HUAWEI ME936 LTE M.2 Module

Application Guide

Issue 02

Date 2017-12-11

Copyright © Huawei Technologies Co., Ltd. 2017. All rights reserved.

No part of this manual may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd. and its affiliates ("Huawei").
The product described in this manual may include copyrighted software of Huawei and possible licensors. Customers shall not in any manner reproduce, distribute, modify, decompile, disassemble, decrypt, extract, reverse engineer, lease, assign, or sublicense the said software, unless such restrictions are prohibited by applicable laws or such actions are approved by respective copyright holders.

Trademarks and Permissions

HUAWEI, HUAWEI, and are trademarks or registered trademarks of Huawei Technologies Co., Ltd.
LTE is a trade mark of ETSI.
Other trademarks, product, service and company names mentioned may be the property of their respective owners.

Notice

Some features of the product and its accessories described herein rely on the software installed, capacities and settings of local network, and therefore may not be activated or may be limited by local network operators or network service providers.
Thus, the descriptions herein may not exactly match the product or its accessories which you purchase.
Huawei reserves the right to change or modify any information or specifications contained in this manual without prior notice and without any liability.

DISCLAIMER

ALL CONTENTS OF THIS MANUAL ARE PROVIDED “AS IS”. EXCEPT AS REQUIRED BY APPLICABLE LAWS, NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE MADE IN RELATION TO THE ACCURACY, RELIABILITY OR CONTENTS OF THIS MANUAL.
TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL HUAWEI BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, OR LOSS OF PROFITS, BUSINESS, REVENUE, DATA, GOODWILL SAVINGS OR ANTICIPATED SAVINGS REGARDLESS OF WHETHER SUCH LOSSES ARE FORSEEABLE OR NOT.
THE MAXIMUM LIABILITY (THIS LIMITATION SHALL NOT APPLY TO LIABILITY FOR PERSONAL INJURY TO THE EXTENT APPLICABLE LAW PROHIBITS SUCH A LIMITATION) OF HUAWEI ARISING FROM THE USE OF THE PRODUCT DESCRIBED IN THIS MANUAL SHALL BE LIMITED TO THE AMOUNT PAID BY CUSTOMERS FOR THE PURCHASE OF THIS PRODUCT.

Import and Export Regulations

Customers shall comply with all applicable export or import laws and regulations and be responsible to obtain all necessary governmental permits and licenses in order to export, re-export or import the product mentioned in this manual including the software and technical data therein.

About This Document

Revision History

Document Version	Date	Chapter	Description
01	2014-05-28		Creation
02	2017-12-11		Deleted privacy policy

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Contents

1 Introduction 9
1.1 Overview 9
1.2 Conventions and Definitions 9
1.2.1 Conventions 9
1.2.2 Definitions 9
1.2.3 Legends 10
1.3 Basic AT Command Processing Principles 11
1.3.1 Ports 11
1.3.2 AT Command Processing Mechanism 11
1.3.3 Recommended Timeout Mechanism for AT Commands Processed by a Host 12
2 Basic Application Scenarios 14
2.1 Querying the IMEI 14
2.1.1 Reference Process 14
2.1.2 Troubleshooting 15
2.2 Querying Additional Information 15
2.2.1 Reference Process 15
2.2.2 Troubleshooting 16
3 Airplane Mode Application Scenarios 17
3.1 Overview 17
3.2 Setting the Flight Mode 17
3.2.1 Reference Process 17
3.2.2 Troubleshooting 18
4 BodySAR Application Scenarios 19
4.1 Overview 19
4.2 Enabling/Disabling BodySAR 19
4.2.1 Reference Process 19
4.2.2 Troubleshooting 20
4.3 Adjusting the WCDMA Transmitted Power Using the BodySAR Feature 20
4.3.1 Reference Process 20
4.3.2 Troubleshooting 21
4.4 Adjusting the GSM Transmitted Power Using the BodySAR Feature 21
4.4.1 Reference Process 21

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

4.4.2 Troubleshooting 23
4.5 Adjusting the LTE Transmitted Power Using the BodySAR Feature 23
4.5.1 Reference Process 23
4.5.2 Troubleshooting 24
4.6 Usage Description Of BodySAR Feature 24
4.6.1 Reference Description 24
4.6.2 Troubleshooting 25
4.7 Setting the BodySAR Type 25
4.7.1 Reference Process 25
4.7.2 Troubleshooting 25
5 Network Searching and Registration Application Scenarios 26
5.1 Searching and Registering Network 26
5.1.1 Reference Process 26
5.1.2 Troubleshooting 28
6 SMS Application Scenarios 29
6.1 Overview 29
6.2 Initializing SMS 31
6.2.1 Reference Process 31
6.2.2 Troubleshooting 35
6.3 Sending Short Messages 35
6.3.1 Reference Process 35
6.3.2 Troubleshooting 37
6.4 Reading Short Messages 38
6.4.1 Reference Process 38
6.4.2 Troubleshooting 40
6.5 Deleting Short Messages 40
6.5.1 Reference Process 40
6.5.2 Troubleshooting 42
7 Phonebook Application Scenarios 43
7.1 Overview 43
7.2 Initializing the Phonebook 43
7.2.1 Reference Process 43
7.2.2 Troubleshooting 44
7.3 Reading Phonebook Entries 45
7.3.1 Reference Process 45
7.3.2 Troubleshooting 46
7.4 Writing Phonebook Entries 47
7.4.1 Reference Process 47
7.4.2 Troubleshooting 48
8 Data Service Application Scenarios 50

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

8.1 Overview 50
8.2 Initializing Data Service Settings 51
8.2.1 Reference Process 51
8.2.2 Troubleshooting 51
8.3 Attaching/Detaching PS 51
8.3.1 Reference Process 51
8.3.2 Troubleshooting 52
8.4 Defining PDP Contexts 52
8.4.1 Reference Process 52
8.4.2 Troubleshooting 53
8.5 Activate PDP Contexts and Enter Data Mode 53
8.5.1 Reference Process 53
8.5.2 Troubleshooting 54

9 Security Settings Application Scenarios 55
9.1 Changing the SIM PIN 55
9.1.1 Reference Process 55
9.1.2 Troubleshooting 56
9.2 Changing the SIM Card Configuration 57
9.2.1 Reference Process 57
9.2.2 Troubleshooting 58

10 SIM Card Application Scenarios 59
10.1 SIM Card Access 59
10.1.1 Reference Process 59
10.1.2 Troubleshooting 62

11 Module Powering Off and Resetting Application Scenarios 63
11.1 Restarting the ME 63
11.1.1 Reference Process 63
11.1.2 Troubleshooting 63
11.2 Powering Off the ME 63
11.2.1 Reference Process 63
11.2.2 Troubleshooting 64

12 DPTF Application Scenarios 65
12.1 Setting Thermal Sensor with the Threshold 65
12.1.1 Reference Process 65
12.1.2 Troubleshooting 65
12.2 Querying the Current Temperature of a Thermal Sensor 65
12.2.1 Reference Process 65
12.2.2 Troubleshooting 66

13 ACT Application Scenarios 67
13.1 Overview 67

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

13.2 Adaptive Clocking 67
13.2.1 Reference Process 67
13.2.2 Troubleshooting 68
14 GPS Application Scenarios 69
14.1 Introduction to GPS 69
14.1.1 GPS Positioning Methods 69
14.1.2 GPS Ports 71
14.2 Standalone Positioning 72
14.3 MSB Positioning Using the User Plane Protocol 73
14.4 MSA Positioning Using the User Plane Protocol 74
14.5 GNSS Positioning 74
15 Appendix 76
15.1 Relative Documents 76
15.2 Acronyms and Abbreviations 76

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

1 Introduction

1.1 Overview

This document is intended to provide references for customers to choose appropriate command sequences to start using the ME936 module in a faster manner. This document also contains examples and relevant description.

This document will be updated based on customers' requirements.

NOTE
This document is only applicable for Windows 7. For Windows 8 and Windows 8.1, please refer to the MBIM protocol.

1.2 Conventions and Definitions

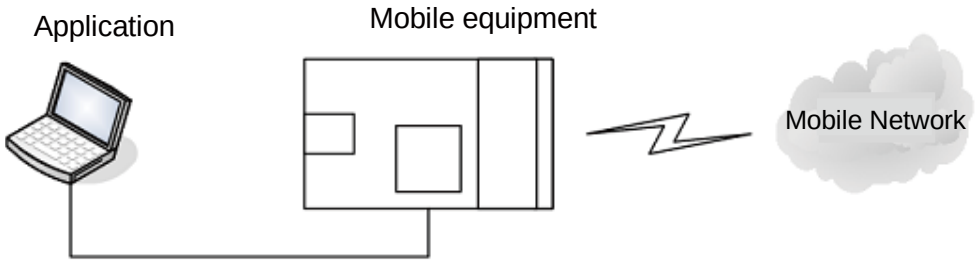
1.2.1 Conventions

Convention	Description
<…>	Value range of AT command parameters
XXXX	Personal identification number (PIN), Personal Unlock Key (PUK), or password

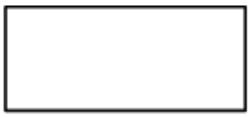
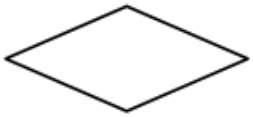
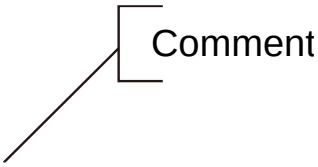
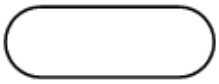
1.2.2 Definitions

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 mobile network.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Term	Definition
Module	HUAWEI LTE module
	

1.2.3 Legends

Legend	Description
	Start.
	Action: includes user input, reports from the module, unsolicited indications from the module, and communication between the module and the host.
	Branch: determines the next step.
	Comment: clarifies the scenario.
	End.
	Dataflow: indicates the next step to which the service goes or the indication reported from an action.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

1.3 Basic AT Command Processing Principles

1.3.1 Ports

The ME936 provides three ports to interact with its host:

- Network Card port: simulated using USB, for establishing data connection.
  Port name: HUAWEI Mobile Connect - Network Card
- PCUI port: simulated using USB, for AT command interaction only.
  Port name: HUAWEI Mobile Connect - PCUI Interface
- GPS port: simulated using USB, for reporting NMEA data.
  Port name: HUAWEI Mobile Connect - GPS Interface

The ME936 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.

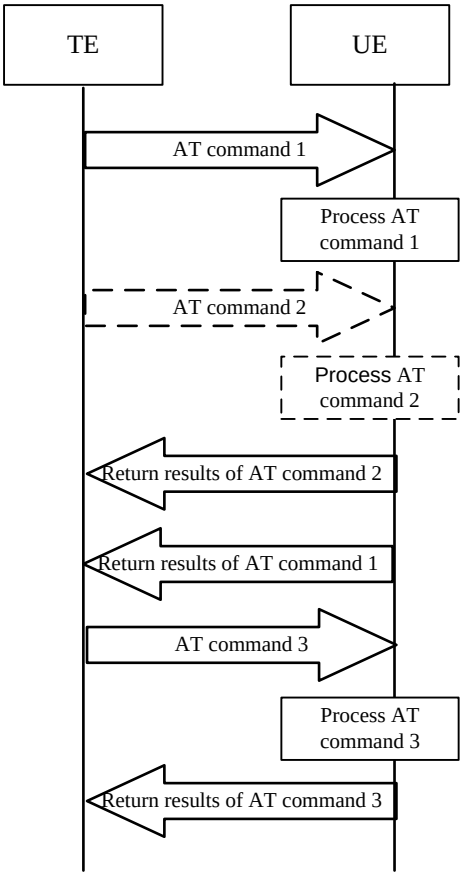
1.3.2 AT Command Processing Mechanism

A module processes AT commands from the ports (MODEM, PCUI, and GPS) in series. The AT commands can parallel processing. It means that an AT command can be processed when the previous AT command processing hasn't been completed.

