

# EG800Q&EG91xQ Series

## PPP Application Note

**LTE Standard Module Series**

Version: 1.0

Date: 2024-11-05

Status: Released



At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

**Quectel Wireless Solutions Co., Ltd.**

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local offices. For more information, please visit:**

<http://www.quectel.com/support/sales.htm>.

**For technical support, or to report documentation errors, please visit:**

<http://www.quectel.com/support/technical.htm>.

Or email us at: [support@quectel.com](mailto:support@quectel.com).

## Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

## Use and Disclosure Restrictions

### License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

### Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

## Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

## Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties ("third-party materials"). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

## Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel's or third-party's servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

## Disclaimer

- a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
- b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
- c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
- d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

**Copyright © Quectel Wireless Solutions Co., Ltd. 2024. All rights reserved.**

# About the Document

## Revision History

Version	Date	Author	Description
-	2024-08-27	Alwyn YE	Creation of the document
1.0	2024-11-05	Alwyn YE	First official release

## Contents

About the Document.....	3
Contents .....	4
Table Index.....	5
Figure Index .....	6
<b>1 Introduction .....</b>	<b>7</b>
<b>2 PPP Application Mode.....</b>	<b>8</b>
<b>3 PPP Setting.....</b>	<b>9</b>
3.1. General Procedures for PPP Setting.....	9
3.2. Recommended Procedures for PPP Setting .....	10
<b>4 PPP Connection Modes.....</b>	<b>12</b>
4.1. Data Mode and Command Mode.....	12
4.1.1. Switch from Data Mode to Command Mode.....	12
4.1.1.1. Change DTR Level to Switch from Data Mode to Command Mode .....	12
4.1.1.2. Use Sequence +++ to Switch from Data Mode to Command Mode .....	12
4.1.2. Switch from Command Mode to Data Mode.....	13
4.1.2.1. Use ATO to Switch from Command Mode to Data Mode.....	13
4.2. Handle URC in Data Mode .....	13
4.3. Data Carrier Detection (DCD) Mode.....	13
<b>5 PPP Connection Termination .....</b>	<b>15</b>
<b>6 PPP Dial-up Operations.....</b>	<b>16</b>
6.1. Preparation.....	16
6.2. PPP Dial-up in Windows 10.....	16
6.2.1. Modem Configuration.....	16
6.2.1.1. Add a New Modem .....	16
6.2.1.2. Configure the Modem Driver .....	21
6.2.2. Dial-up Network Configuration .....	22
6.2.2.1. Create a New Connection .....	22
6.2.2.2. Configure the Connection.....	24
6.2.2.3. Configure the Dial-up Tool .....	25
6.2.2.4. Establish the Dial-up Connection .....	26
<b>7 Appendix References .....</b>	<b>27</b>

## Table Index

Table 1: Related Documents .....	27
Table 2: Terms and Abbreviations .....	27

## Figure Index

Figure 1: PPP Application Mode .....	8
Figure 2: General Procedures for PPP Setting .....	9
Figure 3: Flowchart of Recommended Procedures for PPP Setting .....	10
Figure 4: Search for “Phone and Modem” in Control Panel .....	17
Figure 5: Add a New Modem.....	18
Figure 6: Select Model of the Modem .....	19
Figure 7: Select a Port .....	20
Figure 8: New Modem is Installed Successfully .....	20
Figure 9: Configure the Modem Driver.....	21
Figure 10: Create a New Connection.....	22
Figure 11: Set up the New Connection .....	23
Figure 12: Configure the Connection .....	24
Figure 13: Configure the Dial-up Tool .....	25
Figure 14: Connecting to Dial-up Connection.....	26
Figure 15: Establish the Dial-up Connection Successfully .....	26

# 1 Introduction

This document briefly introduces the PPP functions of Quectel EG800Q series and EG91xQ family (EG915Q series and EG916Q-GL) modules, including PPP application modes, setting procedures, connection modes, termination steps and dialing examples.



## 2 PPP Application Mode

The usage of PPP (Point-to-Point Protocol) is illustrated in the following figure. Use UART port or USB port for PPP connection. The module provides a PPP server for application, and the application provides a PPP client for the module. Meanwhile, the application must provide protocols such as TCP/IP, HTTP(S), etc. When PPP connection is established, the IP packet data stream from the application will be transmitted to the Internet through the module.

Most standard operating systems (e.g. Windows, Unix/Linux) include the PPP protocol stack. For operating systems that have no available applications for PPP connection, it is necessary to develop applicable application software first.

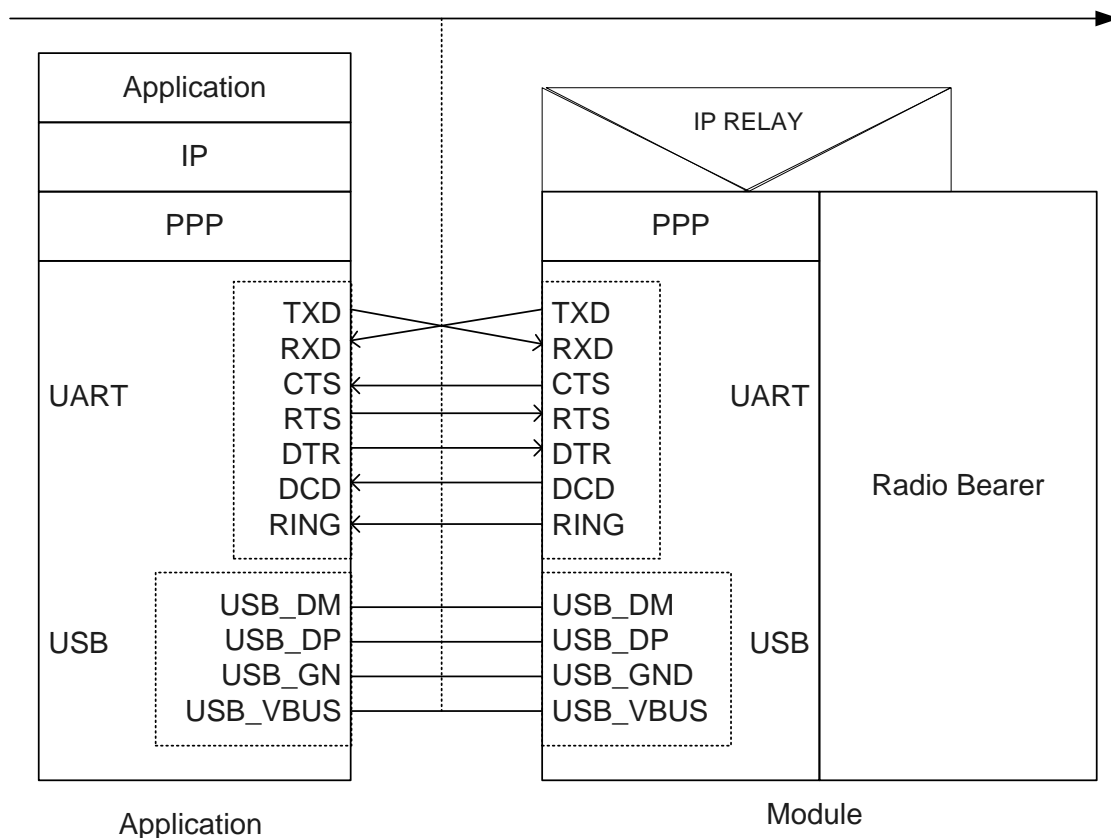


Figure 1: PPP Application Mode

# 3 PPP Setting

## 3.1. General Procedures for PPP Setting

After the module registers on GPRS network, it is necessary to set the APN for PPP by **AT+CGDCONT** and to start PPP by **ATD\*99#**. After executing **ATD\*99#**, the module will enter the PPP frame interaction process, which is based on standard PPP protocol. The module data packet interaction description is shown in the figure below. For more details about standard PPP, see *RFC 1661*.

