



# MTC

## Dial-up Guide\_Windows

V1.2

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## Contact Information

Website: <https://www.fibocom.com>

Address: 10/F-14/F, Block A, Building 6, Shenzhen International Innovation Valley, Dashi First Road, Xili Community, Xili Subdistrict, Nanshan District, Shenzhen

Tel: 0755-26733555

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## Applicable Models

No.	Applicable Model	Description
1	NL66x series	Qualcomm 9X07 platform
2	MG110 series	Qualcomm 9X07 platform
3	MC116 series	Qualcomm 9X07 platform
4	LC116 series	Qualcomm 9X07 platform
5	MA510 series	Qualcomm 9205 platform
6	L61x&LC61x&LG61x&MC61x&MG61x series	Unisoc 8910 platform
7	MC66x & MG61x series	Unisoc 8850 platform
8	LE series	Eigencomm CAT 1 platform
9	FG132 series	Qualcomm SDX35 platform
10	L716 series	Sanechips platform

# Change History

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V1.2 (2024-12-17)	Changed the port information to support all LE series models. Added PPP authentication.
V1.1 (2024-07-15)	Added GTUSBMODE 47/48/49 support for FG132 series modules.
V1.0 (2024-06-06)	Initial version.

# 1 Overview

This document describes the various dial-up modes of MTC platform modules under Windows system. The Win10 system is taken as an example, and the dial-up modes supported by each platform is as follows.

Table 1. Dial-up modes support

Type	Unisoc	Qualcomm	Sanechips	Eigencomm
PPP	√	√	√	√
RNDIS	√	√	√	√
RmNet	--	√	--	--
MBIM	--	√	--	--



Different models on the same platform may support different dial-up modes. It is necessary to query the USB port information table to determine whether the corresponding dial-up mode is supported. For example, MA510 does not support RNDIS/RmNet/MBIM because there is no corresponding USB port. FG132 does not support PPP.

## 2 USB Port Information

The USB port of the module can contain multiple USB interfaces, and each USB interface can be loaded with different USB interface drivers to realize different functions. After Windows system successfully loads USB interface driver, device nodes are generated to realize different module functions, such as Log port, AT port, USB network adapter, etc. The module USB enumeration supports multiple modes and is controlled by the AT+GTUSBMODE setting command.

### 2.1 Unisoc Platform USB Port Information

The specific USB port information is subject to the AT manual of each product. The following table shows the commonly used USB port information of Unisoc platform L61x, LC61x, LG61x, MC61x, MG61x and other series modules.

Table 2. L61x/LC61x/LG61x/MC61x/MG61x USB port information

GTUSBMODE: 31 (default)		
Vendor ID: 0x1782 Product ID: 0x4d10		
Interface Number	Interface Name	Interface Function
0	modem	Modem connector
1	NV	Device NV Interface
2	MOS	Device MOS Log Interface
3	DIAG	Device Modem Log Interface
4	LOG	Device AP Log Interface
5	AT1 port	Device Application Interface
6	AT2 port	Device Application Interface
GTUSBMODE: 32		
Vendor ID: 0x1782 Product ID: 0x4d11		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2	modem	Modem connector
3	NV	Device NV Interface
4	MOS	Device MOS Log Interface
5	DIAG	Device Modem Log Interface
6	LOG	Device AP Log Interface
7	AT1 port	Device Application Interface
8	AT2 port	Device Application Interface



GTUSBMODE: 33		
Vendor ID: 0x1782 Product ID: 0x4d11		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	modem	Modem connector
3	NV	Device NV Interface
4	MOS	Device MOS Log Interface
5	DIAG	Device Modem Log Interface
6	LOG	Device AP Log Interface
7	AT1 port	Device Application Interface
8	AT2 port	Device Application Interface

The following table shows the commonly used USB port information of Unisoc platform MC66x, MG66x and other series modules.

**Table 3. MC66x/MG66x USB port information**

GTUSBMODE: 73 (default)		
Vendor ID: 0x2cb7 Product ID: 0x0a0a		
Interface Number	Interface Name	Interface Function
0	modem	Modem connector
1	AP Log port	Device AP Log Interface
2	CP Log port	Device CP Log Interface
3	AT1 port	Device Application Interface
4	AT2 port	Device Application Interface
GTUSBMODE: 74		
Vendor ID: 0x2cb7 Product ID: 0x0a0b		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2	modem	Modem connector
3	AP Log port	Device AP Log Interface
4	CP Log port	Device CP Log Interface
5	AT1 port	Device Application Interface

6	AT2 port	Device Application Interface
GTUSBMODE: 75		
Vendor ID: 0x2cb7 Product ID: 0x0a0c		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	modem	Modem connector
3	AP Log port	Device AP Log Interface
4	CP Log port	Device CP Log Interface
5	AT1 port	Device Application Interface
6	AT2 port	Device Application Interface

## 2.2 Qualcomm Platform USB Port Information

The following table shows the commonly used USB port information of Qualcomm platform NL668, MG110, MC116, LC116, FG132, MA510 and other series modules.

**Table 4. NL668/MG110/MC116/LC116 USB port information**

GTUSBMODE: 17		
Vendor ID: 0x1508 Product ID: 0x1001		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	AT	Device Application Interface
3	Pipe	Device Pipe
4	RmNet	Wireless Data Device Ethernet Adapter
5	ADB	Android Composite ADB Interface
GTUSBMODE: 18		
Vendor ID: 0x1508 Product ID: 0x1001		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	AT	Device Application Interface
3	Pipe	Device Pipe

4	ECM	ECM communication class interface
5	ECM	ECM data class interface
6	ADB	Android Composite ADB Interface
GTUSBMODE: 19		
Vendor ID: 0x05C6 Product ID: 0x9025		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	Pipe	Device Pipe
3	RmNet	Wireless Data Device Ethernet Adapter
4	Mystorage	Device Storage Interface
5	ADB	Android Composite ADB Interface
GTUSBMODE: 20		
Vendor ID: 0x1508 Product ID: 0x1000		
Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
GTUSBMODE: 21		
Vendor ID: 0x1508 Product ID: 0x1000		
Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface
GTUSBMODE: 22		
Vendor ID: 0x1508 Product ID: 0x1000		
Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface
2	RmNet	Wireless Data Device Ethernet Adapter
GTUSBMODE: 23		
Vendor ID: 0x1508 Product ID: 0x1000		
Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface

2	ECM	ECM communication class interface
3	ECM	ECM data class interface
GTUSBMODE: 24		
Vendor ID: 0x05C6 Product ID: 0x90B6		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	Modem	Modem Connector
3	DIAG	Device Diagnostic Interface
4	ADB	Android Composite ADB Interface
GTUSBMODE: 25		
Vendor ID: 0x1508 Product ID: 0x1001		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	AT	Device Application Interface
3	Pipe	Device Pipe
4	RmNet	Wireless Data Device Ethernet Adapter
GTUSBMODE: 26		
Vendor ID: 0x1508 Product ID: 0x1001		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	AT	Device Application Interface
3	Pipe	Device Pipe
4	ECM	ECM communication class interface
5	ECM	ECM data class interface
GTUSBMODE: 27		
Vendor ID: 0x1508 Product ID: 0x1001		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector

2	AT	Device Application Interface
3	Pipe	Device Pipe
4	ECM	ECM communication class interface
5	ECM	ECM data class interface
6	ADB	Android Composite ADB Interface
7	AUDIO	UAC Interface

GTUSBMODE: 28

Vendor ID: 0x1508 Product ID: 0x1001

Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	RmNet	Wireless Data Device Ethernet Adapter

GTUSBMODE: 29

Vendor ID: 0x2CB7 Product ID: 0x0110

Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	AT	Device Application Interface
3	DIAG	Device Diagnostic Interface

GTUSBMODE: 34

Vendor ID: 0x2CB7 Product ID: 0x0110

Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	AT	Device Application Interface
3	DIAG	Device Diagnostic Interface
4	AUDIO	UAC Interface

GTUSBMODE: 35

Vendor ID: 0x2CB7 Product ID: 0x0110

Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface

2	AT	Device Application Interface
3	DIAG	Device Diagnostic Interface
4	AUDIO	UAC Interface
5	ADB	Android Composite ADB Interface

**Table 5. FG132 series USB port information**

GTUSBMODE: 20

Vendor ID: 0x2CB7 Product ID: 0x0107

Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector

GTUSBMODE: 21

Vendor ID: 0x2CB7 Product ID: 0x0108

Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface

GTUSBMODE: 22

Vendor ID: 0x2CB7 Product ID: 0x0109

Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface
2	RmNet	Wireless Data Device Ethernet Adapter

GTUSBMODE: 23

Vendor ID: 0x2CB7 Product ID: 0x010A

Interface Number	Interface Name	Interface Function
0	Modem	Modem Connector
1	AT	Device Application Interface
2	ECM	ECM communication class interface
3	ECM	ECM data class interface

GTUSBMODE: 24

Vendor ID: 0x2CB7 Product ID: 0x010B

Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface

2	Modem	Modem Connector
3	Diag	Device Diagnostic Interface
4	ADB	Android Composite ADB Interface
GTUSBMODE: 29		
Vendor ID: 0x2CB7 Product ID: 0x0110		
Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	AT	Device Application Interface
3	DIAG	Device Diagnostic Interface
GTUSBMODE: 30		
Vendor ID: 0x2CB7 Product ID: 0x0111		
Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	Modem	Modem Connector
3	Diag	Device Diagnostic Interface
4	AT	Device Application Interface
GTUSBMODE: 36		
Vendor ID: 0x2CB7 Product ID: 0x0112		
Interface Number	Interface Name	Interface Function
0	RmNet	Wireless Data Device Ethernet Adapter
1	Diag	Device Diagnostic Interface
2	AT	Device Application Interface
3	NMEA (GNSS)	GNSS interfaces related to AT commands
GTUSBMODE: 37		
Vendor ID: 0x2CB7 Product ID: 0x0112		
Interface Number	Interface Name	Interface Function
0	RmNet	Wireless Data Device Ethernet Adapter
1	Diag	Device Diagnostic Interface
2	AT	Device Application Interface
3	NMEA (GNSS)	GNSS interfaces related to AT commands

