LTE CELLULAR CONNECTIVITY ON WINDOWS

LTE cellular connectivity on Windows operating system

Purpose of the Document

The purpose of this document is to explain how to setup and configure LTE cellular connectivity to the Internet on Windows operating system. This applies to LTE modems such as BG96, EG91, EG95, EC25, or Raspberry PI HAT.

Document History

Version	Author	Date	Description
A	5G HUB	02.27.2021	Initial Document

Table of Contents

1 Introduction

This document describes how to use LTE modem for connectivity on Windows OS.

This document is applicable to all GSM, UMTS, LTE, and GNSS modules.

2 Install LTE&GNSS Windows Driver

On Windows Operating System (OS), install the following Windows driver for LTE&GNSS modem:
[5G-NB-IoT/Driver at master · 5ghub/5G-NB-IoT (github.com)](https://github.com/5ghub/5G-NB-IoT/tree/master/Driver)

Follow the following steps:

1- Insert a USIM card into the USIM card slot on the hardware board.
2- Connect a USB cable between the hardware board and the computer as in the following diagram (Note: the hardware board is an example and other USB dongle or Raspberry PI HAT can be used. You can also use different antennas if needed)

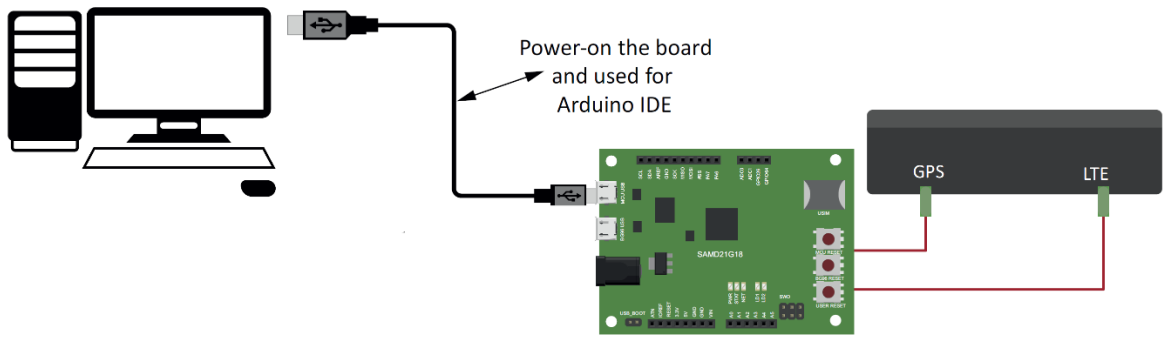

Figure 1: Setting up the hardware board.

3- You shall see the ports and modem in the Windows device manager as in this screenshot:

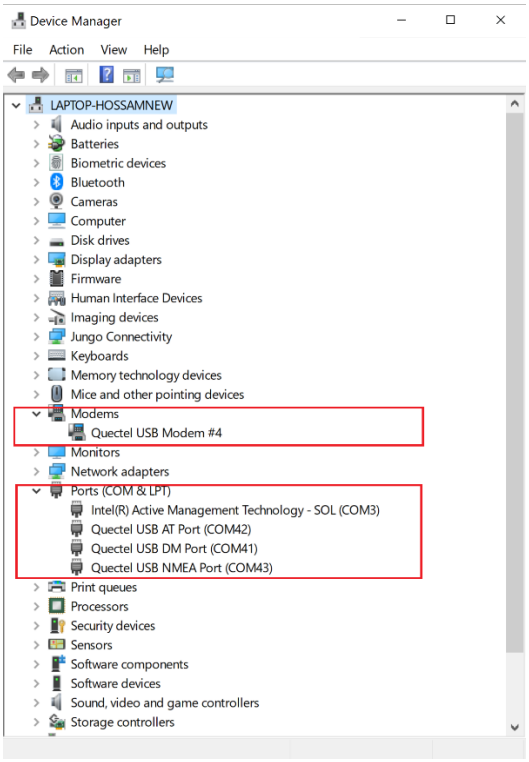

Figure 2: Windows device manager.

NOTE: It is very important to see the **USB modem** in the device manager as this is the driver that Windows OS uses to connect to the Internet and outside world.