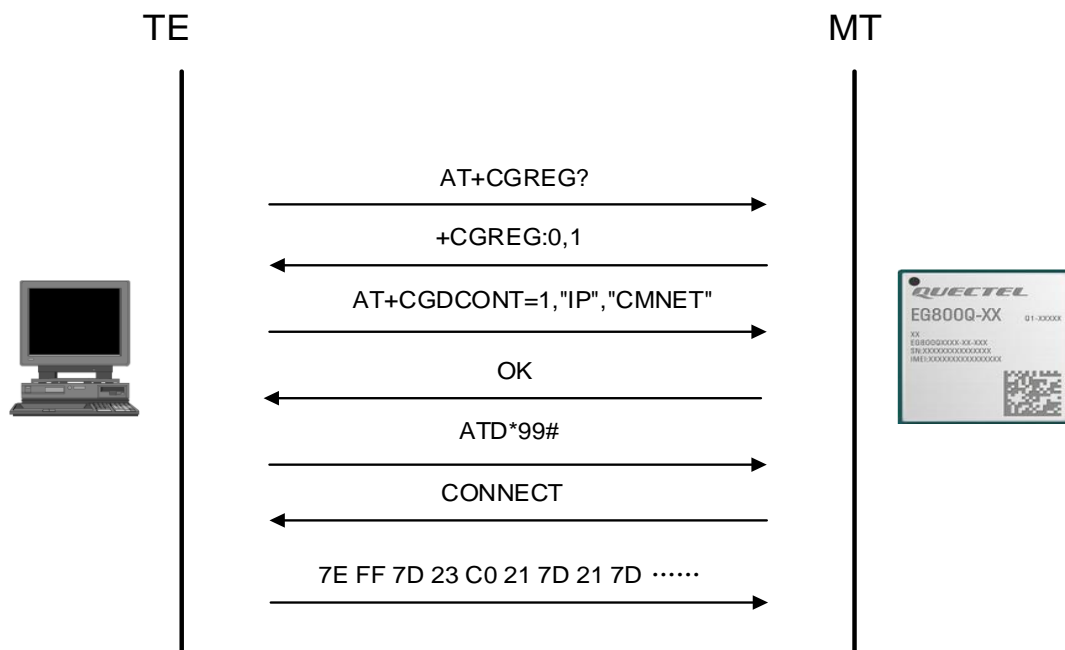


Figure 2: General Procedures for PPP Setting

### 3.2. Recommended Procedures for PPP Setting

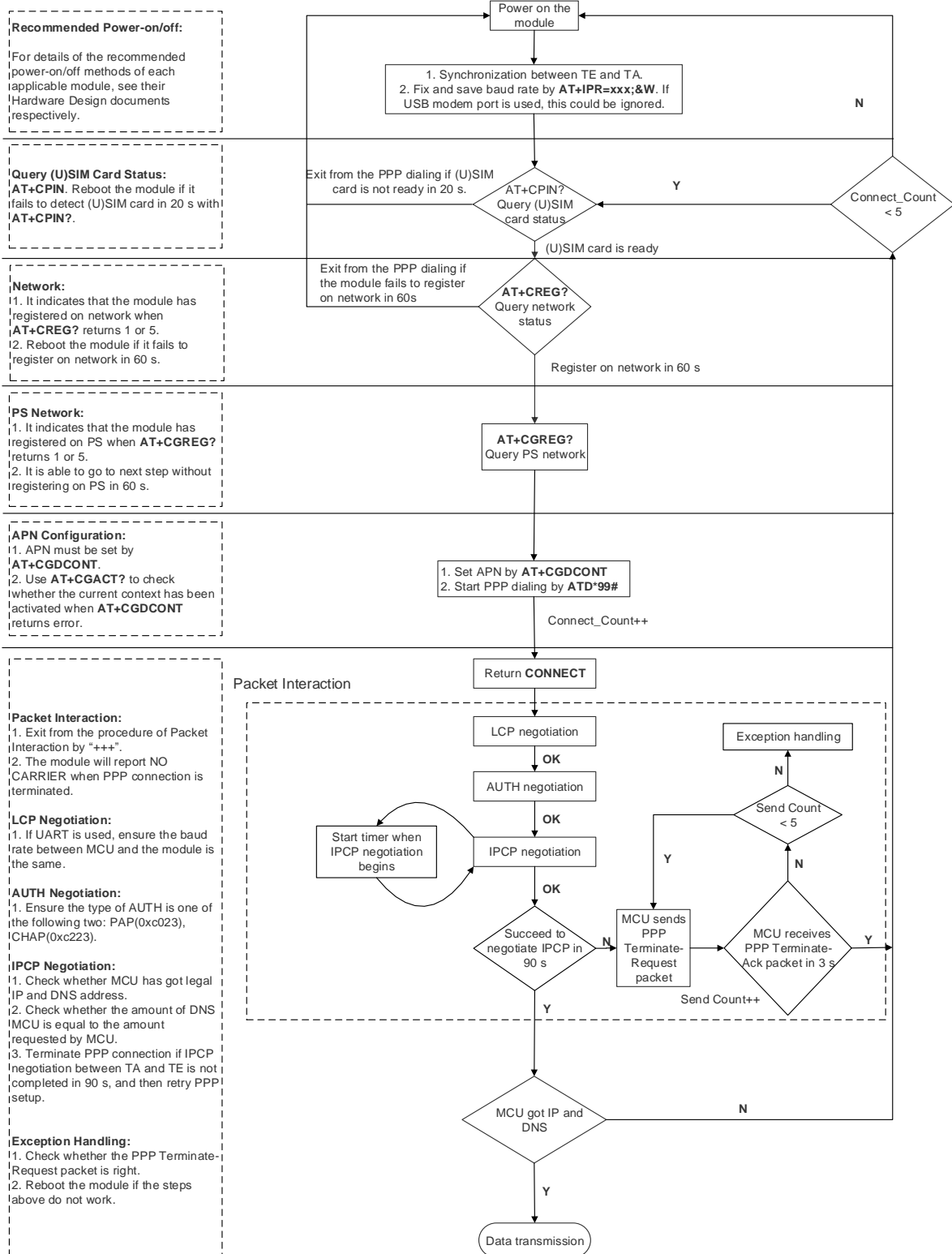


Figure 3: Flowchart of Recommended Procedures for PPP Setting

When the module is powered on, if the main UART is used, set the baud rate by executing **AT+IPR=xxx;&W**. Before executing **ATD\*99#** to set PPP, you must check the status of the (U)SIM card by **AT+CPIN?**. When the (U)SIM card is ready, please periodically check the network registration status by **AT+CREG?** and **AT+CGREG?** until the network is prepared.

