



HUAWEI Module

Firmware Local Upgrade Application Guide

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About This Document

Revision History

Document Version	Date	Chapter	Descriptions
01	2014-08-28		Creation
02	2014-10-10	3	Updated the description of local delta and full upgrade application; updated Figure 3-6 Transfer the full upgrade file
		4.1	Updated note description of Windows 7 power save policy option and COM25 port parameters set



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1 Introduction

This document is intended to provide references for customers to do Huawei module firmware update by the local upgrade solution. Customers need to refer to this document to develop the host application. This document also contains examples and relevant description.

Huawei module and the related firmware in the table below support the local upgrade service.

Huawei Module	Firmware Version
MU509-b	12.815.03.01.00 or latter
MU509-g	12.815.03.01.00 or latter
MU609	12.105.29.00.00 or latter
MU609 (Mini PCIE)	12.105.29.00.00 or latter
MU609 (AT&T Special)	12.107.08.05.457 or latter
MU609 (AT&T Mini PCIE Special)	12.107.07.05.457 or latter

**NOTE**

Customers can send AT command "ATI" or "AT+GMR" to the module and get the firmware version number.

1.1 Organization of This Document

Chapter	Description
Chapter 1 Introduction	Describes the contents and organization of this document.
Chapter 2 Firmware Local Upgrade Overview	Describes the overview of firmware local upgrade solution.



Chapter	Description
Chapter 3 Firmware Local Upgrade Solution	Describes the local upgrade solution details and test steps.
Chapter 4 Firmware Local Upgrade Test Process	Describes the local upgrade test process.
Chapter 5 Local Upgrade Example	Example for the upgrade.
Chapter 6 Acronyms and Abbreviations	Acronyms and Abbreviations

1.2 Basic Download Concept

- **Host Application:** developed by users, this application needs to refer to the processes in this document.
- **Delta File:** made by Huawei, it is a *.FWL file. Huawei can deliver the local upgrade delta file to the customer for local upgrade server deploying or directly upgrade the module on the host.
- **Full File:** made by Huawei, it is a *.FWL file. It can be delivered along with the new firmware version. The customer can use this file to deploy the local upgrade server or directly upgrade the module on the host.



2 Firmware Local Upgrade Overview

2.1 Overview

Huawei firmware local upgrade includes two solutions:

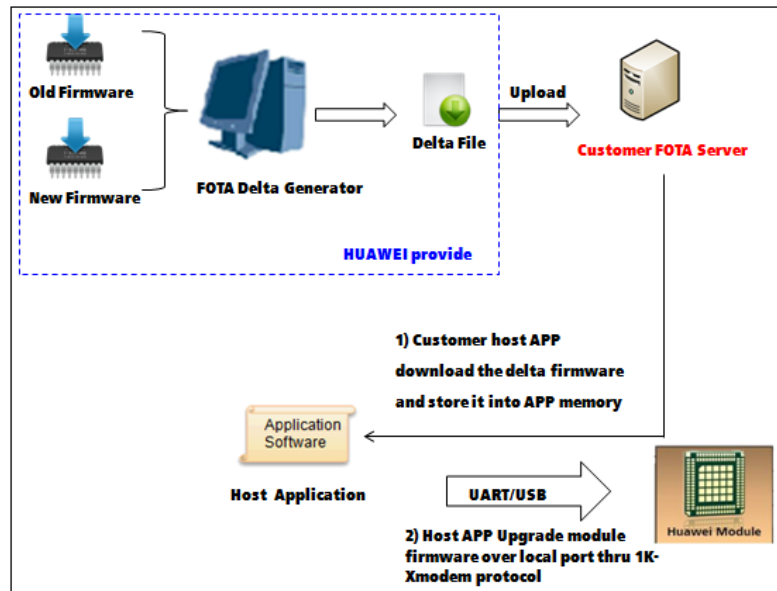
- **Local delta upgrade solution:** only the "delta" part firmware needs to be renewed.
- **Local Full upgrade solution:** the module's firmware will be wholly renewed.

Local upgrade can work in the following condition.

Upgrade Type	UART Port	Modem Port	PCUI Port
Delta upgrade	Support	Support	No-Support
Full upgrade	Support	No-Support	Support

2.2 Local Delta Upgrade

Figure 2-1 Local delta upgrade overview

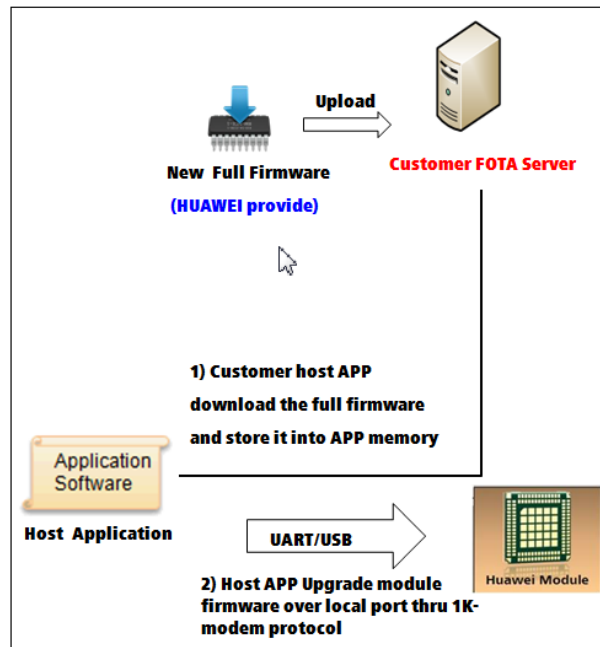


NOTE

- The customer needs to confirm the old firmware and the new firmware version numbers.
- The host needs to provide free memory to store the delta file (usually, the delta file size is around 500 KB).
- The host application should support the 1K-Xmodem protocol (1K-Xmodem protocol details and design reference can be found in the rest section of this document).

2.3 Local Full Upgrade

Figure 2-2 Local full upgrade overview



NOTE

- The customer needs to confirm the old firmware and the new firmware version numbers.
- The host needs to provide free memory to store the full file (different modules have different firmware sizes. Usually, the full file size > 10 MB).
- The host application should support the 1K-Xmodem protocol (1K-Xmodem protocol details and design reference can be found in the rest section of this document).

3 Firmware Local Upgrade Solution

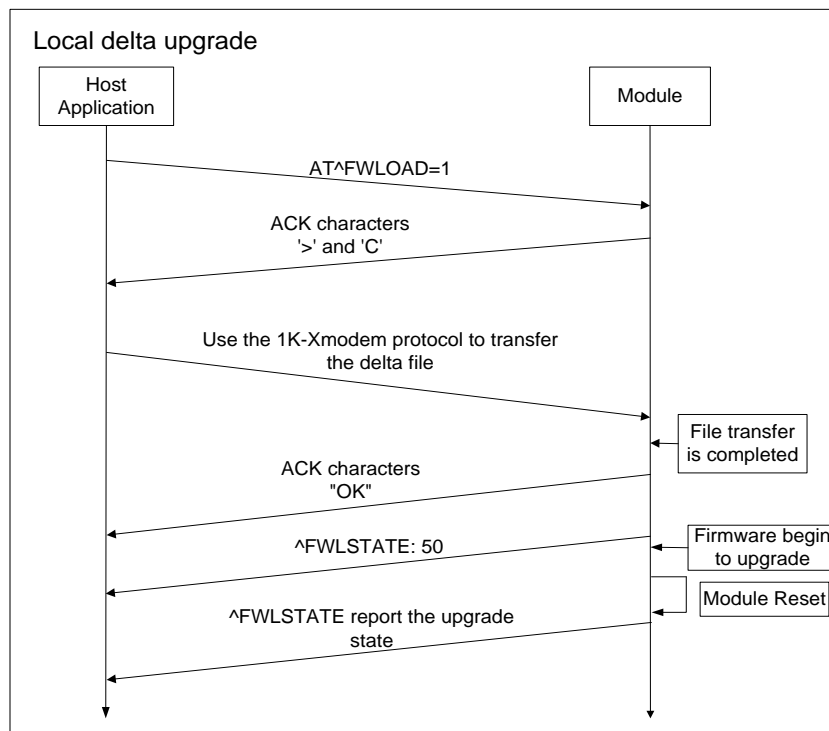
The local firmware file will be stored in the host storage, and host application can launch the local upgrade by AT commands. The local upgrade AT commands description can be found in the module's AT command document.

