory.
- Files can be accessed only when the access criteria are met. Otherwise the SIM card will return PSWs indicating that the access authentication failed. If an EF file's read privilege is PIN protected and the module does not have the PIN authenticated, PSWs indicating that the access authentication failed will be returned after the **AT+CRSM** command is used to read the EF file.
- To use the AT+CRSM command to access the file content on the SIM card, the parameters contained in the command must strictly meet the requirements in the ETSI TS 102.221 and 3GPP TS 31.102. For detailed requirements, refer to the ETSI TS 102.221 and 3GPP TS 31.102.

## 7.2.2 Troubleshooting

| Scenario   | Possible Error Information                | Solution   |
|--|---|--|
| Update the content of the linear fixed structure EFsms file on the SIM card.<br><b>AT+CRSM=178,12258,0,0,10</b>                | <b>+CRSM: 105,129,""</b><br><br><b>OK</b> | The status word (SW) indicates a Read command error occurred. Files with a transparent structure should be read using 176 (READ BINARY). |
| Update the content of the linear fixed structure EFsms file on the SIM card.<br><b>AT+CRSM=220,28476,1,4,176,"1111","7F10"</b> | <b>+CRSM: 105,130,""</b><br><br><b>OK</b> | The PSW indicates that the security conditions were not met. To update the EFsms file, the correct PIN is required.                      |



# 8 Sleeping and Waking Up Application Scenarios

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As an embedded component in the host, the module also consumes power, which increases the power consumption of the integrated product. Therefore, the most important task of power management is to reduce the power consumption of the integrated product by enabling the module's sleep mode when necessary.

The host and the module need to wake each other up from sleep if communication is required. Therefore, another task of power management is to provide a wake-up control mechanism for the host and module.

Power management involves three parts: the host system software (including the USB driver/UART driver/GPIO driver/sleep mechanism functions), connection hardware between the host and module, and the module's software wake-up mechanism.

This chapter is mainly concerned with the module's software wakeup mechanism, including the wake-up principle, how USB related events impact on the waking up of the module and remotely waking up the module, and how the module remotely wakes up the host.

This chapter briefly describes the power management related connection hardware between the host and module.

This chapter does not describe the host system software. For example, if the host runs on a Windows or Mac system, Huawei will provide a USB driver program corresponding to the module. If the host runs on an Android system, Huawei will provide [Guide to Kernel Driver Integration in Linux for Huawei Modules](#) for users to configure the USB-based wakeup function of the module. If the host runs on a Linux system, power management is supported only when the Linux Kernel version is 2.6.35 or later.

This document describes typical module application scenarios. A host can be designed based on the actual system features and the application scenarios of the module to reduce power consumption of both the module and integrated product.

After the host is designed as recommended by this document, the module's power consumption and the whole unit's power consumption can meet the performance requirements. For details, see related description in the product manual.

 **NOTE**

To set the host to be in the standby state, check the module's GPS service state first. If the GPS service is enabled, the host should send AT^WPEND to disable the GPS service. Otherwise, the module cannot enter sleep mode.

## 8.1 Hardware Interfaces

The module communicates with the host using mainly USB or UART. For details about pins related to power management, see Table 8-1 .

For corresponding interface numbers and reference design for the pins, see [HUAWEI ME909u-523 LTE LGA Module Hardware Guide](#) or [HUAWEI ME909u-523 LTE Mini PCIe Module Hardware Guide](#).

**Table 8-1** Power management related pins

| Interface | Pin name   | Direction | Functional Description   | Diagram    |
|-----------|------------|-----------|--|------------|
| PCIE      | WAKE#      | Output    | When a wake-up source arrives, this pin output a low-level-voltage pulse lasting for 1s during which if other wake-up sources arrive, the module will ignore the later wake-up requests. In other words, the module will not output a second pulse during this 1s.   | Figure 8-1 |
| LGA       | WAKEUP_OUT | Output    | When a wake-up source arrives, this pin output a high-level-voltage pulse lasting for 1s during which if other wake-up sources arrive, the module will ignore the later wake-up requests. In other words, the module will not output a second pulse during this 1s.  | Figure 8-2 |
| LGA       | WAKEUP_IN  | Input     | When the pin carries a high-level voltage, the states of the module are as follows:<br>The module will be prohibited to enter sleep mode if the module is awake.<br>The module will be woken up if the module is in sleep mode.<br>When the pin carries a low-level voltage, the module is allowed to enter sleep mode. (By default, the pin is set to INPUT/PD, which is, the software detects a low-level voltage on the pin when the pin is not connected.) | Figure 8-3 |

| Interface | Pin name     | Direction | Functional Description  | Diagram    |
|-----------|--------------|-----------|---|------------|
| LGA       | SLEEP_STATUS | Output    | Indicate the state of the module.<br>When the pin carries a high-level voltage, the module is in working mode. When the pin carries a low-level voltage, the module is in sleep mode. | Figure 8-4 |

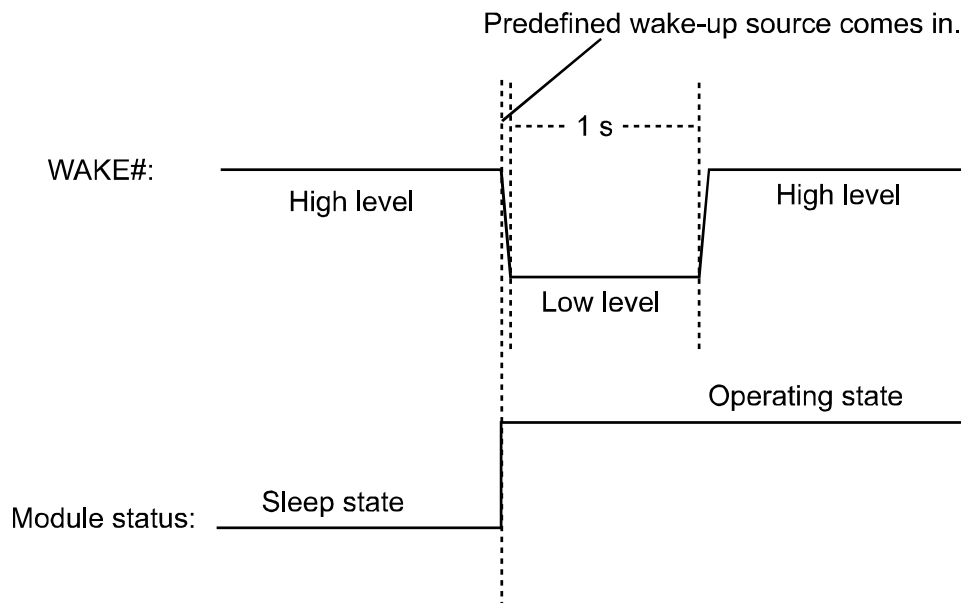


**NOTE**

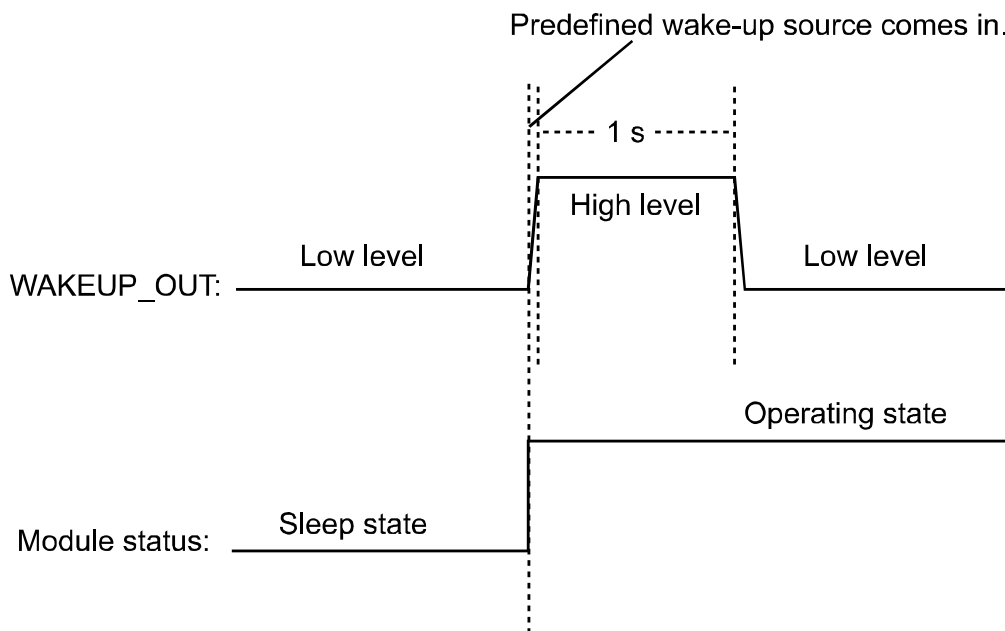
The PCIE interface does not support UART.

## 8.2 Sequence Diagram

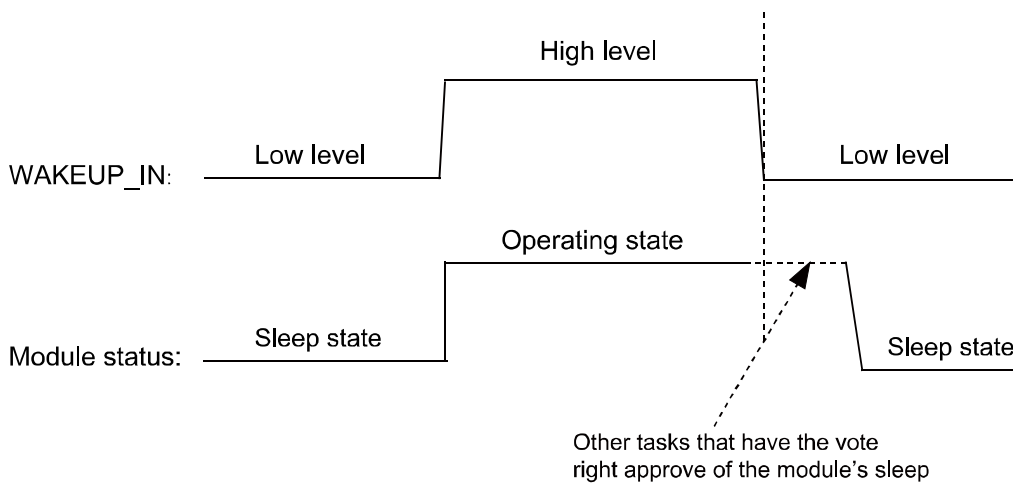
**Figure 8-1** WAKE# PIN output sequence



**Figure 8-2** WAKEUP\_OUT PIN output sequence

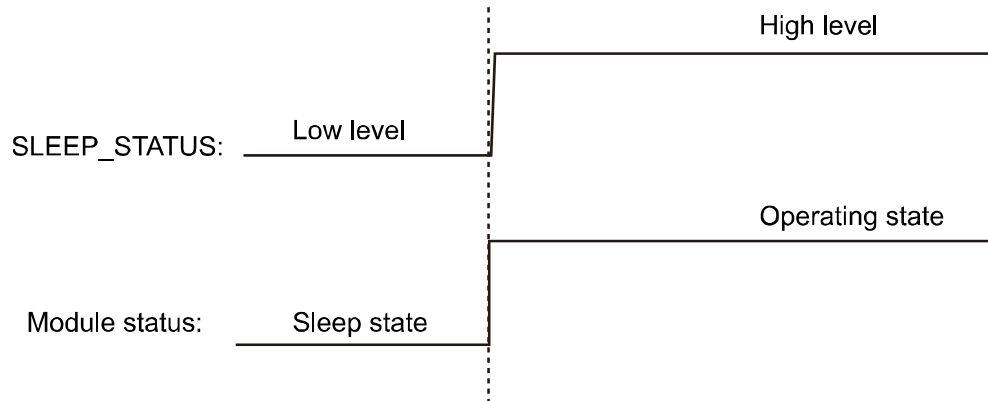


**Figure 8-3** WAKEUP\_IN PIN input sequence



About the vote, see section 8.3.1 .