**NOTE**

1. Please ensure MCU and the module are synchronized successfully after rebooting the module. MCU sends **AT<CR><LF>** to the module every 100 ms until it receives **OK** reported by the module. If the main UART is used, the MCU will execute **AT+IPR=xxx;&W** to set and save the baud rate after successfully synchronizing the baud rate.
2. Before inputting the next AT command, the MCU needs to wait for the response to the previous AT command (such as response **OK**, **CME error**, **CMS error**). If there is no response within 60 seconds, the module can be restarted.
3. It is strongly recommended NOT to power on/off the module frequently. If 3 consecutive dialing retries fail, you can immediately power on/off (reset) the module for the first time. After resetting, if the dialing retry fails, you need to wait 10 minutes for the second reset, 30 minutes for the third reset, and one hour for the fourth reset.
4. If the MCU fails to transmit data to network after establishing the PPP connection, please check the PPP configuration and network status and restart the module.

# 4 PPP Connection Modes

## 4.1. Data Mode and Command Mode

The module communicates with application via USB or UART port (including AT commands and data). USB and UART ports have two working modes: data mode and command mode.

The two ports are in command mode before PPP is set, and the module can execute AT commands in this mode. When PPP negotiation is started, the two ports enter data mode, and remain in the mode when the PPP connection is set. If the PPP connection is not successfully established, the two ports will be in the command mode. In data mode, the module cannot execute AT commands.

EG800Q series and EG91xQ family modules provide convenient methods to switch between the two modes.

### 4.1.1. Switch from Data Mode to Command Mode

#### 4.1.1.1. Change DTR Level to Switch from Data Mode to Command Mode

When the PPP connection has been established and USB/UART port is in data mode, change the DTR level from low to high to switch from data mode to command mode (**AT&D1** must be executed first). After the switch is successful, the module will return **OK**.

#### 4.1.1.2. Use Sequence +++ to Switch from Data Mode to Command Mode

After the PPP connection is successfully established, use **+++** to switch the USB/UART port from data mode to command mode. To prevent the **+++** escape sequence from being misinterpreted as data, the following requirements should be followed:

- 1) Do not input any characters within 1 s or longer before inputting **+++**.
- 2) Input **+++** within 1 s, and no other characters can be inputted during this period.
- 3) Do not input any characters within 1 s after inputting **+++**.

When **+++** is received, the USB/UART port will switch from data mode to command mode, and the module will return **OK**.

#### NOTE

Please perform the above operations after completing the PPP negotiation, otherwise the above operations will terminate the PPP negotiation and the USB/UART port will exit the data mode. After completing the PPP negotiation, when the USB/UART port switches to the command mode, the input data will be treated as AT command, and the module maintains the PPP connection.

### 4.1.2. Switch from Command Mode to Data Mode

#### 4.1.2.1. Use ATO to Switch from Command Mode to Data Mode

To switch USB/UART port from command mode to data mode when PPP connection maintains, you can execute **ATO**.

#### Example

//When PPP connection maintains, USB/UART port is in command mode.

**ATO**

**CONNECT** //Indicates that TA has entered data mode, and all data inputted from USB/UART port will be treated as PPP frames.

### 4.2. Handle URC in Data Mode

The URC for short messages in data mode will not be reported to the PPP dial-up port during PPP connection. But the level of module's RI pin will change from high to low for 120 ms as an indication of URC for short messages. The MCU can switch the port to command mode according to the RI pin status to process incoming calls or short message. After switching to command mode, the URC will be reported to the PPP dial-up port if there are still incoming calls or text messages.

### 4.3. Data Carrier Detection (DCD) Mode

DCD mode is determined by **AT&C**. If **AT&C0** is executed, the DCD pin will not be used to indicate the data carrier status. While executing **AT&C1**, the DCD pin will be used to indicate the data carrier status. The pin will remain at low level when there is data carrier or PPP negotiation begins, otherwise it will remain at high level.

**NOTE**

When switching module's USB/UART port from data mode to command mode (by using **+++**), the DCD state remains unchanged.

# 5 PPP Connection Termination

There are two methods to terminate the PPP dial-up connection:

1. Terminate the PPP connection through the LCP Terminate-Request message, and this method is recommended.
2. TA can also terminate the PPP connection by changing the DTR level. Set the DTR function by **AT&D2** first, change the DTR level from low to high, and the data connection will be automatically terminated. After the PPP connection is completely terminated, the USB/UART port will enter the command mode. Examples are as follows:

## Example

//USB/UART port is still in command mode before PPP connection is established.

**AT&D2**

OK

### NOTE

1. PPP connection termination procedures must be performed in data mode.
2. PPP connection termination procedures can be performed at any time during the PPP setting or connecting process.



# 6 PPP Dial-up Operations

This chapter introduces how to establish PPP dial-up connection in Windows 10. For detailed operations in Linux operating system, see **document [1]**.

## 6.1. Preparation

It is necessary to finish the following steps before establishing a PPP dial-up connection in Windows.

1. Connect the module to PC and enter the PIN code if the (U)SIM card PIN is locked.
2. Make sure the (U)SIM card can successfully register on network.