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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 1-1 AT command processing sequence diagram



1.3.3 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 interruptible 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	10s
AT+CMGS (used to send PDU messages)	60s
AT+COPS=? (used to search for networks)	180s

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:

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

1. The host sends the AT command to the module.
2. If the module returns failure information, go to step 5. Otherwise, go to step 3.
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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

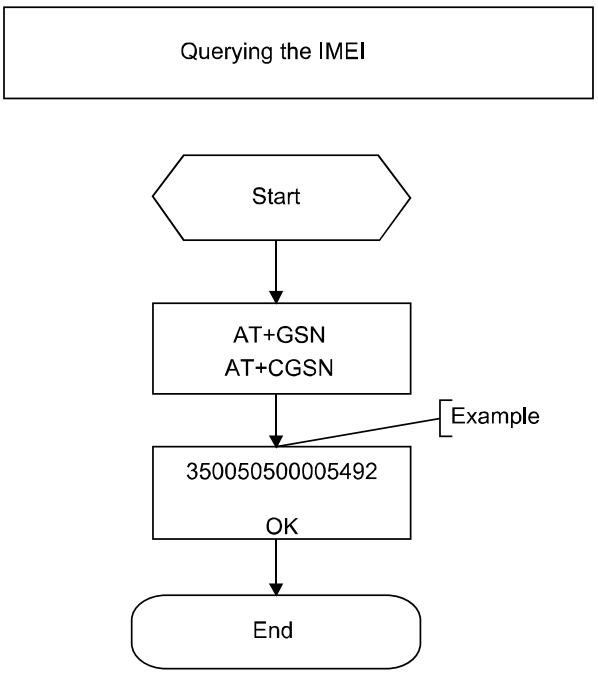
2 Basic Application Scenarios

2.1 Querying the IMEI

2.1.1 Reference Process

Command	Description
AT+GSN/AT+CGSN	Queries the IMEI.
IMEI **OK**	For example: 350050500005492

Figure 2-1 Querying the IMEI



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

2.1.2 Troubleshooting

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

2.2 Querying Additional Information

2.2.1 Reference Process

Command	Description
ATI	Queries the product information.
Product information **OK**	For example: Manufacturer: Huawei Technologies Co., Ltd. Model: ME936 Revision: 11.350.16.00.00 IMEI: 350050500005492 +GCAP: +CGSM
AT+GMR/AT+CGMR	Queries software version.
Software version **OK**	Software version. e.g. 11.350.16.00.00
AT+GMI/AT+CGMI	Queries manufacturer information.
Manufacturer identification **OK**	Huawei Technologies Co., Ltd.
AT+GMM/AT+CGMM	Queries model name.
Model identification **OK**	ME936

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

2.2.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

3 Airplane Mode Application Scenarios

3.1 Overview

Modules are usually embedded into equipments such as personal computers. The airplane mode provided by the modules can be enabled or disabled as required. When the equipment into which the module is embedded is in airplane mode, the radio frequency (RF) of the module is disabled, and other functions of the equipment are still available.

3.2 Setting the Flight Mode

3.2.1 Reference Process

Command	Description
AT^RFSWITCH=1	Sets the software-controlled RF switch to on.
OK	
AT^RFSWITCH?	Queries the states of the software and hardware controlled RF switches.
^RFSWITCH: 1,1 **OK**	Indicates the software switch is on, and the hardware switch is on.

AT^RFSWITCH=0: sets the software-controlled RF switch to off.

AT^RFSWITCH=1: sets the software-controlled RF switch to on.

The value set by **AT^RFSWITCH** command is saved upon power-off. So the settings will be used as the initial settings next time the module is powered on.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

NOTE

The radio state of WWAN can be controlled by the software-controlled and hardware-controlled RF switches. To check the states of the software-controlled and hardware-controlled RF switches, run **AT^RFSWITCH?**.

The radio state of WWAN is controlled in the following manner:

- The radio of the module will be disabled when either the software-controlled or hardware-controlled RF switch is off.
- The radio of the module will be enabled only when both the software-controlled and hardware-controlled RF switches are on.

3.2.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

4 BodySAR Application Scenarios

4.1 Overview

Specific absorption rate (SAR) is a measure of the rate at which energy is absorbed by the body when exposed to an RF electromagnetic field. It is commonly used to measure power absorbed from mobile phones. The greater the SAR value, the greater the radiation effect on humans.

For user equipment (UE) such as modules, their SAR value increases as their transmitted power increases.

At present, most vendors' tablets have passed SAR tests. Generally, these products have embedded proximity sensors. When the sensors detect that a human is in the proximity of or in contact with the UE, they will notify the UE so that the UE will reduce the transmitted power. When the human is no longer in the proximity of or in contact with the UE, the sensors also notify the UE so that the UE will restore the transmitted power.

4.2 Enabling/Disabling BodySAR

4.2.1 Reference Process

Command	Description
AT^BODYSARON=1	Enables the BodySAR feature.
OK	
AT^BODYSARON=0	Disables the BodySAR feature.
OK	

If the BodySAR feature is enabled, the maximum transmitted power can be adjusted. If the BodySAR feature is disabled, the system's default maximum transmitted power is used.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

4.2.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT^BODYSARON=0 OK AT^BODYSARON?	^BODYSARON: 1 OK	It means HW pin enabled BodySAR function.

4.3 Adjusting the WCDMA Transmitted Power Using the BodySAR Feature

4.3.1 Reference Process

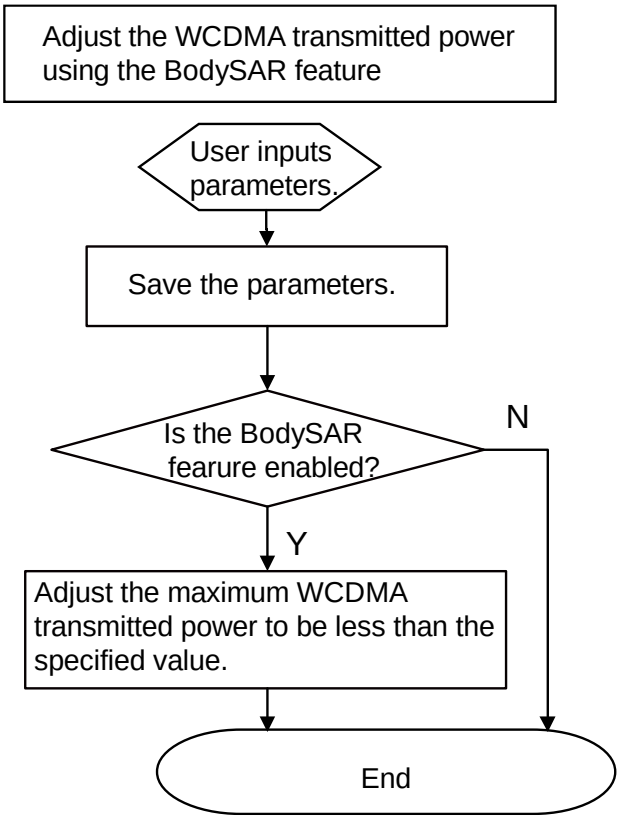
Command	Description
AT^BODYSARWCDMA=20,00000001,18,0000009a	Sets the maximum WCDMA transmitted power threshold. Indicates that set the maximum WCDMA I Tx power limit to 20 and the maximum WCDMA II, WCDMA IV, WCDMA V and WCDMA VIII Tx power limit to 18.
OK	

The WCDMA transmitted power is controlled by setting the maximum transmitted power threshold. Affected by PDM and other factors, the test result may have an error of ±2 dB.

The command and parameters of **AT^BODYSARWCDMA** depend on the product.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 4-1 Adjusting the WCDMA transmitted power



4.3.2 Troubleshooting

None

4.4 Adjusting the GSM Transmitted Power Using the BodySAR Feature

4.4.1 Reference Process

Command	Description
AT^BODYSARGSM=28,00000001,25,00000004	Sets the maximum GSM transmitted power thresholds. Indicates that set the maximum GSM 850 GPRS Tx power limit to 28 and the maximum GSM 1800 GPRS Tx power limit to 25.
OK	

The **AT^BODYSARGSM** set command sets the maximum Tx power limit of GSM, GPRS and EGPRS for each band in single time-slot. When the module changes into

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

multi-slot configuration, the maximum Tx power limit of each time-slot will be reduced. The power reduction in multi-slot configuration is as follow:

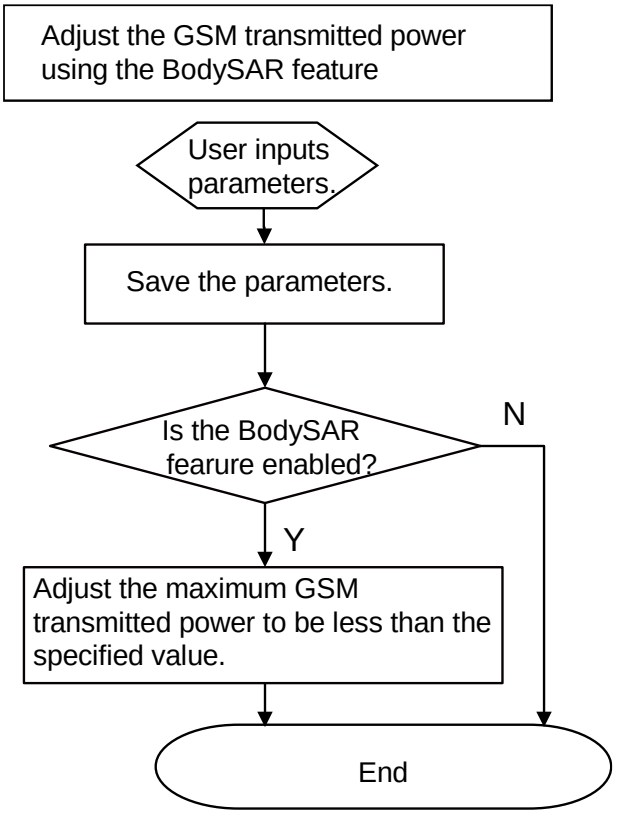
Number of timeslots in uplink assignment	Reduction of maximum Tx power (dB)
1	0
2	3
3	5
4	6
5	7
6	8
7	8.5
8	9

The transmitted power for each band of GSM GPRS and EGPRS (GSM 850, GSM 900, GSM 1800, and GSM 1900) is controlled by setting the maximum transmitted power thresholds. Affected by PDM and other factors, the test result may have an error of ±2 dB.

The command and parameters of **AT^BODYSARGSM** depend on the product.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 4-2 Adjust the GSM transmitted power



4.4.2 Troubleshooting

None

4.5 Adjusting the LTE Transmitted Power Using the BodySAR Feature

4.5.1 Reference Process

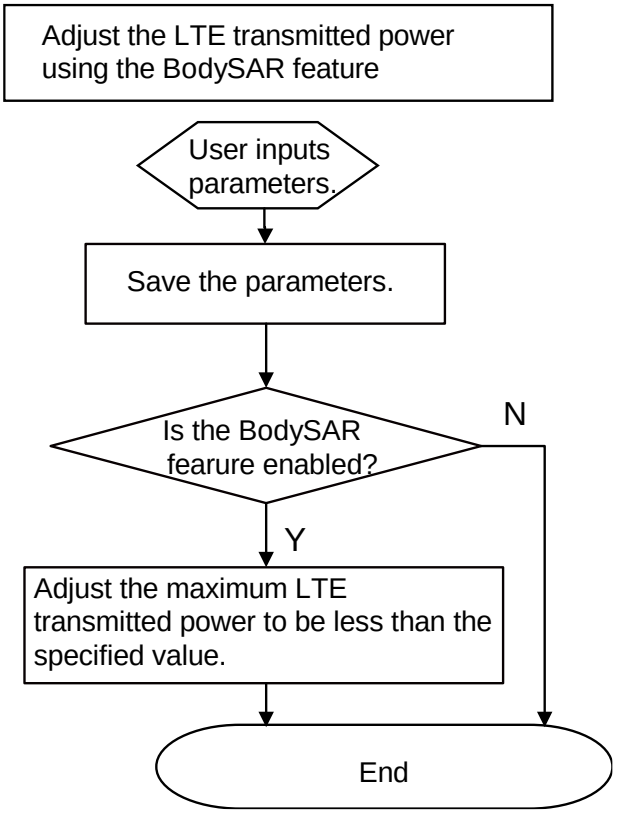
Command	Description
AT^BODYSARLTE=20	Sets the maximum LTE transmitted power threshold. Indicates that set the maximum LTE Tx power limit of bands supported by firmware to 20.
OK	

The LTE transmitted power is controlled by setting the maximum transmitted power threshold. Affected by PDM and other factors, the test result may have an error of ±2 dB.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

The command and parameters of **AT^BODYSARLTE** depend on the product.

Figure 4-3 Adjusting the LTE transmitted power



4.5.2 Troubleshooting

None

4.6 Usage Description Of BodySAR Feature

4.6.1 Reference Description

After a module is powered on, the default BodySAR function status is disabled, and the default power control function in the system is used.

The maximum transmitting power parameters take effect in real time only when the following requirements are met:

- The **AT^BODYSARWCDMA**, **AT^BODYSARGSM** and **AT^BODYSARLTE** command are used to set the maximum transmitting power parameters successfully.
- The **AT^BODYSARON=1** command is used to enable the BodySAR function.

When the maximum transmitting power parameters are not set or the BodySAR function is disabled, the default power control function in the system is used.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

After the maximum transmitting power parameters are set, the **AT^BODYSARON=0** command can be used to disable the BodySAR function. Then the default maximum transmitting power is resumed. If the **AT^BODYSARON=1** command is used to enable the BodySAR function again, the maximum transmitting power parameters that have been set take effect in real time.

The maximum transmitting power parameters are saved in flash. As a contrast, the current BodySAR function status is not saved. That means if the module restarts, the values of the maximum transmitting power parameters are the same with which before restarting, but the BodySAR function status is disabled.

4.6.2 Troubleshooting

None

4.7 Setting the BodySAR Type

4.7.1 Reference Process

Command	Description
AT^BODYSARCFG=0	Sets to OFF state. Indicates the BodySAR function is disabled.
OK	
AT^BODYSARCFG=1	Sets to ON state. Indicates the bodySAR function is enabled. (default value)
OK	
AT^BODYSARCFG=2	AUTO state. If the PLMN number of inserted SIM card is in the BodySAR PLMN list configured in the module, the BodySAR function is enabled. Otherwise, the BodySAR function is disabled.
OK	

NOTE
Only when the BodySAR function is enabled, **AT^BODYSARON** command can be used.