**Figure 8-4** SLEEP\_STATUS PIN output sequence

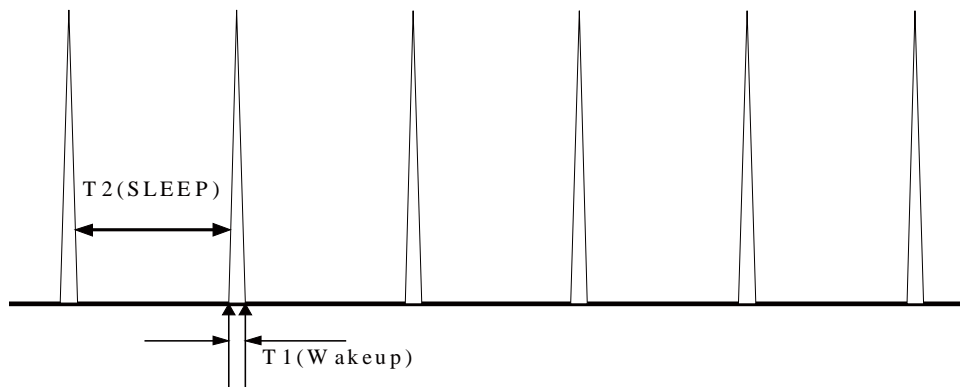


## 8.3 Software Interfaces

### 8.3.1 Principle

The module runs on a multi-task software system. The sleep task is granted with the lowest priority and assigned to detect whether the module can enter sleep mode. Other tasks (such as the RF, SIM card, USB) have voting rights. They vote to decide whether the module can enter sleep mode. When no other tasks are running, the sleep task is executed. If the sleep task detects that all other tasks agree on the module's sleep, the module enters sleep mode, as shown in Figure 8-5 . At this time, the baseband chip reduces the work frequency, and the RF enters the Discontinuous Reception (DRX) mode.

**Figure 8-5** Currency state when the module is in sleep mode



For more information about the module's sleep procedure, see Figure 8-6 .

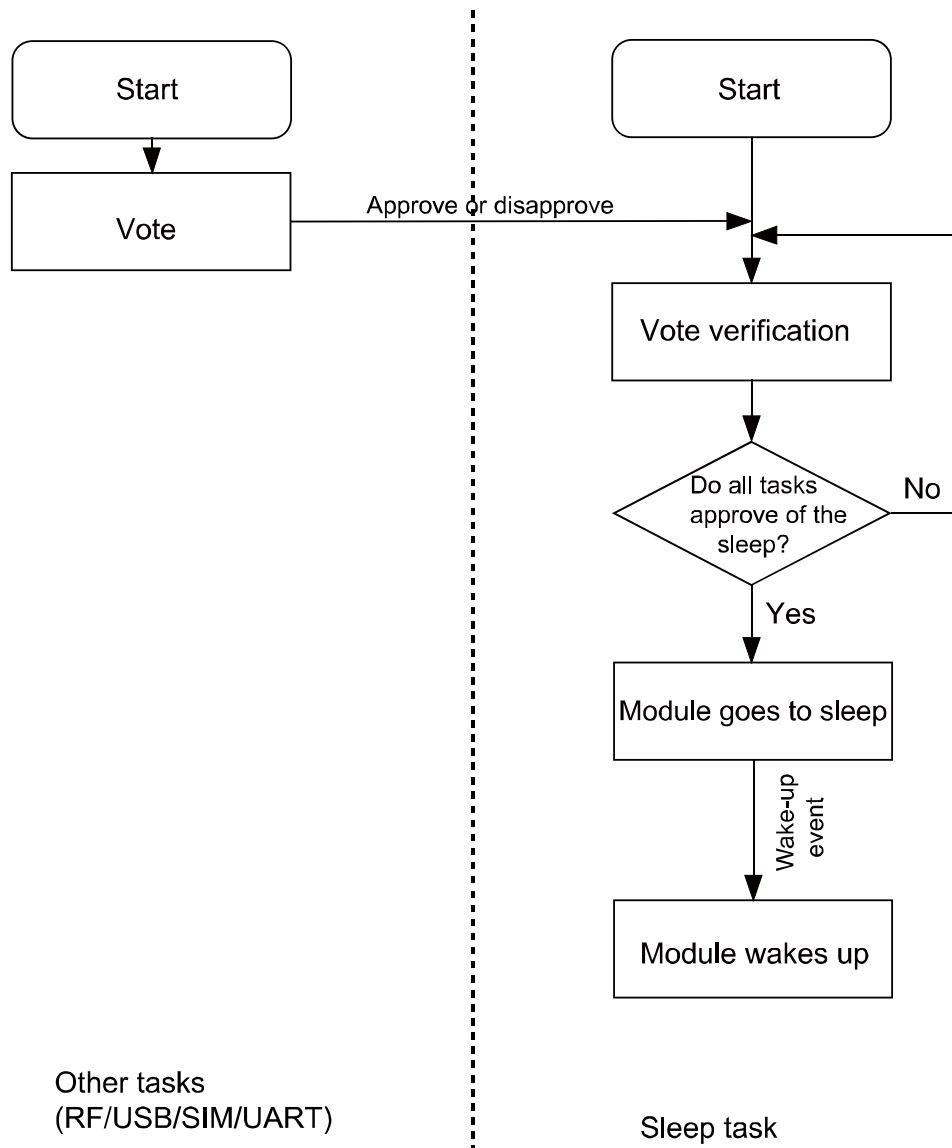


 **NOTE**

The module's sleep mode is different from working mode or flight mode set using the **AT+CFUN** command. The RF will be turned off when the module enters LPM mode using the command **AT+CFUN=0** while the RF will enter DRX mode without being turned off when the module is in sleep mode. For more details, refer to [HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification](#).

The module enters sleep mode automatically when the sleep task detects that all other tasks agree on the module's sleep. The sleep period of the module depends on the current working state and circumstance. The period may last for several seconds, or up to several minutes.

**Figure 8-6** Sleep procedure



## 8.3.2 USB and Sleep

USB is an important communication channel between the module and the host. According to the USB protocol, normally a hub or a root hub periodically sends Start of Frame (SOF) data packages (one data package per ms using full-speed USB and one package per 125  $\mu$ s using high-speed USB). Through this mechanism, USB always votes to stop the module from entering sleep mode.

When the USB driver provided by Huawei detects that the module and the host have not exchanged data in 5 seconds, the USB driver will enable the port's suspend feature, stopping SOF data packages being sent and suspending the USB controller. This enables the USB to vote to agree the module's sleep.

### NOTE

- If the USB driver used is developed by users or is integrated with external application, ensure that the USB driver supports the USB suspend features (including selective suspend and global suspend, as defined in the USB standard.)
- Before the D+/D- connection between the host and the module disconnects, the **AT^WAKEUPCFG=1,1,x** command (*x* is determined by the customers based on the [HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification](#)) must be sent to disable the USB remote wake-up function. Otherwise, after the module is woken up, it cannot enter sleep mode again because it keeps waking up the host over the USB.
- After the D+/D- connection between the host and the module resumes, the **AT^WAKEUPCFG =1,3,x** command (*x* is determined by the customers based on the [HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification](#)) must be sent to enable the USB remote wake-up function. Otherwise, the module cannot wake up the host over the USB.

## 8.3.3 UART and Sleep

UART is an important communication channel between the module and the host. If the host uses UART (a TTL level Interface), it can connect to the module's UART directly. If the host uses RS232, it can connect to the module's UART through a conversion chip such as MAX232.

### NOTE

If the module is in sleep state, the host send data to module only by UART that can't wakeup the module. It must be used with WAKEUP\_IN pin.

## 8.3.4 Module Wake-up

RF periodically wakes up the module based on the DRX cycle (depending on the actual configuration of the network system), as shown in Figure 8-5 .

Other aperiodic events include:

1. The host sends data using USB or pulls WAKEUP\_IN up.
2. Changes on the network, for example, an incoming call, an incoming text message, a signal change, a network working mode change, a network search, an IP data package (when a dial-up network connection is set up).
3. Software system events such as a timer
4. Abnormal events, for example, an antenna drops or a SIM card becomes loose.

## 8.3.5 Host Woken up by Module

### Wake-up Source

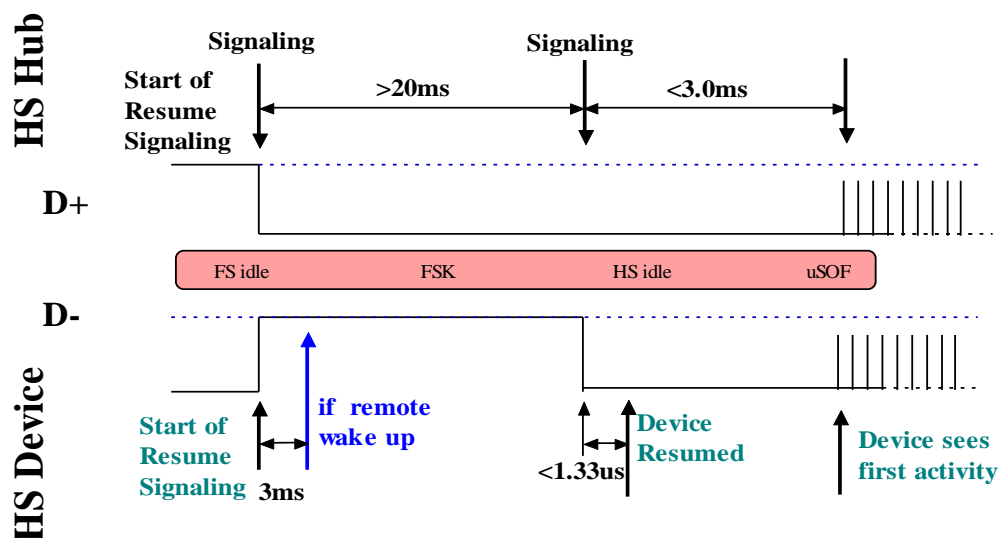
A wake-up source is a module event that can wake up the host, for example, an incoming voice call, a text message, data (PPP data, TCP/UDP data from the network), and unsolicited messages.

### Remotely Waking up the Host Using USB

When the host is in sleep mode and the USB controller is in suspended mode, if the module needs to send data to the host (for example, a wake-up source has arrived), the module sends a remote wake-up signal that lasts 3 ms to inform the host to start USB resume (as shown in Figure 8-7 ). To complete the procedure, the following conditions must be met:

1. The USB controller on the host supports USB remote wake-up and can wake up the host.
2. The USB driver enables or disables remote wake-up by executing SET\_FEATURE and CLEAR\_FEATURE commands. Therefore, remote wake-up must be enabled on the USB driver before USB enters suspended mode.
3. When the host receives the remote wake-up signal from the module, the host needs to send a full speed K signal that lasts at least 20 ms. When the USB controller resumes, the host must send the SOF token within 3 ms from the startup of the idle state. Otherwise, the module enters suspended mode again, as shown in Figure 8-7 .