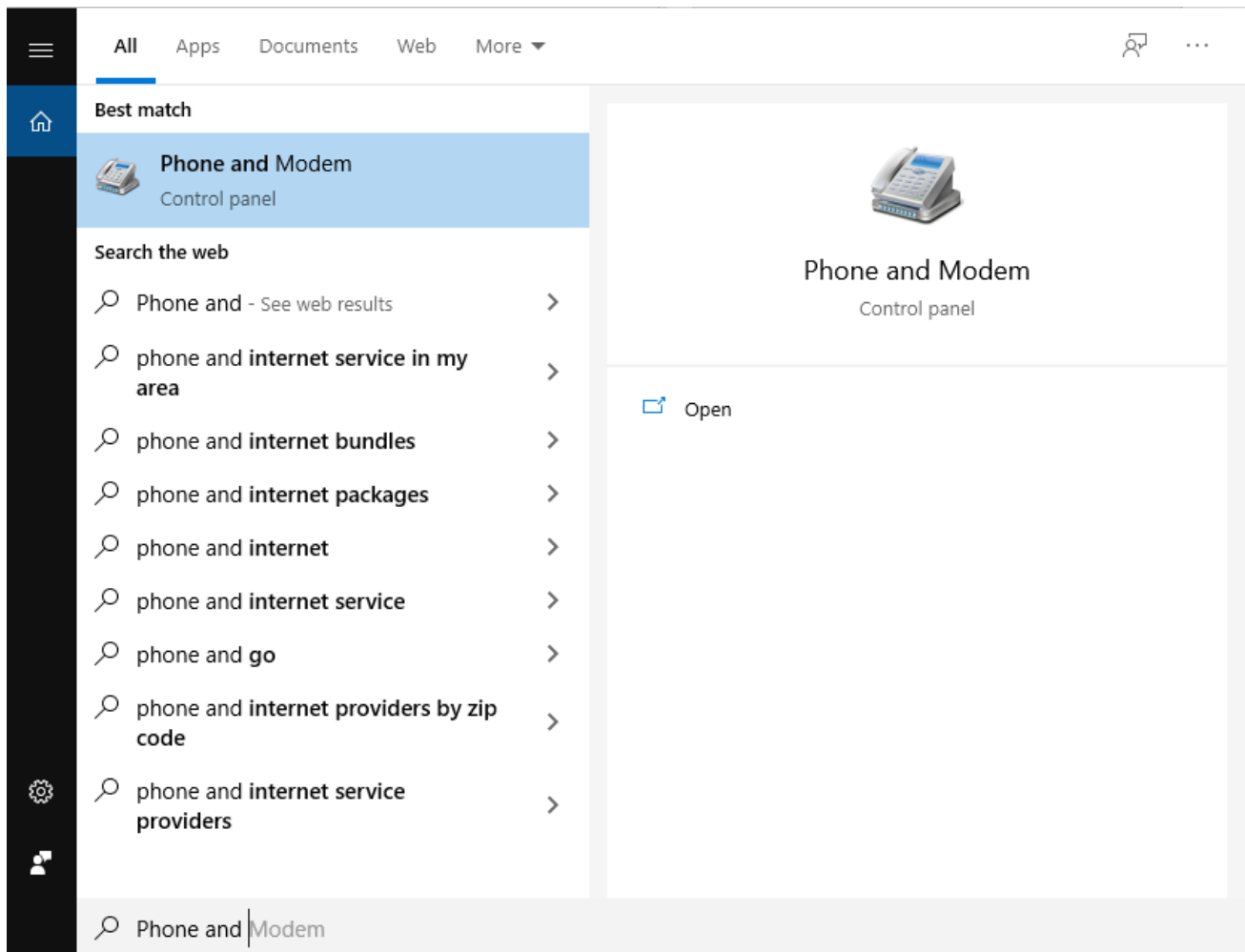
## 6.2. PPP Dial-up in Windows 10

### 6.2.1. Modem Configuration

#### 6.2.1.1. Add a New Modem

If the **Standard 19200 bps Modem** is not installed, you need to add a new standard modem to the modem section of the control panel.

1. Search for “**Phone**” in the main interface, and then click “**Phone and Modem**” as follows when it appears:



**Figure 4: Search for “Phone and Modem” in Control Panel**

2. Double-click the **"Phone and Modem"**, and select **"Modems"** → **"Add..."** to add a new modem, as shown in the following figure.

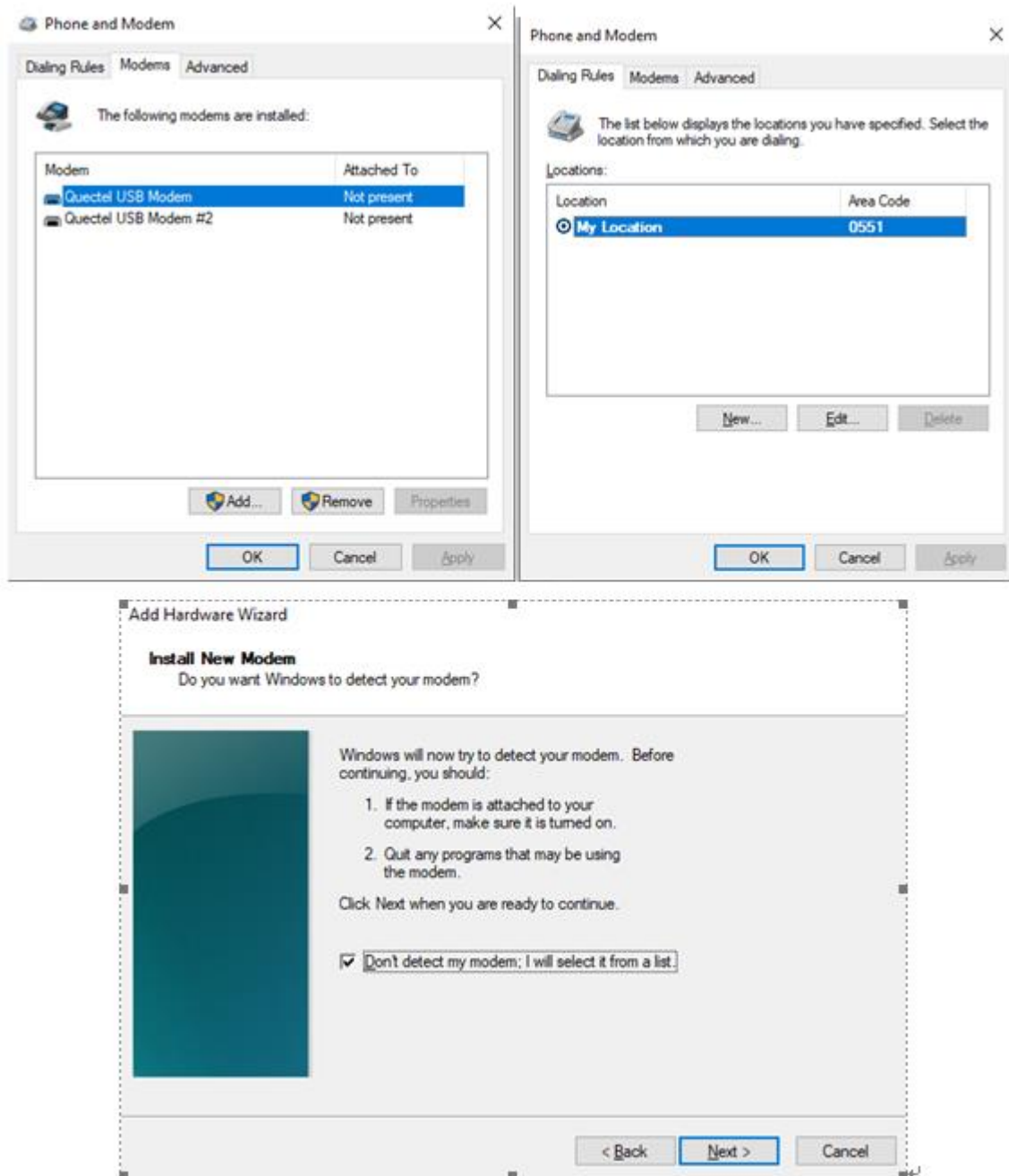
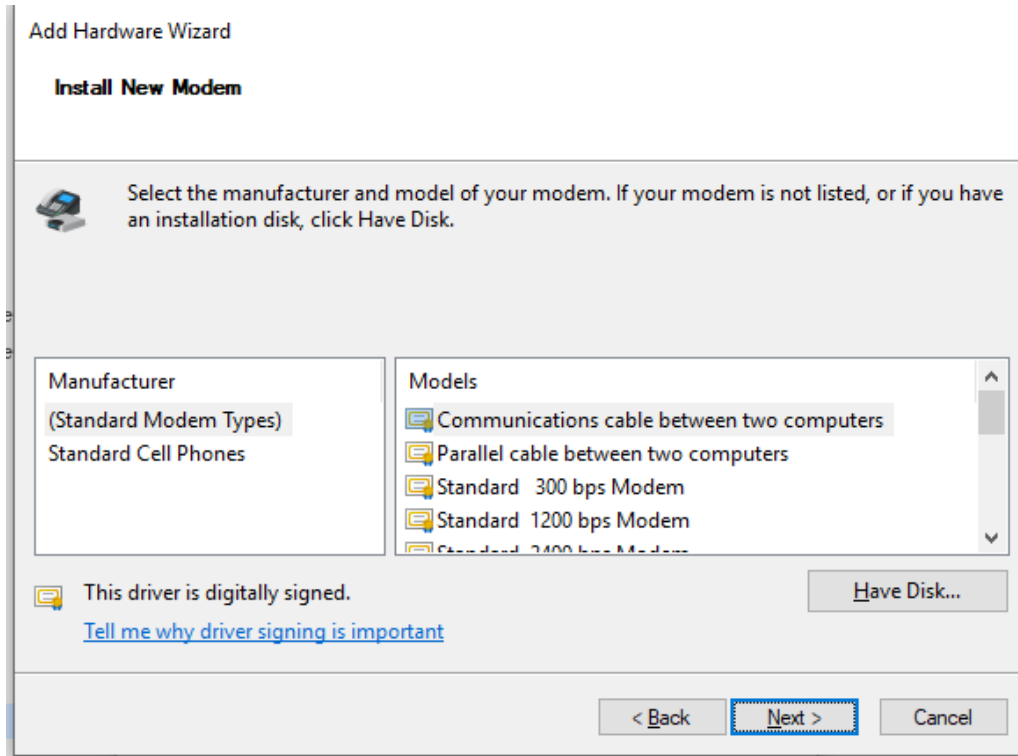