3.1 Local Delta Upgrade

3.1.1 Local Delta Upgrade Flow

The customer can refer to the following local delta upgrade flow to develop the host application.

Figure 3-1 Local delta upgrade flow





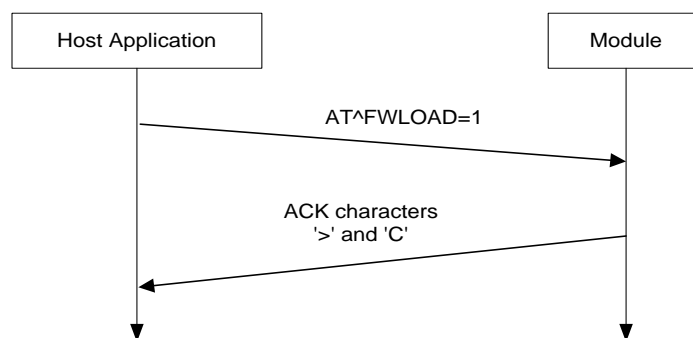
NOTE

- Except AT commands related to the local upgrade service progress, the host application cannot send any other AT commands to the module during the upgrade flow. Otherwise, the local upgrade progress may be interrupted.
- If any failed state or no response is returned, please try again from the beginning.

3.1.2 Local Delta Upgrade Application

Launch the local upgrade

Figure 3-2 Launch the delta upgrade flow



The local delta upgrade can be used on UART port and Modem port. After the host application sends the "AT^FWLOAD" command, the ACK characters '>' and 'C' are returned and then the host application can send firmware data.

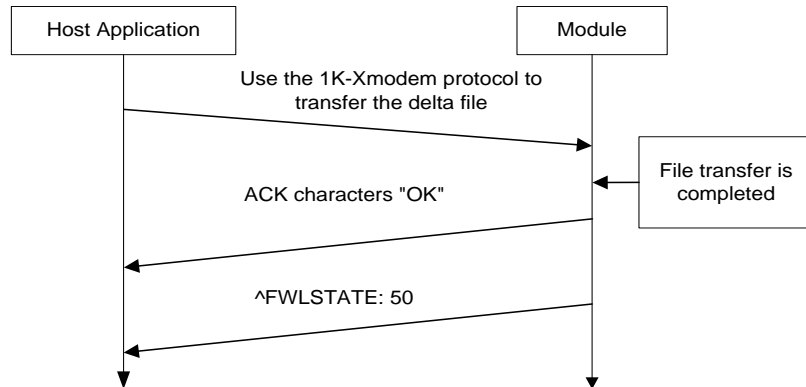


NOTE

- The character '>' is only reported once.
- The duration between two 'C' characters will be about 10 seconds. And there are maximum ten 'C' characters to be reported before the module finally returns failed upgrade state.

Transfer the delta file

Figure 3-3 Transfer the delta file



The host application needs to implement the 1K-Xmodem protocol which can be used to transfer the update file.

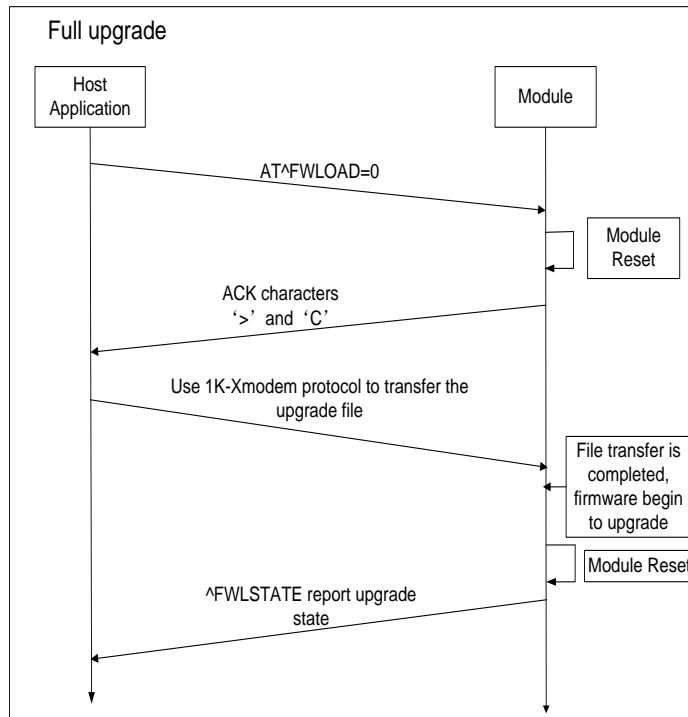
The character "OK" indicates the delta file is successfully transferred to the module. And then "**^FWLSTATE: 50**" will be reported to inform that the module can start to update the firmware. Finally, the module will finish the firmware upgrade and reset automatically. The host application should re-open the module's port and wait for the AT command "**^FWLSTATE**" reported by the module.

3.2 Local Full Upgrade

3.2.1 Local Full Upgrade Flow

The customer can refer to the following full upgrade flow to develop the host application.

Figure 3-4 Local full upgrade flow



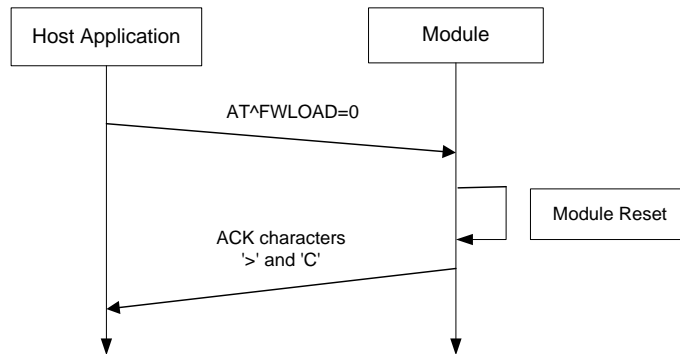
NOTE

- Except AT commands related to the local upgrade service progress, the host application cannot send any other AT commands to the module during the upgrade flow. Otherwise, the local upgrade progress may be interrupted.
- During the local full upgrade process, the baud rate of the upgrade file transferred by 1K-Xmodem protocol must set to 115200 bit/s.
- If any failed state or no response is returned, please try again from the beginning.

3.2.2 Local Full Upgrade Application

Launch the local upgrade

Figure 3-5 Launch the full upgrade flow



The local full upgrade can be used on UART port and PCUI port. After the host application sends the "AT^FWLOAD" command, the module will be reset to start the full upgrade flow. If the module's PCUI port is open when the module restarts, the host application should close the PCUI port and re-open the PCUI port after it re-enumerated. And then the ACK characters '>' and 'C' will be returned to inform that the host application can send firmware data.

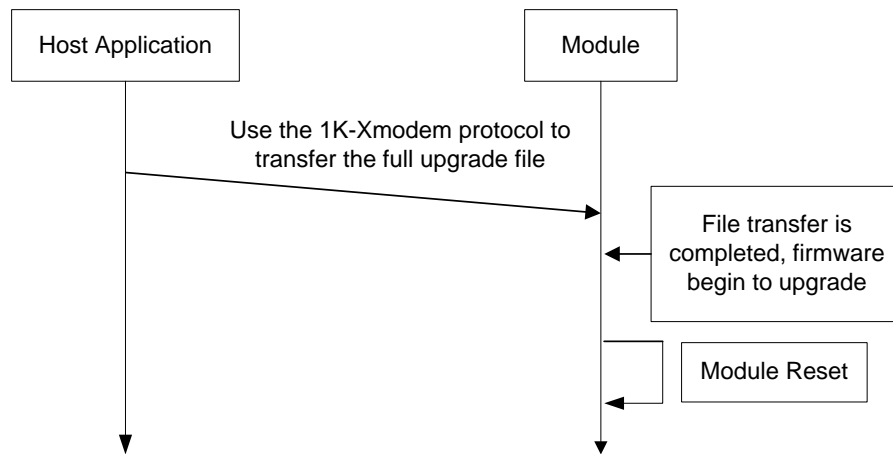


NOTE

- The character '>' is only reported once.
- The duration between two 'C' characters will be about 10 seconds. And there are maximum ten 'C' characters to be reported before the module finally returns failed upgrade state.