Figure 8-7 USB resume time sequence



**Figure 8-8** Successful procedure of remote wake-up

| Transfer | F | Control    | ADDR | ENDP | bRequest      | wValue               | wIndex                  | wLength | Time           | Time Stamp     |
|----------|---|------------|------|------|---------------|----------------------|-------------------------|---------|----------------|----------------|
| 5        | S | SET        | 3    | 0    | SET_FEATURE   | DEVICE_REMOTE_WAKEUP | 0x0000                  | 0       | 3.519 ms       | 8.897.431.766  |
| Packet   | H | Suspend    |      |      |               |                      |                         |         |                |                |
| 5356     | H | 12.022 sec |      |      |               |                      |                         |         | 8.900.949.650  |                |
| Packet   | ? | Resume     |      |      |               |                      |                         |         |                |                |
| 5357     | ? | 21.000 ms  |      |      |               |                      |                         |         | 20.923.255.382 |                |
| Packet   | H | Resume EOP |      |      |               |                      |                         |         |                |                |
| 5358     | H | 1.333 μs   |      |      |               |                      |                         |         | 36.727 ms      | 20.944.255.448 |
| 6        | S | GET        | 3    | 0    | GET_STATUS    | 0x0000               | USB 2.0 Standard Status | 2       | 1.162 ms       | 20.980.983.366 |
| 7        | S | SET        | 3    | 0    | CLEAR_FEATURE | 0x0001               | 0x0000                  | 0       | 12.352 ms      | 20.982.145.182 |

## WAKEUP\_OUT Waking up the Host

The module will output a 1s pulse using WAKE# as shown in Figure 8-1 or WAKEUP\_OUT as shown in Figure 8-2 when a wake-up source arrives. The host wakes itself up after detecting the level change.

## Remote Wake-up Configuration

The power consumption of the host increases if it is frequently woken up. The host can configure the module's wake-up sources using ^WAKEUPCFG and ^CURC command so as to reduce the power consumption.

The ^WAKEUPCFG command can be used to choose wake-up sources and the wake-up channel (USB or WAKEUP\_OUT). The ^CURC command can choose unsolicited messages. For more details, refer to AT Command Interface Specification.

# 8.4 Application Scenarios: System with USB Connection only

A host runs on Android, with support for USB suspend, USB remote resume, voice calling, and text messages.

## 8.4.1 Hardware Connection

The host connects to the module using USB.

## 8.4.2 Software Procedure

| Command                        | Description                             |
|--------------------------------|---|
| AT^WAKEUPCFG=?                 | Query the parameter range of WAKEUPCFG. |
| ^WAKEUPCFG: (0-1),(0-3),(0-15) |   |
| OK                             |   |



| Command                    | Description   |
|----------------------------|---|
| <b>AT^WAKEUPCFG=1,2,15</b> | Configure the module to make sure that incoming calls, text messages, data, and unsolicited messages can remotely wake up the host using USB. |
| OK                         |   |
| <b>AT^CURC=?</b>           | Query the parameter range of <b>CURC</b> .  |
| <b>^CURC: (0-1)</b>        |   |
| OK                         |   |

### 8.4.3 Advantages

With software configuration, while the system requirements (calling and text messages) are met, the number of times the host is woken up by unsolicited messages, and consequently the power consumption, are reduced.

## 8.5 Application Scenarios: System with USB and WAKEUP\_OUT

A host running Android, with support for text messages, but has not USB remote resume or voice calling.

### 8.5.1 Hardware Connection

The host must connect to the module using USB and WAKEUP\_OUT pins

### 8.5.2 Software Procedure

| Command                               | Description  |
|---------------------------------------|--|
| <b>AT^WAKEUPCFG=?</b>                 | Query the parameter range of <b>WAKEUPCFG</b> .  |
| <b>^WAKEUPCFG: (0-1),(0-3),(0-15)</b> |  |
| OK                                    |  |
| <b>AT^WAKEUPCFG=1,1,14</b>            | Configure the module to make sure that text messages, data, and unsolicited messages can remotely wake up the host using the WAKEUP_OUT pin. |



---

OK

AT^CURC=?

Query the parameter range of **CURC**.

^CURC: (0-1)

OK

---

### 8.5.3 Advantages

A solution is provided for systems not supporting USB remote resume.

With software configuration, while the system requirements (calling and text messages) are met, the number of times the host is woken up by unsolicited messages, and consequently the power consumption, are reduced.

## 8.6 System with Other Connection Methods

If the host can be connected to the module only using UART, you can refer to the [HUAWEI ME909u-523 LTE LGA Module Hardware Guide](#) or [HUAWEI ME909u-523 LTE Mini PCIe Module Hardware Guide](#). If the host can connect to the module using USB/UART/WAKEUP\_OUT and can support USB remote wake-up and UART remote wake-up, prioritize USB remote wake-up over WAKEUP\_OUT remote wake-up. For details about the software procedure, refer to the earlier sections while considering the host system feature.



# 9 Thermal Protection Application Scenarios

## 9.1 Pre-configuration

| Command          | Description   |
|------------------|---|
| <b>^THERM: 1</b> | When the temperature is higher than the temperature protection threshold, the module enables thermal protection: The module turns off its RF and reports to the host. |
| <b>^THERM: 0</b> | When the temperature is lower than the temperature protection hysteresis threshold, the module disables thermal protection: turns on its RF and reports to the host.  |

### 9.1.1 Troubleshooting

None

## 9.2 Thermal Protection Process

- When the module's temperature is lower than 101°C, the module works normally.
- When the module's temperature is higher than 101°C, the module enables thermal protection: turns off its RF transmission and presents the **^THERM: 1** indication. When the module's temperature is higher than 107°C, the module will turn off after 15 seconds. When the module's temperature is lower than 93°C, the module disables thermal protection: turns on its RF transmission, and presents the **^THERM: 0** indication.



 **NOTE**

- During an emergency call, if thermal protection is enabled, the module will present an indication but will not take thermal protection actions such as turning off its RF or shutting down.
- After thermal protection is enabled, users cannot make emergency calls.
- Thermal protection is designed to protect the module from being damaged by over temperature. To work in high temperature environments, both the module and its peripheral components must be able to resist the same temperature.





# 10 Module Powering Off and Resetting Application Scenarios

## 10.1 Restarting the ME

### 10.1.1 Reference Process

| Command            | Description         |
|--------------------|---------------------|
| <b>AT+CFUN=1,1</b> | Restart the module. |
| <b>OK</b>          |                     |

The ME can be reset or restarted using the **AT+CFUN** command. After the restart, the module must register with the network and authenticate its SIM card's PIN.

### 10.1.2 Troubleshooting

None

## 10.2 Powering Off ME

### 10.2.1 Reference Process

| Command       | Description           |
|---------------|-----------------------|
| <b>AT^MSO</b> | Power off the module. |
| <b>OK</b>     |                       |

After the command is received, the module will power-off.



## 10.2.2 Troubleshooting

None



# 11 GPS Application Scenarios

## 11.1 Introduction to GPS

### 11.1.1 GPS Positioning Methods

Table 11-1 GPS positioning methods

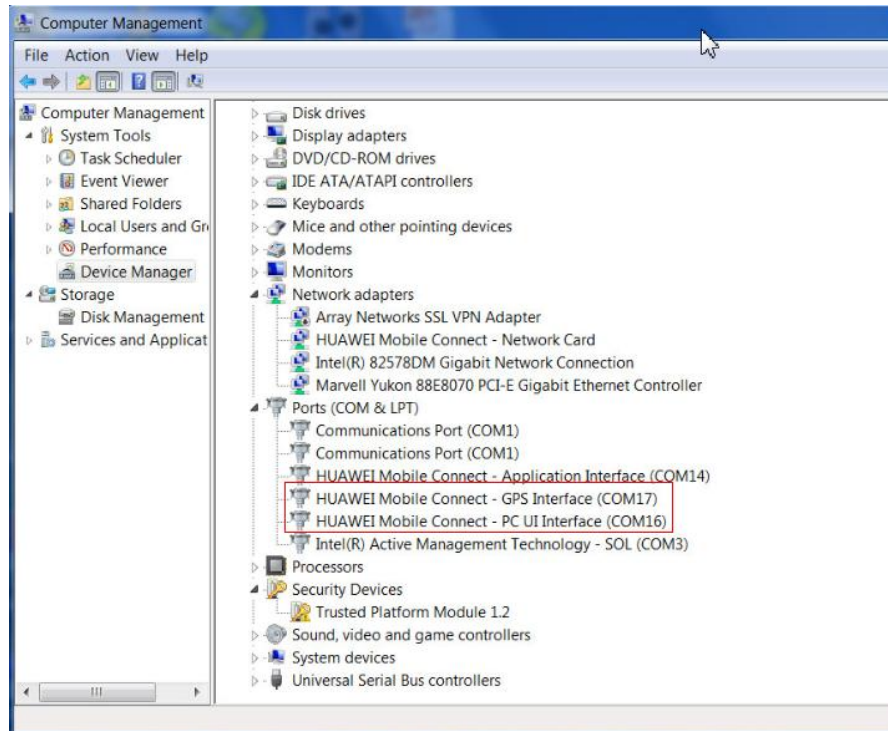
| Positioning methods  | Description   | Benefits   | Drawbacks   |
|--|---|--|---|
| Standalone   | This is a traditional GPS positioning method. Using this method, a module receives satellite signals directly and makes calculations to obtain positioning results.   | No communication with the network is invoked, incurring no data traffic between the module and the network.  | Long time to first fix (TTFF) in code mode.                               |
| Mobile Station Based (MSB) positioning using the User Plane Protocol | Requests the assistant data from the network to assist and accelerate the positioning. This method is one of the Assisted GPS (A-GPS) methods.  | <ul style="list-style-type: none"><li>• Significantly reduces the TTFF after cold start and increases the rate of successful positioning.</li><li>• Enables positioning in environments with very poor satellite signals.</li></ul>  | Requires the assistant data from the network, incurring network traffic.  |
| Mobile Station Assisted (MSA) using the User Plane Protocol          | Requests data from the network to assist and accelerate the positioning. After receiving satellite data, the module sends the satellite data to the network for calculations, and the network returns the calculation results to the module. This method is one of the A-GPS methods. | <ul style="list-style-type: none"><li>• Reduces the TTFF after cold start and increases the rate of successful positioning.</li><li>• Hands most workload to the network, reducing the module's workload.</li><li>• Enables positioning in environments with poor satellite signals (network dependent).</li></ul> | Requires complex interaction with the network, incurring network traffic. |



| Positioning methods                                      | Description   | Benefits   | Drawbacks  |
|--|---|--|--|
| XTRA positioning   | Downloads XTRA data from the Qualcomm's XTRA server to assist positioning. The XTRA data is valid for 7 days.                                 | <ul style="list-style-type: none"><li>• Reduces the TTFF after cold start.</li><li>• Long valid period for the XTRA data, eliminating frequent data downloading.</li></ul> | <ul style="list-style-type: none"><li>• Cannot reduce the TTFF after cold start as significantly as the A-GPS methods.</li><li>• The XTRA data's ability to assist positioning declines as time goes by.</li></ul> |
| Cell ID  | Base station mode, this approach will be based on the cell ID number of the mobile terminal is located to determine the location of the user. | This mode can be use when other optioning methods are failed.  | Very low accuracy.   |
| Global navigation satellite system (abbreviated as GNSS) | Uses both the GPS and GLONASS for positioning.  | Using more satellites, increases the successful positioning rate and the positioning accuracy.   |  |

## 11.1.2 GPS Ports

Figure 11-1 GPS Interface detected after the module is connected to a computer



GPS Interface port is used to send GPS-related AT commands and unsolicited indications for NMEA positioning data.