Figure 5: Add a New Modem

- Follow the instructions on the screen to install the new modem: select “**Standard 19200 bps Modem**” and then the port (such as “**COM10**”) to be installed; click “**Next**” button until the configuration is complete. For details, see the figure below.



**Figure 6: Select Model of the Modem**

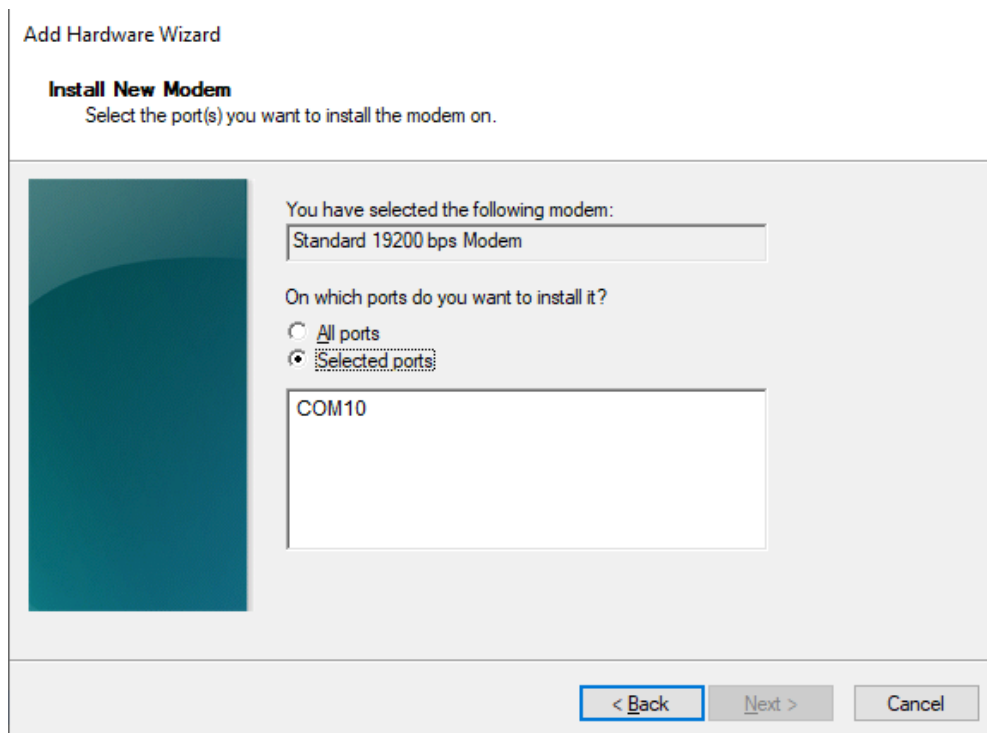


Figure 7: Select a Port

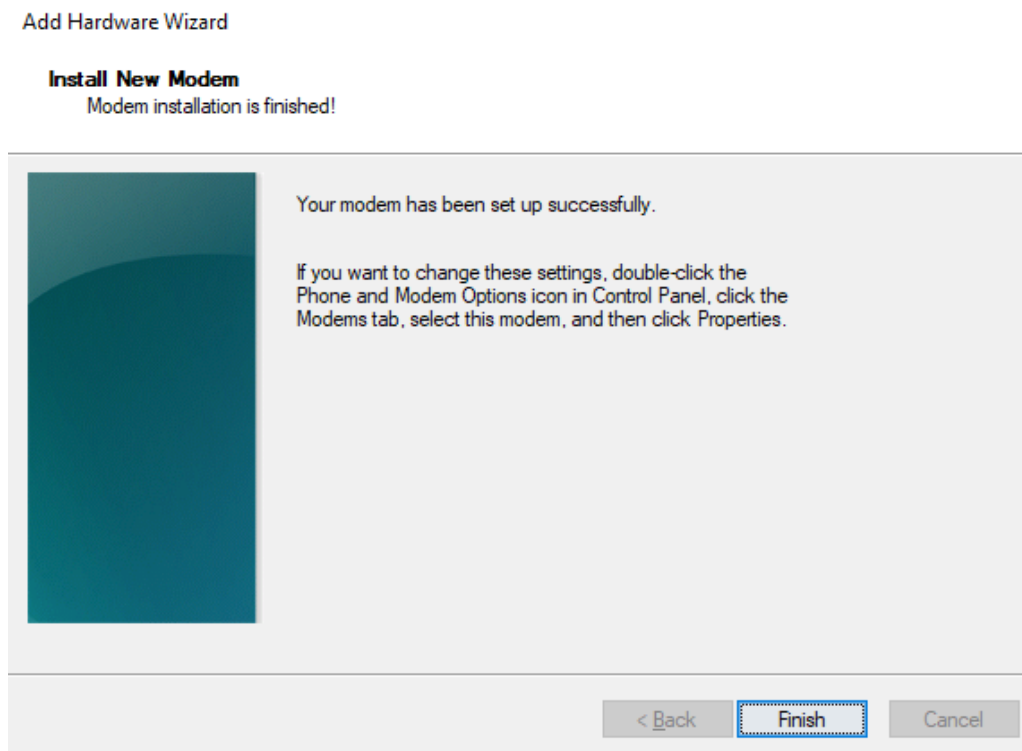


Figure 8: New Modem is Installed Successfully

### 6.2.1.2. Configure the Modem Driver

Select the installed **"Standard 19200 bps Modem"** and click the **"Properties"** button. After entering the interface, select the **"Modems"** option and modify the **"Maximum Port Speed"** to **"115200"** (default value). Click the **"Advanced"** option, configure **"Extra Settings"** and input **AT+CGDCONT=1,"IP","CMNET"** as shown below.