4.7.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

5 Network Searching and Registration Application Scenarios

5.1 Searching and Registering Network

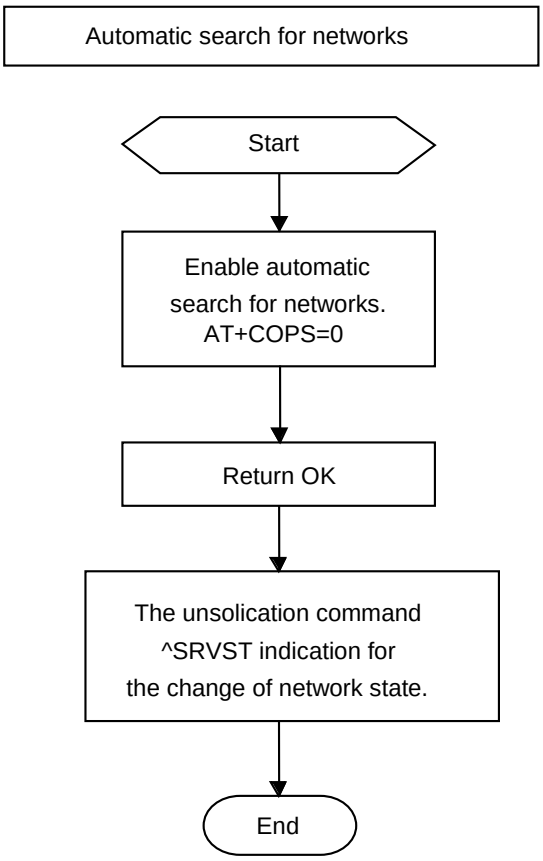
5.1.1 Reference Process

Command	Description
AT+COPS=0	Enables automatic search for networks.
OK	
AT+COPS=1,2,"46000"	Manual search for the appointed network.
OK	
AT+COPS=?	Searches for all networks, and returns the networks.
OK	
AT+CREG=2	Enables the unsolicited indication when network registration state changes.
OK	
AT^SYSCFGEX="00",3FFFFFFF,1,2,7FFFFFFFFFFFFFFF,,	Sets the system mode, network access order, frequency band, roaming support, domain, and other features.
OK	
AT^SYSINFOEX	Queries the system service state, domain, roaming status, and system mode.
^SYSINFOEX: 2,3,0,1,,1,"GSM",3,"EDGE" **OK**	
AT^HCSQ?	Queries the signal quality.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

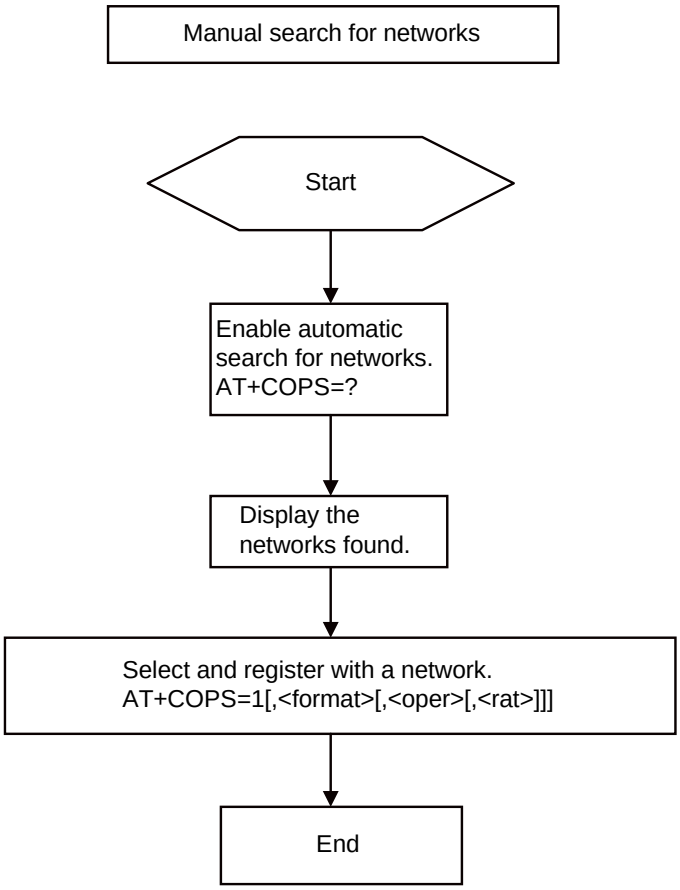
Command	Description
^HCSQ:"GSM",73 **OK**	

Figure 5-1 Automatic search for networks



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 5-2 Manual search for networks



NOTE

The application scenario is applicable for 3GPP (GSM/WCDMA/LTE), and UE is not in data service state.

5.1.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+COPS?	+CME ERROR: SIM failure	No SIM card is detected. Insert a SIM card.
AT+CREG?	+CME ERROR: SIM failure	No SIM card is detected. Insert a SIM card.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

6 SMS Application Scenarios

6.1 Overview

Short Message Service (SMS) is a text messaging service using a service center (SC) to transfer short text messages between GSM MEs and Short Message Entities (SMEs). ME936 only supports protocol data unit (PDU) mode message.

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 6-1 shows an example of data encoded in PDU format of submitted type.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 6-1 Example of data encoded in PDU format of submitted type

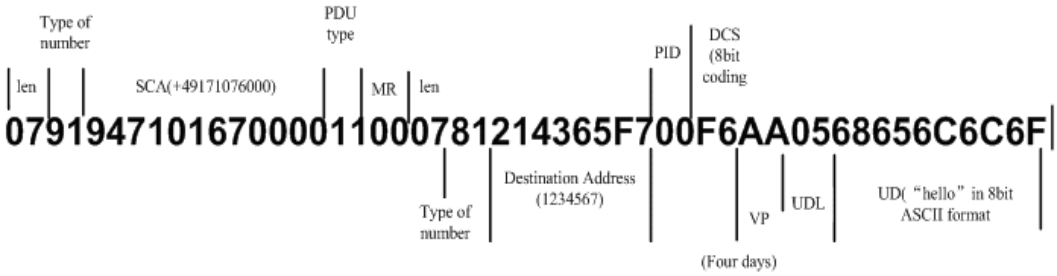
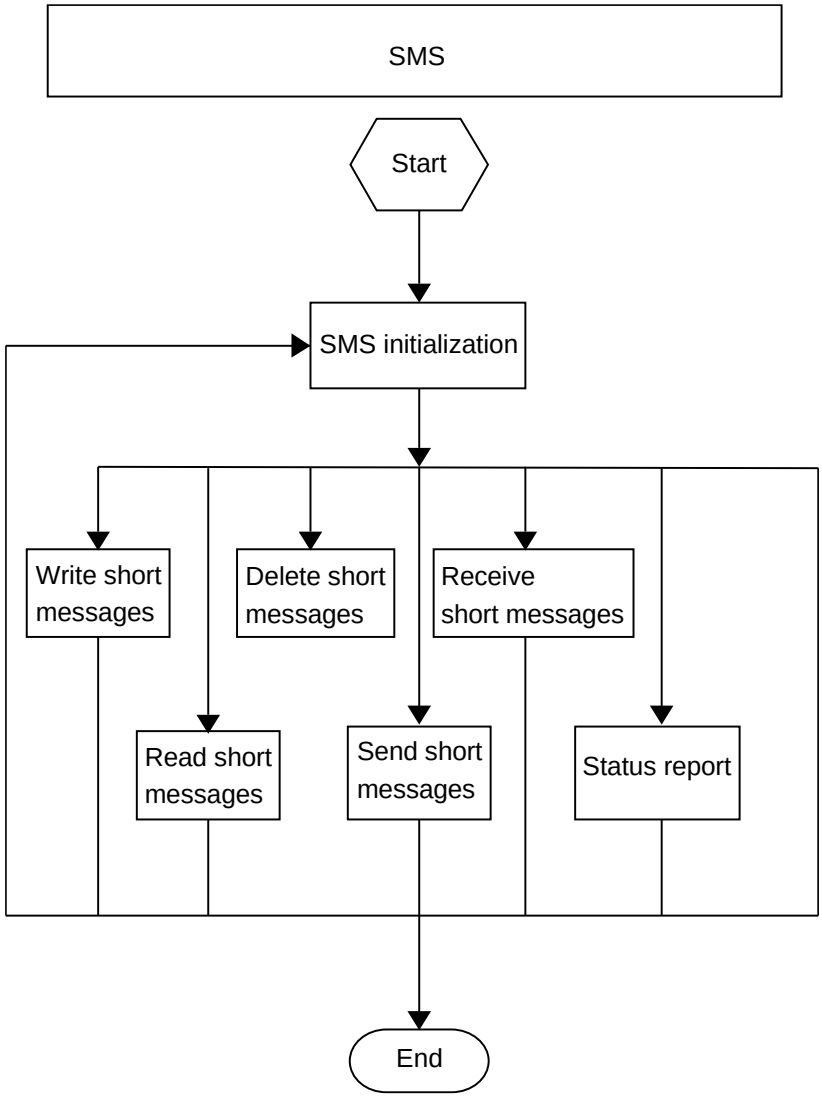


Figure 6-2 shows the general SMS process.

Figure 6-2 General SMS process



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

6.2 Initializing SMS

6.2.1 Reference Process

Command	Description
AT+CSCA?	Queries the SMSC address.
+CSCA: "13800688509",129 **OK**	
AT+CSCA="+8613800755500"	Sets the SMSC address to the SMSC number of China Mobile's Shenzhen Branch.
OK	
AT+CSMS?	Queries the short message service type.
+CSMS: 0,1,1,1 **OK**	
AT+CNMI?	Queries the configuration of the new message indications to TE.
+CNMI: 0,0,0,0,0 **OK**	
AT+CNMI=2,1,2,2,0	Configures the new message indications to TE.
OK	
AT+CPMS?	Queries the preferred short message storage.
+CPMS: "SM",12,20,"SM",12,20,"SM",12,20 **OK**	
AT+CPMS="SM"	Sets SM as short message storage medium.
OK	
AT+CGSMS?	Queries the MO SMS bearer domain.
+CGSMS: 1 **OK**	
AT+CMGF?	Queries the short message format.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
+CMGF: 0 **OK**	
AT+CMGF=0	Sets 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.

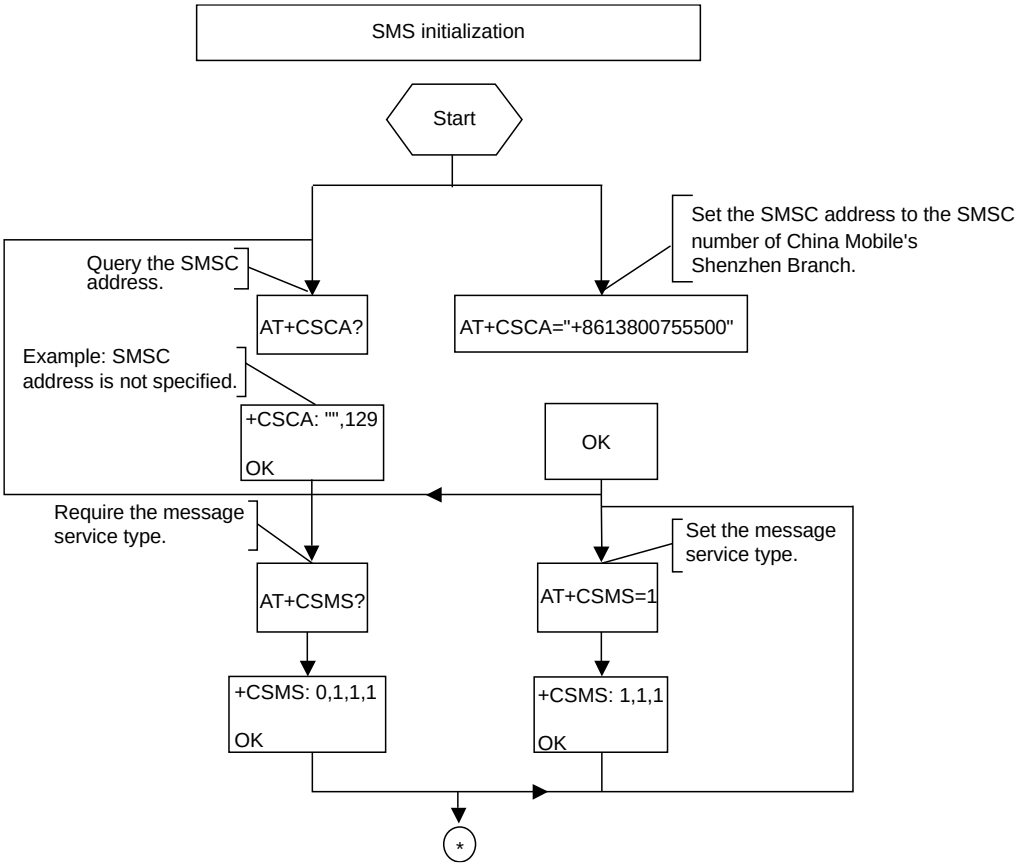
Use the **AT+CNMI** command to set the unsolicited indications.

Use the **AT+CPMS** command to select the preferred short message storage (SIM or ME). The ME936 supports only the SM (SIM card) storage.