Figure 11-2 Data sent through the GPS interface ports

```
*POSEND: -1,65490
$GPGSV,3,1,12,02,,21,04,19,106,32,07,01,053,33,08,09,081,19*43
$GPGSV,3,2,12,10,11,053,34,15,38,209,38,28,73,150,35,29,35,309,27*74
$GPGSV,3,3,12,41,,,38,42,,,37,50,,,40,12,08,222,*4E
$GPGGA,093918.0,2231.848903,N,11356.626149,E,1,06,1.2,38.9,M,-1.0,M,*7F
$GPRMC,093918.0,A,2231.848903,N,11356.626149,E,0.0,141013.0,0.0,E,A*25
$GPGSA,A,2,04,08,10,15,26,29,,,,,1.5,1.2,0.9*3B

*POSEND: -1,65489
$GPGSV,3,1,12,02,,21,04,19,106,32,07,01,053,32,08,09,081,19*42
$GPGSV,3,2,12,10,11,053,33,15,38,209,39,28,73,150,35,29,35,309,27*72
$GPGSV,3,3,12,41,,,38,42,,,37,50,,,40,12,08,222,*4E
$GPGGA,093919.0,2231.848898,N,11356.626151,E,1,06,1.2,38.9,M,-1.0,M,*74
$GPRMC,093919.0,A,2231.848898,N,11356.626151,E,0.0,141013.0,0.0,E,A*2E
$GPGSA,A,2,04,08,10,15,26,29,,,,,1.5,1.2,0.9*3B

*POSEND: -1,65488
$GPGSV,3,1,12,02,,21,04,19,106,32,07,01,053,33,08,09,081,19*43
$GPGSV,3,2,12,10,11,053,33,15,38,209,38,28,73,150,35,29,35,309,26*72
$GPGSV,3,3,12,41,,,38,42,,,37,50,,,41,12,08,222,*4F
$GPGGA,093920.0,2231.848895,N,11356.626150,E,1,06,1.2,38.9,M,-1.0,M,*72
$GPRMC,093920.0,A,2231.848895,N,11356.626150,E,0.0,141013.0,0.0,E,A*28
$GPGSA,A,2,04,08,10,15,26,29,,,,,1.5,1.2,0.9*3B

*POSEND: -1,65487
```

After the positioning starts, NMEA data is sent at the rate of 1Hz through the GPS interface port.

After the positioning finish, POSEND is sent through the GPS interface port.

## 11.2 Standalone Positioning

| Command                 | Description  |
|-------------------------|--|
| <b>AT^WPDOM=0</b>       | Set the positioning method to Standalone.  |
| OK                      |  |
| <b>AT^WPDST=0</b>       | Set the session type to single positioning.  |
| OK                      |  |
| <b>AT^WPDST=1</b>       | Set the session type to tracking and positioning.  |
| OK                      |  |
| <b>AT^WPDFR=65535,1</b> | Set the number of positioning times and the interval between each positioning for the tracking and positioning. If the session is a single positioning, you do not need to set these parameters. |
| OK                      |  |
| <b>AT^WPQOS=255,500</b> | Set the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold.  |
| OK                      |  |
| <b>AT^WPDGP</b>         | Start positioning.   |
| OK                      |  |
| <b>^POSEND: -1,9</b>    | The first value indicates positioning end reason, and the second indicates the left positioning times.   |

### NOTE

- The Standalone method can be used when the module has no SIM card inserted.
- If there is an ongoing positioning session, the session must be terminated before setting the positioning parameters so that the parameters can take effect for the positioning to be started. This rule applies to all positioning methods.
- Execute **AT^WPEND** command can terminate the current positioning session.



## 11.3 MSB Positioning Using the User Plane Protocol

| Command                              | Description   |
|--------------------------------------|---|
| <b>AT^WPDOM=5</b>                    | Set the positioning method to MSB.  |
| <b>OK</b>                            |   |
| <b>AT^WPDST=1</b>                    | Set the session type to tracking and positioning.   |
| <b>OK</b>                            |   |
| <b>AT^WPDFR=65535,1</b>              | Set the number of positioning times and the interval between each positioning for the tracking and positioning.   |
| <b>OK</b>                            |   |
| <b>AT^WPQOS=255,500</b>              | Set the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold..                  |
| <b>OK</b>                            |   |
| <b>AT^WPURL=SUPL.GOOGLE.COM:7276</b> | Set the A-GPS server address and port number. This address is just Google AGPS server. Some of the AGPS server requires certificate authentication.                 |
| <b>OK</b>                            |   |
| <b>AT+CGDCONT=15,"IP","CMNET"</b>    | Set the PDP context required by A-GPS dial-up. By default, A-GPS dial-up uses the fifteenth PDP context. "CMNET" is the APN of network that module have registered. |
| <b>OK</b>                            |   |
| <b>AT^WPDGP</b>                      | Start positioning.  |
| <b>OK</b>                            |   |
| <b>^POSEND: -1,9</b>                 | The first value indicates positioning end reason, and the second indicates the left positioning times.  |

 **NOTE**

- The MSB method requires the module to register with a network, and will incur data traffic during positioning. When the MSB positioning fails, the module will automatically switch to the Standalone positioning if NV3756=1, but will not switch to the Standalone positioning if NV3756=0.
- During the AGPS positioning process, please do not search the network, because this operation will influence the positioning time.

## 11.4 MSA Positioning Using the User Plane Protocol

| Command                              | Description   |
|--------------------------------------|---|
| <b>AT^WPDOM=1</b>                    | Set the positioning method to MSA.  |
| <b>OK</b>                            |   |
| <b>AT^WPDST=1</b>                    | Set the session type to tracking and positioning.   |
| <b>OK</b>                            |   |
| <b>AT^WPDFR=65535,1</b>              | Set the number of positioning times and the interval between each positioning for the tracking and positioning.   |
| <b>OK</b>                            |   |
| <b>AT^WPQOS=255,500</b>              | Set the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold.                   |
| <b>OK</b>                            |   |
| <b>AT^WPURL=SUPL.GOOGLE.COM:7276</b> | Set the A-GPS server address and port number. This address is just Google AGPS server. Some of the AGPS server requires certificate authentication.                 |
| <b>OK</b>                            |   |
| <b>AT+CGDCONT=15,"IP","CMNET"</b>    | Set the PDP context required by A-GPS dial-up. By default, A-GPS dial-up uses the fifteenth PDP context. "CMNET" is the APN of network that module have registered. |
| <b>OK</b>                            |   |
| <b>AT^WPDGP</b>                      | Start positioning.  |
| <b>OK</b>                            |   |



 **NOTE**

- The MSA method requires the module to register with a network, and incurs data traffic during positioning. If GPS response time in the positioning QoS is set to a too small value, the MSA positioning may fail.
- During the AGPS positioning process, please do not search the network, because this operation will influence the positioning time.

## 11.5 XTRA Positioning

| Command                   | Description  |
|---------------------------|--|
| <b>AT^WPDOM=6</b>         | Set the positioning method to gpsOneXTRA.  |
| <b>OK</b>                 |  |
| <b>AT^XTRASTA</b>         | Query the status of XTRA data. If the date of the obtained XTRA data is more than seven days earlier than the current date, the XTRA data is invalid, and the module needs to download new XTRA data. (The XTRA data's ability to assist positioning declines as time goes by. Therefore, it would be appropriate to set the XTRA data's valid period to three days. You can also download the latest XTRA data without querying the existing XTRA data information.)  |
| <b>OK</b>                 | Notify XTRA data query result.   |
| <b>^XDSTATUS: 0,0,0,0</b> |  |
| <b>AT^XTRATIME.....</b>   | Upper layer applications use this command to access the SNTP server to obtain the current time information, and inject the information into the module.  |
| <b>OK</b>                 |  |
| <b>^TIMESETRULT: 0</b>    | Notify XTRA time injected result.  |
| <b>AT^XTRADATA.....</b>   | Upper layer applications use this command to access the XTRA server to download XTRA data, packetize the data, and inject the data into the module. (You can also inject the XTRA data from the host into the module.)<br><br>There are two types of XTRA files stored on the XTRA server: <ul style="list-style-type: none"> <li>• Xtra.bin file: contains predicted two-line orbital elements for GPS satellites, about 45 KB.</li> <li>• Xtra2.bin file: contains predicted two-line orbital elements for GPS and GLONASS satellites, about 80 KB.</li> </ul> |

| Command                 | Description   |
|-------------------------|---|
| OK                      |   |
| <b>^DATASETRULT: 50</b> | Notify XTRA data injected result.   |
| <b>AT^WPDST=1</b>       | Set the session type to tracking and positioning.   |
| OK                      |   |
| <b>AT^WPDFR=65535,1</b> | Set the number of positioning times and the interval between each positioning for the tracking and positioning.                                   |
| OK                      |   |
| <b>AT^WPQOS=255,500</b> | Set the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold. |
| OK                      |   |
| <b>AT^WPDGP</b>         | Start positioning.  |
| OK                      |   |
| <b>^POSEND: -1,9</b>    | The first value indicates positioning end reason, and the second indicates the left positioning times.  |



**NOTE**

XTRA date must be injected before XTRA data is injected.

## 11.6 GNSS Positioning

The GNSS positioning uses both the GPS and GLONASS satellites for positioning.

| Command           | Description  |
|-------------------|--|
| <b>AT^WGNSS=1</b> | Set GNSS as the positioning system to use both the GPS and GLONASS satellites for positioning. To switch from one positioning system to another, the module must restart. To switch the module to use GPS satellites only, run <b>AT^WGNSS=0</b> and restart the module. |
| OK                |  |

| Command   | Description  |
|---|--|
| <b>AT^WPDOM=<i>a value within the value range</i></b> | For the MSA and MSB positioning methods, the data obtained from the server is two-line orbital elements of GPS satellites, which will not help the GLONASS positioning, but the module will still search for GLONASS satellites. |
| <b>OK</b>   |  |
| <b>AT^WPDST=1</b>                                     | Set the session type to tracking and positioning.  |
| <b>OK</b>   |  |
| <b>AT^WPDFR=65535,1</b>                               | Set the number of positioning times and the interval between each positioning for the tracking and positioning.  |
| <b>OK</b>   |  |
| <b>AT^WPQOS=255,500</b>                               | Set the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold.  |
| <b>OK</b>   |  |
| <b>AT^WPDGP</b>                                       | Start positioning.   |
| <b>OK</b>   |  |
| <b>^POSEND: -1,9</b>                                  | The first value indicates positioning end reason, and the second indicates the left positioning times.   |

 **NOTE**

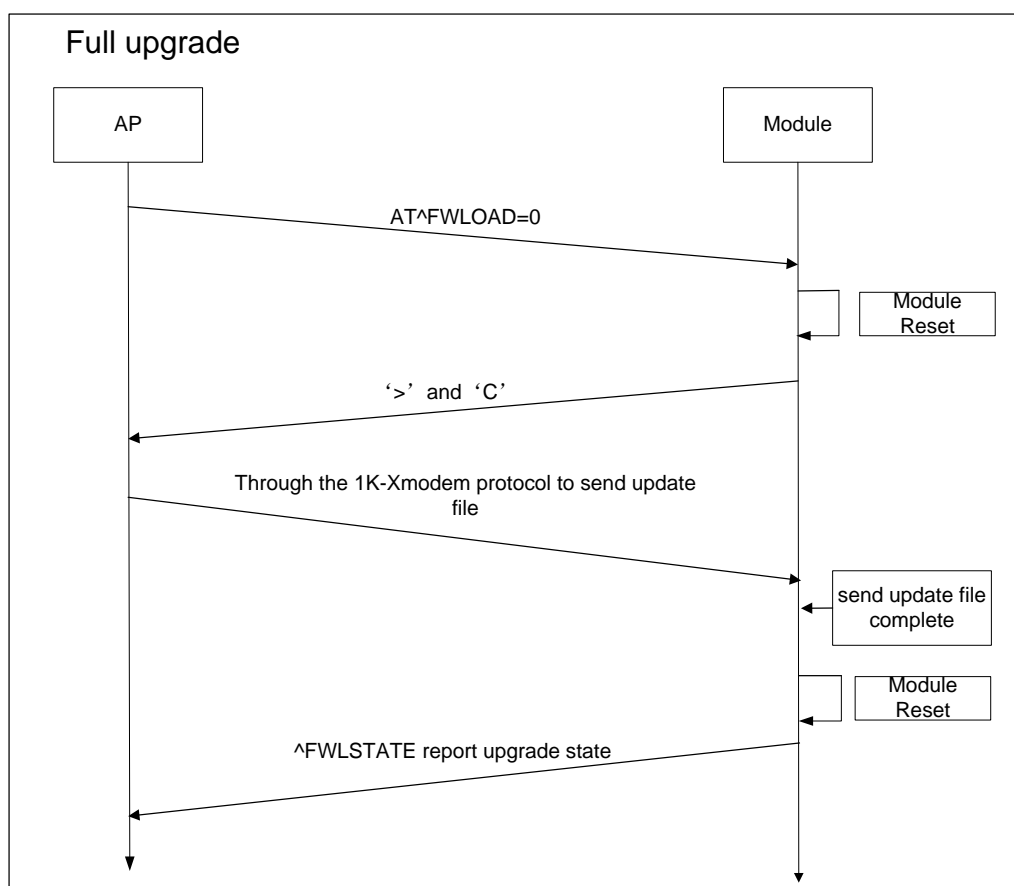
After **AT^WGNSS** is executed, the module must be restarted to allow the settings configured by **AT^WGNSS** to take effect.