4	ADB	Android Composite ADB Interface
GTUSBMODE: 38		
Vendor ID: 0x2CB7 Product ID: 0x0113		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
GTUSBMODE: 39		
Vendor ID: 0x2CB7 Product ID: 0x0113		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
5	ADB	Android Composite ADB Interface
GTUSBMODE: 40		
Vendor ID: 0x2CB7 Product ID: 0x0114		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
GTUSBMODE: 41		
Vendor ID: 0x2CB7 Product ID: 0x0114		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	Diag	Device Diagnostic Interface



3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
5	ADB	Android Composite ADB Interface

GTUSBMODE: 42

Vendor ID: 0x2CB7 Product ID: 0x0115

Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands

GTUSBMODE: 43

Vendor ID: 0x2CB7 Product ID: 0x0115

Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
5	ADB	Android Composite ADB Interface

GTUSBMODE: 47

Vendor ID: 0x2CB7 Product ID: 0x0117

Interface Number	Interface Name	Interface Function
0	RmNet	Wireless Data Device Ethernet Adapter
1	Diag	Device Diagnostic Interface
2	AT	Device Application Interface
3	NMEA (GNSS)	GNSS interfaces related to AT commands
4	DPL	Data Protocol Logging

GTUSBMODE: 48

Vendor ID: 0x2CB7 Product ID: 0x0118

Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface

1	ECM	ECM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
5	DPL	Data Protocol Logging
GTUSBMODE: 49		
Vendor ID: 0x2CB7 Product ID: 0x0119		
Interface Number	Interface Name	Interface Function
0	MBIM	MBIM communication class interface
1	MBIM	MBIM data class interface
2	Diag	Device Diagnostic Interface
3	AT	Device Application Interface
4	NMEA (GNSS)	GNSS interfaces related to AT commands
5	ADB	Android Composite ADB Interface



Only USB composition containing DPL interfaces will include TCP/UDP logs in the log.

**Table 6. MA510 series USB port information**

GTUSBMODE: 31 (default)		
Vendor ID: 0x2CB7 Product ID: 0x0106		
Interface Number	Interface Name	Interface Function
0	DIAG	Device Diagnostic Interface
1	Modem	Modem Connector
2	AT	Device Application Interface
3	ECM	ECM communication class interface
4	ECM	ECM data class interface
GTUSBMODE: 32		
Vendor ID: 0x2CB7 Product ID: 0x010A		
Interface Number	Interface Name	Interface Function
0	MODEM	Modem Connector
1	AT	Device Application Interface

2	ECM	ECM communication class interface
3	ECM	ECM data class interface

## 2.3 Sanechips Platform USB Port Information

The specific USB port information is subject to the AT manual of each product. The following table shows the commonly used USB port information of L716 and other series modules.

**Table 7. L716 series USB port information**

GTUSBMODE: 10 (default)		
Vendor ID: 0x2CB7 Product ID: 0x0001		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2	AT	Device Application Interface
3	MODEM	Modem Connector
4	AT	Device Application Interface
5	Log	Device Log Interface
6	ADB	Android Composite ADB Interface
GTUSBMODE: 11		
Vendor ID: 0x2CB7 Product ID: 0x0001		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2	AT	Device Application Interface
3	MODEM	Modem Connector
4	AT	Device Application Interface
5	Log	Device Log Interface
6	ADB	Android Composite ADB Interface

## 2.4 Eigencomm Platform USB Port Information

The following table shows the commonly used USB port information of Eigencomm platform LE series modules.

Table 8. LE series USB port information

GTUSBMODE: 30		
Vendor ID: 0x2CB7 Product ID: 0x0D01		
Interface Number	Interface Name	Interface Function
0/1	AT	Device Application Interface
2/3	Log	Device Log Interface
4/5	AT	Device Application Interface
GTUSBMODE: 31		
Vendor ID: 0x2CB7 Product ID: 0x0D01		
Interface Number	Interface Name	Interface Function
0	RNDIS	RNDIS communication class interface
1	RNDIS	RNDIS data class interface
2/3	AT	Device Application Interface
4/5	Log	Device Log Interface
6/7	AT	Device Application Interface
GTUSBMODE: 32		
Vendor ID: 0x2CB7 Product ID: 0x0D01		
Interface Number	Interface Name	Interface Function
0	ECM	ECM communication class interface
1	ECM	ECM data class interface
2/3	AT	Device Application Interface
4/5	Log	Device Log Interface
6/7	AT	Device Application Interface

## 3 RNDIS Dial-up

### 3.1 Introduction to RNDIS Dial-up

NDIS is the abbreviation of Network Driver Interface Specification. It spans the transport layer, the network layer and the data link layer, defines the communication interface specification between the network card or the network card driver and the upper layer protocol driver, shields the difference of the underlying physical hardware, and enables the upper layer protocol driver to communicate with any type of the underlying network card.

NDIS creates a complete development environment for network drivers. It only needs to call NDIS functions, without considering the kernel of the operating system and the interface with other drivers. Therefore, the network drivers can be separated from the complex communication with the operating system, which greatly facilitates the writing of network drivers. In addition, NDIS encapsulation feature allows you to focus on one-layer driver design, reducing the complexity of the design, and easy to extend the driver stack.

RNDIS refers to Remote NDIS. The implementation of RNDIS based on USB is actually to run TCP/IP on the USB device, that is, TCP/IP over USB, so that the USB device acts as a network card to realize the network communication of the host.

Configure support for RNDIS NIC mode through AT+GTUSBMODE and reboot, and you can check the RNDIS driver inside the network adapter.

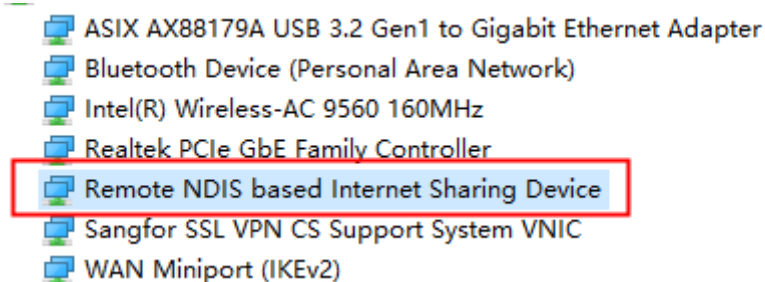


Figure 1. RNDIS driver

### 3.2 RNDIS Dial-up

#### 3.2.1 Set PDP Context

```
AT+CGDCONT=2,"IPV4V6","CMNET"
```

```
OK
```

```
AT+CGDCONT?
```

```
+CGDCONT:
```

```
0,"IPV4V6","3gnet","10.42.89.203,2408:840d:6820:dbb0:1777:3338:8da8:44b2",0,0
```

```
+CGDCONT: 2,"IPV4V6","cmnet","0.0.0.0,0:0:0:0:0:0:0:0",0,0
```

OK

## 3.2.2 RNDIS Dial-up

Dial-up commands:

AT+COPS?

+COPS: 0,0,"CHN-UNICOM",7

OK

AT+GTRNDIS=1,2

OK

AT+GTRNDIS?

+GTRNDIS:

1,2,"10.2.209.25,2408:840D:6800:0714:61FC:F74E:2DCA:5A9F","112.65.184.255,2408:8888:0:8888::8","210.22.84.3,2408:8899:0:8899::8"

OK

Description:

Parameter 1: Take the value "0" or "1", that is, deactivate or activate.

Parameter 2: Bounded cid. After activation, the network card transmits data through the pdp bearer of the bounded cid.

After dial-up, the IP address can be seen on the network card, and it is the same as the IPV4 address queried in the module, and the IPV6 prefix address is the same.

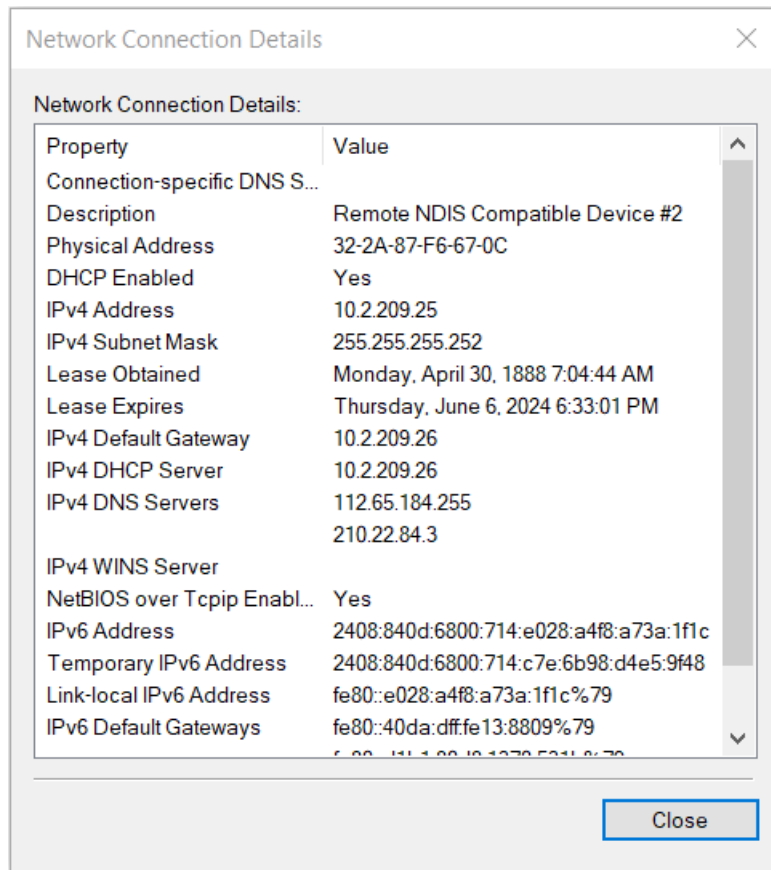


Figure 2. Check RNDIS NIC information

Execute a ping package on the host. If it can be pinged, the dial-up is successful.

```
C:\Users\fibcom>ping -4 www.qq.com

Pinging ins-r23tsuuf.ias.tencent-cloud.net [58.246.163.58] with 32 bytes of data:
Reply from 58.246.163.58: bytes=32 time=19ms TTL=52
Reply from 58.246.163.58: bytes=32 time=22ms TTL=52
Reply from 58.246.163.58: bytes=32 time=19ms TTL=52
Reply from 58.246.163.58: bytes=32 time=22ms TTL=52

Ping statistics for 58.246.163.58:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 22ms, Average = 20ms

C:\Users\fibcom>ping -6 www.qq.com

Pinging ins-r23tsuuf.ias.tencent-cloud.net [2408:80f1:21:c120::c] with 32 bytes of data:
Reply from 2408:80f1:21:c120::c: time=18ms
Reply from 2408:80f1:21:c120::c: time=18ms
Reply from 2408:80f1:21:c120::c: time=20ms
Reply from 2408:80f1:21:c120::c: time=20ms

Ping statistics for 2408:80f1:21:c120::c:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 18ms, Maximum = 20ms, Average = 19ms
```