Transfer the full upgrade file

Figure 3-6 Transfer the full upgrade file



After the full 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. If the module's PCUI port is open when the module restarts, the host application should close the PCUI port and re-open the PCUI port after it re-enumerated, and wait for the upgrade state AT command "**^FWLSTATE**".

4 Firmware Local Upgrade Test Process

4.1 Test with Windows COM Port Tool

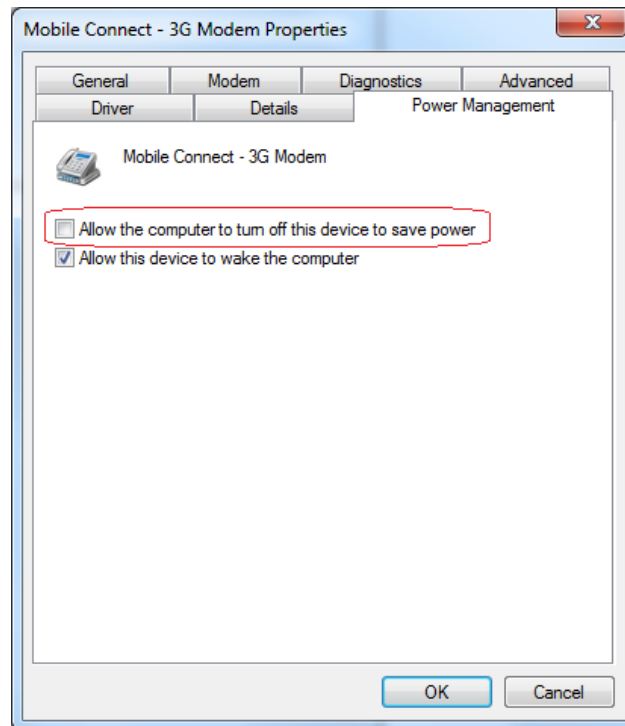
This section takes the local delta upgrade test process for an example, and the test process is executed on Windows 7 with a COM port tool (this tool supports the 1K-Xmodem protocol to transfer files). Customers can take the following steps for reference.



NOTE

- If the local update function is tested on Windows 7, the customer should select the item as shown in Figure 4-1 . Because the Windows 7 power save policy may block the upgrade flow and make the COM port tool no response. Customers can find this modem port properties windows by: right click **Computer**, and select **Manage > Computer Management > Device Manager > Modems**. Find out the module's Modem port and right click **Properties** menu.
- Except AT commands related to the local upgrade service progress, the host application cannot send any other AT commands to the module during the upgrade flow. Otherwise, the local upgrade progress may be interrupted.

Figure 4-1 The Windows 7 power save policy option



Then start the local upgrade test:

- Step 1 Open the COM port tool and choose the correct Modem port number (in this test, the Modem's port number is **COM25**).

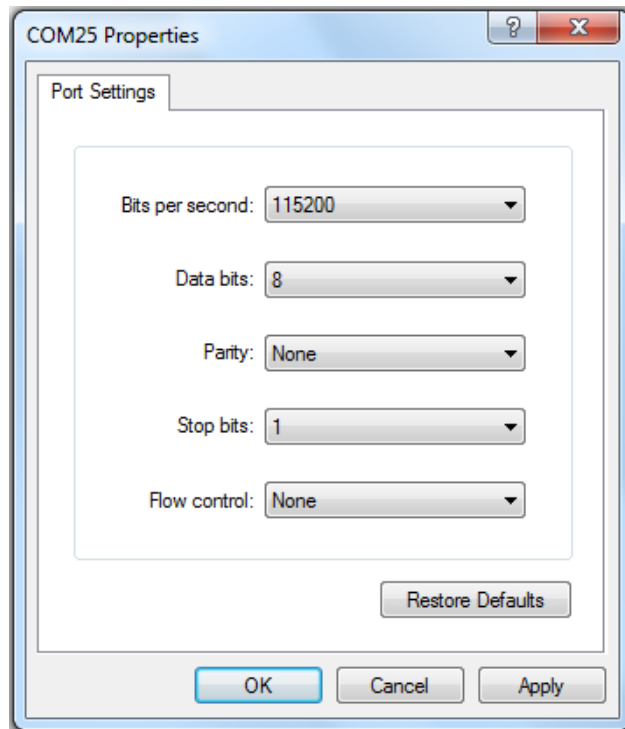


- Step 2 Set the parameters of the COM25 port.

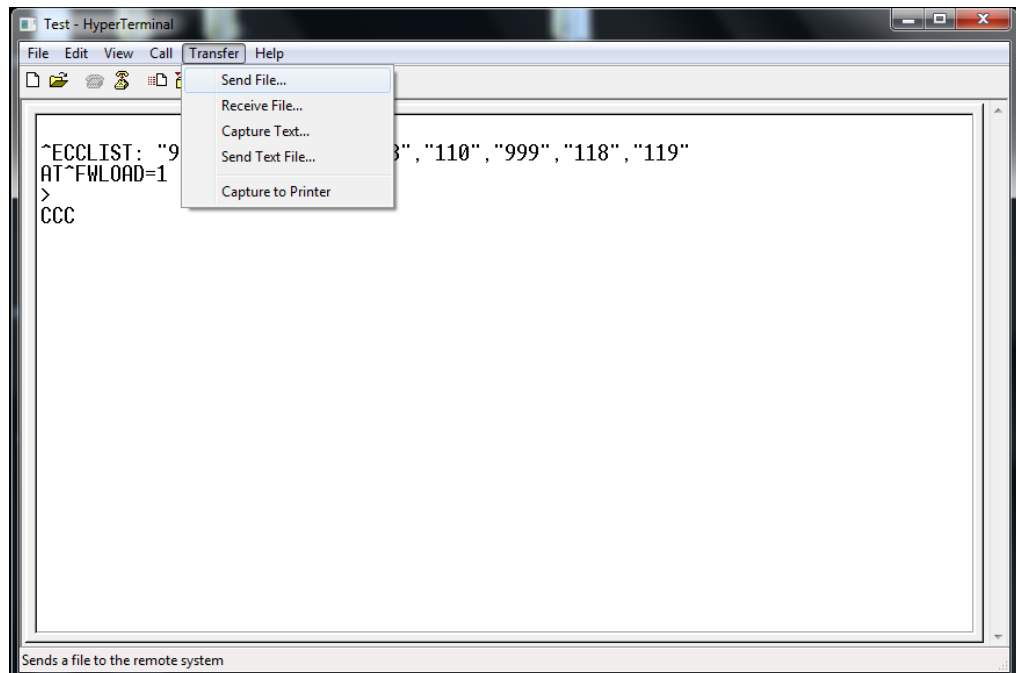


NOTE

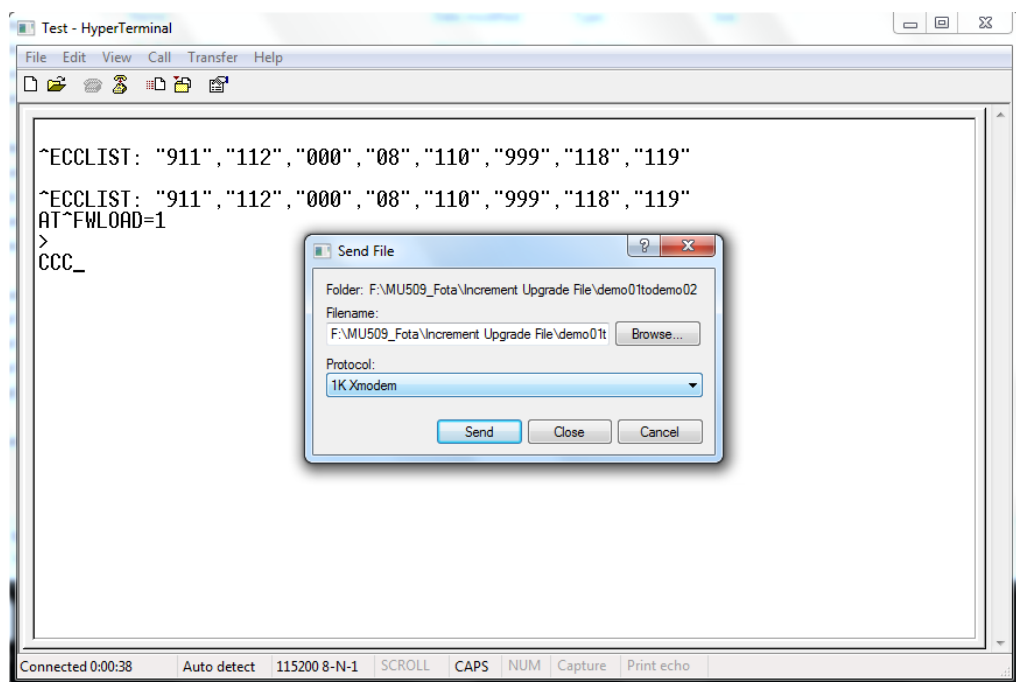
- During the local full upgrade process, the baud rate of the upgrade file transferred by 1K-Xmodem protocol must set to 115200 bit/s.
- During the local delta upgrade process, run **AT+IPR?** to get the parameter return values which are used to set the baud rate.