# 12 Local Upgrade Application Scenarios

## 12.1 Starting the Local Upgrade

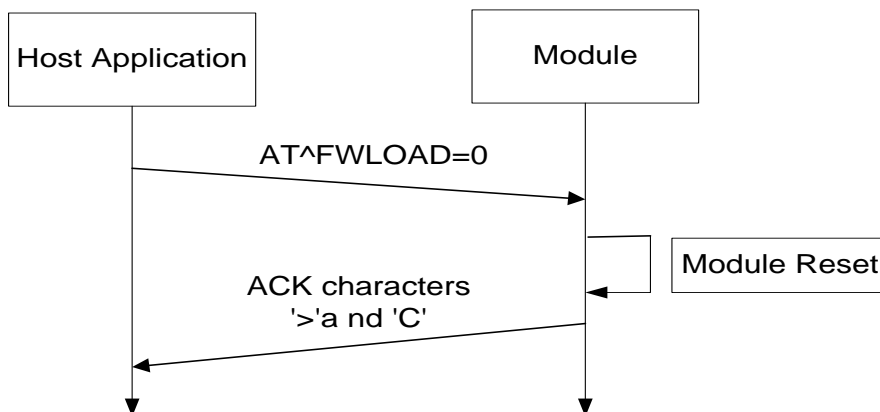
### 12.1.1 Full Upgrade Flow

Figure 12-1 Full upgrade flow



## 12.1.2 Launch the Local Upgrade

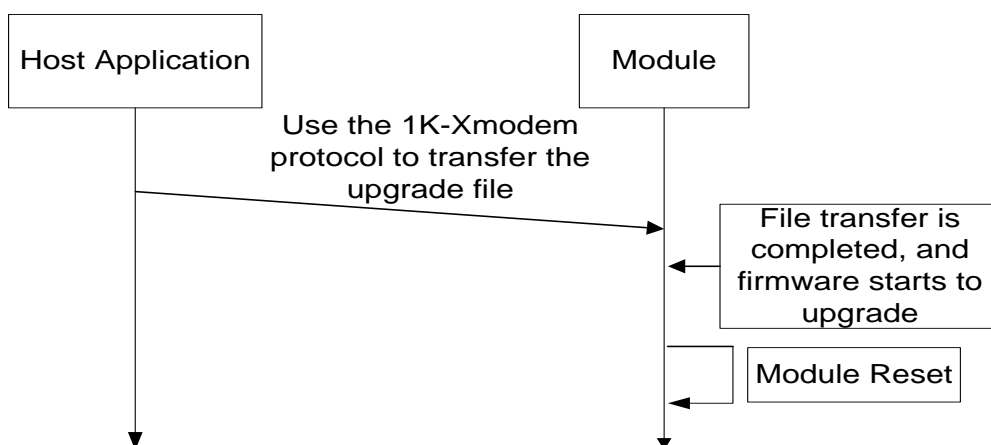
Figure 12-2 Launch the upgrade flow



The local upgrade can be used on PCUI port. After the host application sends the "AT^FWLOAD" command, the module will be reset to start the upgrade flow. And then the ACK characters '>' and 'C' will be returned to inform that the host application can receive firmware data. The character '>' is only reported once, and the duration between two 'C' characters will be about 10 seconds. And there are maximum ten 'C' characters will be reported before the module finally return failed upgrade state.

## 12.1.3 Transfer the Upgrade File

Figure 12-3 Transfer the upgrade file



After the upgrade file is transferred to the module, the module will start to upgrade the firmware directly. Finally, the module will be automatically reset to finish the upgrade flow. The host application should re-open the module's port and wait for the upgrade state AT command "AT^FWLSTATE".

## 12.1.4 Test

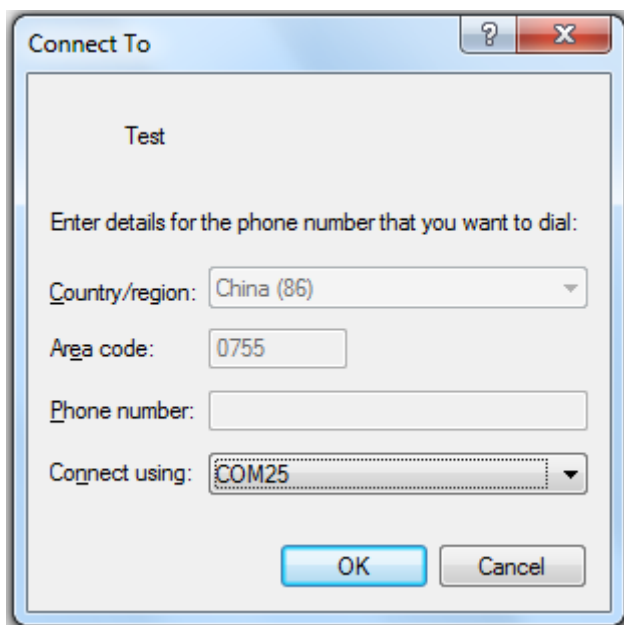
### Tools and Test Steps

This section takes the full upgrade flow for example; the test is taken on Windows 7 or XP system with Hyper Terminal tool.

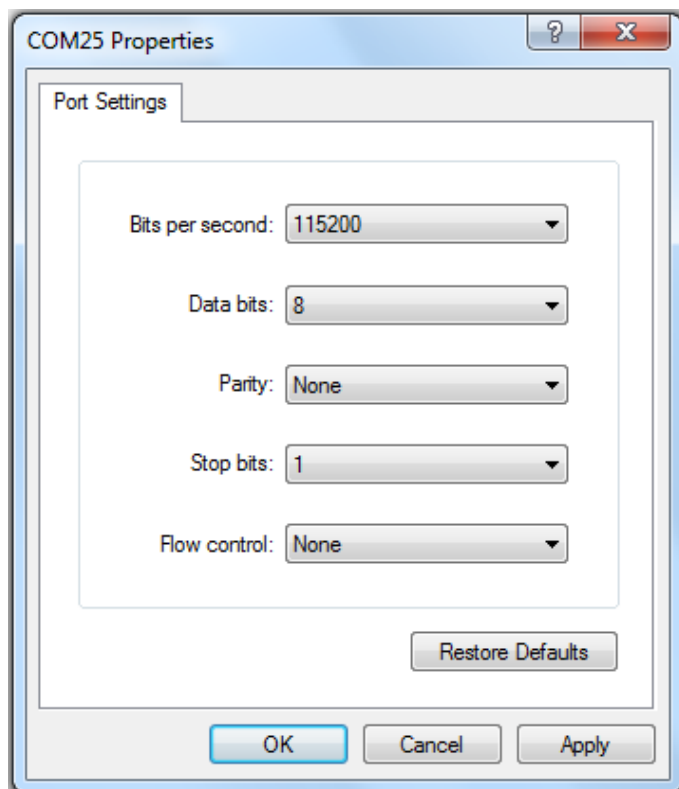
 **NOTE**

The Hyper Terminal tool supports 1k-Xmodem protocol to transfer files.

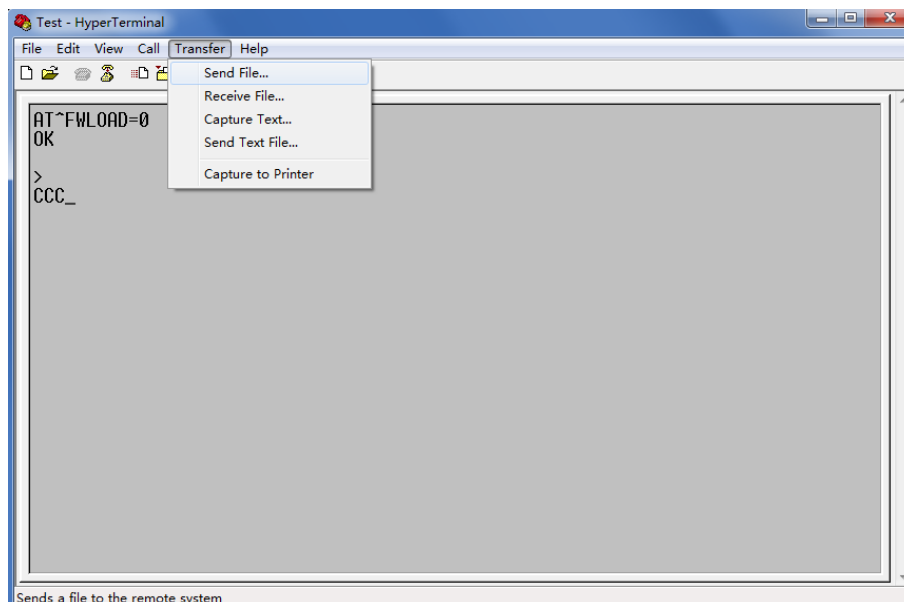
- Step 1 Open the **Hyper Terminal tool** and choose the PCUI port number. (In this document, the PCUI port is **COM25**.)



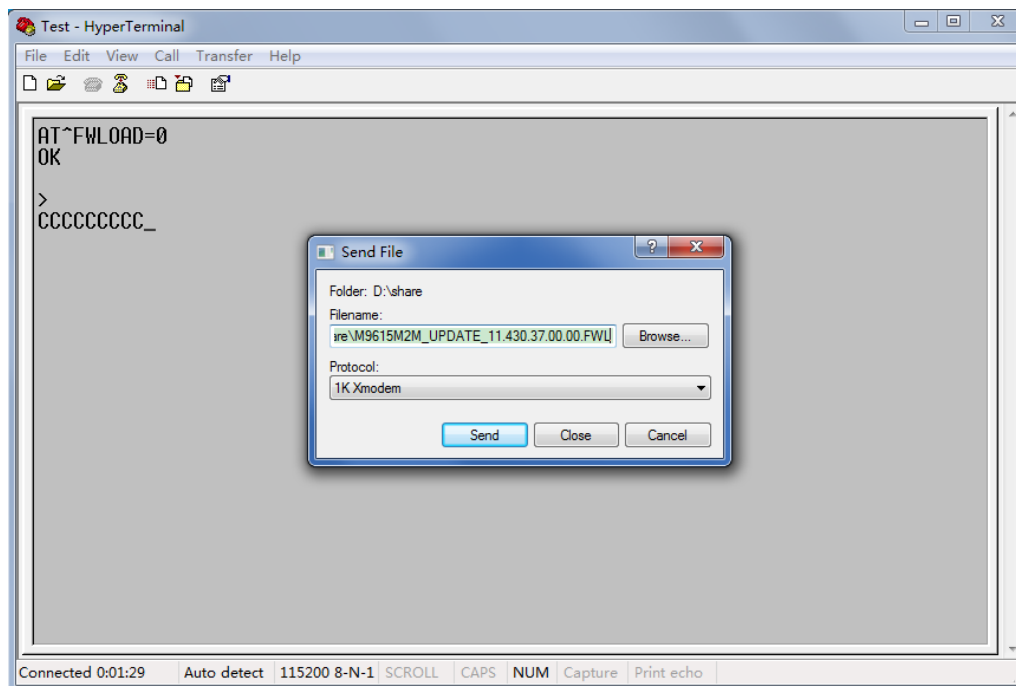
- Step 2 Set the parameters of the COM25 port.