3 Using the USIM card

To configure and use the USIM card, follow the following steps:

1- If you have the USIM card, it needs to be activated. If you are using the 5G HUB Global SIM card, go to IoT Connector to start activating your SIM, monitor its usage, and start using it with the hardware boards and Raspberry PI HAT. The IoT connector is available here: IoT Connector

2- Insert the USM card into the USIM card slot on the hardware board.
3- Launch QCOM tool and connect to the LTE modem through the USB port. Follow instructions in this document for how to connect QCOM tool to the LTE modem.

4 Setting the Access Point Name (APN)

APN is the Access Point Name of the mobile operator. Since LTE modem is a cellular device, it connects to mobile operator network. Each mobile operator network has different APN name. For example, AT&T uses the APN: **m2mNB16.com.attz**. Verizon, T-Mobile, or other mobile operators around the world uses different APN. For the first time to use the LTE modem, you need to set the APN as the factory default value of the APN name might be a different value.

If you are using the 5G HUB Global SIM card, it uses the APN: **super**.

In the QCOM tool, use the following AT command to set the APN name:

```
AT+CGDCONT=1,”IP”,”super“,
```

This AT command will set the APN name on the LTE modem for both IPv4 and IPv6.

To be able to connect to different mobile operators which has the best signal quality and best coverage, you can enable roaming capability on the LTE modem. The following AT command is used to enable roaming services:

```
AT+QCFG=”roamservice”,2
```

The following QCOM tool screenshot shows that it is connected to the hardware board over USB COM port number 42. After it connects, you can run the following AT commands, which configure the APN and roaming service on the LTE modem.

```
[2021-02-27_22:52:35:200] AT+CGDCONT=1,"IP","super"
[2021-02-27_22:52:35:200]OK
[2021-02-27_22:52:36:699] AT+QCFG="roamservice",2
[2021-02-27_22:52:36:699]OK
[2021-02-27_22:52:40:423] AT+CGDCONT?
[2021-02-27_22:52:40:423]+CGDCONT: 1,"IP","super","0.0.0.0",0,0,0,0
[2021-02-27_22:52:40:423]OK
```