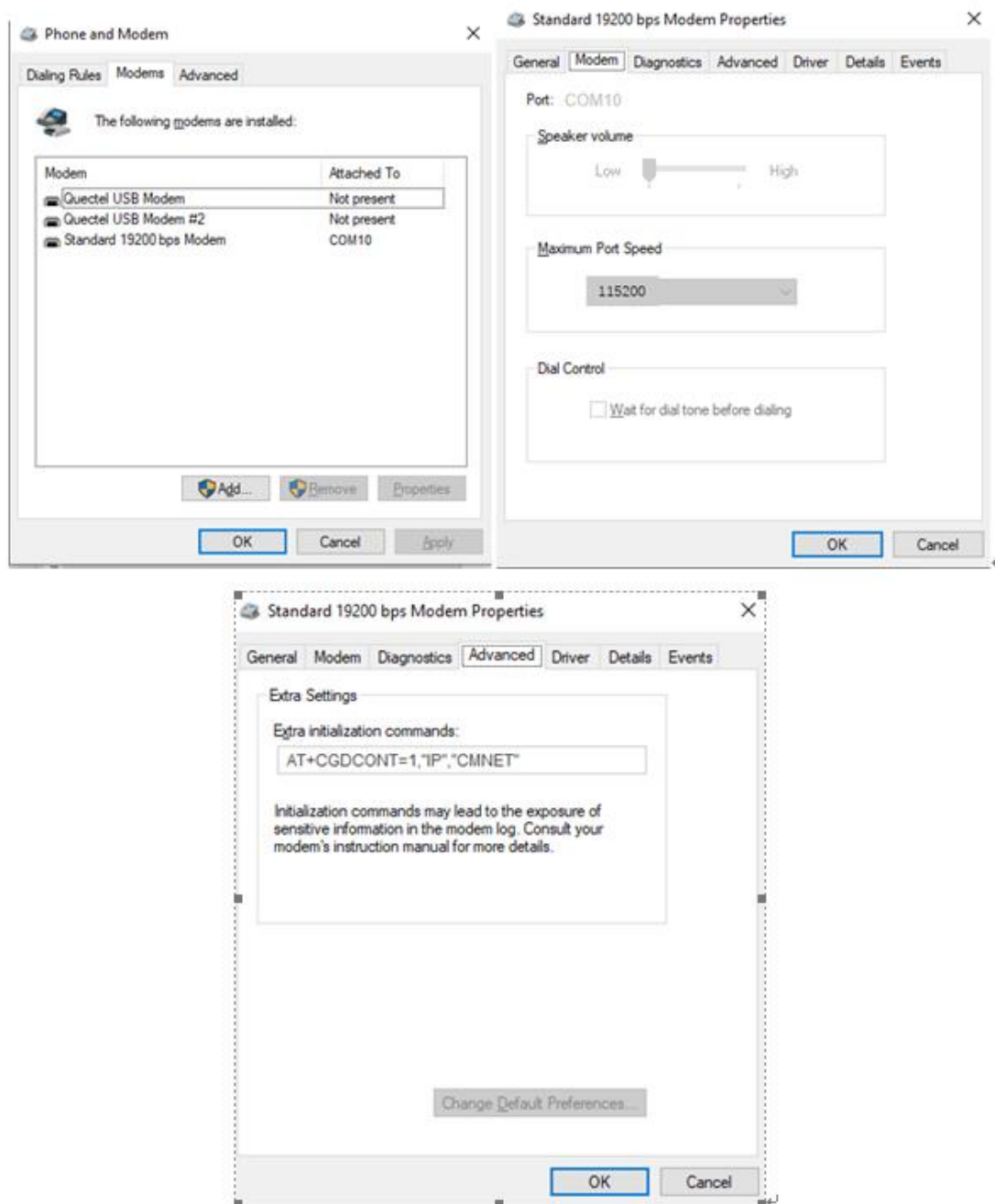


Figure 9: Configure the Modem Driver

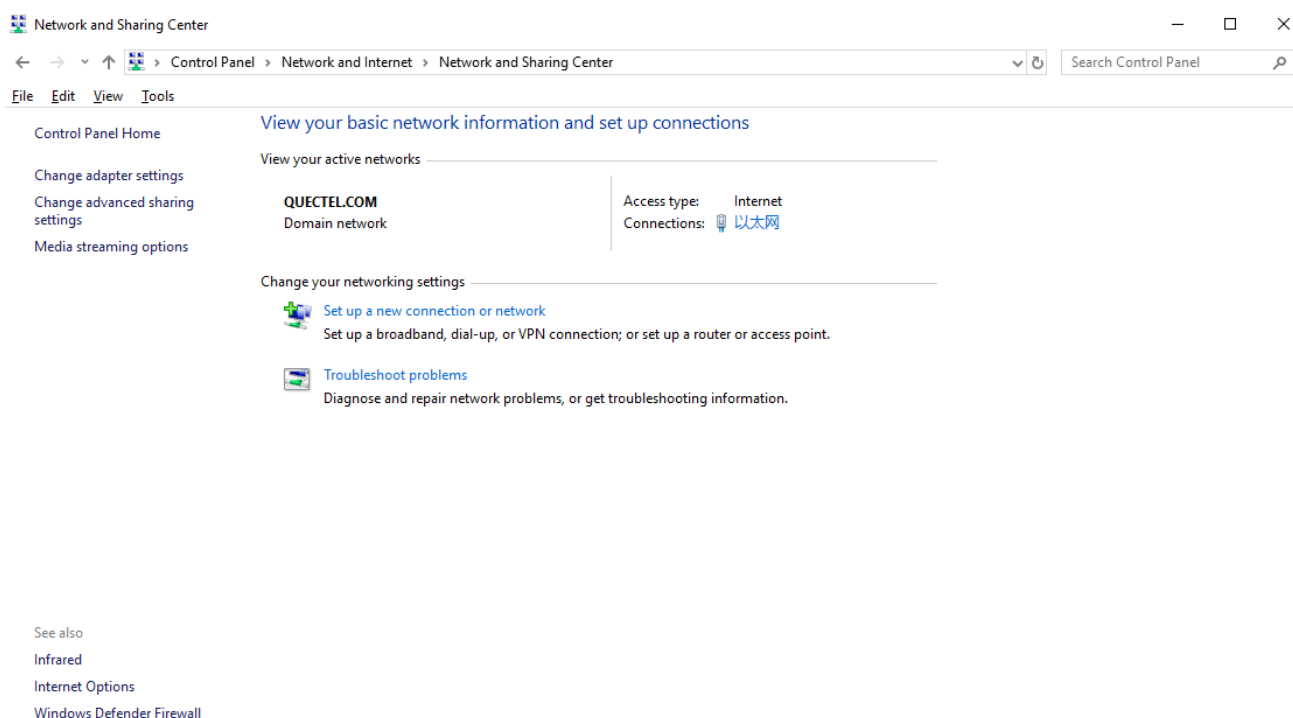
**NOTE**

In the example above, the settings predefine a PDP context where CID=1, PDP type=IP and APN=CMNET. CMNET is the APN of the network operator China Mobile and it should be replaced with the value provided with the value defined by the network operator.

## 6.2.2. Dial-up Network Configuration

### 6.2.2.1. Create a New Connection

1. Open “Control Panel”, click “Network and Internet”, “Network and Sharing Center” and finally “Set up a new connection or network”, as illustrated below.



**Figure 10: Create a New Connection**

2. Select **“Connect to the Internet”**, click **“Next”**. Then click **“Set up a new connection anyway”** and **“Dial-up”** to connect as illustrated in the following figure.