Use the **AT+CGSMS** command to select the MO SMS bearer domain (PS or CS domain). For ME936, the CS domain is the preferred MO bearer domain.

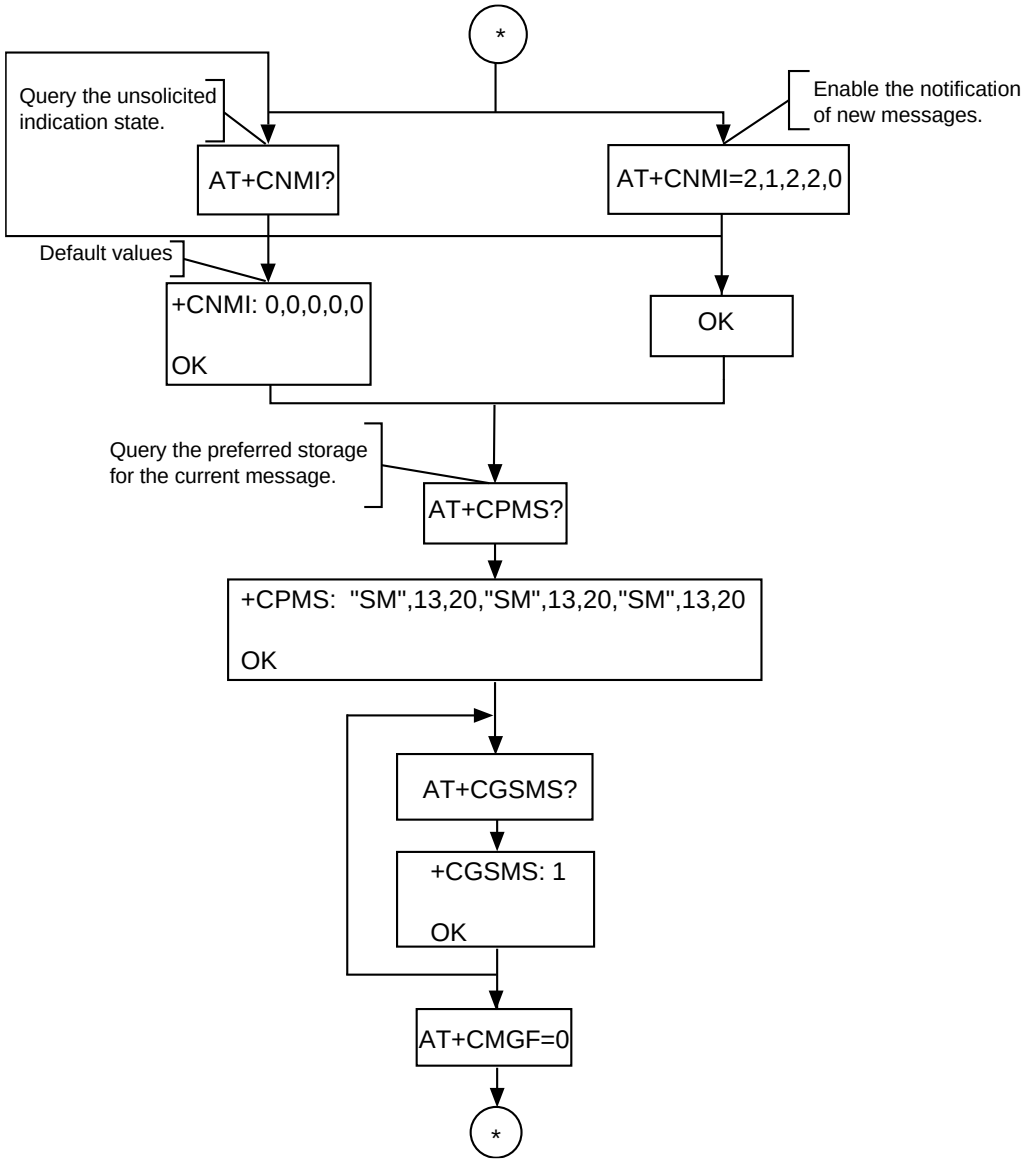
Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 6-3 SMS initialization process – part 1



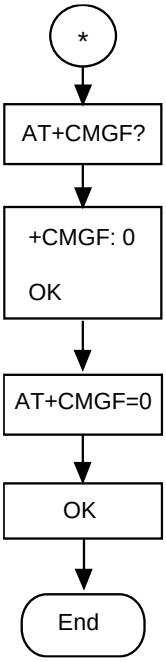
Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 6-4 SMS initialization process – part 2



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 6-5 SMS initialization process – part 3



6.2.2 Troubleshooting

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

6.3 Sending Short Messages

6.3.1 Reference Process

Command	Description
AT+CMGF=0	Sets the short message format to PDU.
OK	
AT+CSCA?	Queries the SMSC address.
+CSCA: "13800688509",129 **OK**	

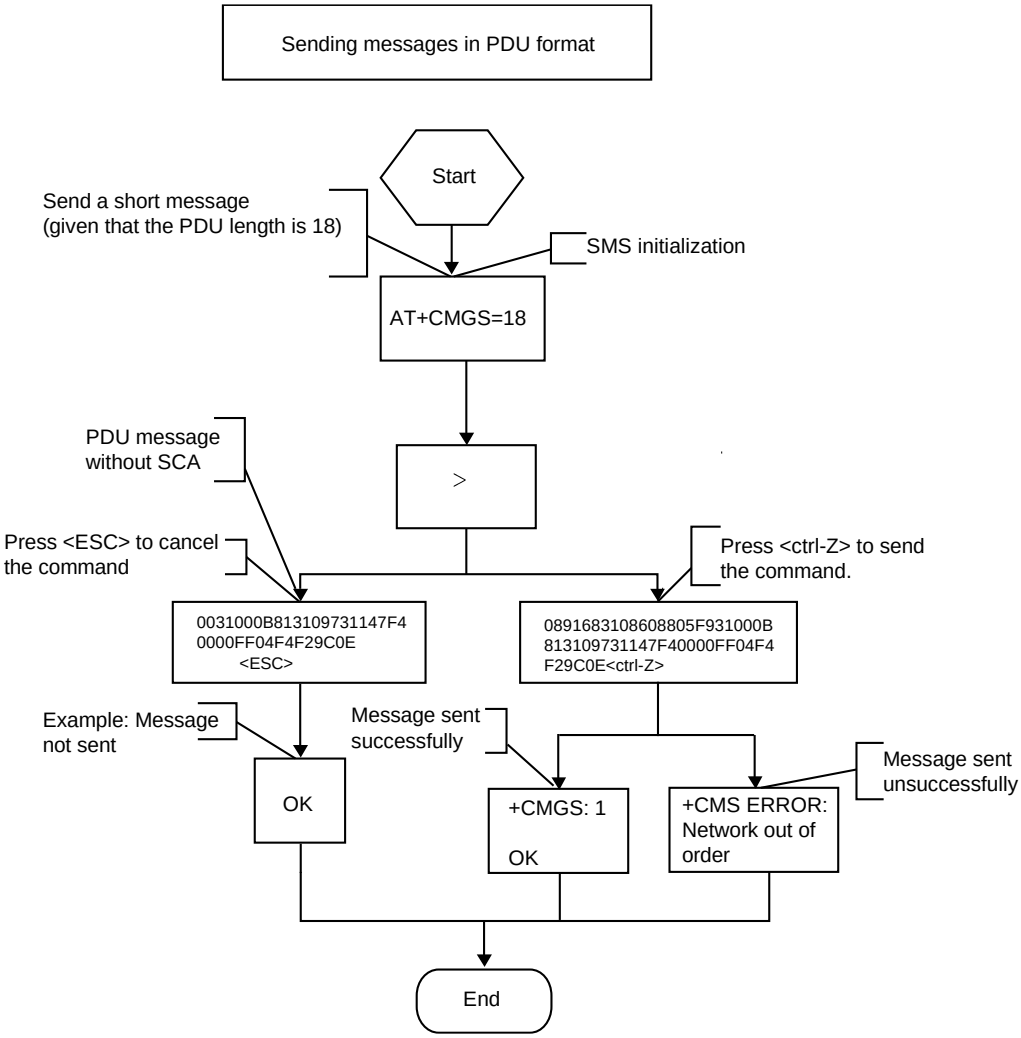
Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
AT+CMGS=18 **>0031000B813109731147F40000FF04F4F29C0E\x0A**	Sends a PDU message without the service center address. The value of SMSC address is the setting of AT+CSCA command.
+CMGS: 168 **OK**	The message is successfully sent.
AT+CMGS=18 **>0891683108608805F931000B813109731147F40000FF04F4F29C0E\x1A**	Sends a PDU message with the correct service center address.
+CMGS: 169 **OK**	The message is successfully sent.
AT+CMGS=18 **>0891683108608805F031000B813109731147F40011FF04F4F29C0E\x1A**	Sends a PDU message with the wrong service center address.
+CMS ERROR: Network out of order	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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 6-6 Sending short messages in PDU format



6.3.2 Troubleshooting

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

6.4 Reading Short Messages

6.4.1 Reference Process

Command	Description
AT+CMGL=0	Lists all received unread messages.
+CMGL: 2,0,,48 **0891683108608805F9040D916831 09732097F200000143261900100 1F506215744FD3D1A0E930C8429 6D9EC370BFDE86C2F23228FFA EFF00** **+CMGL: 4,0,,64** **0891683108608805F9040D916831 09732097F200000140326131050 0 32506215744FD3D1A0E930C8429 6D9EC370BFDBE83C2B0380F6A 97416FF7B80C6AVFE5E510** **OK**	The format of short messages can refer to the AT+CMGL command.
AT+CMGR=4	Reads the message stored in the message storage location 4.
+CMGR: 1,,64 **0891683108608805F9040D916831 09732097F200000140326131050 0 32506215744FD3D1A0E930C8429 6D9EC370BFDBE83C2B0380F6A 97416FF7B80C6AVFE5E510** **OK**	The format of short messages can refer to the AT+CMGR command.

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 sate 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

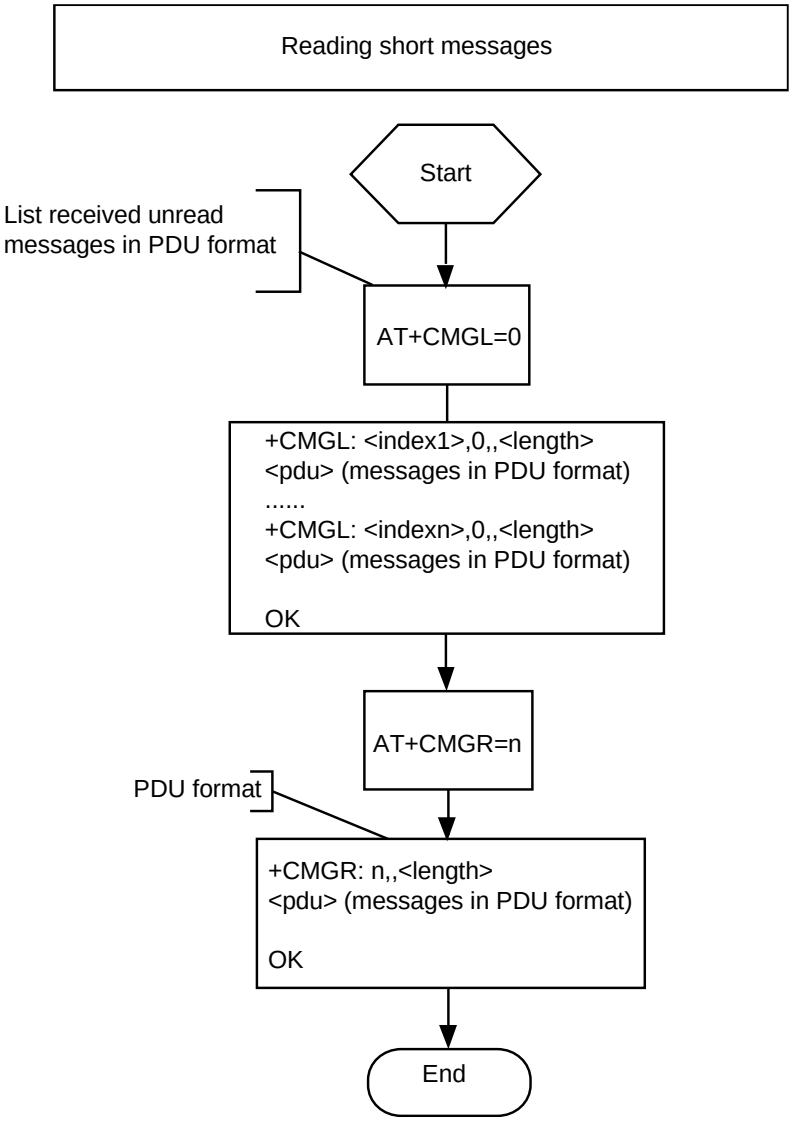
Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Message State	PDU Mode
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 6-7 Reading short messages