Figure 3. Ping packet

# 4 PPP Dial-up

## 4.1 Introduction to PPP Dial-up

PPP (Point-to-Point Protocol) is a link-layer protocol designed for simple links that transmit data packets between peer units. This link provides full-duplex operation and passes packets in sequence. The main purpose of the design is to establish a point-to-point connection to send data through dial-up or dedicated lines, making it a common solution for simple connection between various hosts, bridges and routers.

The function of a dial-up network is to establish a communication link between two computers through a modem. Connecting to the Internet through a dial-up network is essentially logging your computer into an ISP's dial-up server by dial-up in.

## 4.2 Modem

### 4.2.1 Install and Configure Modem

The module is powered on and connected to the computer through USB. It is necessary to use the AT port to install the modem.



The modem on the Qualcomm platform will be installed automatically, and the modem can no longer be reinstalled.

#### 4.2.1.1 Install Modem

The procedure is as follows:

1. Open **Phone and Modem**, create an area code, and install a new modem.

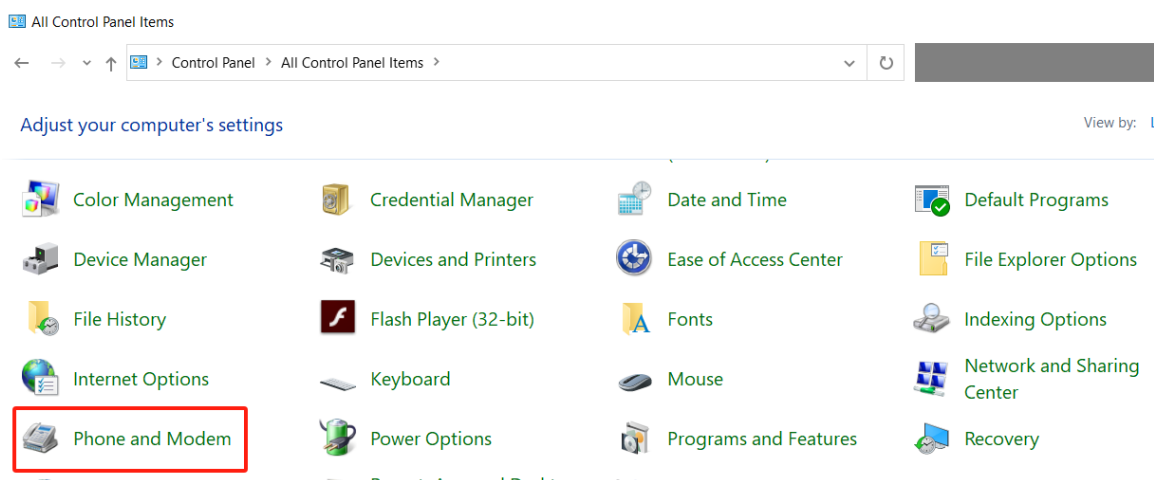


Figure 4. Open Phone and Modem