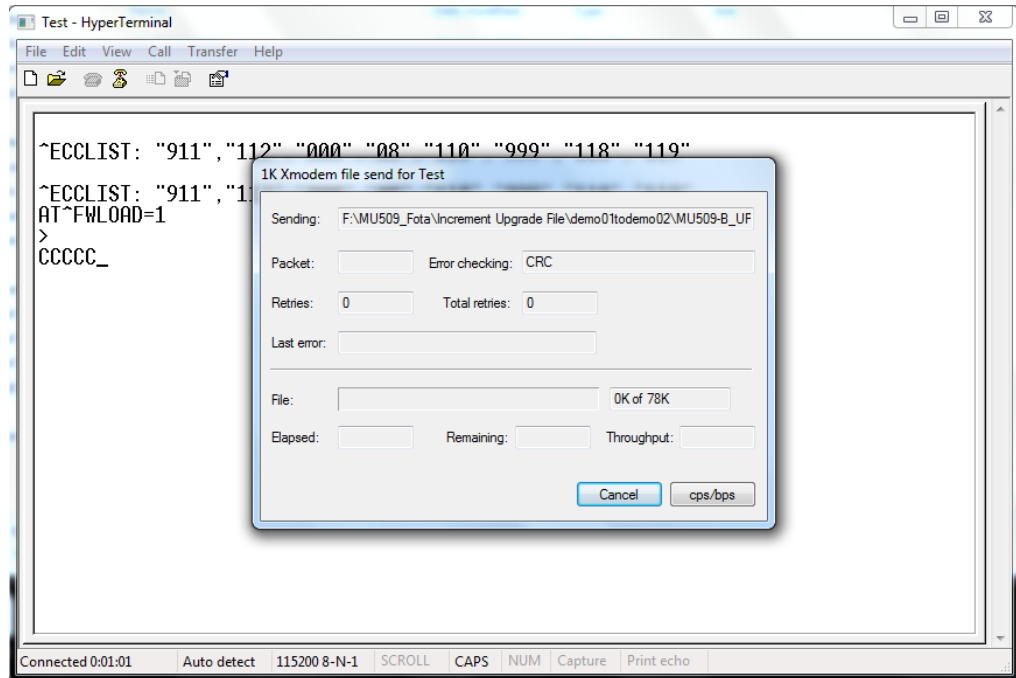
Step 3 Run **AT^FWLOAD=1** to launch a delta upgrade.



Step 4 Browse the delta file path and select the **1K Xmodem** protocol.

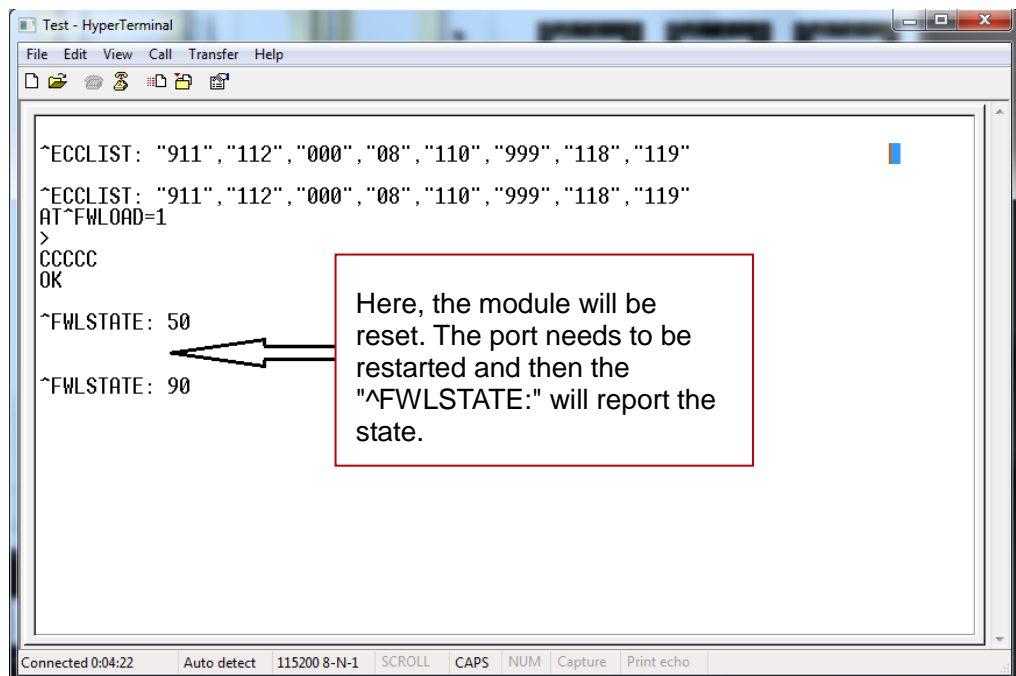


Step 5 Transfer the local file to the module's flash.



The file transfer is completed and then the upgrade will start. Finally, the module will be automatically reset to finish the upgrade.

- If the upgrade is successful, **^FWLSTATE: 90** will be returned.
- If there are some errors during the upgrade, the **^FWLSTATE** will give an error code.



4.2 Test with Linux Minicom Tool

This section takes the local delta upgrade test process for an example, and the test process is executed on Linux system with the minicom tool (this tool supports the 1K-Xmodem protocol to transfer files). Customers can take the following steps for reference.



NOTE

The section takes MU609 modem port local upgrade testing progress for an example, and the firmware version number of MU609 mentioned in this section only for demo test.

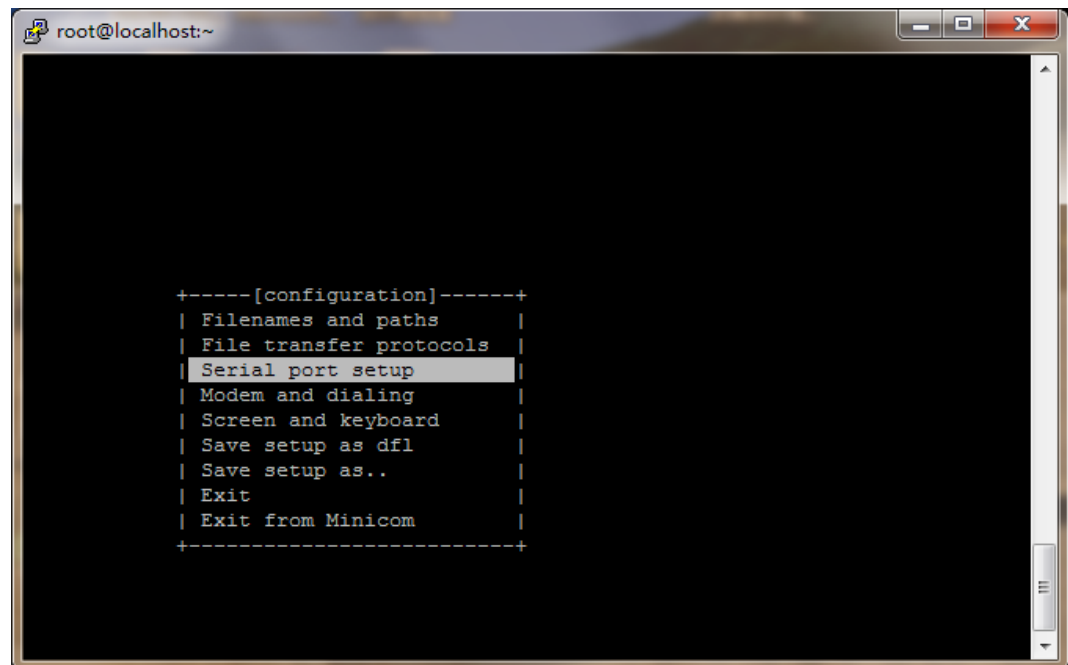
Step 1 Check the module USB port number. Normally, the **tttyUSB0** is the modem port.

```
[root@localhost ~]# ls /dev/ttyUSB*
/dev/ttyUSB0 /dev/ttyUSB1 /dev/ttyUSB2 /dev/ttyUSB3 /dev/ttyUSB4
```