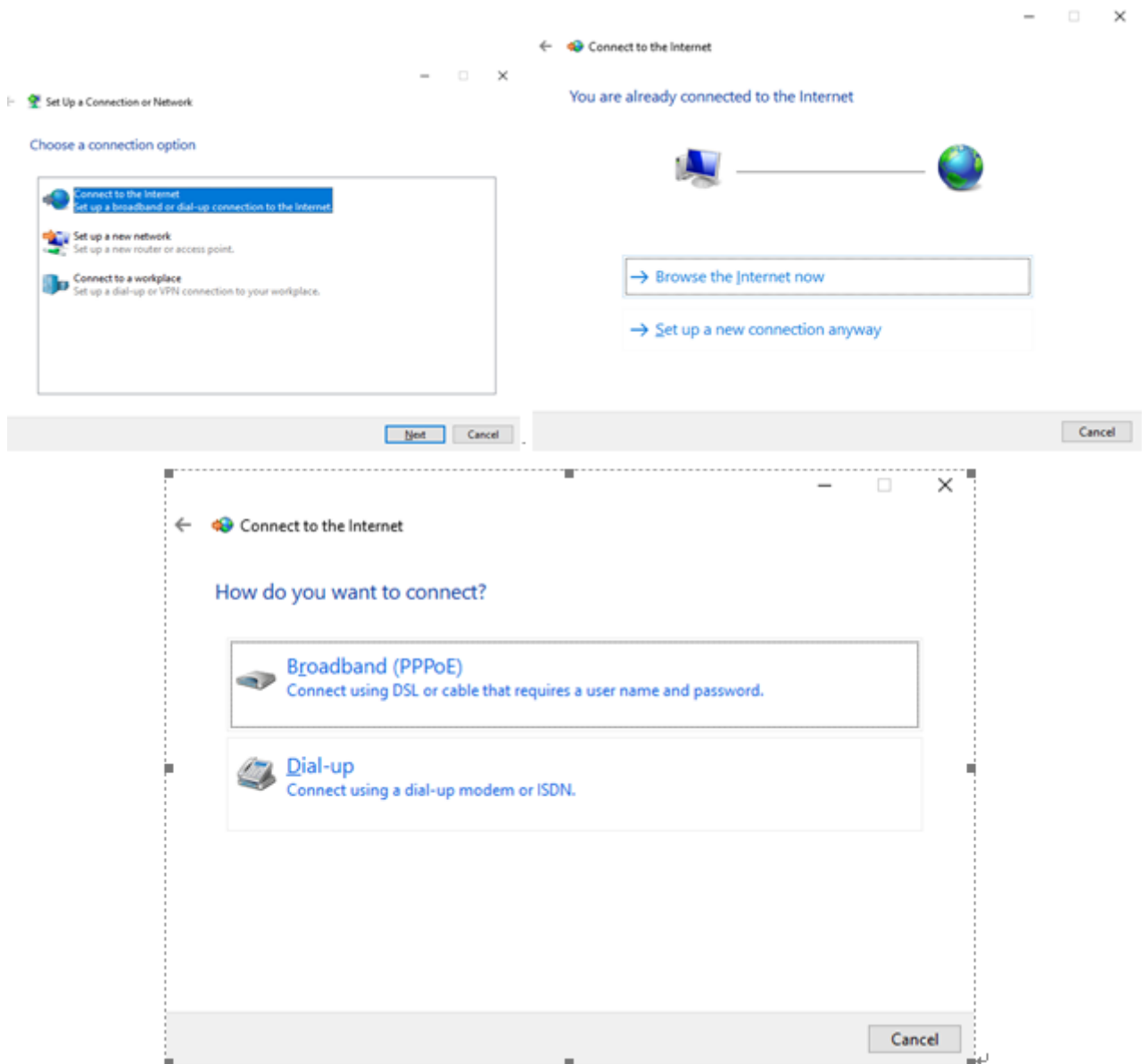
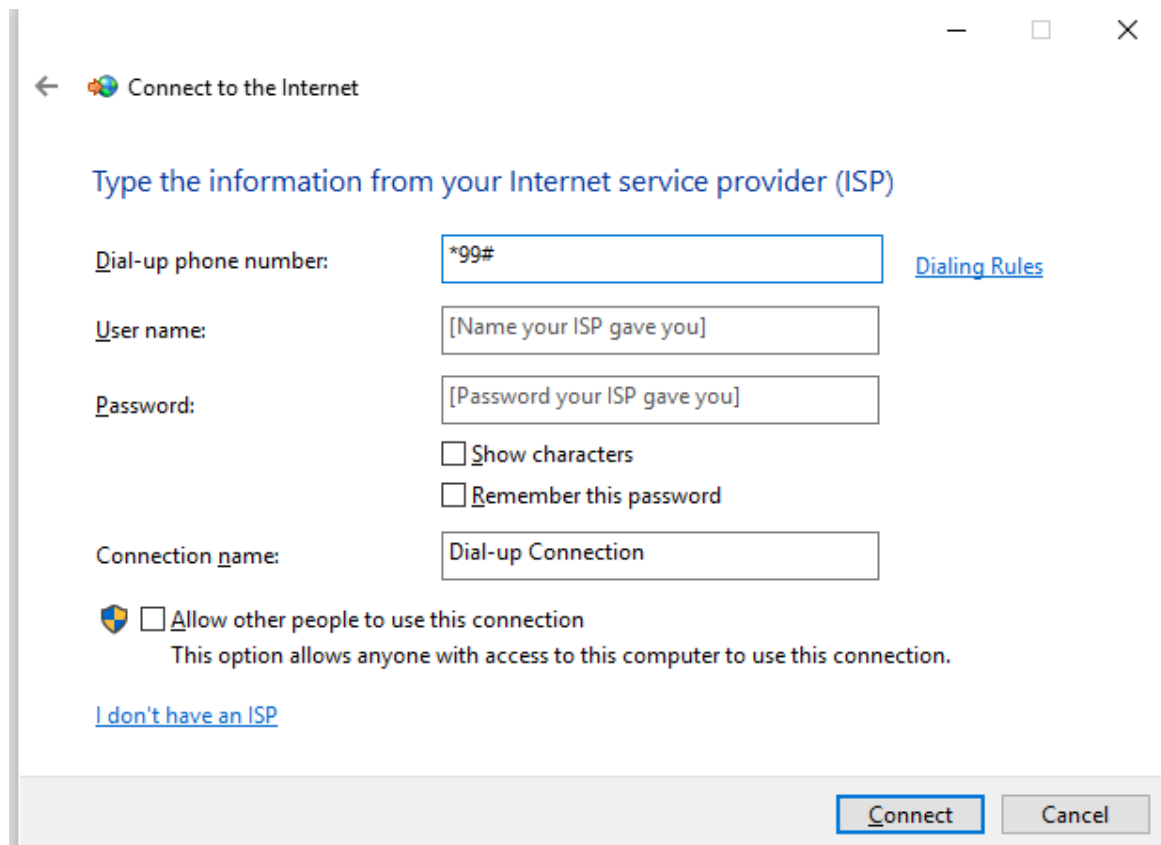


Figure 11: Set up the New Connection



### 6.2.2.2. Configure the Connection

Enter number (such as “\*99#”) in “Dial-up phone number”, and then click “Connect” button, as illustrated below.



The screenshot shows a window titled "Connect to the Internet" with a back arrow and a globe icon. Below the title bar, there is a heading "Type the information from your Internet service provider (ISP)". The form contains the following fields and options:

- Dial-up phone number:** A text box containing "\*99#" with a "Dialing Rules" link to its right.
- User name:** A text box containing "[Name your ISP gave you]".
- Password:** A text box containing "[Password your ISP gave you]". Below it are two checkboxes: "Show characters" and "Remember this password", both of which are unchecked.
- Connection name:** A text box containing "Dial-up Connection".
- Allow other people to use this connection:** An unchecked checkbox with a shield icon. Below it is the text: "This option allows anyone with access to this computer to use this connection."
- Link:** A blue link labeled "I don't have an ISP".
- Buttons:** At the bottom right, there are two buttons: "Connect" (highlighted with a blue border) and "Cancel".