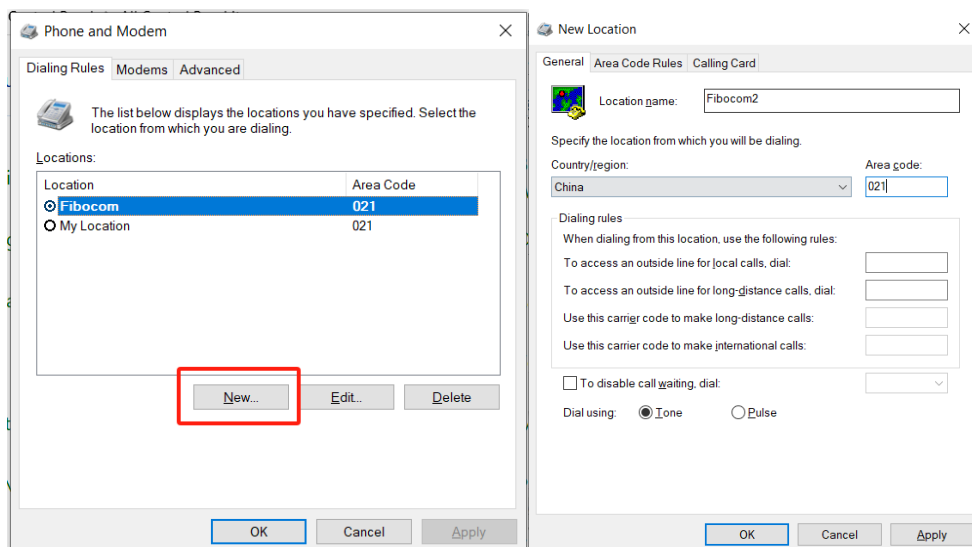


Figure 5. Establish dial-up rules

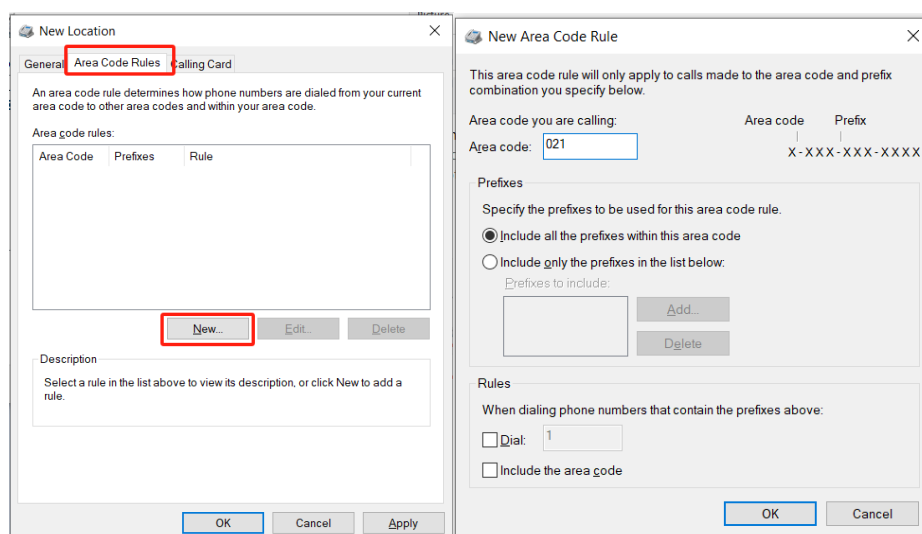


Figure 6. Create an area code

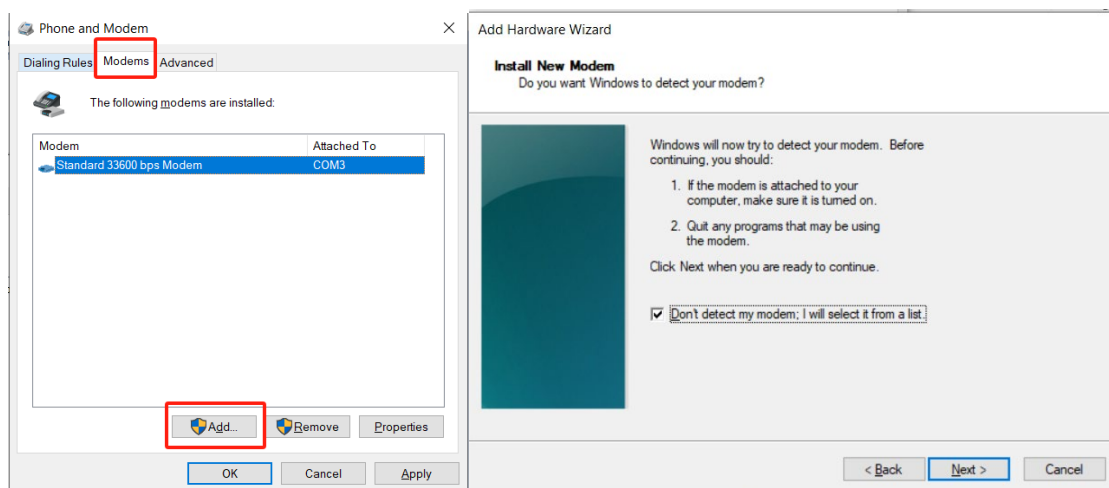


Figure 7. Install a new modem

2. Select the baud rate and the installation port, click **Next**, and the installation is complete.

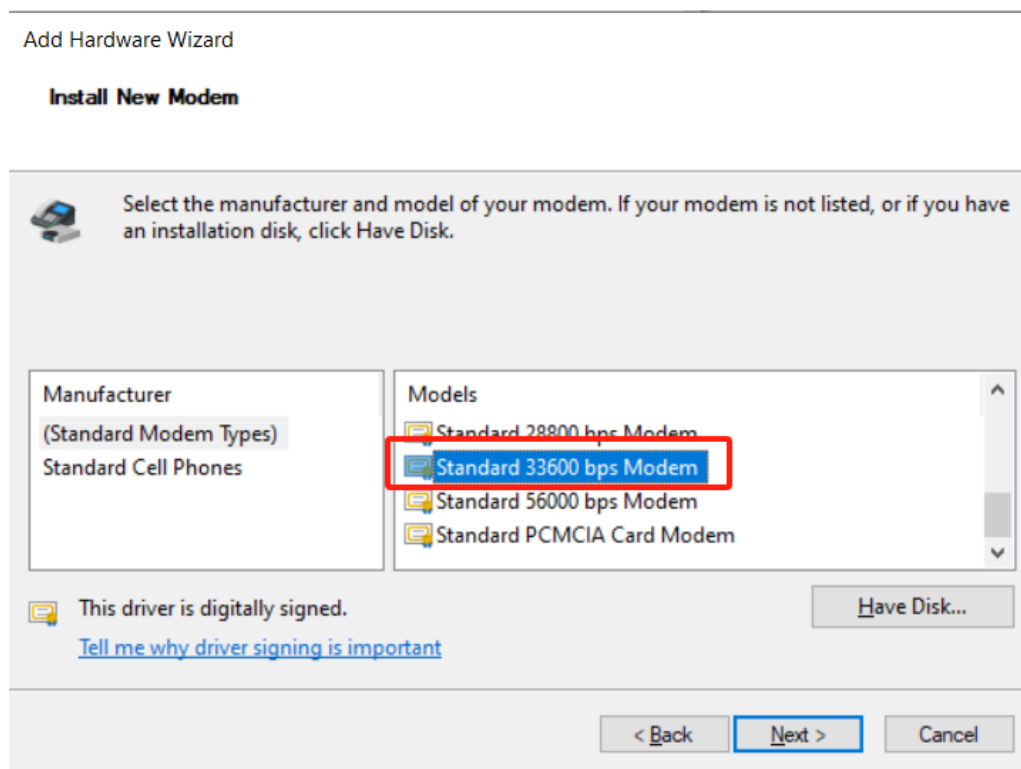


Figure 8. Select the baud rate

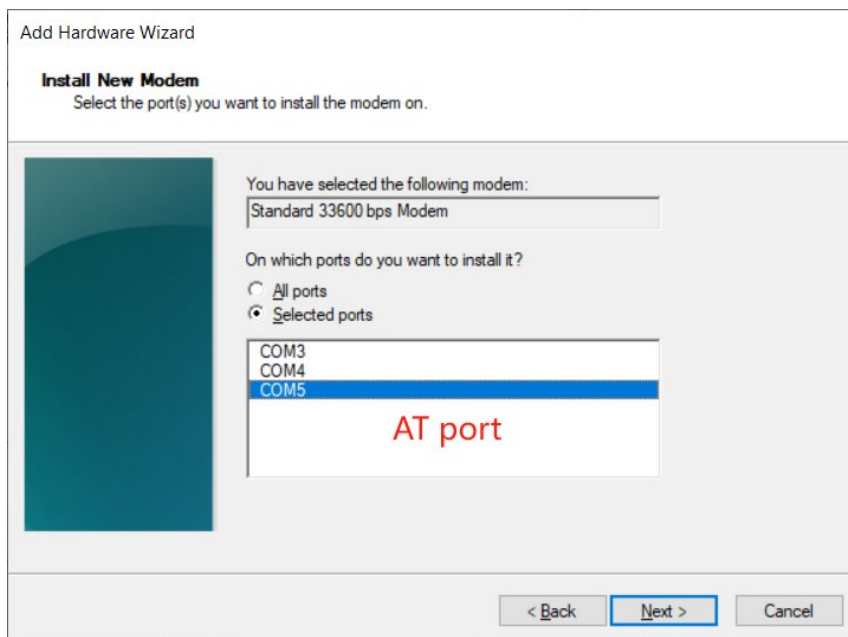


Figure 9. Select installation port

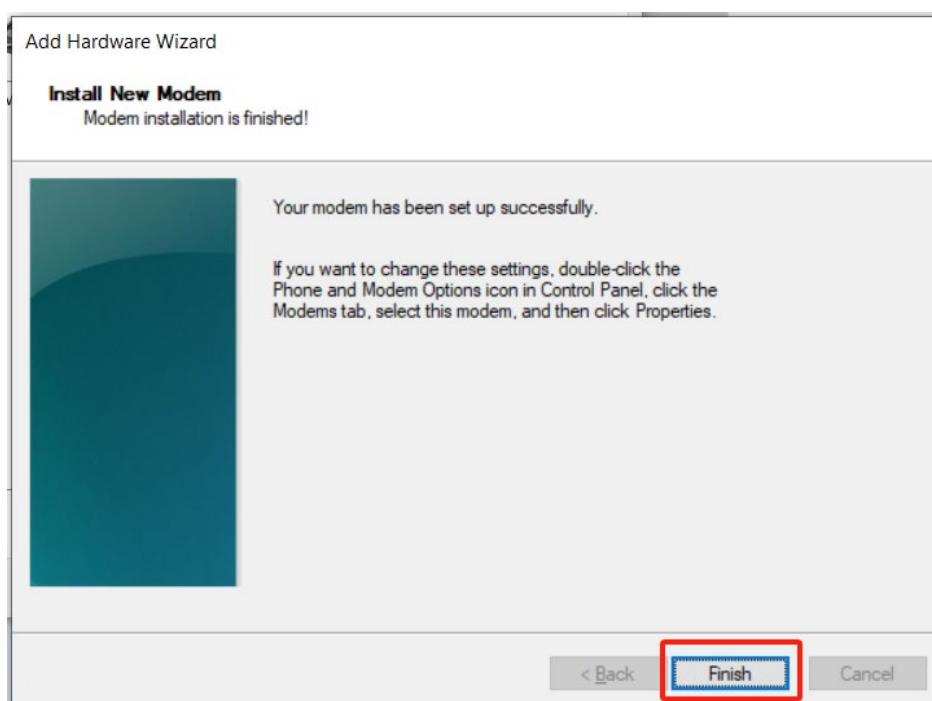


Figure 10. The installation is finished

#### 4.2.1.2 Change Hardware Flow Control



Ignore this section if you are using USB dial-up.

If UART dial-up is used, you need to select the installed modem in Device Manager and change the hardware flow control.

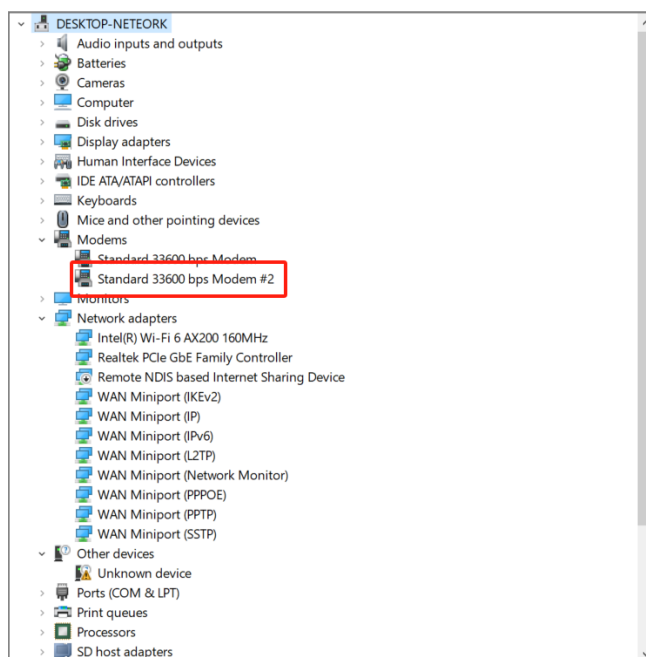


Figure 11. Select modem

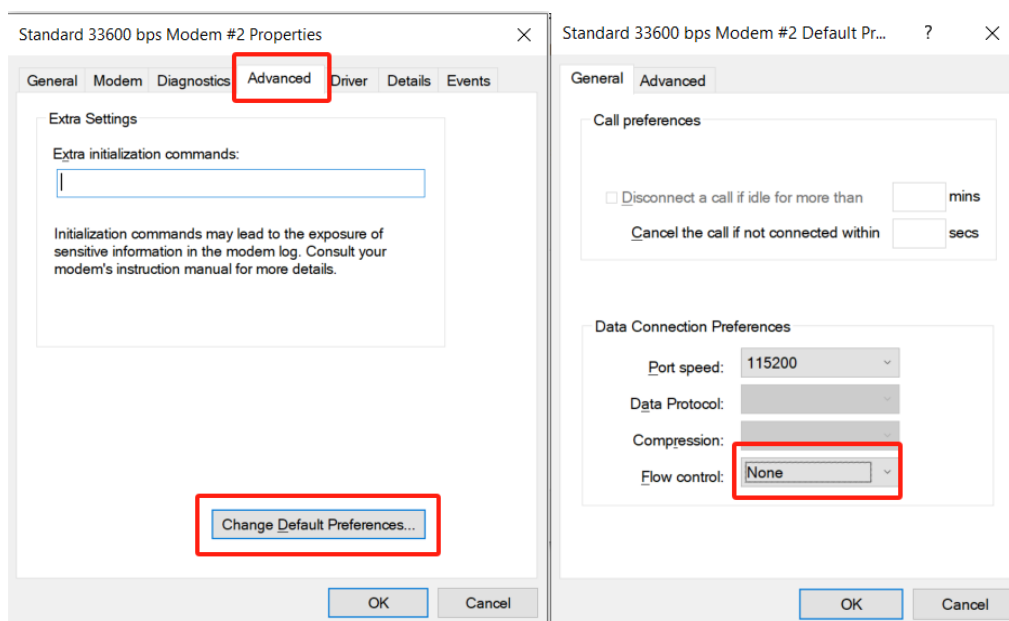


Figure 12. Set data flow control

## 4.2.2 View Modem

After installation and configuration as described above, you can see the modem with USB interface in the Device Manager, as shown in the following figure:

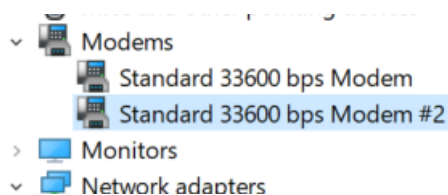


Figure 13. Modem

Right-click the modem and click properties to view the port on the **Modem** tab.