Step 2 Launch the minicom configuration.

```
[root@localhost ~]# minicom -s
```

Step 3 Enter the **Serial port setup** menu. Normally, customers only need to set the correct port name to the **Serial Device** item.



```

root@localhost:~
+-----+
| A -   Serial Device       : /dev/ttyUSB0   |
| B -   Lockfile Location   : /var/lock      |
| C -   Callin Program      :                |
| D -   Callout Program     :                |
| E -   Bps/Par/Bits        : 115200 8N1     |
| F -   Hardware Flow Control : No           |
| G -   Software Flow Control : Yes          |
|                                         |
|   Change which setting? █         |
+-----+
| Screen and keyboard        |
| Save setup as dfl          |
| Save setup as..           |
| Exit                       |
| Exit from Minicom          |
+-----+

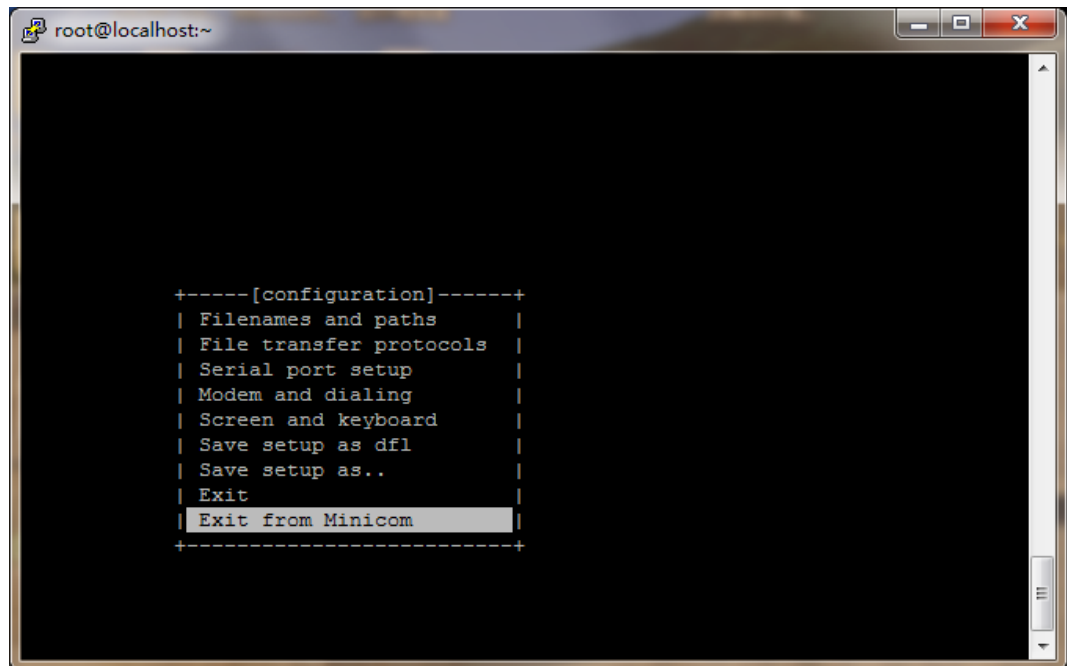
```

Step 4 Save the configurations as default and exit the configuration.

```

root@localhost:~
+-----[configuration]-----+
| Filenames and paths        |
| File transfer protocols    |
| Serial port setup          |
| Modem and dialing          |
| Screen and keyboard        |
| Save setup as dfl          |
| Save setup as..           |
| Exit                       |
| Exit from Minicom          |
+-----+

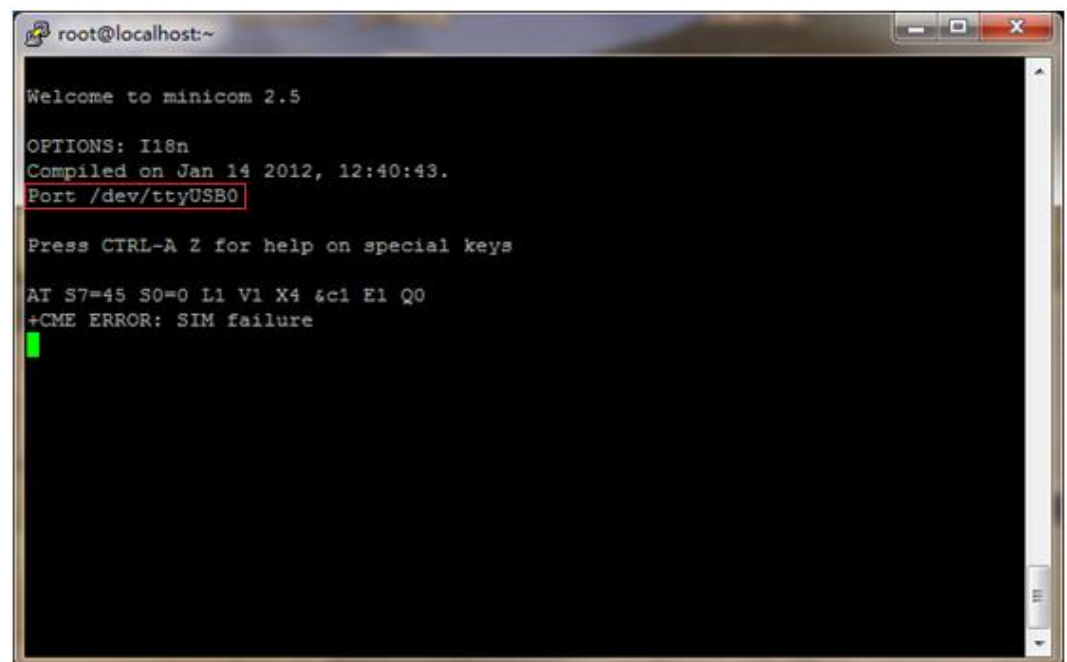
```



```

root@localhost:~
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols      |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard          |
| Save setup as dfl            |
| Save setup as..              |
| Exit                          |
| Exit from Minicom            |
+-----+
  
```

Step 5 After exiting from the configuration, the minicom tool will connect the **tttyUSB0** port, and then the minicom tool can be used to send or receive the AT command.