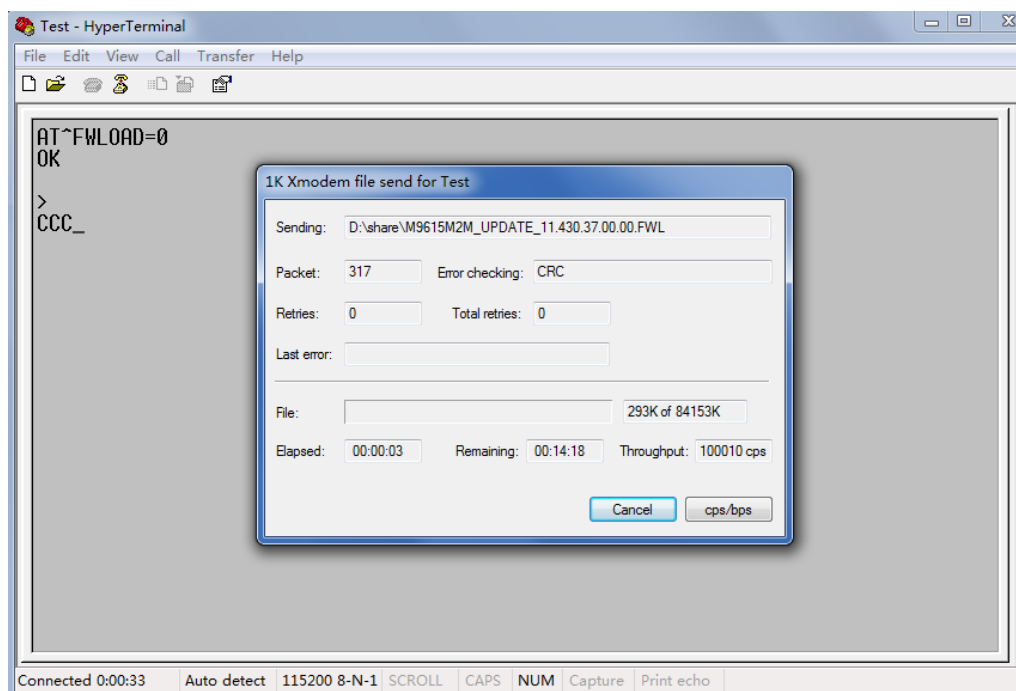
Step 3 Run the **AT^FWLOAD=0** command, and launch a full upgrade.



Step 4 Choose the file which will be sent to the module and choose the **1K Xmodem** protocol.



Step 5 Begin to transfer the local file to the module flash.



Step 6 After finishing the file transmission, start the upgrade. And the module will reset automatically to finish the upgrade.

- If the upgrade is successful, the module will return **^FWLSTATE: 90**.
- If the upgrade comes across some error, the **^FWLSTATE** will give an error code.





## Requirement of the AP

The AP is required to have 4 KB RAM at least (used to store the cache data). If AP needs to support the full upgrade, AP FLASH memory must be larger than 80 MB (the full size of ME909u-523 firmware upgrade files is 80 MB).

1. AP should be able to access and load the upgrade files.
2. AP should have a file transmission tool, this tool need to support 1K-Xmodem protocol.

## Finding the PCUI port on Android and Linux System

Step 1 Enter `/sys/bus/usb/drivers/option`, and look out the following types of folders.

```
1-1.1:2.2 1-1.1:2.4  
1-1.1:2.3 1-1.1:2.5
```

Step 2 Enter these folders, and view the **bInterfaceProtocol** value.

```
# cd 1-1.1\2.4  
  
# ls  
bAlternateSetting    ep_86  
bInterfaceClass      modalias  
bInterfaceNumber     power  
bInterfaceProtocol   subsystem  
bInterfaceSubClass   supports_autosuspend  
bNumEndpoints        ttyUSB2  
driver               uevent  
ep_04
```

If the **bInterfaceProtocol** value is **12**, the port is PCUI.

```
InterfaceProtocol  
12
```

### 12.1.5 Reference Process

| Command                  | Description             |
|--------------------------|-------------------------|
| <code>AT^FWLOAD=0</code> | Start the full upgrade. |
| <code>&gt;</code>        |                         |
| <code>C</code>           |                         |

 **NOTE**

- After the module reports 'C', the host transmits the upgrade package to the module using the 1K-Xmodem protocol.
- Full upgrade only supports on USB PCUI port.

## 12.1.6 Troubleshooting

If using the full upgrade on some hosts, after the module is restarted, the PCUI port number may be changed. So you need to find the corresponding port, and then send the local upgrade package.

## 12.2 Reporting the Local Upgrade State

### 12.2.1 Reference Process

| Command  | Description                             |
|--|---|
| <b>AT^FWLOAD=0</b>                                 |   |
| <b>&gt;</b>  |   |
| <b>C</b>   |   |
| <b>The board restarts, and the upgrade starts.</b> |   |
| <b>^FWLSTATE: 90</b>                               | Report that the local upgrade succeeds. |

 **NOTE**

After the data have been transmitted completely and successfully, the MT will not send **OK** to the TE.

### 12.2.2 Troubleshooting

None

# 13 LED Indication Application Scenarios

## 13.1 Overview

Light Emitting Diode (LED) indicates the MT's current state. Table 13-1 shows the HUAWEI default LED program, including LED mode to different states.

**Table 13-1** HUAWEI default LED program

| LED Mode                                 | Service State                |
|--|------------------------------|
| Permanently off                          | Off line                     |
| 100 ms on/100ms off/100 ms on/1700ms off | Power on Initialization      |
| 100 ms on/100ms off/100 ms on/1700ms off | Register fail and no service |
| 100 ms on/100ms off/100 ms on/1700ms off | Connect to no service area   |
| 100 ms on/1900ms off                     | Register on WCDMA            |
| Permanently on                           | Connect on WCDMA             |
| Permanently on                           | Transmit data on WCDMA       |
| Permanently on                           | Connect on HSPA              |
| Permanently on                           | Transmit on HSPA             |
| 100 ms on/1900ms off                     | Register on LTE              |
| Permanently on                           | Connect on LTE               |
| Permanently on                           | Transmit data on LTE         |



**NOTE**

LED ON indicates LED GPIO High and LED OFF indicates LED GPIO Low.



## 13.2 LED Setting Operations

### 13.2.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT^LEDCTRL=?</b>   | Check the parameter range supported by the command.  |
| <b>^LEDCTRL: (0-2),00003FFF,(0-1),(1-100),(1-100),(1-100),(1-100)</b> |  |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL?</b>  | Query the current LED program, <b>1</b> indicates adapting HUAWEI default program.   |
| <b>^LEDCTRL: 1</b>  |  |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=0</b>   | Turn off LED function.   |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=1</b>   | Configure HUAWEI default program.  |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=2,00000001,0</b>  | Configure that offline state LED mode is Permanently off.  |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=2,00000001,1,10,10</b>                                  | Configure that offline state LED mode is single flash and cycle time is 2s (1s on/1s off).   |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=2,00000001,1,1,1,1,17</b>                               | Configure that offline state LED mode is double flash and cycle time is 2s (0.1s on/0.1s off/0.1s on/1.7s off).  |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=2,0000000F,1,1,1,1,17</b>                               | Configure that offline, power on initialization, register fail no service and connect to no service state LED mode are double flash. Cycle time is 2s (0.1s on/0.1s off/0.1s on/1.7s off). |
| <b>OK</b>   |  |
| <b>AT^LEDCTRL=2,00007000,1</b>  | Configure that register successful on LTE, connect and transmit state LED mode are Permanently on.   |

| Command                 | Description  |
|-------------------------|--|
| OK                      |  |
| AT^LEDCTRL=2,3FFFFFFF,1 | Configure that all service state LED modes are Permanently on. |
| OK                      |  |

**NOTE**

After LED mode is configured, it will take effective immediately. We suggest to configure all the LED modes corresponding to its service states. If one LED mode does not configure, the corresponding service state will adapt LED mode to Permanently OFF.

## 13.2.2 Troubleshooting

None

# 14 Serial Port Configuration Application Scenarios

## 14.1 Baud Rate Configuration

### 14.1.1 Reference Process

| Command                           | Description  |
|-----------------------------------|--|
| <b>AT+IPR?</b>                    | Query the baud rate currently used by a module.  |
| <b>+IPR: 115200</b>               |  |
| <b>OK</b>                         |  |
| <b>AT+IPR="&lt;baud rate&gt;"</b> | Set a module's baud rate. After a new baud rate is specified, the module communicates using the new baud rate. |
| <b>OK</b>                         |  |

 **NOTE**

- If a module's baud rate is too low, its communication speed will be slow.
- At present, the ME909u-523 supports the following baud rates: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
- In future, the higher speed baud rate may be supported, such as 230400, 460800, 921600, 1000000, 1500000, 2500000, 3000000, 3500000 and 4000000

### 14.1.2 Troubleshooting

| Scenario                                       | Possible Error Information                        | Solution  |
|--|---|---|
| Specify a baud rate not supported by a module. | <b>AT+IPR="&lt;baud rate&gt;"</b><br><b>ERROR</b> | Check that the specified baud rate is within the range of supported baud rates. |



## 14.2 Setting Hardware Flow Control

### 14.2.1 Reference Process

| Command           | Description  |
|-------------------|--|
| <b>AT+IFC=0,0</b> | Turn hardware flow control off. After hardware flow control is turned off, communication between the UE and the DTC is not restricted by flow control.   |
| <b>OK</b>         |  |
| <b>AT+IFC=2,2</b> | Turn hardware flow control on. After hardware flow control is turned on, communication between the UE and the TE is restricted by flow control: Data transmission stops when UE's or TE's buffer level exceeds 80% and resumes when the buffer level is below 20%. |
| <b>OK</b>         |  |