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

6.4.2 Troubleshooting

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

6.5 Deleting Short Messages

6.5.1 Reference Process

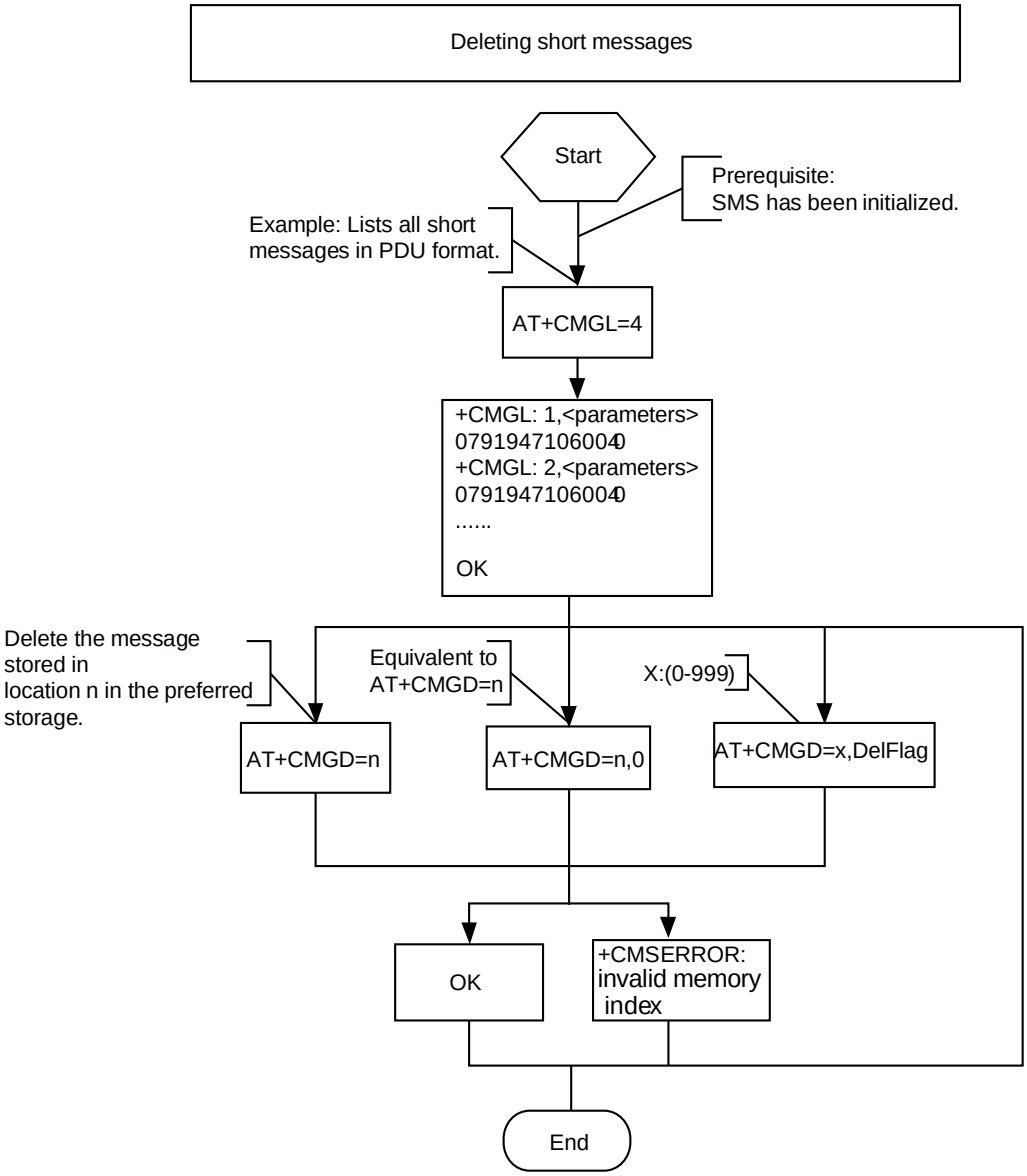
Command	Description
AT+CMGF=0	Sets the message format to PDU mode.
OK	
AT+CMGL=4	Lists all short messages (PDU mode).
+CMGL: 6,2,,30 **0011000A917179876213000 0A713C8329BFD6681D0EF 3B282C2F83F2EFFA0F** **+CMGL: 11,1,,36** **0791947106004013240C919 4715982699000003080413115748013C8329BFD6681D0 EF3B282C2F83F2EFFA0F**	
OK	
AT+CMGD=1	Deletes the message stored in storage location 1.
OK	

- 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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

- 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 6-8 Deleting short message



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

6.5.2 Troubleshooting

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

7 Phonebook Application Scenarios

7.1 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.

7.2 Initializing the Phonebook

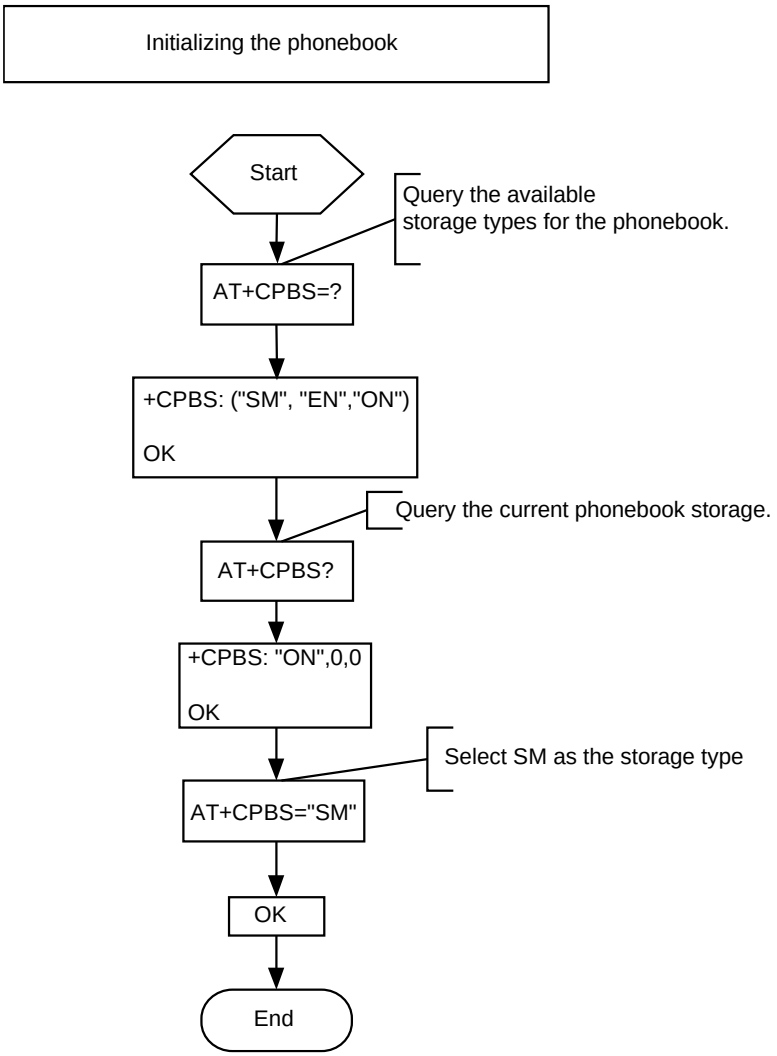
7.2.1 Reference Process

Command	Description
AT+CPBS?	Queries the current phonebook storage.
+CPBS: "SM",0,250 **OK**	
AT+CPBS="SM"	Selects SM as the storage type.
OK	

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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 7-1 Initializing the phonebook



7.2.2 Troubleshooting

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

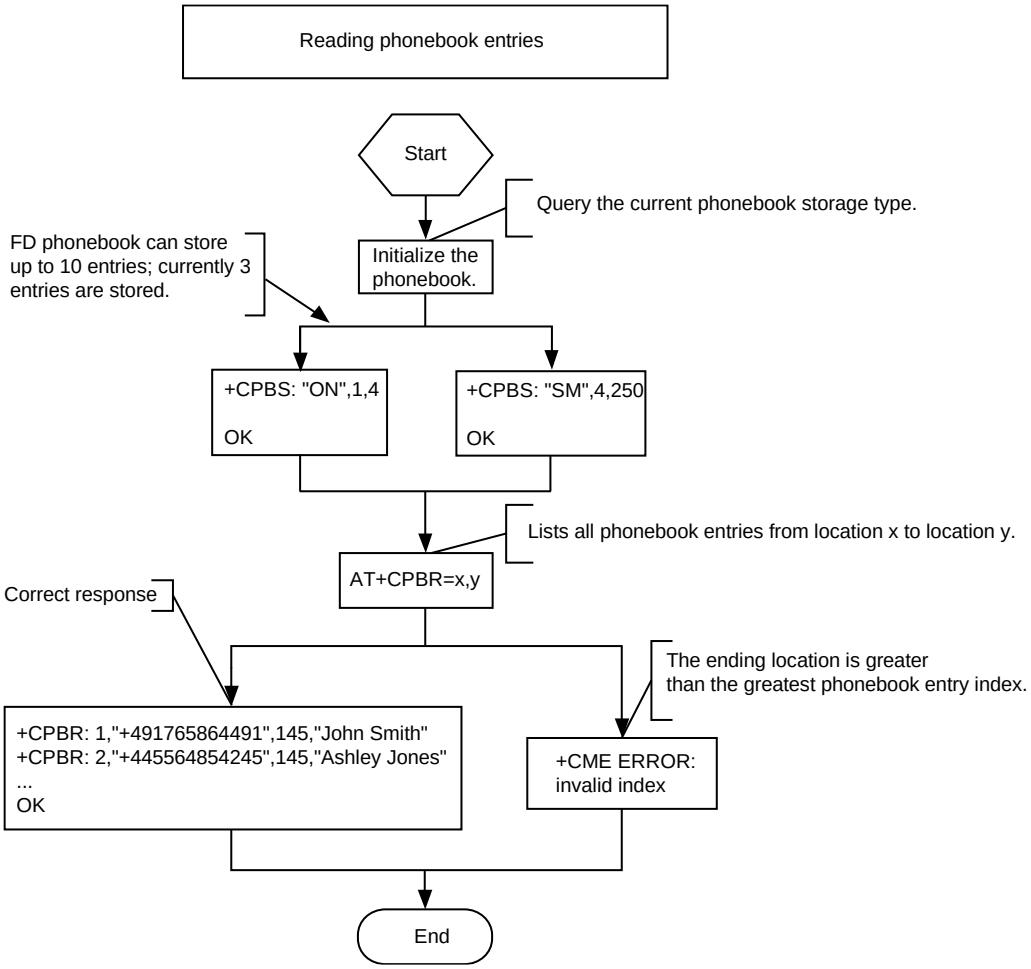
7.3 Reading Phonebook Entries

7.3.1 Reference Process

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 7-2 Reading phonebook entries



7.3.2 Troubleshooting

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Scenario	Possible Error Information	Solution
AT+CPBR=<index1>,<index2>	+CME ERROR: invalid index	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.
AT+CPBR=<index1>	+CME ERROR: not found	No entries are found in the storage locations in index 1. Check that there have been entries successfully written into these locations.
AT+CPBR=<index1>,<index2>	+CME ERROR: not found	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.

7.4 Writing Phonebook Entries

7.4.1 Reference Process

Command	Description
AT+CPBR=?	Queries the ranges of parameters related to the phonebook entries.
+CPBR: (1-250),80,14 **OK**	
AT+CPBW="5","13903702805",,"test"	Writes a phonebook record.
OK	
AT+CPBW=1	Deletes the entry in index 1 in the phonebook.
OK	

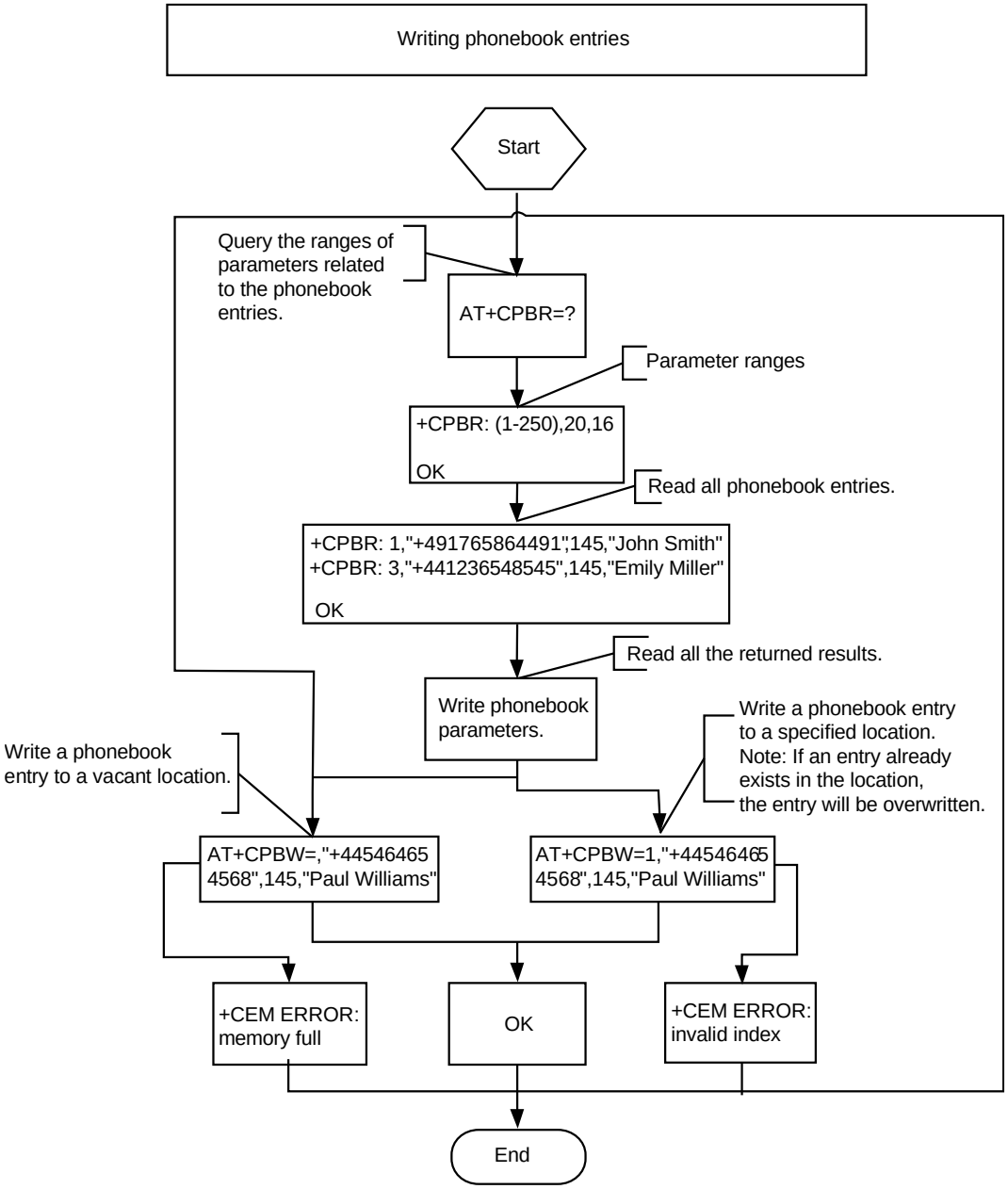
There are two methods to edit phonebook entries using the **AT+CPBW** command:

- 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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

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

Figure 7-3 Writing phonebook entries



7.4.2 Troubleshooting

Scenario	Possible Error Information	Solution
Error information is returned in response to one of the previous	+CME ERROR: SIM busy	Phonebook initialization has not completed. Try again later.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

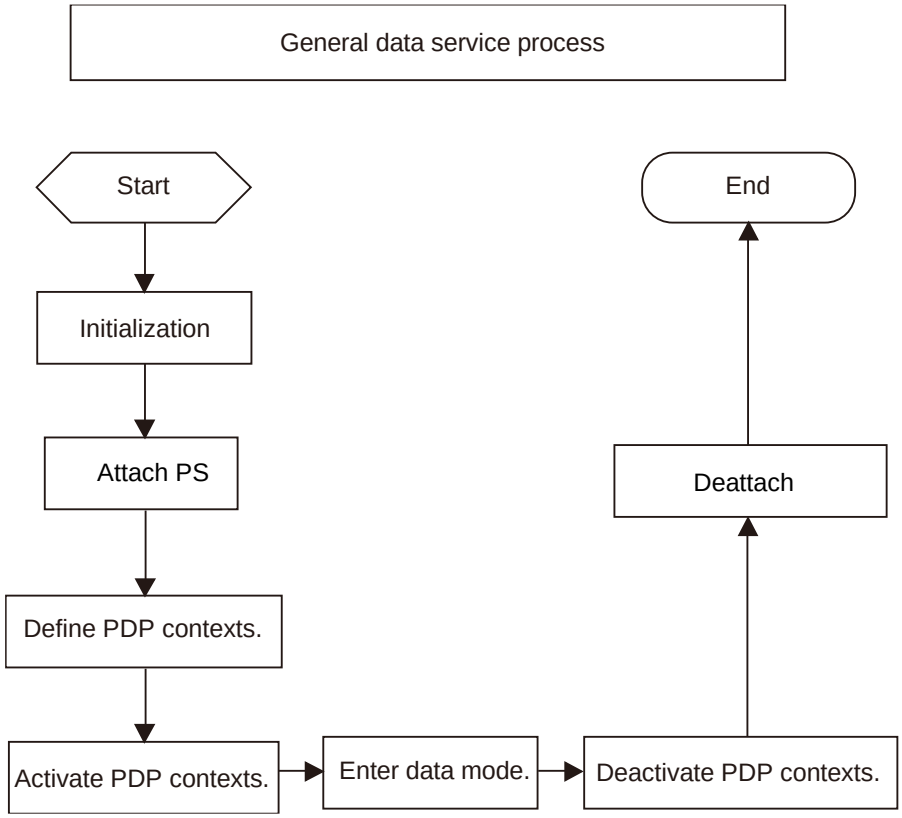
Scenario	Possible Error Information	Solution
commands.	+CME ERROR: SIM PIN required	Enter the correct PIN.
	+CME ERROR: SIM PUK required	Enter the correct PUK.
Error information is returned when writing an entry into the phonebook.	+CME ERROR: dial string too long	Check that the phone number is not too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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

8 Data Service Application Scenarios

8.1 Overview

Figure 8-1 General data service process



The procedure for starting data service is as follows:

1. Initialize data service settings.
2. Attach PS.
3. Define packet data protocol (PDP) contexts.
4. Activate PDP contexts and enter data mode.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

General data service process is shown as Figure 8-1 . To quit data mode, deactivate PDP contexts, and then detach. For details about the processes of the steps in the previous procedure, see the following sections.

8.2 Initializing Data Service Settings

8.2.1 Reference Process

Command	Description
AT+CGREG?	Queries the network registration state.
+CGREG: 0,0 **OK**	
AT+CGREG=1	Enables the network registration state URC.
OK	

8.2.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+CGREG?	+CGREG: 0,0 OK The PS domain has not attached.	Run **AT+CGATT=1** to manually attach to the PS domain.

8.3 Attaching/Detaching PS

8.3.1 Reference Process

Command	Description
AT+CGATT=1	Attaches PS.
OK	
AT+CGATT?	Queries the attach state.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
+CGATT: 1 **OK**	
AT+CGATT=0	Detaches PS.
OK	

If PS has been attached or detached, the attached or detached command will be ignored, and "OK" will be returned.

If the ME detaches PS, all activated PDP contexts will be automatically deactivated.

8.3.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+CGATT?	+CGATT: 0 OK The PS domain has not attached.	Run **AT+CGATT=1** to manually attach to the PS domain.

8.4 Defining PDP Contexts

8.4.1 Reference Process

Command	Description
AT+CGDCONT?	Queries the defined PDP contexts.
+CGDCONT: 20,"IPV4V6","","0.0.0.0",0,0 **OK**	
AT+CGDCONT=1,"IP","1234"	Defines a new PDP context.
OK	
AT+CGDCONT?	Queries the defined PDP context.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
+CGDCONT: 1,"IP","1234","",0,0 **OK**	
AT+CGDCONT=1	Deletes the PDP context with <cid>=1.
OK	
AT+CGDCONT?	Queries the defined PDP contexts.
OK	

The **AT+CGDCONT** command is used to define the context ID and specify the PDP type and access point name (APN). Each PDP context has a context ID (specified by the <cid> parameter of the **AT+CGDCONT** command), which is a sequence number starting from 1.

The PDP type describes the protocol between the ME and the network, and the APN specifies the gateway between the mobile network and the Internet.

The range of <cid> supported by ME936 module is the integer from 1 to 20.

Send **AT+CGDCONT=<cid>**, PDP context returns not defined status.

8.4.2 Troubleshooting

None

8.5 Activate PDP Contexts and Enter Data Mode

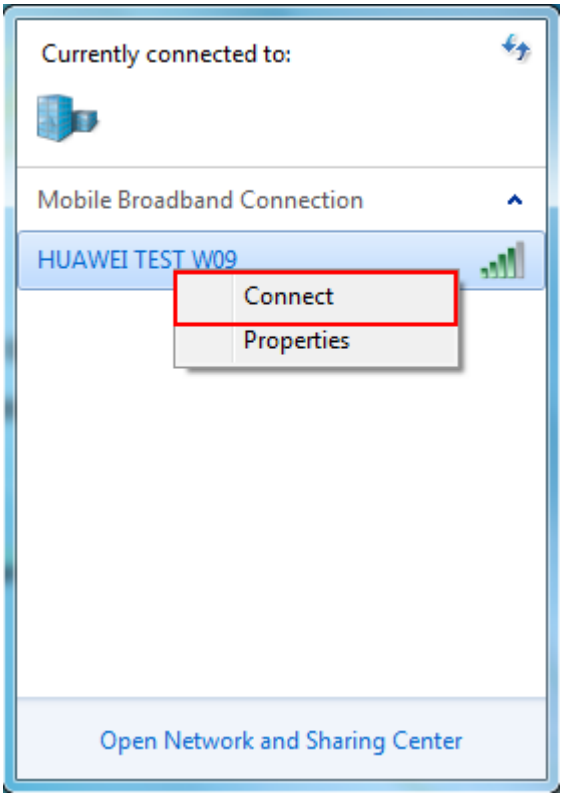
8.5.1 Reference Process

Please refer to WWAN UI of related operating system.

For example, on Windows 7 operating system, users can click **Connect** in WWAN UI to enter data mode.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 8-2 WWAN UI



8.5.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

9 Security Settings Application Scenarios

9.1 Changing the SIM PIN

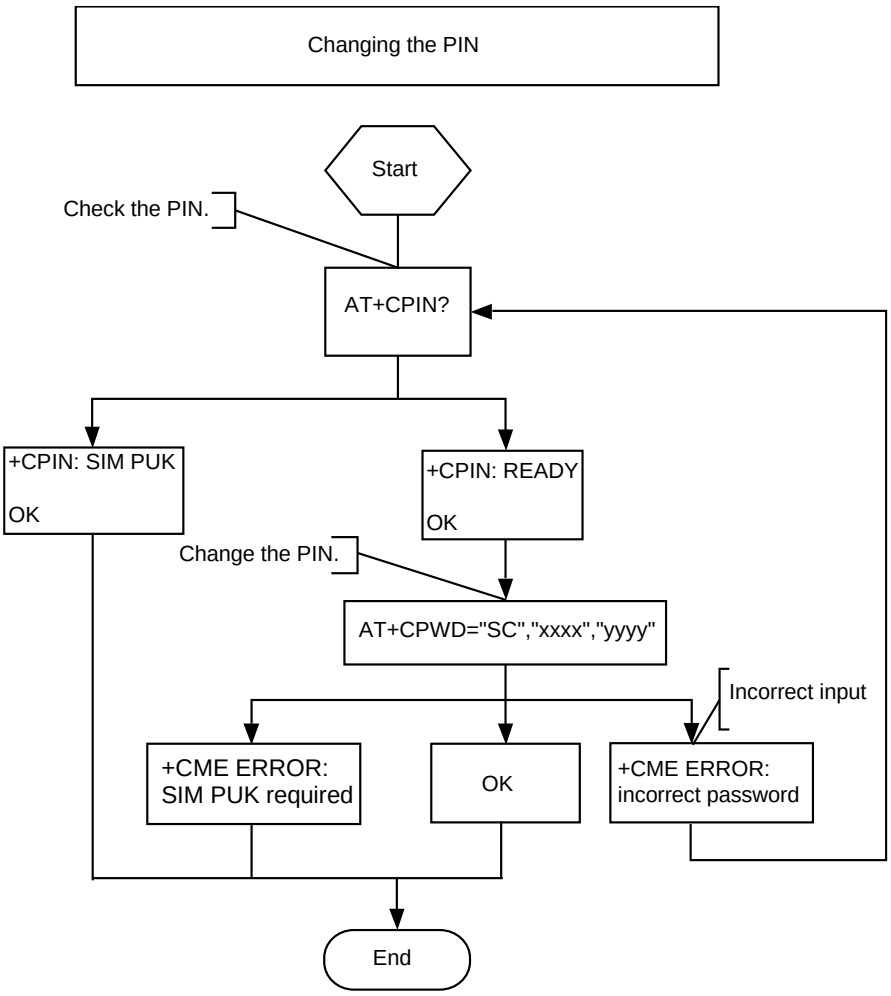
9.1.1 Reference Process

Command	Description
AT+CPWD="SC","9999","1234"	Changes the PIN. Current PIN=9999; new PIN=1234.
OK	
AT+CPWD="SC","1113","1233"	Enters an incorrect PIN (first attempt).
+CME ERROR: incorrect password	
AT+CPWD="SC","3333","1255"	Enters an incorrect PIN (second attempt).
+CME ERROR: incorrect password	
AT+CPWD="SC","4711","1331"	Enters an incorrect PIN (third attempt).
+CME ERROR: SIM PUK required	
AT+CPIN?	Checks whether the password is requested.
+CPIN: SIM PUK **OK**	
AT+CPIN="12345678","0000"	Enters the SIM PUK and specify the new SIM PIN (activate new "SC" lock).
OK	

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

The **AT+CPWD** command can be used to change a SIM card's PIN. When the SIM card is PIN protected, the correct PIN must be entered to unblock SIM card. If incorrect PINs are entered three consecutive times, the PUK is required to unblock the SIM.