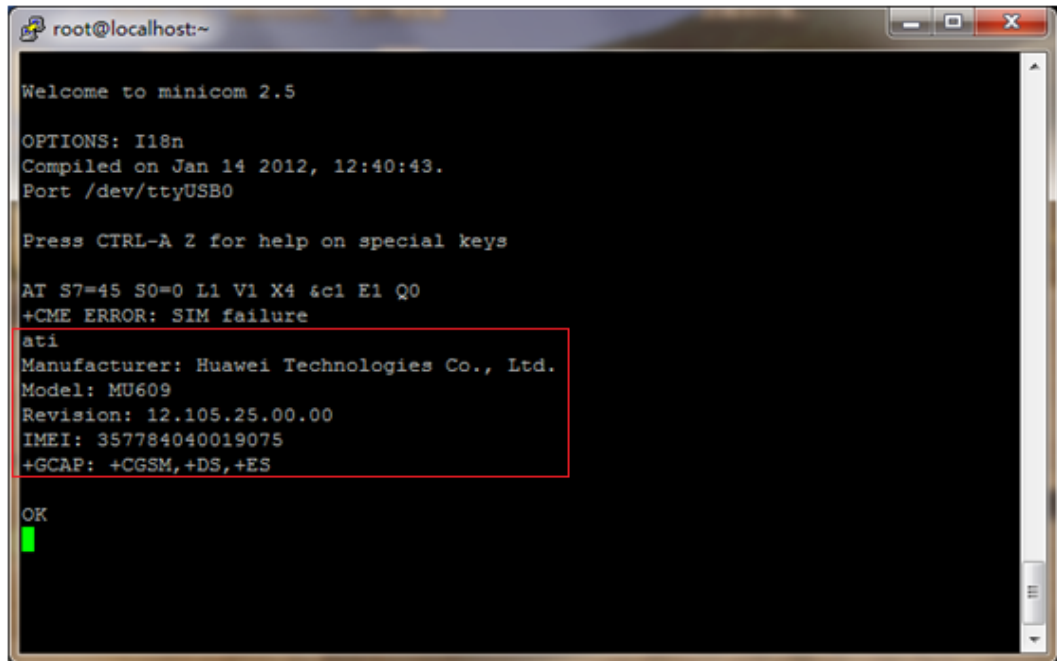
```

root@localhost:~
Welcome to minicom 2.5

OPTIONS: I18n
Compiled on Jan 14 2012, 12:40:43.
Port /dev/ttyUSB0

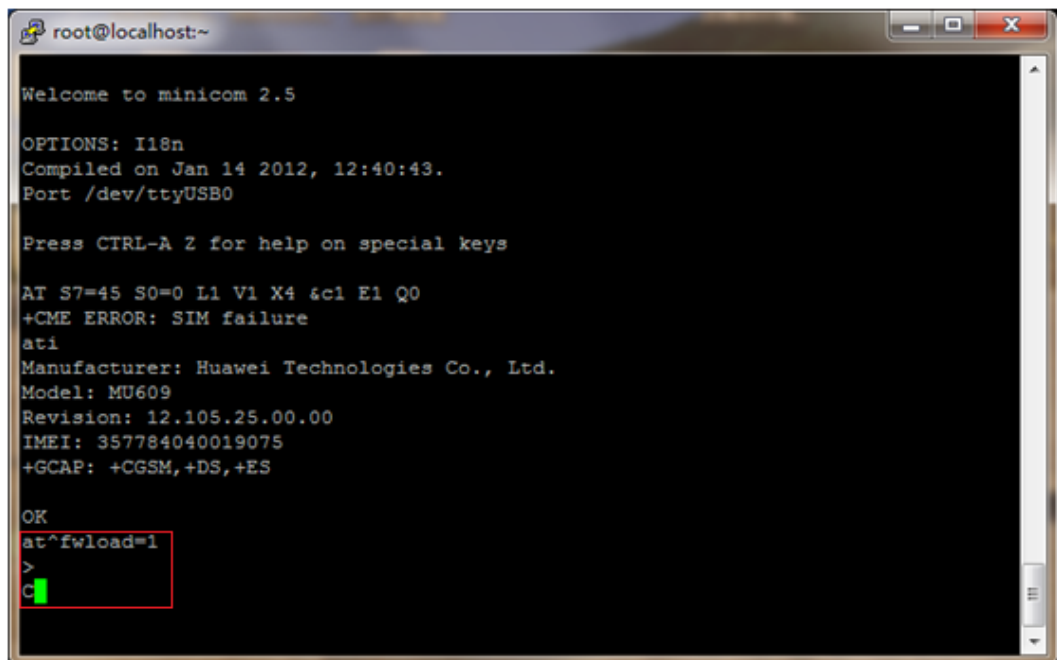
Press CTRL-A Z for help on special keys

AT S7=45 S0=0 L1 V1 X4 &c1 E1 Q0
+CME ERROR: SIM failure
  
```



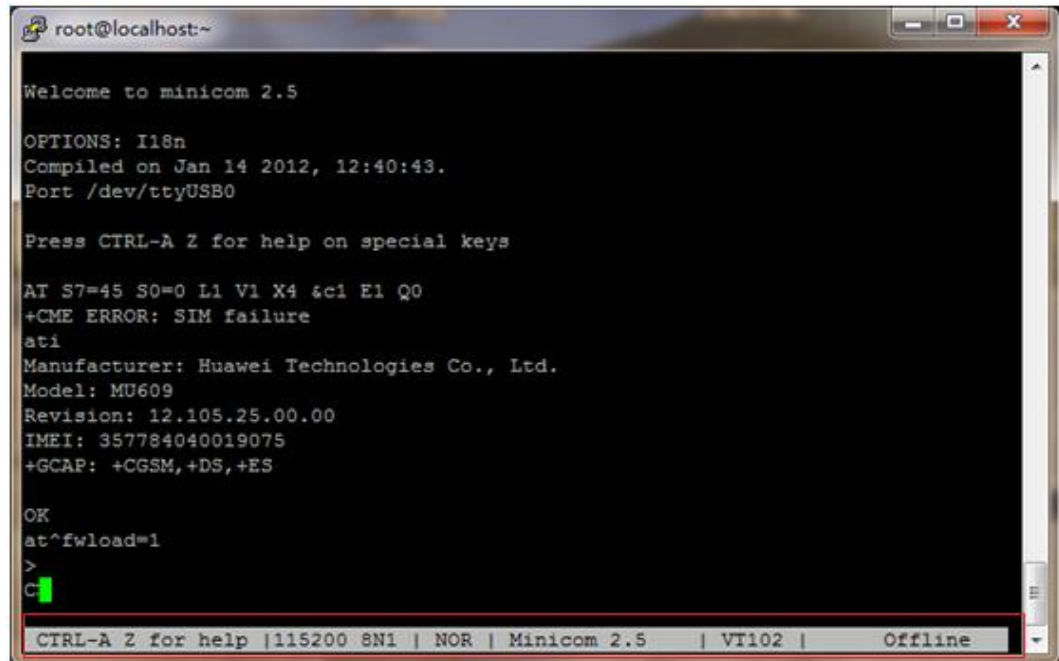
```
root@localhost:~  
Welcome to minicom 2.5  
  
OPTIONS: I18n  
Compiled on Jan 14 2012, 12:40:43.  
Port /dev/ttyUSB0  
  
Press CTRL-A Z for help on special keys  
  
AT S7=45 S0=0 L1 V1 X4 &c1 E1 Q0  
+CME ERROR: SIM failure  
ati  
Manufacturer: Huawei Technologies Co., Ltd.  
Model: MU609  
Revision: 12.105.25.00.00  
IMEI: 357784040019075  
+GCAP: +CGSM,+DS,+ES  
  
OK  
█
```

Step 6 Run **AT^FWLOAD=1** to activate the local upgrade function.

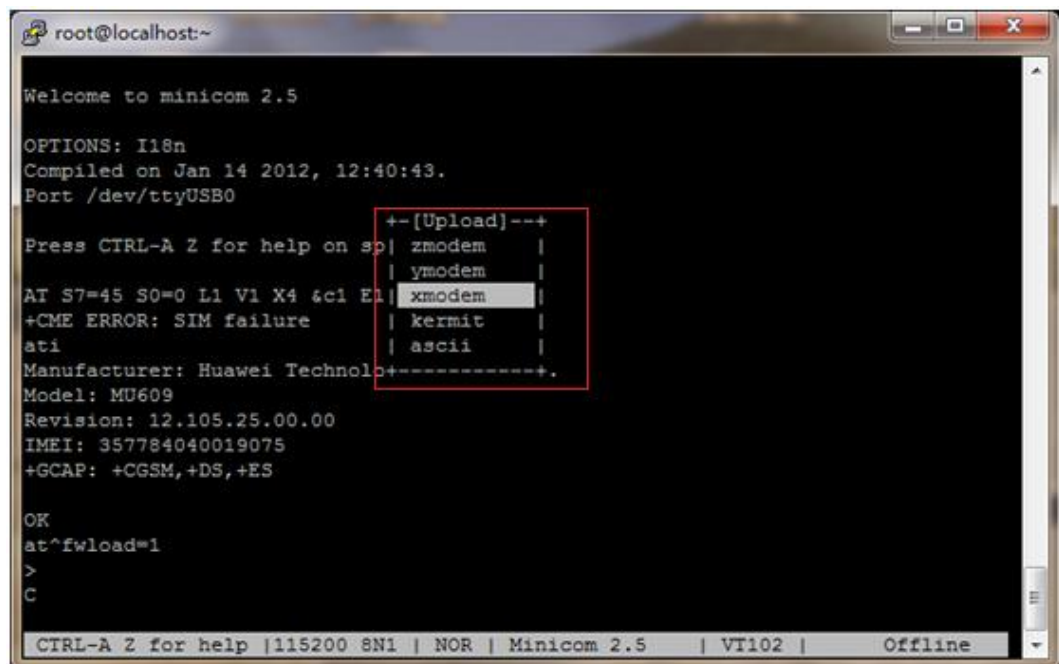


```
root@localhost:~  
Welcome to minicom 2.5  
  
OPTIONS: I18n  
Compiled on Jan 14 2012, 12:40:43.  
Port /dev/ttyUSB0  
  
Press CTRL-A Z for help on special keys  
  
AT S7=45 S0=0 L1 V1 X4 &c1 E1 Q0  
+CME ERROR: SIM failure  
ati  
Manufacturer: Huawei Technologies Co., Ltd.  
Model: MU609  
Revision: 12.105.25.00.00  
IMEI: 357784040019075  
+GCAP: +CGSM,+DS,+ES  
  
OK  
at^fwload=1  
>  
C  
█
```

Step 7 After getting the characters **>** and **C** returned from the module, use the function key **CTRL+A** to activate the function menu.