Figure 12: Configure the Connection

### 6.2.2.3. Configure the Dial-up Tool

Enter number (such as “\*99#”) in “Dial” window, click “Properties” button, and configure the “Standard 19200 bps Modem (COM10)”. Then select “115200” from the drop-down list of “Maximum speed”. Click “OK” button to finish the configuration. See the following figure for details.

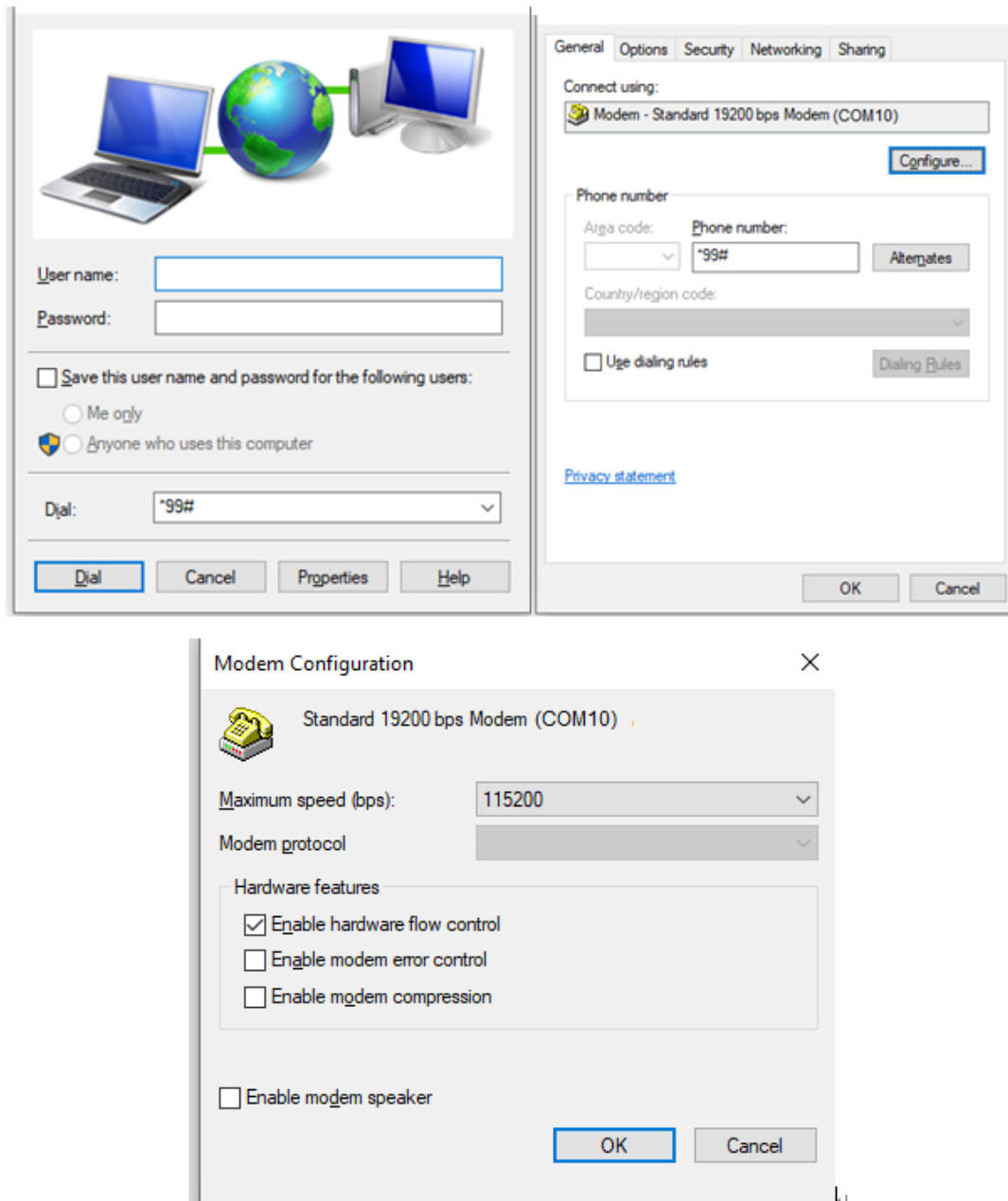
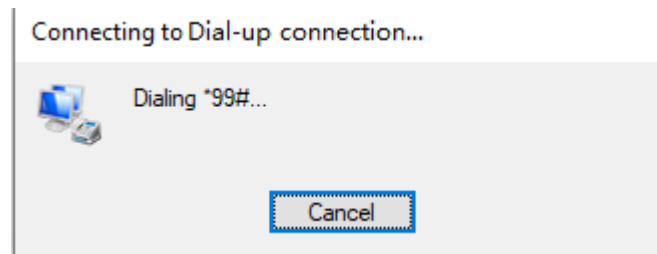


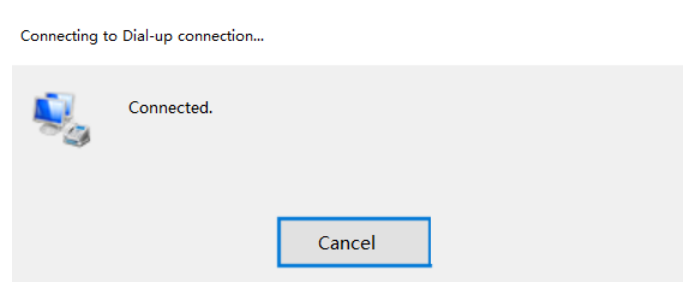
Figure 13: Configure the Dial-up Tool

#### 6.2.2.4. Establish the Dial-up Connection

After the above operations, click the “**Dial**” button, the interface will pop up a prompt box “**Verifying username and password**”, and the pop-up box quickly pops up “**Connected**” to indicate a dial-up connection. See following figures for details.



**Figure 14: Connecting to Dial-up Connection**



**Figure 15: Establish the Dial-up Connection Successfully**

# 7 Appendix References

**Table 1: Related Documents**

Document Name
[1] Quectel_UMTS_LTE_5G_Linux_USB_Driver_User_Guide
[2] Quectel_EG800Q_Series_Hardware_Design
[3] Quectel_EG91xQ_Series_Hardware_Design

**Table 2: Terms and Abbreviations**

Abbreviation	Description
APN	Access Point Name
CHAP	Challenge Handshake Authentication Protocol
DCD	Data Carrier Detection
DNS	Domain Name Server
DTR	Data Terminal Ready
GPRS	General Packet Radio Service
GSM	Global System of Mobile Communication
IP	Internet Protocol
IPCP	IP Control Protocol
LCP	Link Control Protocol
MCU	Micro Control Unit
MS	Mobile Station

---

PAP	Password Authentication Protocol
PC	Personal Computer
PDP	Packet Data Protocol
PIN	Personal Identification Number
PPP	Point-to-Point Protocol
RI	Ring Indicator
TA	Terminal Adapter
TE	Terminal Equipment
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
(U)SIM	(Universal) Subscriber Identity Module

---