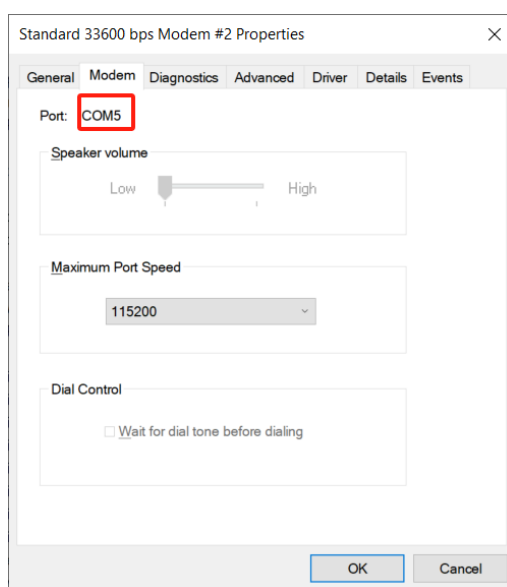


Figure 14. Port properties

## 4.3 Establish a Dial-up Connection

### 4.3.1 Set APN, Username, Password, and Authentication Method

Some dedicated networks require the settings of APN, username, password, and authentication method. You can configure these parameters by sending the following AT commands through the serial port:

```
AT+CGDCONT=1,"IPV4V6","APN"
```

```
OK
```

```
AT+MGAUTH=1,1,"username","password"
```

```
OK
```

### 4.3.2 First Dial-up

The process for the first dial-up is as follows:

1. Open **Network and Sharing Center**, select **Set up a new connection or network**, and connect to the new Internet.

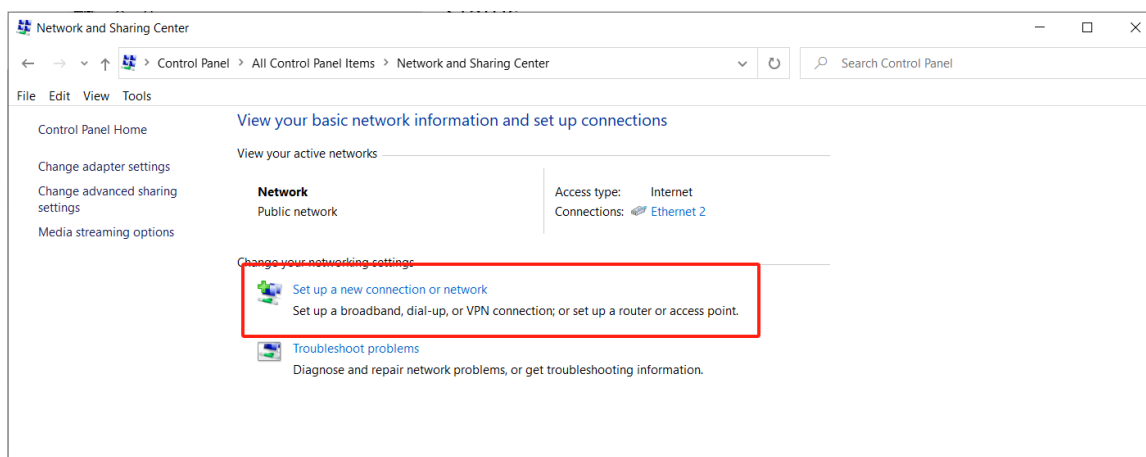


Figure 15. Set up a new connection or network

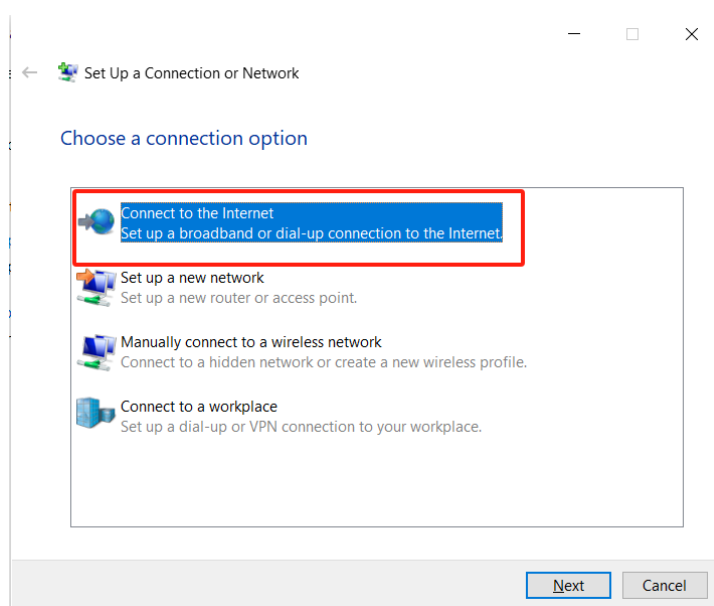


Figure 16. Connect to Internet

2. Select **Set up a new connection anyway** and dial.

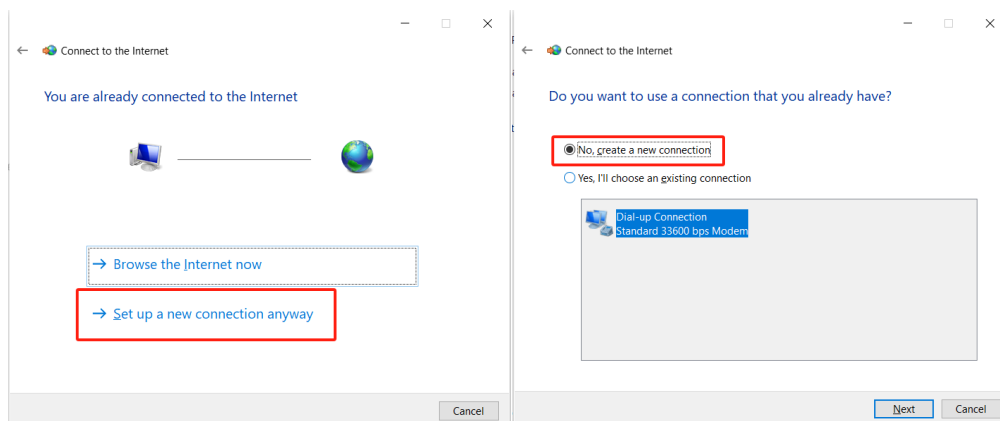


Figure 17. Set up a new connection

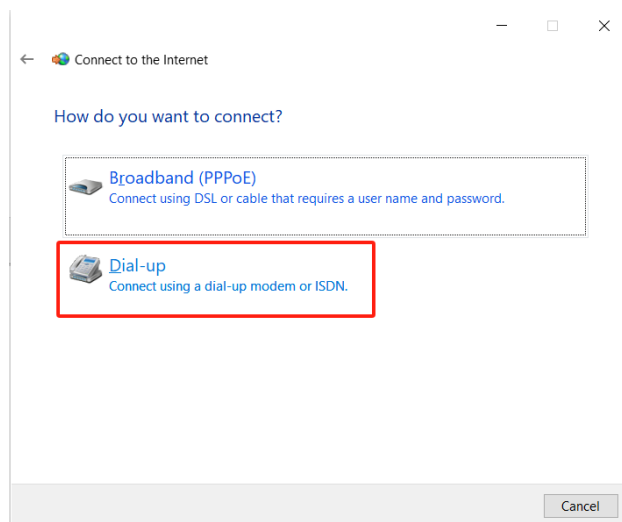


Figure 18. Select dial-up

3. Turn on the modem and enter the phone number (**\*99#** in most cases). If the module supports multiple profiles and multi-channel PDN dialing, you can use **\*99\*\*\*1#** (the first PDN, usually replaced by the **\*99#** command), **\*99\*\*\*2#** (the second PDN), and **\*99\*\*\*3#** (the third PDN), and select the corresponding APN for dialing. If network authentication is required, fill in the required username and password. After the configuration, click **Connect**.

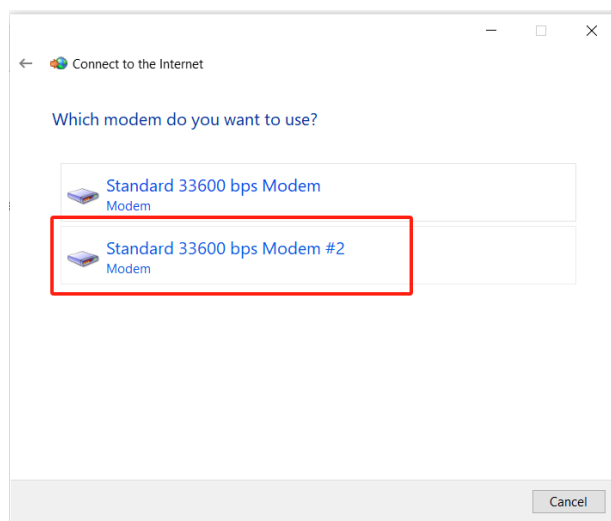


Figure 19. Select modem

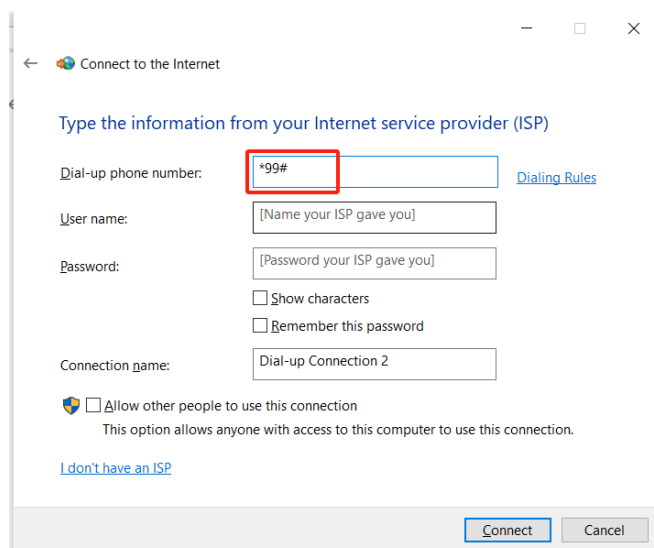


Figure 20. Set dial-up information

After the connection is complete, you can click the Internet access icon in the lower-right corner to view the status of the dial-up results.