Figure 9-1 Changing the PIN



9.1.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+CPWD="SC",<oldpwd>,<newpwd>	+CME ERROR: incorrect password	<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.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

9.2 Changing the SIM Card Configuration

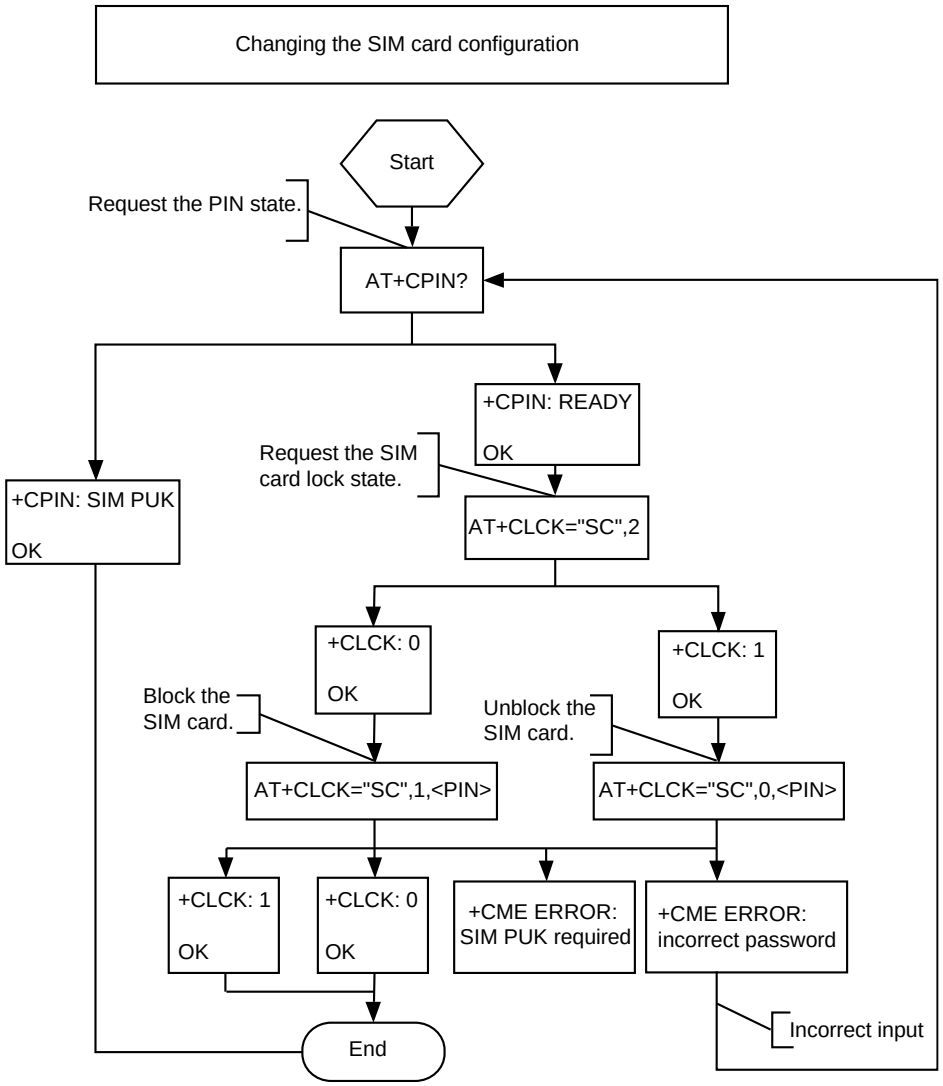
9.2.1 Reference Process

Command	Description
AT+CPIN?	Requests the PIN state.
+CPIN: READY **OK**	
AT+CLCK="SC",2	Requests the SIM card state.
+CLCK: 0 **OK**	"+CLCK: 0" means that the SIM card is not blocked.
AT+CLCK="SC",1,"5555"	Uses an incorrect PIN to change the SIM card lock.
+CME ERROR: incorrect password	
AT+CLCK="SC",1,"0000"	Enables the SIM card lock.
OK	
AT+CLCK="SC",2	Requests the SIM card state.
+CLCK: 1 **OK**	"+CLCK: 1" means that the SIM card is blocked.
AT+CLCK="SC",0,"0000"	Disables the SIM card lock.
OK	
AT+CLCK="SC",2	Requests the SIM card state.
+CLCK: 0 **OK**	"+CLCK: 0" means that the SIM card is not blocked.
AT+CLCK="SC",1,"0000"	Enables the SIM card lock.
OK	

If the SIM card is blocked, the PIN code (that is, the PIN) is requested when the module is started. To enable the SIM card lock, the PIN is requested. A maximum of three attempts to enter the PIN is allowed. The **AT+CLCK="SC",<mode>,<PIN>** command can be used to block or unblock the SIM card. When <mode>=1, the SIM card will be blocked. When <mode>=0, the SIM card will be unblocked. Before enabling the SIM card lock, it is recommended that the **AT+CPIN?** command be used to check the current state of the SIM card lock. If "+CPIN: SIM PUK" is returned, the correct PUK must be entered to change the SIM card settings.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 9-2 Changing the SIM card configuration



9.2.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+CLCK="SC",1,<pwd>	+CME ERROR: operation not allowed	If PIN authentication has been enabled, it cannot be enabled again. Check whether PIN authentication has been enabled.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

10 SIM Card Application Scenarios

10.1 SIM Card Access

10.1.1 Reference Process

Command	Description
AT+CRSM=192,28483	Obtains response from the EF.
+CRSM: 144,0,000000026F43040011F05501020000 **OK**	
AT+CRSM=176,12258,0,0,10	Reads binary data from the EF.
+CRSM: 144,0,980000000000000000F3 **OK**	
AT+CRSM=178,28484,1,4,255	Reads records from the EF (incorrect input).
+CRSM: 103,28 **OK**	The first parameter <sw1>='103'. '103' is a decimal number corresponding to hexadecimal number '67', which indicates "illegal parameter <P3>". The second parameter <sw2>='xx', which indicates the correct length (28 in the example) or indicates that no information is provided.
AT+CRSM=178,28484,1,4,28	Reads the record of the last dialed number from the EF.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
+CRSM: 144,0,FFFFFFFFFFFF FFFFFFFFFFFFFFFF05814200 10F6FFFFFFFFFFFFFFFF **OK**	

The operations to access the SIM card depend on the value of <command>, a s described in Table 10-1 .

Table 10-1 Values of <command>

Value	Read Binary Command	Function
176	READ BINARY	Read binary strings from the current data domain.
178	READ RECORD	Read complete linear fixed or cyclic data domain consisting of CURRENT, ABSOLUTE, NEXT, and PREVIOUS.
192	GET RESPONSE	Return the basic information about the current data domain, including the file type and size.
214	UPDATE BINARY	Update the current data domain.
220	UPDATE RECORD	Update all the records in the linear fixed or cyclic data domain. There are four update modes: CURRENT, ABSOLUTE, NEXT, and PREVIOUS, of which only the PREVIOUS mode can be used for cyclic files.
242	STATUS	Return the status information about the current data domain.

The following table describes the components of the data returned in response to the READ RECORD command.

Byte	Description	Length
1 to X	Alpha identifier	X byte(s)
X+1	BCD code length; number/SSC content	1 byte
X+2	TON and NPI	1 byte
X+3 to X+12	Dialed number/SSC string	10 bytes
X+13	Capacity/configuration identifier	1 byte

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Byte	Description	Length
X+14	Extension1 record identifier	1 byte

Figure 10-1 Reading record response values

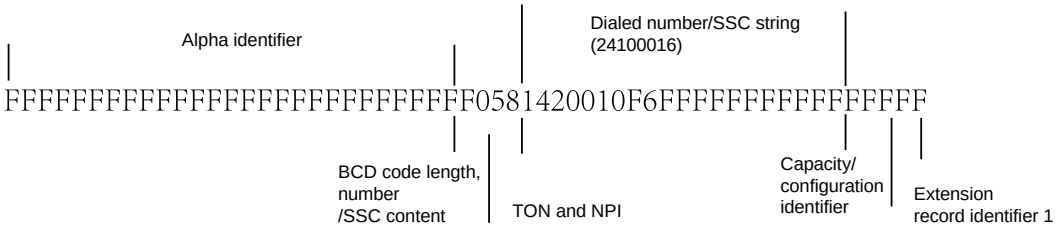
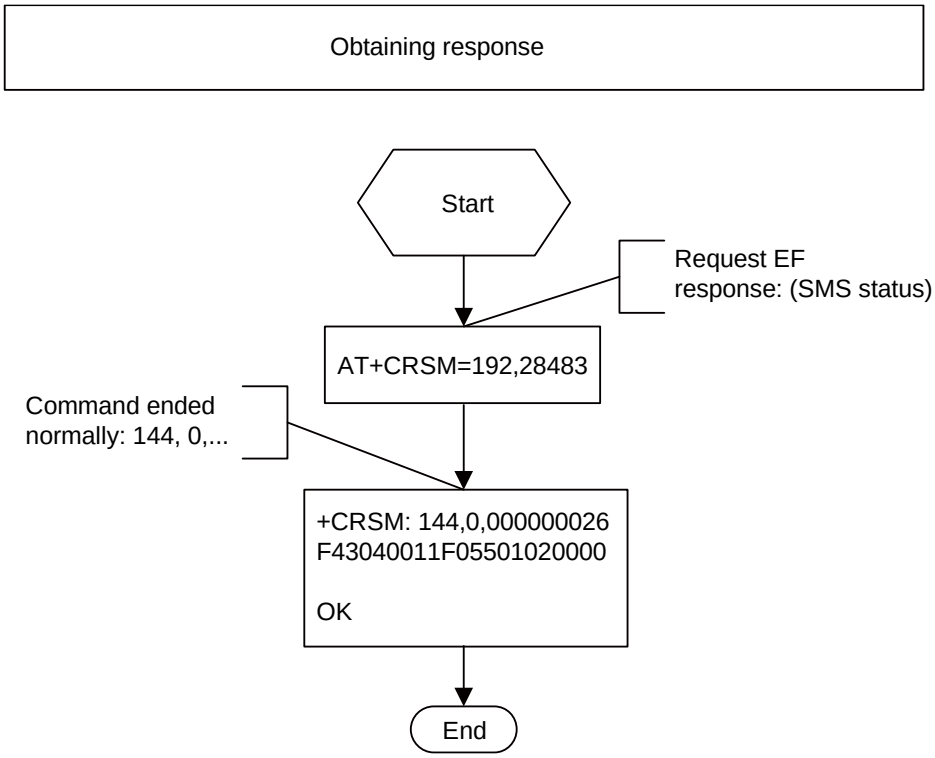
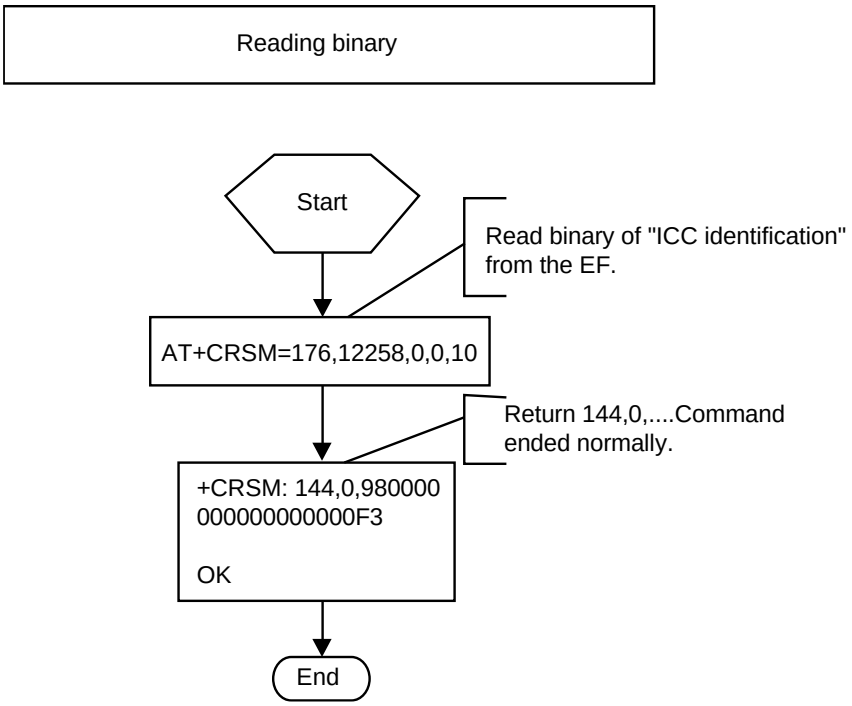


Figure 10-2 Obtaining response



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Figure 10-3 Reading binary



10.1.2 Troubleshooting

Scenario	Possible Error Information	Solution
Error information is returned in response to one of the previous commands.	+CME ERROR: SIM not inserted or +CME ERROR: memory failure	Insert a SIM card.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

11 Module Powering Off and Resetting Application Scenarios

11.1 Restarting the ME

11.1.1 Reference Process

Command	Description
AT+CFUN=1,1	Restarts the module.
OK	

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.