### 14.2.2 Troubleshooting

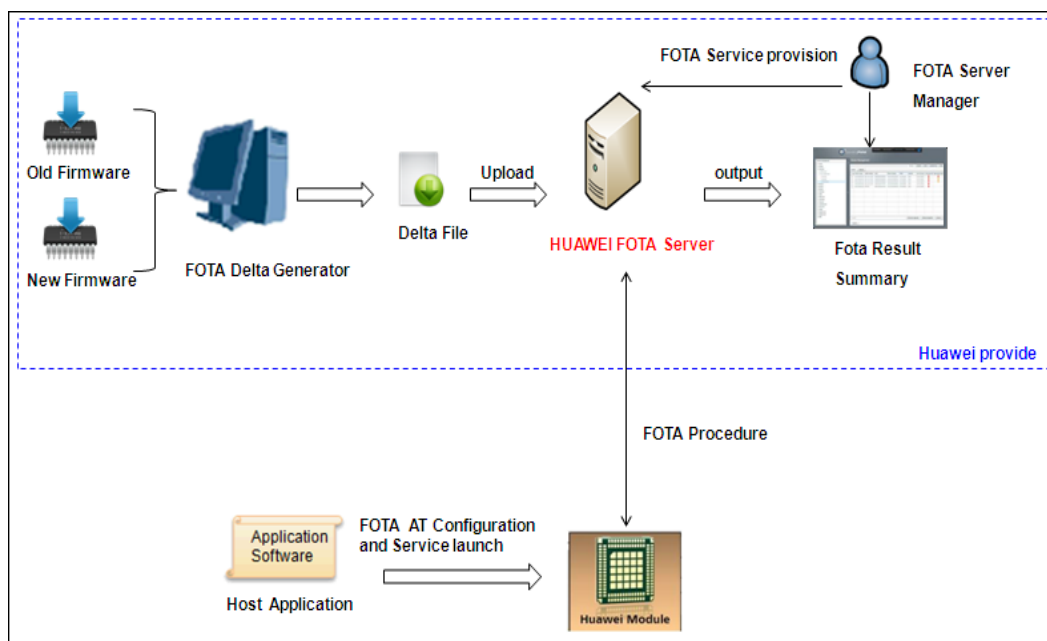
None

# 15 FOTA Application Scenarios

## 15.1 FOTA Process

### 15.1.1 Upgrade Module Firmware Over Air Through Delta Package

**Figure 15-1** Upgrade module firmware over air through delta package

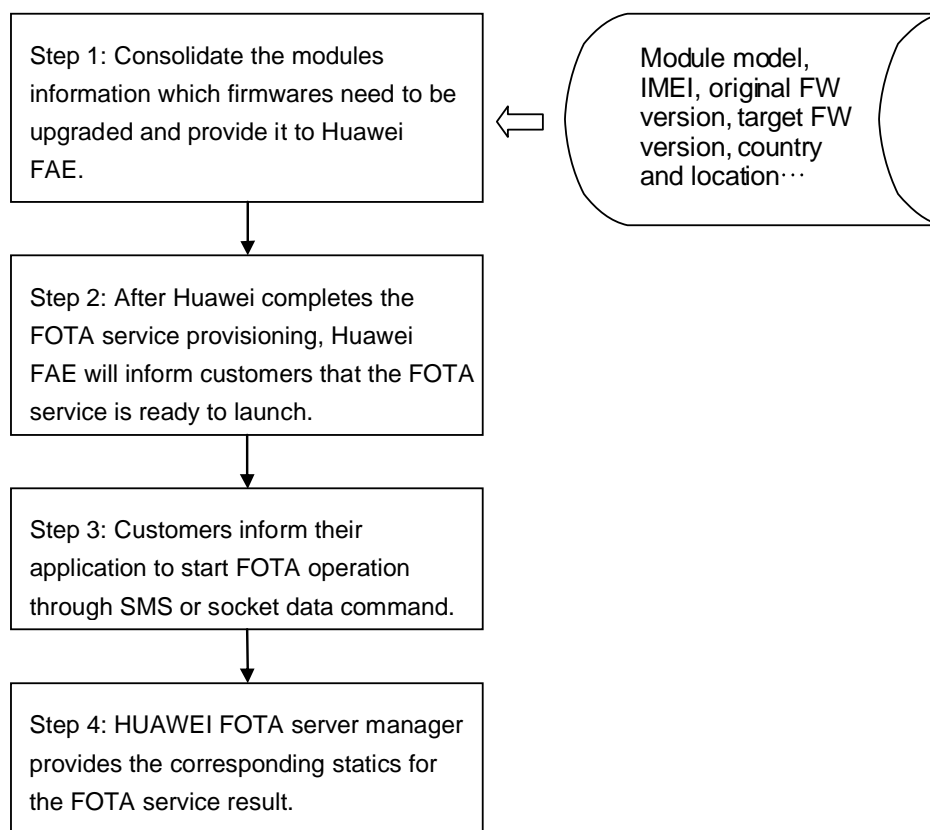


### 15.1.2 Procedure for FOTA Implementation

This section describes the workflow of HUAWEI Module FOTA feature.



**Figure 15-2** FOTA data flow



**NOTE**

If the module is powered off during the firmware installing progress, after the module is restarted, the firmware will resume installing at the last point.

AT command example (after customer application received SMS from HUAWEI FOTA server or socket command to perform FOTA upgrade):

| Command  | Description                           |
|--|---------------------------------------|
| <b>AT+GMR</b>                                    | Query the module's software version.  |
| <b>12.815.01.03.00</b>                           |                                       |
| <b>OK</b>  |                                       |
| <b>AT^FOTACFG="1234","", "", 2<sup>[1]</sup></b> | Configure APN.                        |
| <b>OK</b>  |                                       |
| <b>AT^FOTAMODE=0,0,1,1</b>                       | Set FOTA mode.                        |
| <b>OK</b>  |                                       |
| <b>AT^FOTASTATE?</b>                             |                                       |
| <b>^FOTASTATE: 10</b>                            | Indicate that the FOTA state is idle. |

OK

**AT^FOTADET** Start to detect if new version exists in Huawei FOTA server.

OK

**^FOTASTATE: 11**

**^FOTASTATE: 12,12.815.01.04.00,79114,"Support send sms background"** Get the module's new version "12.815.01.04.00".

**AT^FOTADL=1** Start to download the new version and upgrade.

OK

**^FOTASTATE: 30** Indicate that it is downloading FW delta file.

**AT^FOTADLQ** Query file download.

**^FOTADLQ: 1,"IMAGE",1324,1324**

**^FOTADLQ: 2,"XNV",47104,77778**

OK

**^FOTASTATE: 40** Indicate that FW delta file is completely downloaded.

**^FOTASTATE: 50** Indicate that FW is ready to update. After few minutes, FW is successfully upgraded.

**^FOTASTATE: 90**

**AT+GMR** Query the module's software version after the upgrade.

**12.815.01.04.00** The software version has been changed.

OK

 **NOTE**

[1] <APN> should be configured before any FOTA function is enabled. Here is an example and the module needs to be configured according to the specific network.

## 15.2 Setting FOTA Mode

### 15.2.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT^FOTAMODE=?</b>                                | Check the parameter range supported by the command.  |
| <b>^FOTAMODE: (0-1),(0-1),(0-1),(0-1),(1-65535)</b> |  |
| <b>OK</b>   |  |
| <b>AT^FOTAMODE?</b>                                 | Query the current settings.  |
| <b>^FOTAMODE: 0,0,0,1,7</b>                         | Return the current FOTA mode: manual query, manual download, manual upgrade, and resumable data transfer enabled                                 |
| <b>OK</b>   | The value 7 indicates that the query cycle is seven days, which is meaningless when manual query is used.  |
| <b>AT^FOTAMODE=1,1,1,1,15</b>                       | Configure FOTA mode as auto query, auto download, auto upgrade, and resumable data transfer enabled. And the auto query cycle is set to 15 days. |
| <b>OK</b>   |  |



#### NOTE

- Parameter settings are all saved upon power-off.
- All parameters will be restored to their default values after the upgrade.

### 15.2.2 Troubleshooting

| Scenario                      | Possible Error Information                  | Solution   |
|-------------------------------|---|--|
| An error message is returned. | <b>+CME ERROR: Error command parameters</b> | The parameter is incorrectly set. For details, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> . |

## 15.3 Setting FOTA Connection Parameters

### 15.3.1 Reference Process

| Command                           | Description  |
|-----------------------------------|--|
| <b>AT^FOTACFG="cmnet","","",2</b> | Set the APN to <b>cmnet</b> and authentication mode to <b>CHAP</b> . Leaves the user name and password blank. These parameters should be set according to the contracted values. |
| <b>OK</b>                         |  |
| <b>AT^FOTACFG?</b>                | Query the current settings.  |
| <b>^FOTACFG: "cmnet","","",2</b>  |  |
| <b>OK</b>                         |  |

 **NOTE**

- Parameter settings are all saved upon power-off.
- **<APN>** may be modified by other operations, so **<APN>** should be configured before any FOTA function is enabled.
- This command does not provide a test command. For details, see the latest version of [HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification](#).

### 15.3.2 Troubleshooting

| Scenario                      | Possible Error Information                  | Solution   |
|-------------------------------|---|--|
| An error message is returned. | <b>+CME ERROR: Operation not supported</b>  | The operation is not supported. For details, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> .   |
| An error message is returned. | <b>+CME ERROR: Error command parameters</b> | The parameter is incorrectly set. For details, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> . |



## 15.4 Manually Querying for Upgrade Firmware Version

### 15.4.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT^FOTACFG="cmnet","","",2</b>   | This command is used to configure the PDP context. For example, sets the APN to <b>cmnet</b> (the value of APN is provided by the network server) and authentication mode to <b>CHAP</b> . |
| <b>OK</b>   |  |
| <b>AT^FOTAMODE=0,0,0,1</b>  | Configure FOTA mode as manual query, manual download, manual upgrade, and resumable data transfer enabled.   |
| <b>OK</b>   |  |
| <b>AT^FOTASTATE?</b>  | Query the current FOTA state.  |
| <b>^FOTASTATE: 10</b>   | Indicate that the FOTA state is idle.  |
| <b>OK</b>   |  |
| <b>AT^FOTADET</b>   | Check for updates. Ensure that the module is registered with a valid network before you run this command.  |
| <b>OK</b>   | Return <b>OK</b> (success) or return <b>+CME ERROR</b> (failure).  |
| <b>^FOTASTATE: 11</b>   | Report that the query operation is in process.   |
| <b>^FOTASTATE:<br/>12,12.815.01.04.00,79114,"Support<br/>send sms background"</b> | Report information about the new version, including the version number, size of the file to be downloaded, and change description.   |
| <b>AT^FOTASTATE?</b>  | Query the current FOTA state.  |
| <b>^FOTASTATE: 12</b>   | Indicate that a new version is found.  |
| <b>OK</b>   |  |
| <b>AT^FOTADL=0</b>  | Delete the detected new version.   |
| <b>OK</b>   |  |
| <b>AT^FOTASTATE?</b>  | Query the current FOTA state.  |

**^FOTASTATE: 10** Indicate that the FOTA state is idle.

OK

**AT^FOTADET** Check for updates after deleting the new version on the server.

OK

**^FOTASTATE: 11**

**^FOTASTATE: 14** Report that no new version is found.

 **NOTE**

- Version detection is allowed only if the FOTA state is idle.
- If the module is undergoing the PS data service or IPSTACK service, the FOTA service cannot be initiated, including version detection, download, and upgrade.
- The parameter **<description>** of the **^FOTASTATE** command is a string composed of ASCII characters. This parameter is used to describe the changed items (corresponding to the feature items in **changelog.xml** in the upgrade package) of the new version. The parameter contains a maximum of five records, each containing up to 255 characters. Records are separated by semicolon.

## 15.4.2 Troubleshooting

| Scenario                            | Possible Error Information                          | Solution  |
|-------------------------------------|---|---|
| An error message is returned.       | <b>+CME ERROR: FOTA is in collision state</b>       | Check whether the PS data service or IPSTACK service is going on, or use <b>AT^FOTASTATE?</b> command to check whether the FOTA state is idle.  |
| An error message is returned.       | <b>+CME ERROR: Previous command is not complete</b> | Wait for the previous command to be completely executed.  |
| An error message is returned.       | <b>+CME ERROR: SIM PIN required</b>                 | Use the PIN to unlock the SIM card.   |
| The module reports a query failure. | <b>^FOTASTATE: 13,&lt;error_code&gt;</b>            | Upon a query failure, the module restores the FOTA state to idle and deletes the downloaded files. For error codes, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> . |



## 15.5 Periodically Querying the Version

### 15.5.1 Reference Process

| Command   | Description  |
|---|--|
| <b>AT^FOTAMODE=1,0,0,1,7</b>  | Configure FOTA mode as auto query, auto download, auto upgrade, and resumable data transfer enabled and the query cycle to seven days. |
| <b>OK</b>   | The command is successfully executed.<br><br>The module automatically checks for updates when the query time arrives.                  |
| <b>^FOTASTATE: 11</b>   | Report that the query operation is in process.   |
| <b>^FOTASTATE:<br/>12,12.815.01.04.00,79114,"Support<br/>send sms background"</b> | Report information about the new version.  |

 **NOTE**

- Periodical query is based on either of the two timekeeping modes: network timekeeping or local timekeeping. If network timekeeping is unavailable, local timekeeping is used. Local timekeeping may not be accurate.
- Local timekeeping is affected by **AT+CCLK** command. Upon a power-off event, the CCLK value changes to **1980**. After you choose to use local timekeeping and change the CCLK value, the query operation cannot be carried out at the correct time.