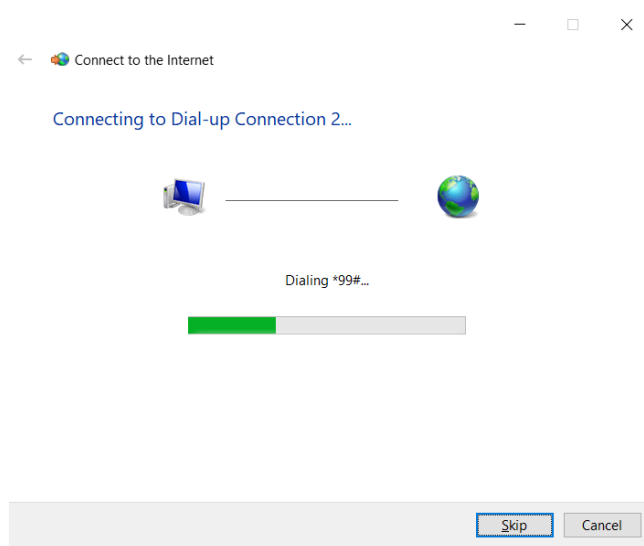


Figure 21. Start connection



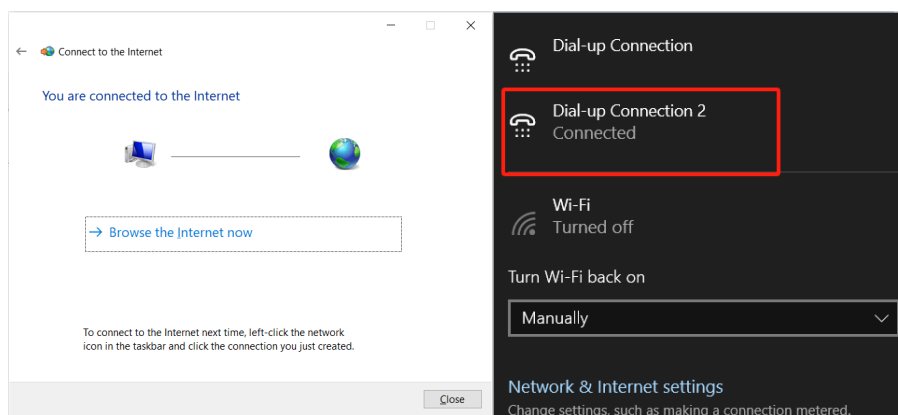


Figure 22. Connection result

### 4.3.3 Non-first Dial-up or Failed First Dial-up

If the first dial-up failed, or if it is not the first dial-up, follow the following procedure.

1. Open the Internet access icon in the lower right corner, select the dial-up connection you have created, and click **Connect**.

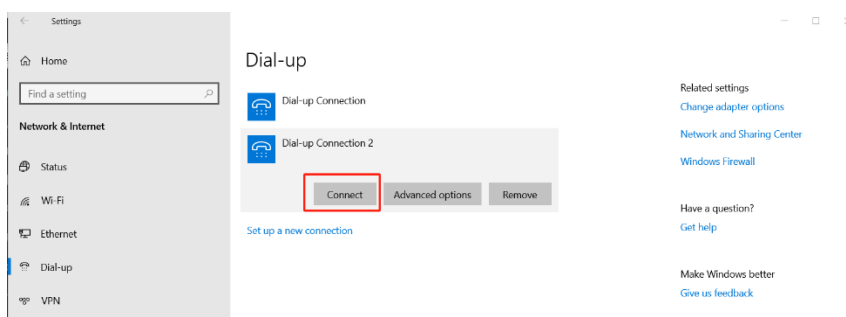


Figure 23. Dial-up connection

2. Select **Properties** on the dial-up interface, select the specified modem, and then select **Enable hardware flow control**.

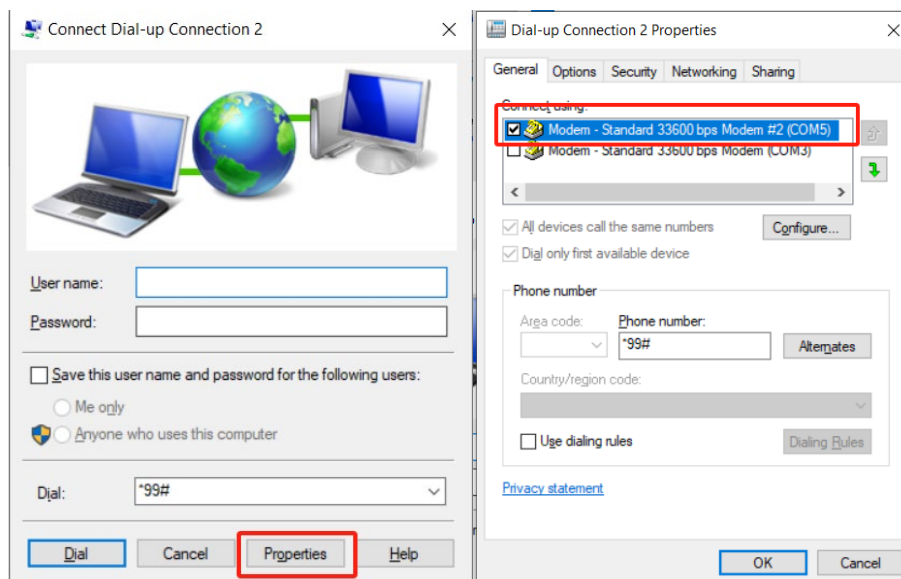


Figure 24. Select modem

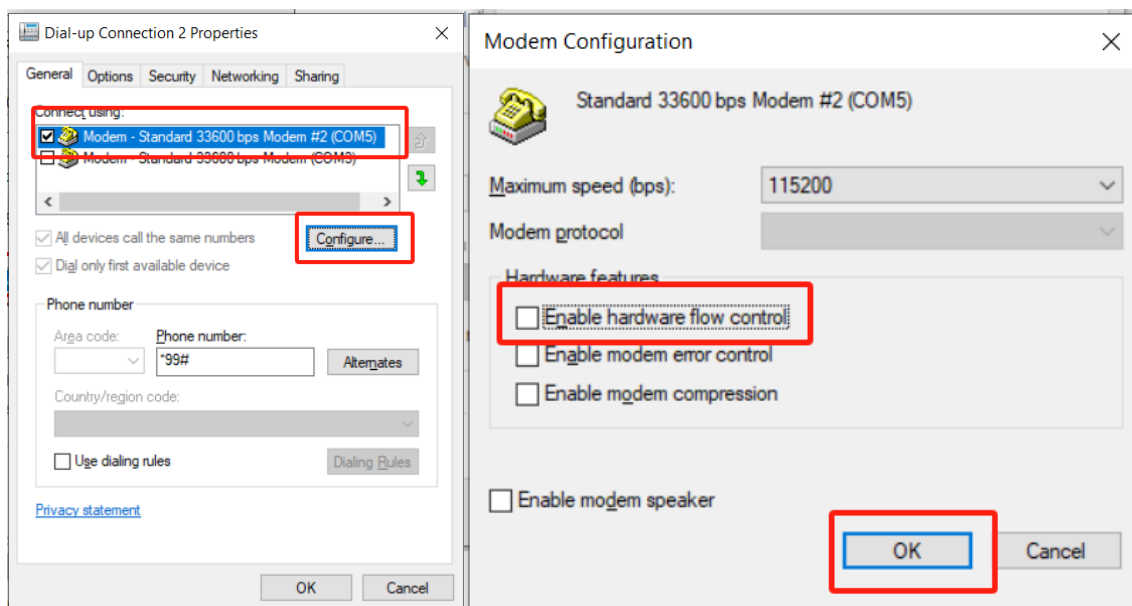


Figure 25. Enable hardware flow control

3. Set the authentication type. On the **Security** tab, set the authentication method according to your needs.

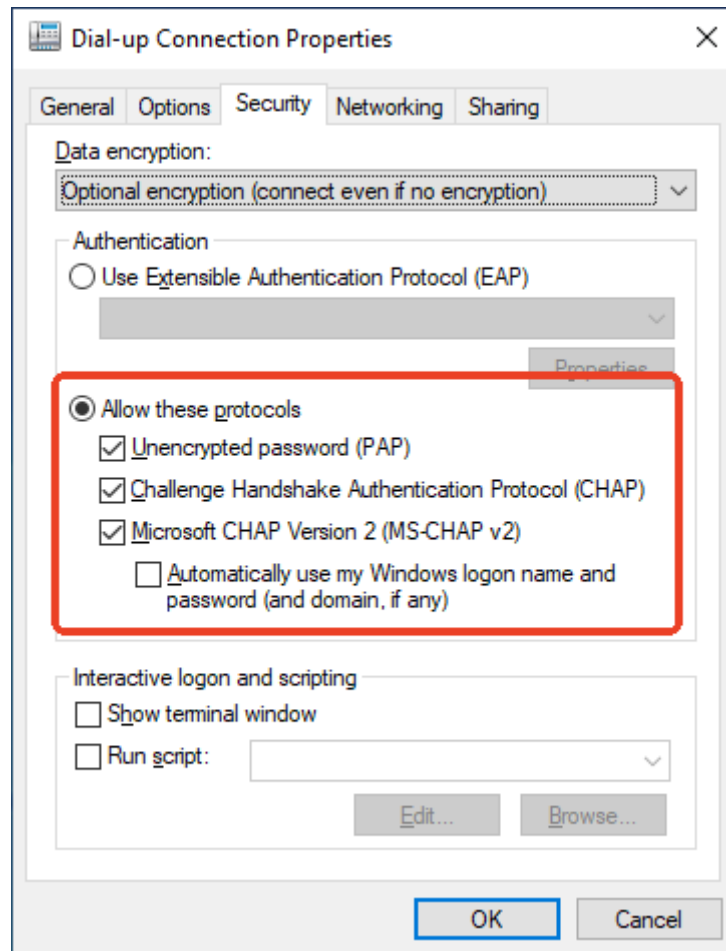


Figure 26. Set authentication method

4. Set the dial-up network type. On the **Networking** tab, set the network type to IP, IPv6, or IPv4v6 according to your needs.