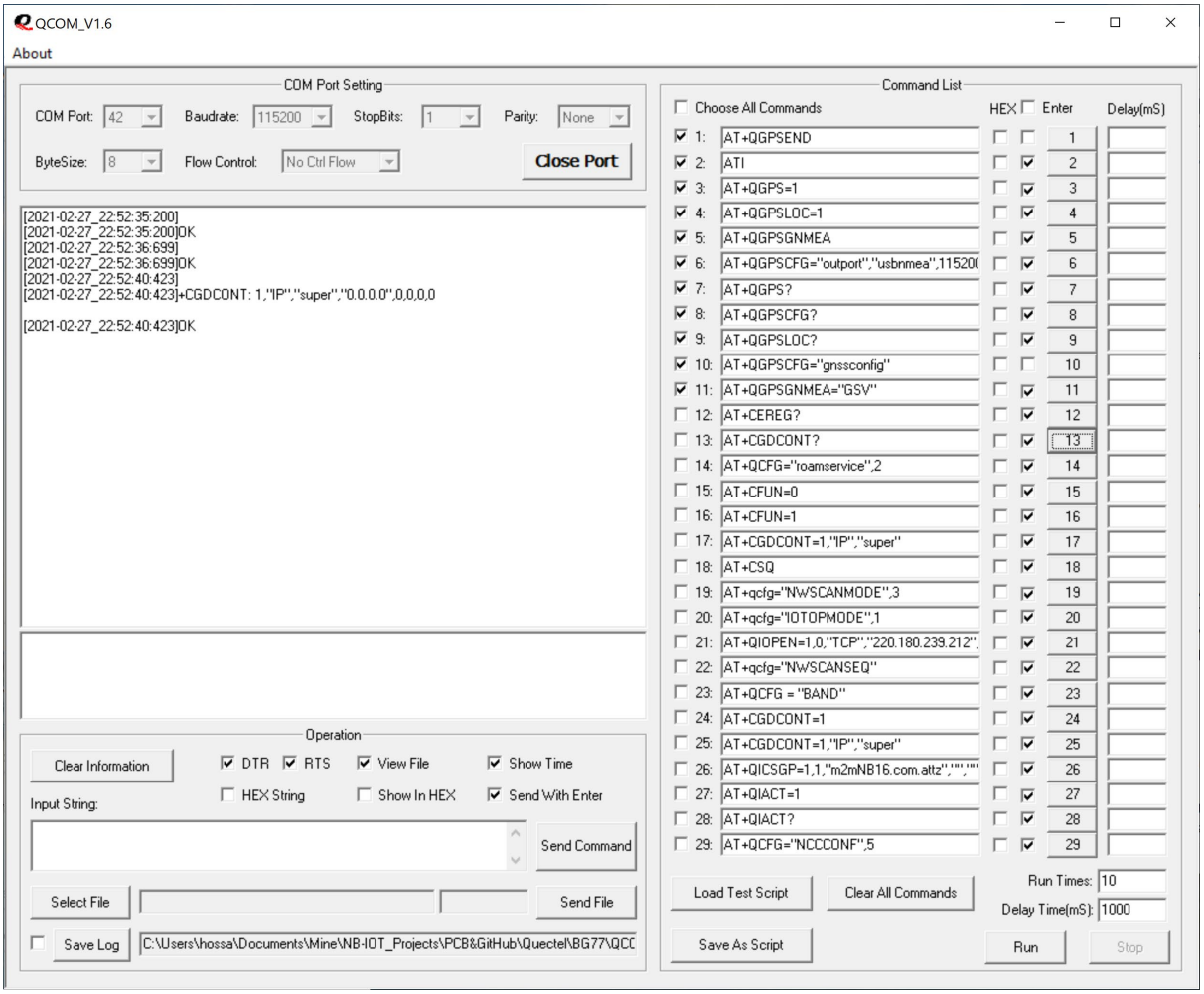

Figure 3: QCOM tool to configure APN.

You can query the APN stored on the LTE modem by running the following command which shows the APN is now set to **super** for IPv4 or IPv6

```
[2021-02-27_22:52:40:423] AT+CGDCONT?
[2021-02-27_22:52:40:423]+CGDCONT: 1,"IP","super","0.0.0.0",0,0,0,0
[2021-02-27_22:52:40:423]OK
```

Once the two steps above are completed through the QCOM tool, restart the LTE modem by unplugging the USB cable and plug it again.

Now, you can check the network registration of the LTE modem. Run the following AT command as in the screenshot below:

```
[2021-02-27_22:58:35:692]AT+CEREG?
```