### 15.5.2 Troubleshooting

| Scenario              | Possible Error Information                                   | Solution  |
|-----------------------|--|---|
| Auto query is in use. | No query operation is initiated when the query time arrives. | <ol style="list-style-type: none"> <li>1. Check if the FOTA state is idle. If not, change the FOTA state to idle by using the <b>AT^FOTADL=0</b> command.</li> <li>2. Check whether the PS data service or IPSTACK service is going on. If yes, terminate the service.</li> </ol> |



## 15.6 Manually Downloading the Version

### 15.6.1 Reference Process

| Command  | Description   |
|--|---|
| <b>AT^FOTASTATE?</b>   | Query the current FOTA state.   |
| <b>^FOTASTATE: 12</b>  | Indicate that a new version is found.   |
| <b>OK</b>  |   |
| <b>AT^FOTADL=1</b>   | Run this command to manually download the version or to resume data transfer.   |
| <b>OK</b>  | The command is successfully executed.<br>Report that the download is in process.  |
| <b>^FOTASTATE: 30</b>  |   |
| <b>AT^FOTADL=2</b>   | Run this command to manually download Pause.  |
| <b>OK</b>  | The command is successfully executed.<br>Report that the download is pending. If the resumable data transfer mode is disabled, the command will return "+CME ERROR: Operation not supported". |
| <b>^FOTASTATE: 31</b>  |   |
| <b>AT^FOTADL=1</b>   | Run this command to manually download the version or to resume data transfer.   |
| <b>OK</b>  | The command is successfully executed.<br>Report that the download is in process.  |
| <b>^FOTASTATE: 30</b>  |   |
| <b>AT^FOTADLQ</b>  | Query the download progress.  |
| <b>^FOTADLQ: 1,"IMAGE",1324,1324</b><br><b>^FOTADLQ: 2,"XNV",47104,77778</b> | Return that the IMAGE file size is 1324 bytes, and 1324 bytes have been downloaded.<br>The XNV file size is 77778 bytes, and 47104 bytes have been downloaded.                                |
| <b>OK</b>  |   |
| <b>^FOTASTATE: 40</b>  | Report that the version is completely downloaded and passes the MD5 verification.   |
| <b>AT^FOTADL=?</b>   | Query the parameters supported by the command.  |



|                       |                                  |
|-----------------------|----------------------------------|
| <b>^FOTADL: (0-2)</b> | Return the supported parameters. |
|                       | 0: not to download.              |
| <b>OK</b>             | 1: download.                     |
|                       | 2: download pause                |

 **NOTE**

- Version download is allowed only if the FOTA state is **12** (new version detected) and **31** (download pending).
- The prerequisites for version download and query are:  
Module registered with a valid network.  
No ongoing PS data service or IPSTACK service.

## 15.6.2 Troubleshooting

| Scenario                               | Possible Error Information                 | Solution  |
|--|--|---|
| An error message is returned.          | <b>+CME ERROR: Operation not supported</b> | The command is incorrect.   |
| An error message is returned.          | <b>+CME ERROR: SIM PIN required</b>        | Use the PIN to unlock the SIM card.   |
| An error message is returned.          | <b>ERROR</b>                               | The command is executed in incorrect FOTA state. Ensure that the FOTA state is <b>12</b> or <b>31</b> before you run the command.   |
| The module reports a download failure. | <b>^FOTASTATE: 20,&lt;error_code&gt;</b>   | Upon a download failure, the module restores the FOTA state to idle and deletes the downloaded file. For error codes, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> . |



## 15.7 Automatically Downloading the Firmware

### 15.7.1 Reference Process

| Command   | Description   |
|---|---|
| <b>AT^FOTAMODE=0,1,0,1</b>  | Configure auto download mode.   |
| <b>OK</b>   |   |
| <b>AT^FOTADET</b>   | Run this command to manually check for upgrades.                                    |
| <b>OK</b>   |   |
| <b>^FOTASTATE: 11</b>   | Report that the query operation is in process.                                      |
| <b>^FOTASTATE:<br/>12,12.815.01.01.00,79102,"Support<br/>send sms background"</b> | Report that a new version is found and information about the new version.           |
| <b>^FOTASTATE: 30</b>   | Automatically download the new version and reports that the download is in process. |
| <b>^FOTASTATE: 40</b>   | Report that the version is completely downloaded and passes the MD5 verification.   |

### 15.7.2 Troubleshooting

None

## 15.8 Using the Resumable Data Transfer Function

### 15.8.1 Reference Process

| Command                    | Description                                   |
|----------------------------|---|
| <b>AT^FOTAMODE=0,0,0,1</b> | Enable resumable data transfer.               |
| <b>OK</b>                  |   |
| <b>AT^FOTASTATE?</b>       | Query the FOTA state.                         |
| <b>^FOTASTATE: 31</b>      | Indicate that the download is pending.        |
| <b>OK</b>                  |   |
| <b>AT^FOTADL=1</b>         | Resume the transmission from the break point. |

OK

**^FOTASTATE: 30** Report that the download is in process.

**^FOTASTATE: 40** Report that the download is complete.



**NOTE**

If resumable data transfer is disabled, the download pending due to network disconnection or TCP link breakoff will be regarded as a download error.

## 15.8.2 Troubleshooting

| Scenario  | Possible Error Information                                 | Solution  |
|---|--|---|
| The function of resumable data transfer is disabled, and the network or TCP link is disconnected. | <b>^FOTASTATE: 20,18</b><br><b>Or other download error</b> | The module deletes the downloaded file and restores the FOTA state to idle. |
| The function of resumable data transfer is enabled, and the module is powered off.                | <b>^FOTASTATE: 31</b>                                      | The module prompts that the download can be resumed.                        |

## 15.9 Manually Cancelling the Download

### 15.9.1 Reference Process

| Command               | Description  |
|-----------------------|--|
| <b>AT^FOTADL=1</b>    | Initiate the version download.   |
| OK                    |  |
| <b>^FOTASTATE: 30</b> | Report that the download is in process.  |
| <b>AT^FOTADL=0</b>    | Cancel the download, delete the downloaded file, and restore the FOTA state to idle. |
| OK                    | The command is successfully executed.  |
| <b>AT^FOTASTATE?</b>  |  |

|                       |   |
|-----------------------|---|
| <b>^FOTASTATE: 10</b> | Report that the operation to cancel the download is complete. The FOTA state is idle. |
| <b>OK</b>             |   |

## 15.9.2 Troubleshooting

None

# 15.10 Manually Upgrading the Version

## 15.10.1 Reference Process

| Command               | Description   |
|-----------------------|---|
| <b>AT^FOTASTATE?</b>  |   |
| <b>^FOTASTATE: 40</b> | Report that the download is complete.   |
| <b>OK</b>             |   |
| <b>AT^FWUP</b>        | Run this command to manually start the upgrade.                                   |
| <b>OK</b>             | The command is successfully executed.   |
| <b>^FOTASTATE: 50</b> | Report that the upgrade starts. The module restarts, and then starts the upgrade. |
| <b>^FOTASTATE: 90</b> | Report that the upgrade succeeds.   |

### NOTE

- The module restarts several times during the upgrade. Ensure that during this process, the module is powered on. Do not send AT commands during the upgrade.
- If the upgrade fails, the module enters forcible loading mode, you can perform any of the following:
  1. One-click upgrade from devices running Windows (full upgrade using the .exe file)
  2. Upgrade from devices that run Android or Linux using **UpdateWizard** (full upgrade using the .bin file)
  3. Local upgrade no matter the host having the operation system or not (for details, see chapter 12 .



## 15.10.2 Troubleshooting

| Scenario                               | Possible Error Information                          | Solution   |
|--|---|--|
| An error message is returned.          | <b>+CME ERROR: Previous command is not complete</b> | Wait for the previous command to be completely executed.   |
| An error message is returned.          | <b>+CME ERROR: FOTA is in collision state</b>       | 1. Check whether the PS data service or IPSTACK service is going on.<br>2. Check that the FOTA state is not <b>40</b> (download is complete).  |
| An error message is returned.          | <b>ERROR</b>  | The command format is incorrect. Please see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> .  |
| The module reports an upgrade failure. | <b>^FOTASTATE: 80,&lt;error_code&gt;</b>            | The module automatically changes the FOTA state to idle and deletes the downloaded file. You can use the <b>AT^FOTADL=0</b> command to set the FOTA state to idle manually. For error codes, see the latest version of <a href="#">HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification</a> . |

## 15.11 Automatically Upgrading the Version

### 15.11.1 Reference Process

| Command                    | Description  |
|----------------------------|--|
| <b>AT^FOTAMODE=0,1,1,1</b> | Configure FOTA mode as auto download and auto upgrade. |
| <b>OK</b>                  |  |
| <b>AT^FOTADET</b>          | Check for upgrades.                                    |



---

**OK**

**^FOTASTATE: 11**

**^FOTASTATE:  
12,12.815.01.02.00,79114,"Support  
send sms background"**

Return information about the new version.

**^FOTASTATE: 30**

Automatically download the version.

**^FOTASTATE: 40**

Report that the version is completely downloaded and passes the MD5 verification.

**^FOTASTATE: 50**

**^FOTASTATE: 90**

Report that the module is ready for the upgrade.

Report that the upgrade succeeds.

**AT^FOTASTATE?**

Query the FOTA state.

**^FOTASTATE: 10**

The FOTA state changes to idle after the upgrade.

**OK**

---

## 15.11.2 Troubleshooting

None



# 16 Appendix

## 16.1 Relative Documents

1. HUAWEI ME909u-523 LTE LGA Module AT Command Interface Specification
2. 3GPP TS 27.007 AT command set for User Equipment (UE)
3. 3GPP TS 27.005 Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
4. 3GPP TS 23.040 Technical realization of the Short Message Service(SMS)
5. 3GPP TS 31.102 Universal Subscriber Identity Module(USIM) application
6. 3GPP TS 24.008 Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
7. 3GPP TS 29.002 Mobile Application Part (MAP) specification
8. 3GPP TS 22.004 General on supplementary services
9. ETSI TS 102.221 Smart Cards; UICC-Terminal interface; Physical and logical characteristics

## 16.2 Acronyms and Abbreviations

**Table 16-1** List of Abbreviations

| Acronym or Abbreviation | Expansion                            |
|-------------------------|--------------------------------------|
| 3GPP                    | Third Generation Partnership Project |
| AGPS                    | Assisted Global Positioning System   |
| APN                     | Access Point Name                    |
| AT                      | Attention                            |
| CS                      | Circuit Switched (CS) domain         |
| DCE                     | Data Circuit Equipment               |
| DTE                     | Data Terminal Equipment              |
| ECM                     | Ethernet Control Model               |



| Acronym or Abbreviation | Expansion                                   |
|-------------------------|---|
| GPRS                    | General Packet Radio Service                |
| GPS                     | Global Positioning System                   |
| GSM                     | Global System for Mobile Communications     |
| IMEI                    | International Mobile Equipment Identity     |
| IP                      | Internet Protocol                           |
| LTE                     | Long Term Evolution                         |
| ME                      | Mobile Equipment                            |
| PDP                     | Packet Data Protocol                        |
| PDU                     | Protocol Data Unit                          |
| PIN                     | Personal Identity Number                    |
| PPP                     | Point-to-Point Protocol                     |
| PUK                     | PIN Unblocking Key                          |
| PS                      | Packet Switched (PS) domain                 |
| QoS                     | Quality of Service                          |
| SIM                     | Subscriber Identity Module                  |
| SMS                     | Short Message Service                       |
| TE                      | Terminal Equipment                          |
| UART                    | Universal Asynchronous Receiver/Transmitter |
| UE                      | User Equipment                              |
| UMTS                    | Universal Mobile Telecommunications System  |
| USIM                    | Universal Subscriber Identity Module        |
| WCDMA                   | Wideband CDMA                               |

**Table 16-2** Phonebook-related abbreviations

| Abbreviation | Full Name            |
|--------------|----------------------|
| SM           | SIM phonebook        |
| EN           | SIM emergency number |
| ON           | SIM own numbers      |