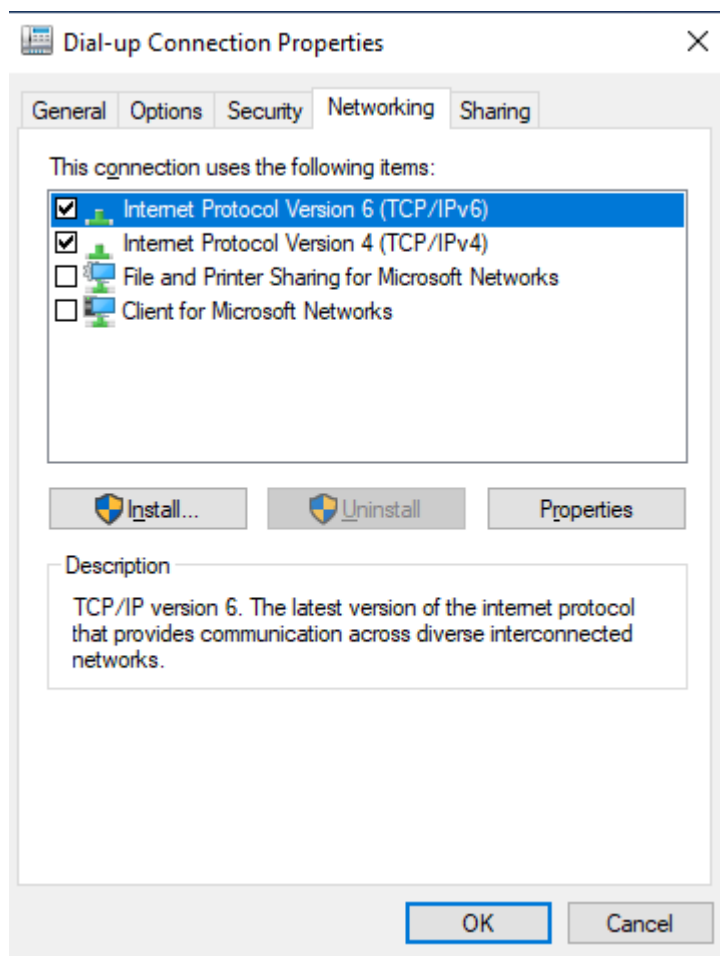


Figure 27. Set dial-up network type

5. Enter the phone number. If the network requires a username and password, fill in the required username and password and then click **Dial**.



Figure 28. Dial-up

### 4.3.4 View IP Address

Open the CMD window and enter *ipconfig* to query the PPP network card.

```
C:\Users\q>ipconfig

Windows IP Configuration

PPP adapter Dial-up Connection:

    Connection-specific DNS Suffix  . : 
    IPv6 Address. . . . . : 2409:891f:6800:98b2:1811:fa97:7d79:9aea
    Link-local IPv6 Address . . . . . : fe80::1811:fa97:7d79:9aea%26
    IPv4 Address. . . . . : 10.16.90.66
    Subnet Mask . . . . . : 255.255.255.255
    Default Gateway . . . . . : fe80::1811:fa97:7c79:9aeb%26
                                0.0.0.0
```

Figure 29. PPP network card

### 4.3.5 Check Ping Results

Ping the network using the PPP network card in the command line window.

```
C:\Users\q>ping -4 www.qq.com

Pinging ins-r23tsuuf.ias.tencent-cloud.net [183.194.238.117] with 32 bytes of data:
Reply from 183.194.238.117: bytes=32 time=52ms TTL=51
Reply from 183.194.238.117: bytes=32 time=38ms TTL=51
Reply from 183.194.238.117: bytes=32 time=36ms TTL=51
Reply from 183.194.238.117: bytes=32 time=36ms TTL=51

Ping statistics for 183.194.238.117:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 36ms, Maximum = 52ms, Average = 40ms

C:\Users\q>ping -6 www.qq.com

Pinging ins-r23tsuuf.ias.tencent-cloud.net [2409:8c1e:75b0:1120::27] with 32 bytes of data:
Reply from 2409:8c1e:75b0:1120::27: time=62ms
Reply from 2409:8c1e:75b0:1120::27: time=38ms
Reply from 2409:8c1e:75b0:1120::27: time=38ms
Reply from 2409:8c1e:75b0:1120::27: time=41ms

Ping statistics for 2409:8c1e:75b0:1120::27:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 38ms, Maximum = 62ms, Average = 44ms
```

Figure 30. Ping the network

## 5 RmNet Dial-up

### 5.1 Introduction to RmNet Dial-up

The RmNet interface is the evolution of the Qualcomm platform to ECM, and it also belongs to CDC-ECM. Their specific difference lies in the different ways of encapsulating USB commands, the used USB interfaces, and the definition of endpoints. The RmNet function in Qualcomm devices simulates the network interface of connected terminal devices and supports QMI as a communication channel. QMI defines a framework for communication between applications and drivers. After installing the USB driver on a Windows system, you can see the network card for RmNet in the network adapter.

This section mainly introduces the RmNet dial-up process under Windows.



This dial-up method is unique to the Qualcomm platform and is not supported by other platforms.

Configure support for RmNet NIC mode through AT+GTUSBMODE and reboot, and you can check the RmNet driver inside the network adapter.

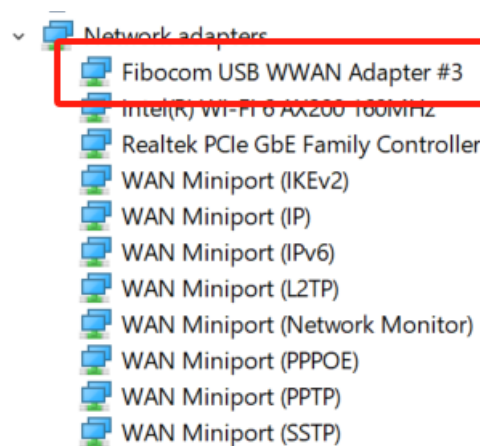


Figure 31. RmNet driver

## 5.2 RmNet Dial-up Process

Send the command AT\$QCRMCALL=1,1 to establish an IPv4 connection.

```
AT
OK
AT+COPS?
+COPS: 0,0,"CHN-CT",7
```

```
OK
AT$QCRMCALL=1,1
$QCRMCALL: 1, V4
```

```
OK
```

Send the command AT\$QCRMCALL=0,1 to disconnect the dial.

```
AT$QCRMCALL=0,1
OK
```

Send the command AT\$QCRMCALL=1,1,3 to establish an IPv4v6 connection.

```
AT$QCRMCALL=1,1,3
$QCRMCALL: 1, V4
$QCRMCALL: 1, V6
```

```
OK
```

If multiple PDNs are supported, AT\$QCRMCALL=1,1,1,2,cid can be issued to activate the corresponding cid, thereby activating the corresponding PDN. Issue the AT\$QCRMCALL=1,1,1,2,2 command to activate the second PDN.

```
AT$QCRMCALL=1,1,1,2,2
$QCRMCALL: 1, V4
```

```
OK
```

```
AT+CGDCONT?
+CGDCONT:
1,"IPV4V6","CTNET","10.46.111.196,36.14.4.84.66.240.64.76.23.160.89.7.120.39.166.195",0,0,0,0
+CGDCONT: 2,"IP","3GNET","10.33.187.10",0,0,0,0
```

```
OK
```

After the dial-up is complete, ping a website to check whether the dial-up is successful.

```
Mobile Broadband adapter Cellular 3:
  Connection-specific DNS Suffix  . : 
  IPv4 Address. . . . . : 10.195.43.25
  Subnet Mask . . . . . : 255.255.255.252
  Default Gateway . . . . . : 10.195.43.26

Wireless LAN adapter Wi-Fi:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix  . : ght.com

C:\Users\fibcom>ping www.baidu.com

Pinging www.a.shifen.com [110.242.68.4] with 32 bytes of data:
Reply from 110.242.68.4: bytes=32 time=52ms TTL=54
Reply from 110.242.68.4: bytes=32 time=48ms TTL=54
Reply from 110.242.68.4: bytes=32 time=45ms TTL=54
Reply from 110.242.68.4: bytes=32 time=44ms TTL=54

Ping statistics for 110.242.68.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 44ms, Maximum = 52ms, Average = 47ms
```

Figure 32. Ping a website



# 6 MBIM Dial-up

## 6.1 Introduction to MBIM Dial-up

MBIM (Mobile Broadband Interface Model) is a new interface standard proposed by Intel, Microsoft and other USB/IF members along with the widespread application of mobile broadband in notebook/Ultrabook, Tablet, Pad and other mobile devices. Specific standards can be downloaded from the official website of USB/IF. It unifies the interface standards of mobile broadband devices (USB data cards/network cards, NGFF data cards, etc.) and PC terminals. Modem vendors do not need to provide drivers, because they are supported on WIN8 and later versions.