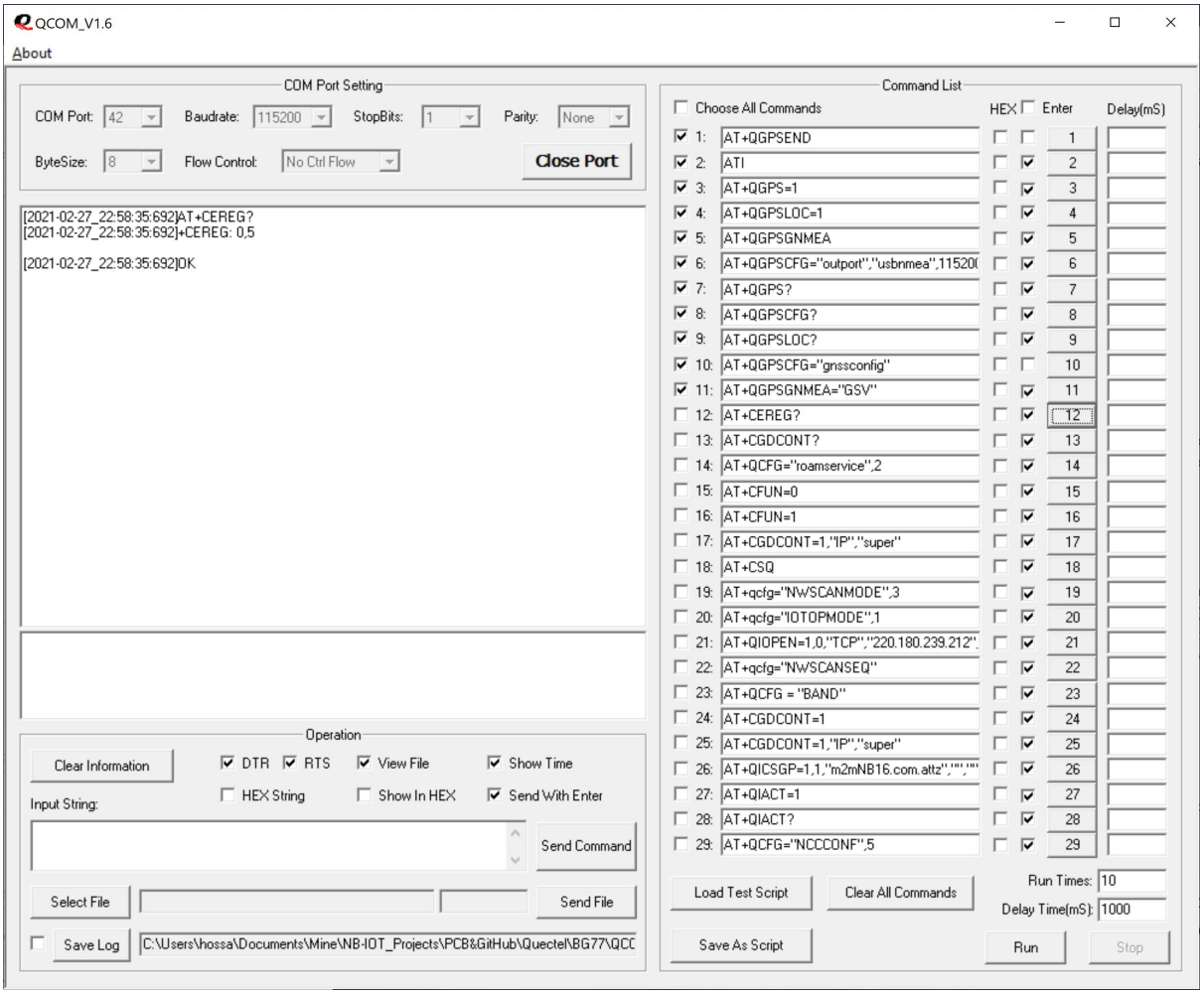

Figure 4: QCOM tool to check network registration with mobile operator.

The LTE modem shall register on the mobile operator network and you shall see the following response. The AT+CEREG command shall return either the value of 1 or 5 as below.

```
[2021-02-27_22:58:35:692]AT+CEREG?
[2021-02-27_22:58:35:692]+CEREG: 0,5
[2021-02-27_22:58:35:692]OK
```

The value returned by the AT+CEREG command shall be interpreted according to the following values:

Value	Meaning
0	Not registered. MT is not currently searching an operator to register to.
1	Registered, home network
2	Not registered, but MT is currently trying to attach or searching an operator to register to.
3	Registration denied
4	Unknown
5	Registered, roaming

If the value returned is either 1 or 5, it means the LTE modem is configured correctly and register on the mobile operator network successfully. You are now ready to connect to the Internet through Windows OS.

Please note that the above configuration needs to be done only once. After that, when you plug the USB cable and connect the PC to the hardware board again, Windows OS detects it as a LTE modem and connects automatically to the Internet and outside world.

5 Connecting Windows OS to the Internet

When the hardware board is connected to the Windows PC, click on the **Networking & Internet settings** icon on the Task bar and you shall see the LTE cellular connectivity as below.