Step 8 Press key **S** to get the file upload method menu. Use the key "**↑**" or "**↓**" to move the cursor and select the **xmodem**, then press the **Enter** key.

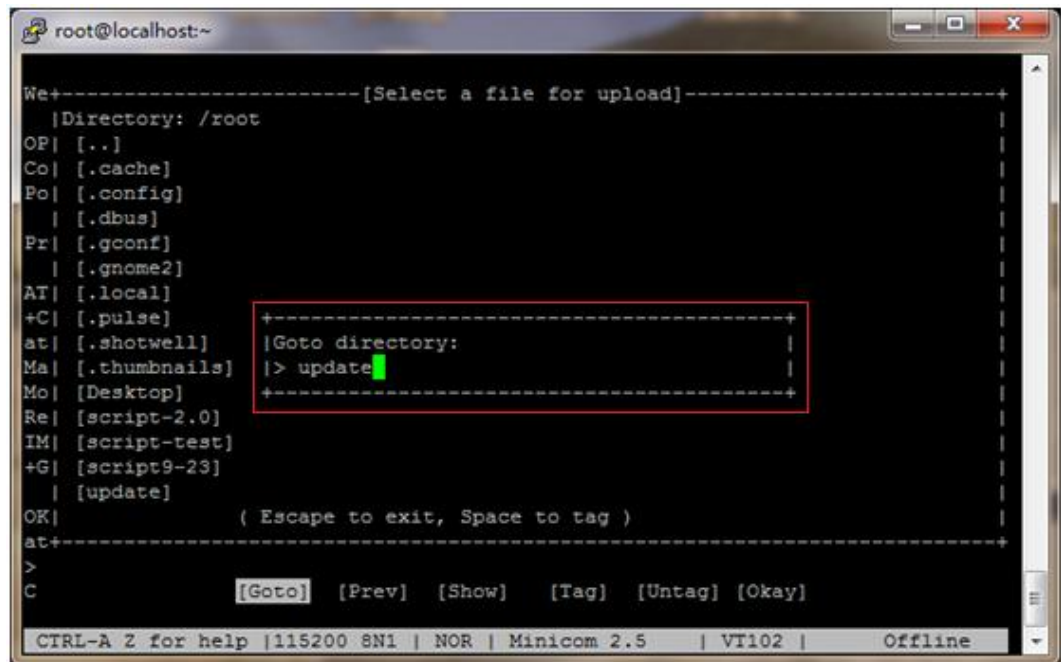


Step 9 Customers can find the **Select a file for upload** and use the key "**←**" or "**→**" to select the tag. Please select the **Goto** tag and click the **Enter** key. Then enter the file backup path in the menu, and click the **Enter** key to go to that file directory.



NOTE

This document uses the path "/root/update" as the file backup path.

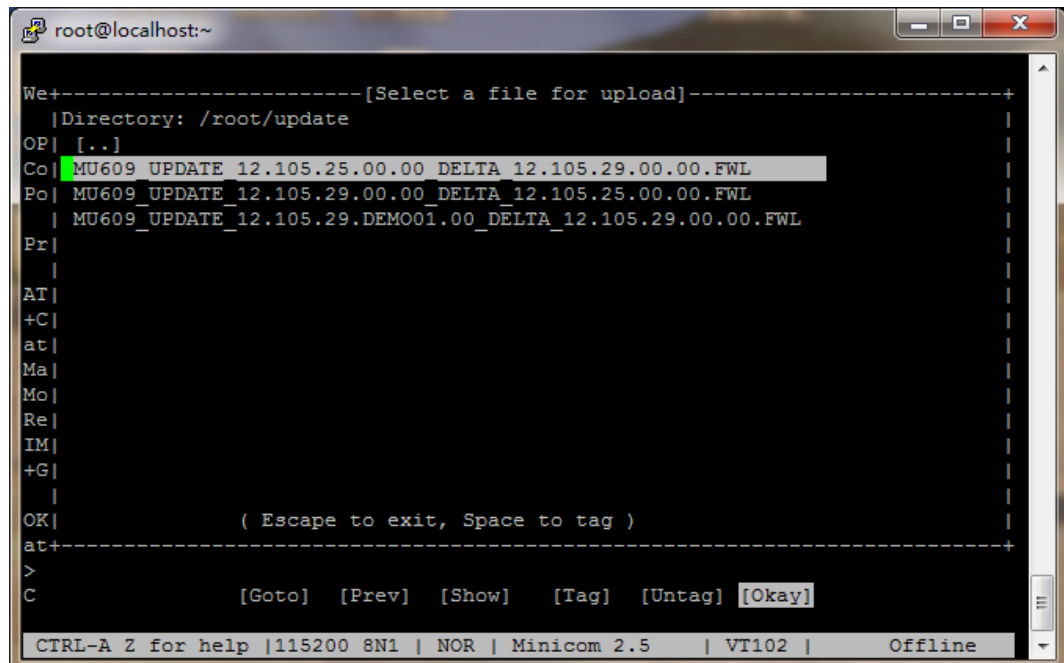


```

root@localhost:~
We+-----[Select a file for upload]-----+
|Directory: /root
OP| [...]
Co| [.cache]
Po| [.config]
  | [.dbus]
Pr| [.gconf]
  | [.gnome2]
AT| [.local]
+C| [.pulse]
  |Goto directory:
at| [.shotwell]      |
Ma| [.thumbnails]   |
Mo| [Desktop]        |
Re| [script-2.0]     |
IM| [script-test]    |
+G| [script9-23]     |
  | [update]
OK|                  ( Escape to exit, Space to tag )
at+-----+
>
C      [Goto] [Prev] [Show] [Tag] [Untag] [Okay]

CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline
  
```

- Step 10 Use the key "↑" or "↓" to select the correct local upgrade file, and click the **Space** key to pitch on that file. Then use the key "←" or "→" to switch the **Okay** tag, and click **Enter** key to confirm the file upload.

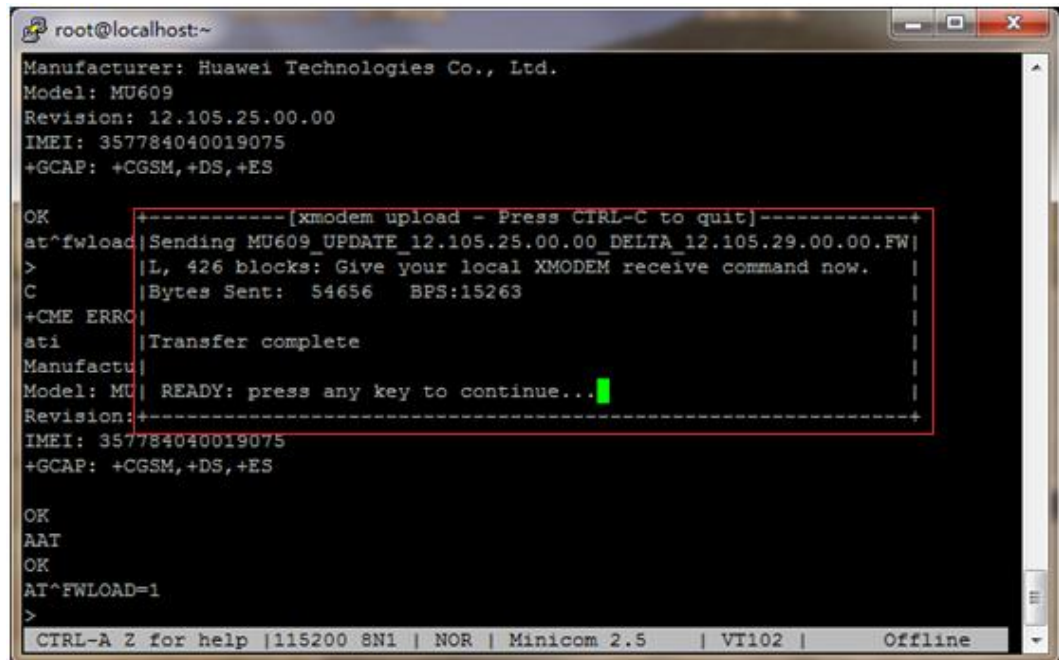


```

root@localhost:~
We+-----[Select a file for upload]-----+
|Directory: /root/update
OP| [...]
Co| MU609_UPDATE_12.105.25.00.00_DELTA_12.105.29.00.00.FWL
Po| MU609_UPDATE_12.105.29.00.00_DELTA_12.105.25.00.00.FWL
  | MU609_UPDATE_12.105.29.DEMO01.00_DELTA_12.105.29.00.00.FWL
Pr|
  |
AT|
+C|
at|
Ma|
Mo|
Re|
IM|
+G|
  |
OK|                  ( Escape to exit, Space to tag )
at+-----+
>
C      [Goto] [Prev] [Show] [Tag] [Untag] [Okay]

CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline
  