11.1.2 Troubleshooting

None

11.2 Powering Off the ME

11.2.1 Reference Process

Command	Description
AT^MSO	Powers off the module.
OK	

After the command is received, the module will only do the preparative work of power-off such as deregister. The host should cut off the power in order to finish the power-off operation.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

11.2.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

12 DPTF Application Scenarios

12.1 Setting Thermal Sensor with the Threshold

12.1.1 Reference Process

Command	Description
AT+XTSM=0,1,80000,3000,1000	Sets thermal sensor with the threshold. Indicates that set the RF sensor 0 (only support 0) Alarm ID 1,threshold is 80000-20000=60000 MilliDegC, Hysteresis is 3000 MilliDegC, and the Sampling Period is 1000 ms.
OK	

The DPTF feature is used for host to monitor module temperature environment by Thermal Sensor. Host can set several groups threshold to module, and module will unsolicited response to host when module temperature exceed the threshold that host configures.

12.1.2 Troubleshooting

None

12.2 Querying the Current Temperature of a Thermal Sensor

12.2.1 Reference Process

Command	Description
AT+XTAMR=0	Queries the temperature of thermal sensor.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
+XTAMR: 0,40000	Indicates that the current temperature of RF sensor is 40°C.
OK	

12.2.2 Troubleshooting

None

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

13 ACT Application Scenarios

13.1 Overview

The ACT (Adaptive Clocking Tuning) feature indicates that the host tunes the clock frequency of components (such as display) which may interfere the WWAN (Wireless Wide Area Network) radio of the module, according to the current frequency information of the module. It can reduce the impact on the WWAN, and improve the performance of OTA (Over The Air).

13.2 Adaptive Clocking

13.2.1 Reference Process

Command	Description
AT+XADPCLKFREQINFO=1	Enables ACT feature.
OK	
AT+XADPCLKFREQINFO?	Queries the status of enabling/disabling the ACT feature.
+XADPCLKFREQINFO: 1 **OK**	
AT+XADPCLKFREQINFO=?	Queries Frequency information.
+XADPCLKFREQINFO: 2147600000,5000000,0 **OK**	

The ACT feature is disabled when powered on. It can be enabled by using **AT+XADPCLKFREQINFO=1**.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

After enabling the ACT feature, the AT command **AT+XADPCLKFREQINFO=?** can be used to query the frequency information. If the ACT feature is not enabled, this command will return ERROR.

When the frequency information has been changed, the unsolicited command **+XADPCLKFREQINFO** will unsolicited present the frequency information.

13.2.2 Troubleshooting

Scenario	Possible Error Information	Solution
AT+XADPCLKFREQINFO=?	ERROR Query current frequency information returns error.	Run **AT+XADPCLKFREQINFO=1** to enable ACT feature.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

14 GPS Application Scenarios

14.1 Introduction to GPS

14.1.1 GPS Positioning Methods

Table 14-1 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.	• Significantly reduces the TTFF after cold start and increases the rate of successful positioning. • Enables positioning in environments with very poor satellite signals.	Requires the assistant data from the network, incurring network traffic.

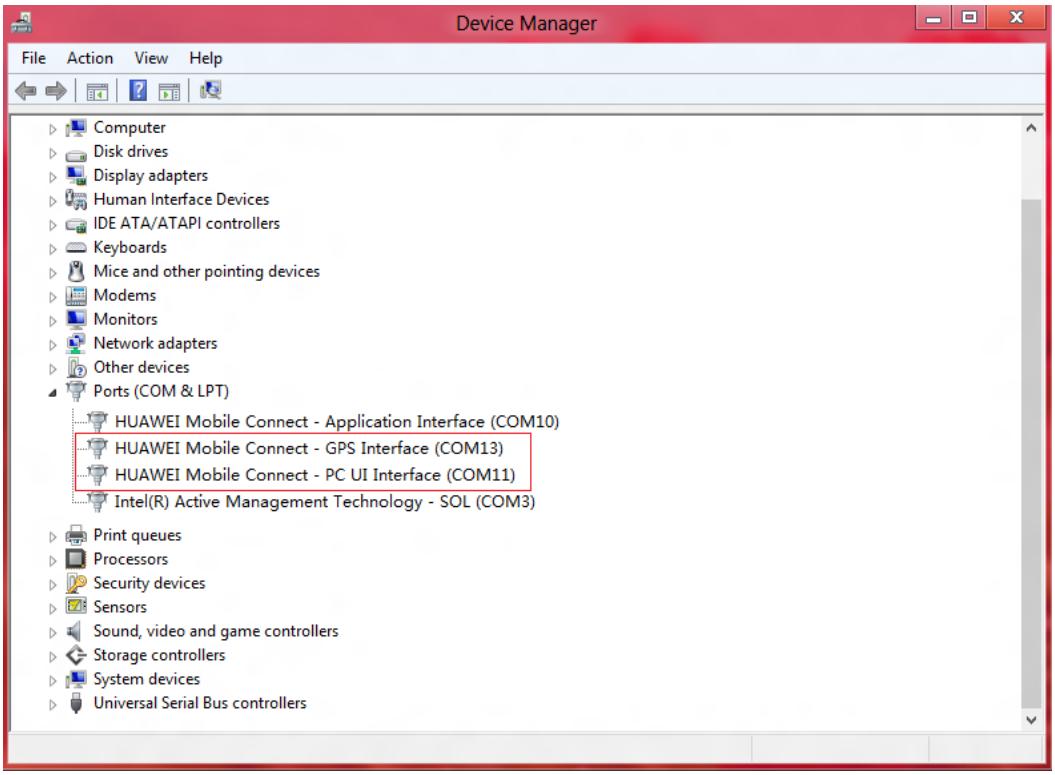
Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Positioning methods	Description	Benefits	Drawbacks
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.	• Reduces the TTFF after cold start and increases the rate of successful positioning. • Hands most workload to the network, reducing the module's workload. • Enables positioning in environments with poor satellite signals (network dependent).	Requires complex interaction with the network, incurring network traffic.
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.	

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

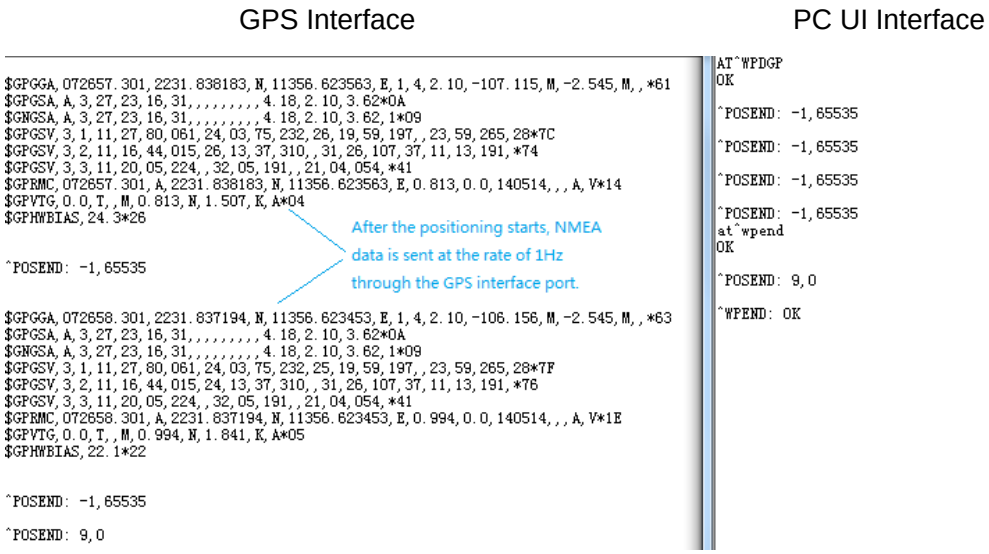
14.1.2 GPS Ports

Figure 14-1 PC UI Interface and GPS Interface detected after the module is connected to a computer



The PC UI Interface port could be used to send GPS-related AT commands, and the GPS Interface port could be used to send unsolicited indications for NMEA positioning data.

Figure 14-2 Data sent through the PC UI interface and GPS interface ports



Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

NOTE

Open GPS Interface, then the positioning starts. So if you want to start the positioning by AT command in PC UI Interface, you need execute **AT^WPDGP** command in PC UI Interface before opening GPS Interface.

14.2 Standalone Positioning

Command	Description
AT^WPDOM=0	Sets the positioning method to Standalone.
OK	
AT^WPDST=0	Sets the session type to single positioning.
OK	
AT^WPDST=1	Sets the session type to tracking positioning.
OK	
AT^WPDFR=0,1	Sets unlimited 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	
AT^WPDFR=10,2	Sets 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	
AT^WPQOS=255,50	Sets the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold. This command is just valid for single positioning.
OK	
AT^WPDGP	Starts positioning.
OK	

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
^POSEND: -1,9	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.
- If the current positioning session is started by executing **AT^WPDGP**, execute **AT^WPEND** command in the same interface can terminate it.
- If the current positioning session is started by opening GPS interface, close GPS interface can terminate it.

14.3 MSB Positioning Using the User Plane Protocol

Command	Description
AT^WPDOM=5	Sets the positioning method to MSB.
OK	
AT^WPDST=1	Sets the session type to tracking and positioning.
OK	
AT^WPDFR=0,1	Sets unlimited positioning times and the interval between each positioning for the tracking and positioning.
OK	
AT^WPURL=SUPL.GOOGLE.COM:7276	Sets the A-GPS server address and port number. This address is just Google A-GPS server. Some of the A-GPS server requires certificate authentication.
OK	
AT^WPDGP	Starts positioning.
OK	
^POSEND: -1,65535	The first value indicates positioning end reason, and the second indicates the left positioning times.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

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.

14.4 MSA Positioning Using the User Plane Protocol

Command	Description
AT^WPDOM=1	Sets the positioning method to MSA
OK	
AT^WPQOS=255,50	Sets the positioning service quality. The first parameter indicates the response time, and the second indicates the horizontal accuracy threshold.
OK	
AT^WPURL=SUPL.GOOGLE.COM:7276	Sets the A-GPS server address and port number. This address is just Google A-GPS server. Some of the A-GPS server requires certificate authentication.
OK	
AT^WPDGP	Starts positioning.
OK	
^POSEND: -1,0	The first value indicates positioning end reason, and the second indicates the left positioning times.

NOTE

- The MSA method requires the module to register with a network, and will incur data traffic during positioning. When the MSA positioning fails, the module will automatically switch to the standalone positioning.
- For MSA, only the single positioning is supported.

14.5 GNSS Positioning

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

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Command	Description
AT^WPCAP=3	Sets GNSS as the positioning system to use both the GPS and GLONASS satellites for positioning. To switch the module to use GPS satellites only, run **AT^WPCAP=1**.
OK	
AT^WPDOM=*a value within the value range*	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.
OK	
AT^WPDST=1	Sets the session type to tracking and positioning.
OK	
AT^WPDFR=0,1	Sets unlimited positioning times and the interval between each positioning for the tracking and positioning.
OK	
AT^WPDGP	Starts positioning.
OK	
^POSEND: -1,65535	The first value indicates positioning end reason, and the second indicates the left positioning times.

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

15 Appendix

15.1 Relative Documents

1. HUAWEI ME936 LTE M.2 Module AT Command Interface Specification
2. 3GPP TS 22.004 General on supplementary services
3. 3GPP TS 23.040 Technical realization of the Short Message Service(SMS)
4. 3GPP TS 24.008 Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
5. 3GPP TS 27.005 Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
6. 3GPP TS 27.007 AT command set for User Equipment (UE)
7. 3GPP TS 29.002 Mobile Application Part (MAP) specification
8. 3GPP TS 31.102 Universal Subscriber Identity Module(USIM) application
9. ETSI TS 102.221 Smart Cards; UICC-Terminal interface; Physical and logical characteristics
10. GSM 07.05 Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)

15.2 Acronyms and Abbreviations

Table 15-1 List of Abbreviations

Abbreviation	Expansion
ACT	Adaptive Clocking Tuning
APN	Access Point Name
CDMA	Code Division Multiple Access
CS	Circuit Switched (CS) Domain
DPTF	Dynamic Power and Temperature Framework
GNSS	Global Navigation Satellite System

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Abbreviation	Expansion
GPRS	General Packet Radio Service
GPS	Global Position System
GSM	Global System for Mobile Communications
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
LTE	Long Term Evolution
ME	Mobile Equipment
MT	Mobile Terminal
NMEA	National Marine Electronics Association
OTA	Over The Air
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
PUK	PIN Unblocking Key
PS	Packet Switched (PS) Domain
QoS	Quality of Service
RF	Radio Frequency
RSSI	Receive Signal Strength Indicator
SCA	Service Center Address
SIM	Subscriber Identity Module
SM	Short Message
SMS	Short Message Service
SMSC	Short Message Service Center
TE	Terminal Equipment
TPDU	Transfer Protocol Data Unit
UIM	User Identity Module
URC	Unsolicited Result Code

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.

Abbreviation	Expansion
USIM	Universal Subscriber Identity Module
USSD	Unstructured Supplementary Service Data
VP	Validity Period
WCDMA	Wideband CDMA
WWAN	Wireless Wide Area Network

Table 15-2 Phonebook-related abbreviations

Abbreviation	Full Name
SM	SIM phonebook
LD	MT last dialed number
EN	SIM emergency number
FD	SIM fixed dialing number
ON	SIM own numbers
RC	Recent call list on the MT
MC	MT missed call list

Huawei Proprietary and Confidential
Copyright © Huawei Technologies Co., Ltd.