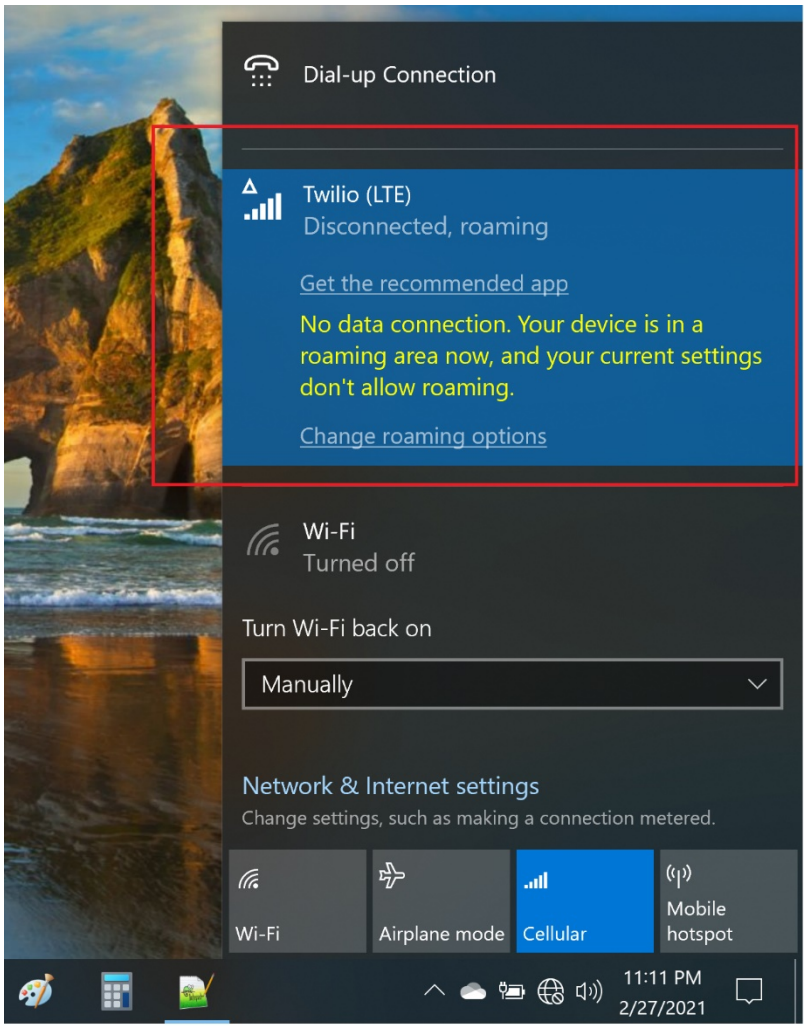

Figure 5: Windows Network & Internet settings.

Initially, it shows as disconnected. Click the **Changing roaming option** and change the **Data roaming options** to **Roam** as in the screen shoot below.

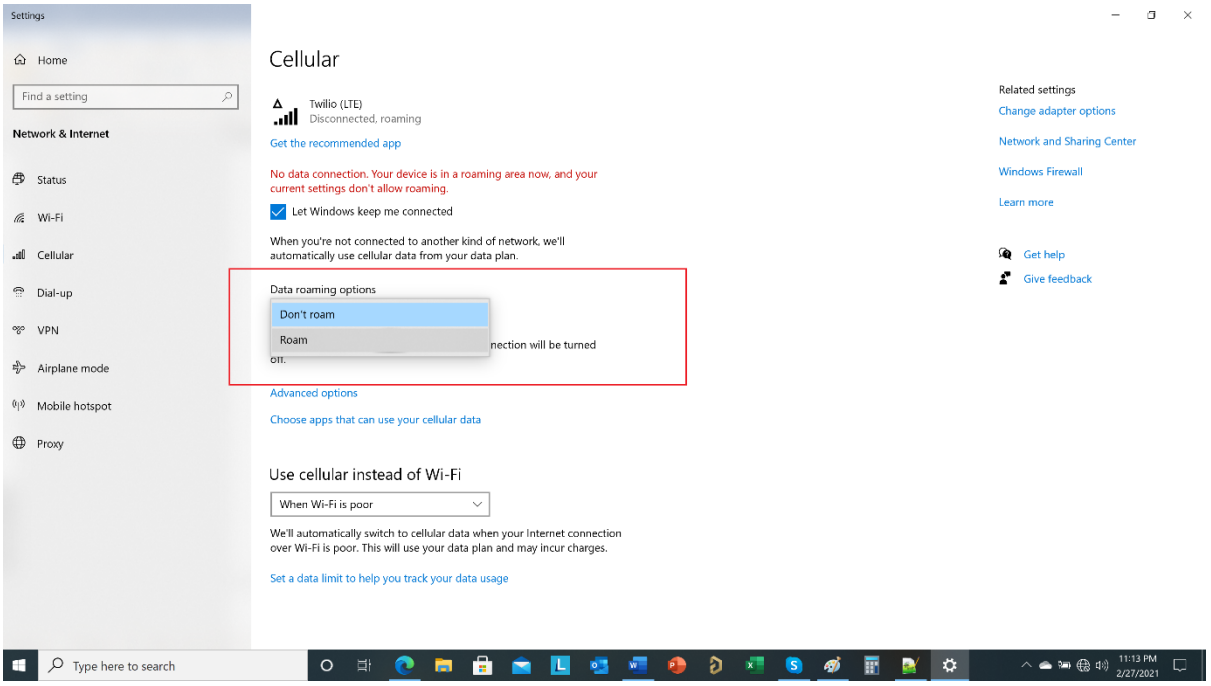

Figure 6: Changings Roaming option in Windows settings.

Once roaming option is enabled, Windows OS will connect immediately to the mobile operator network successfully. As in the screenshot below, you will find the LTE cellular connectivity is in connected state and the cellular icon and signal strength bars appear on the Task bar.