```

Step 11 Wait for the local upgrade file uploaded, and then press any key to continue.



```

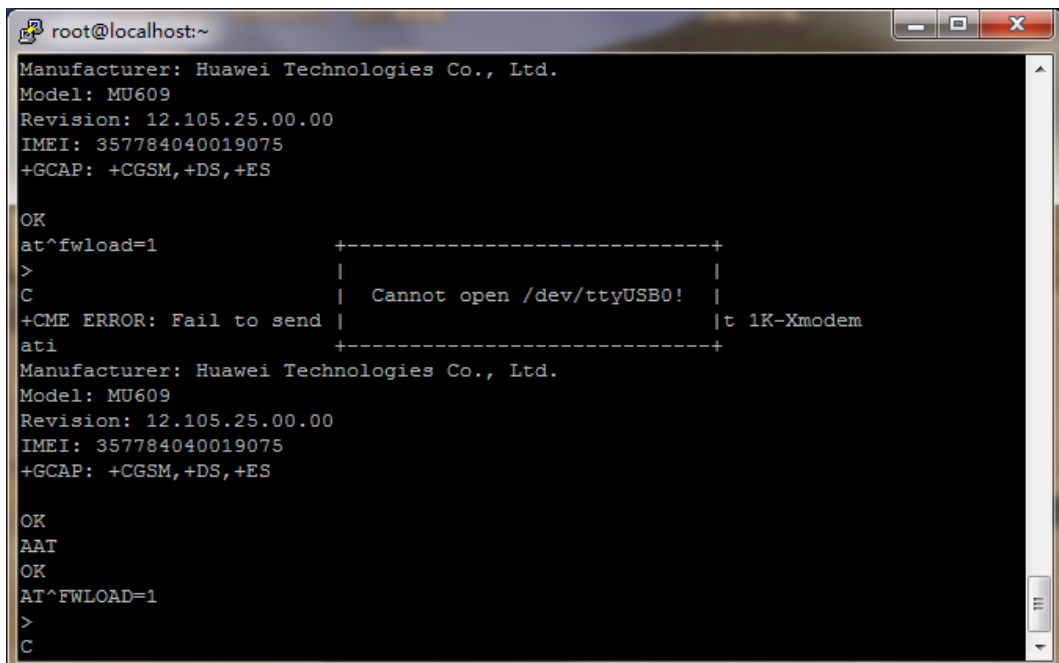
root@localhost:~
Manufacturer: Huawei Technologies Co., Ltd.
Model: MU609
Revision: 12.105.25.00.00
IMEI: 357784040019075
+GCAP: +CGSM,+DS,+ES

OK
+-----[xmodem upload - Press CTRL-C to quit]-----+
at^fwload|Sending MU609_UPDATE_12.105.25.00.00_DELTA_12.105.29.00.00.FW|
> |L, 426 blocks: Give your local XMODEM receive command now. |
C |Bytes Sent: 54656 BPS:15263 |
+CME ERROR: Transfer complete |
ati |Transfer complete |
Manufacturer: Huawei Technologies Co., Ltd. |
Model: MU609 READY: press any key to continue... |
Revision: 12.105.25.00.00 |
IMEI: 357784040019075 |
+GCAP: +CGSM,+DS,+ES |
+-----+

OK
AAT
OK
AT^FWLOAD=1
>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.5 | VT102 | Offline

```

Step 12 The module will continue to run the firmware upgrade progress, and reset automatically to finish the upgrade progress. The picture below shows the module USB ports is removed.



```

root@localhost:~
Manufacturer: Huawei Technologies Co., Ltd.
Model: MU609
Revision: 12.105.25.00.00
IMEI: 357784040019075
+GCAP: +CGSM,+DS,+ES

OK
at^fwload=1
>
C
+-----+
+CME ERROR: Fail to send | Cannot open /dev/ttyUSB0! |
ati |t 1K-Xmodem |
+-----+
Manufacturer: Huawei Technologies Co., Ltd.
Model: MU609
Revision: 12.105.25.00.00
IMEI: 357784040019075
+GCAP: +CGSM,+DS,+ES

OK
AAT
OK
AT^FWLOAD=1
>
C

```

Step 13 After resetting, the module will re-enumerate the serial ports.

```

root@localhost:~
+GCAP: +CGSM,+DS,+ES

OK
AAT
OK
AT^FWLOAD=1
>
C
^SYSSTART
^SIMST: 255
^ECCLIST: "911","112","000","08","110","999","118","119"
^ECCLIST: "911","112","000","08","110","999","118","119"
^SRVST: 1
^SRVST: 1
^MODE: 5,4
^RSSI: 99

```

Step 14 Send **ATI** command to the module, and check whether the module's current firmware version is changed.

```

root@localhost:~
^SIMST: 255
^ECCLIST: "911","112","000","08","110","999","118","119"
^ECCLIST: "911","112","000","08","110","999","118","119"
^SRVST: 1
^SRVST: 1
^MODE: 5,4
^RSSI: 99
^FWLSTATE: 90
ATI
Manufacturer: Huawei Technologies Co., Ltd.
Model: MU609
Revision: 12.105.29.00.00
IMEI: 357784040019075
+GCAP: +CGSM,+DS,+ES

OK

```

5 Local Upgrade Example

This chapter describes normal local upgrade progress. Customers can refer to develop the host application.

**NOTE**

The firmware versions of the modules used in this document are for demo.

5.1 Local Delta Upgrade

Customers can get the firmware delta file from Huawei and store on the local server.

- Check the module firmware version:

Run: AT+GMR

Response: 12.815.01.03.00

OK

- Send the local delta upgrade request command:

Run: AT^FWLOAD=1

Response: >C Indicate that the module is ready and can get the firmware file.

OK Indicate that the host application transfers the delta file to the module by the 1k-Xmodem protocol.

- Ready to upgrade the firmware:

Response: ^FOTASTATE: 50

- The module will report the upgrade result after reset:

Response: ^FOTASTATE: 90

- Check the firmware version number to confirm the result:

Run: AT+GMR



Response: 12.815.01.04.00

OK

5.2 Local Full Upgrade

Customers can get the firmware full file from Huawei and store on the local server.

- Check the module firmware version:

Run: AT+GMR

Response: 12.815.01.03.00

OK

- Send the local full upgrade request command. Module will reset automatically to init the local full upgrade:

Run: AT^FWLOAD=0

Response: If the characters indicate that module is ready and can get the
firmware file
>C

- The host application transfers the full firmware file to the module by the 1K-Xmodem protocol.
- The module will start the firmware upgrade after gets all the firmware files, and then will be automatically reset to finish the upgrade.
- The module will report the upgrade result after reset:

Response: ^FOTASTATE: 90

- Check the firmware version number to confirm the result:

Run: AT+GMR

Response: 12.815.01.04.00

OK



6 Acronyms and Abbreviations

Acronym or Abbreviation	Expansion
ACK	Acknowledgement
IMEI	International Mobile Equipment Identity
UART	Universal Asynchronous Receiver/Transmitter
UI	User Interface