## 6.2 Dial-up Process

### 6.2.1 Confirm USB Mode

After the module is connected to Windows and booted, check whether there is an MBIM driver in the Windows Device Manager:

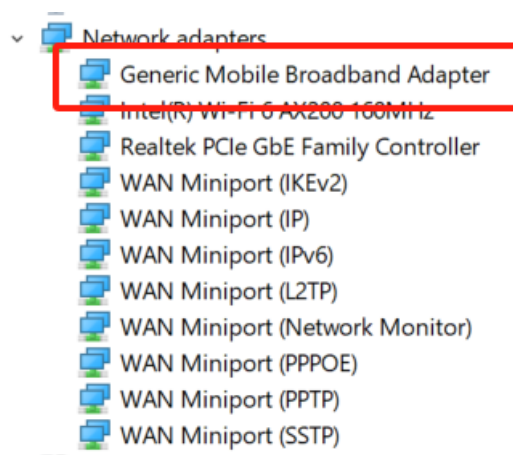


Figure 33. MBIM driver

If there is no MBIM NIC driver in Device Manager, check USB mode. Send AT+GTUSBMODE to the module through the serial port for query and setting (the parameters of different products are different, please refer to the section "USB Port Information" for details. The NL668 is taken as an example):

```
AT+GTUSBMODE?  
+GTUSBMODE: 17  
  
OK  
AT+GTUSBMODE=29      /*USB is set to include MBIM*/  
OK  
  
AT+CFUN=15           /*Reboot the module*/
```

OK

## 6.2.2 Initiate Dial-up

1. Click the network icon on the Windows taskbar. If this is the first time you are using MBIM, or if you have not set up an access point, the following window will pop up.

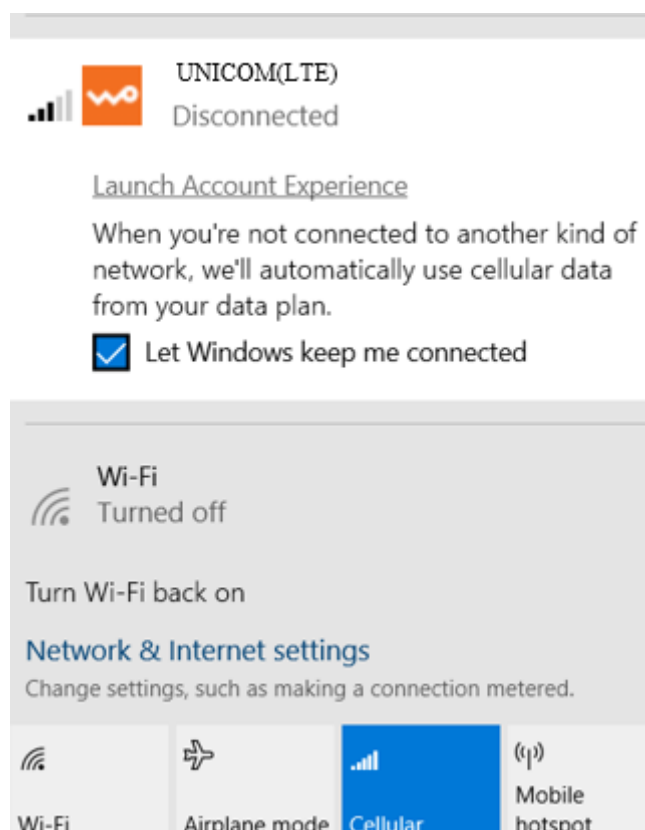


Figure 34. Lack of access points

2. Choose **Windows Settings > Network & Internet > Cellular > Advanced Options > Add an APN** to add an APN in the pop-up window. You can customize the configuration file name. Set the user name and password as required.

← Settings

## APN

Profile name

APN

User name

Password

Figure 35. Add access points

3. Click the network icon on the Windows taskbar, and the following window will pop up. Check **Let Windows keep me connected**, click the **Connect** button, and then Windows will initiate a dial.

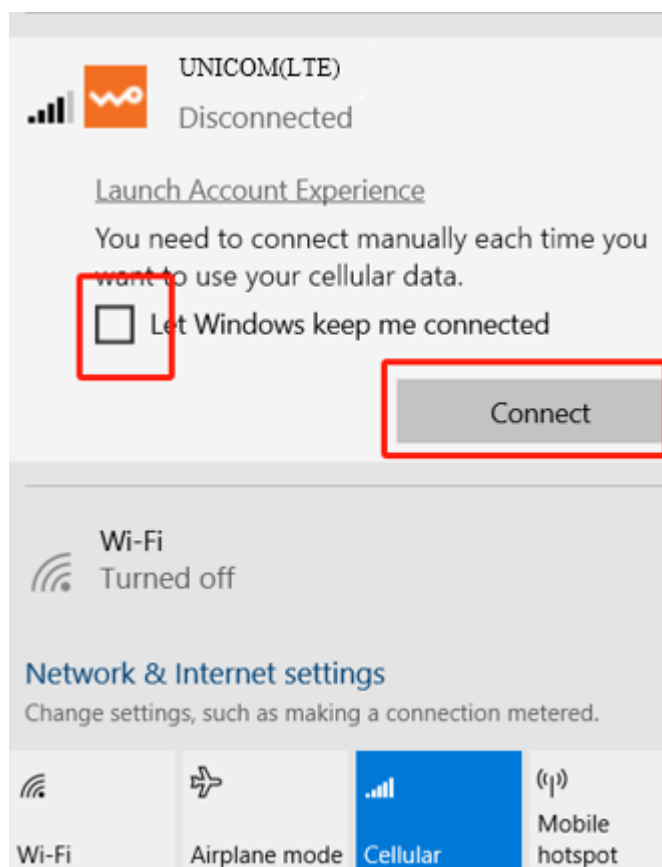


Figure 36. Initiate a dial-up

The following information is displayed if the dial-up is successful:

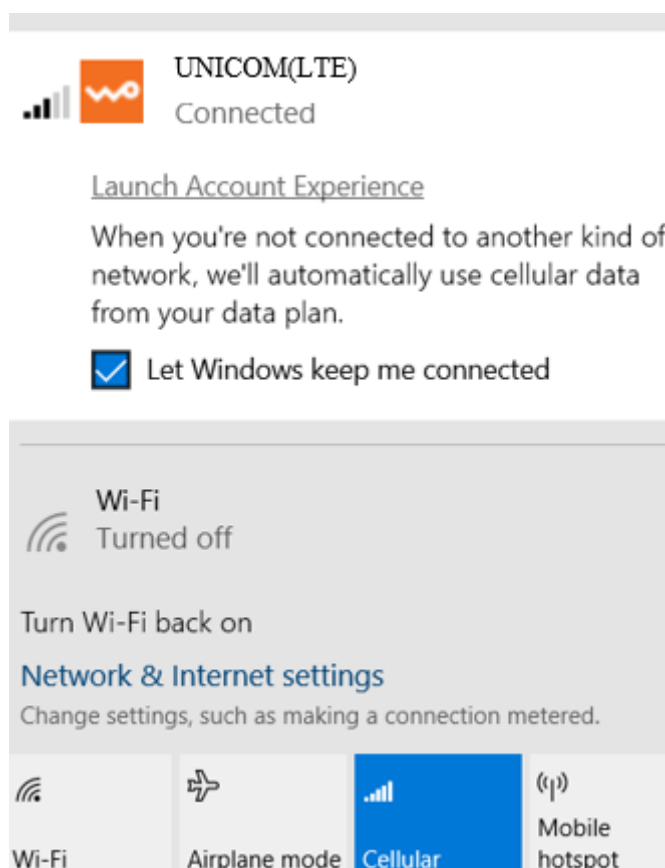


Figure 37. Successful dial-up

## 6.2.3 Check Dial-up Result

Under the command-line window, execute ipconfig to check the IP address.

```
Mobile Broadband adapter Cellular 15:

Connection-specific DNS Suffix . : 
IPv6 Address. . . . . : 2408:8471:b12:bff9:1c51:bb8a:47b9:925a
IPv6 Address. . . . . : 2408:8471:b12:bff9:285d:fb13:b1ee:3779
Temporary IPv6 Address. . . . . : 2408:8471:b12:bff9:218c:2e22:e7ca:8276
Link-local IPv6 Address . . . . . : fe80::1c51:bb8a:47b9:925a%57
IPv4 Address. . . . . : 11.100.65.209
Subnet Mask . . . . . : 255.255.255.252
Default Gateway . . . . . : 2408:8471:b12:bff9:1c90:6367:9903:dc03
                          fe80::1c90:6367:9903:dc03%57
                          11.100.65.210
```

Figure 38. Check IP address

Execute a ping package to check the network.

```
Mobile Broadband adapter Cellular 15:

Connection-specific DNS Suffix  . : 
IPv6 Address. . . . . : 2408:8471:b12:bff9:1c51:bb8a:47b9:925a
IPv6 Address. . . . . : 2408:8471:b12:bff9:285d:fb13:b1ee:3779
Temporary IPv6 Address. . . . . : 2408:8471:b12:bff9:218c:2e22:e7ca:8276
Link-local IPv6 Address . . . . . : fe80::1c51:bb8a:47b9:925a%57
IPv4 Address. . . . . : 11.100.65.209
Subnet Mask . . . . . : 255.255.255.252
Default Gateway . . . . . : 2408:8471:b12:bff9:1c90:6367:9903:dc03
                          fe80::1c90:6367:9903:dc03%57
                          11.100.65.210

C:\Users\fibcom>ping -4 www.baidu.com

Pinging www.a.shifen.com [110.242.68.3] with 32 bytes of data:
Reply from 110.242.68.3: bytes=32 time=215ms TTL=54
Reply from 110.242.68.3: bytes=32 time=42ms TTL=54
Reply from 110.242.68.3: bytes=32 time=42ms TTL=54
Reply from 110.242.68.3: bytes=32 time=40ms TTL=54

Ping statistics for 110.242.68.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 40ms, Maximum = 215ms, Average = 84ms
```

Figure 39. Ping packet