By now, you have successfully connected to the Internet through the LTE modem. You can start browsing the Internet, checking, and using Email clients, download and uploads files, and have fully connectivity to the Internet and outside world.

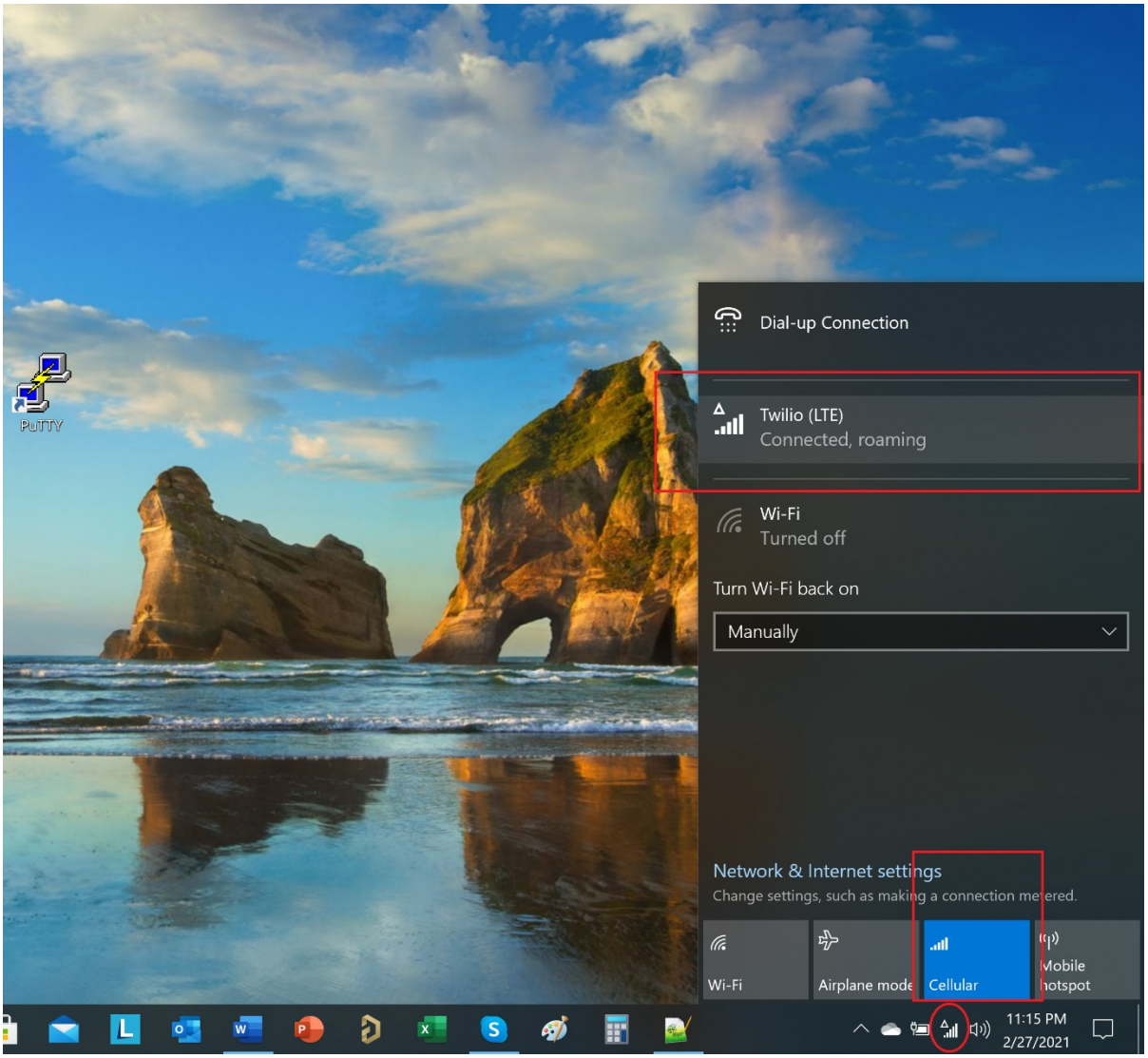

Figure 7: LTE cellular connectivity is enabled on Windows.

6 Troubleshooting

Sometimes the LTE modem is configured with different APN or multiple APNs. To delete these APNs from the LTE modem, issue the following AT command:

```
AT+CGDCONT=1
AT+CGDCONT=2
AT+CGDCONT=3
```