# Robustel GoRugged M1000 MP

## Smart Cellular Modem

## For GPRS/EDGE/UMTS/HSPA Networks

# User Guide

| | |
|---|---|
| Document Name: | **User Guide** |
| Firmware: | **1.0.0** |
| ModemConfigurator: | **1.0.0** |
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| DocID: | **RT_UG_M1000 MP_v.1.0.0** |



**www.robustel.com**

**About This Document**

This document describes the hardware and software of the *Robustel GoRugged M1000 MP Smart Cellular Modem.*

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**Important Notice**

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the modem are used in a normal manner with a well-constructed network, the modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Robustel accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the modem, or for failure of the modem to transmit or receive such data.

**Safety Precautions**

**General**

- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Do not use your modem in aircraft, hospitals, petrol stations or in places where using CELLULAR products is prohibited.
- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliance, etc.
- An external antenna must be connected to the modem for proper operation. Only uses approved antenna with the modem. Please contact authorized distributor on finding an approved antenna.
- Always keep the antenna with minimum safety distance of 26.6 cm or more from human body. Do not put the antenna inside metallic box, containers, etc.

*Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Modem may be used at this time.*

**Using the modem in vehicle**

- Check for any regulation or law authorizing the use of CELLULAR in vehicle in your country before installing the modem.
- The driver or operator of any vehicle should not operate the modem while in control of a vehicle.
- Install the modem by qualified personnel. Consult your vehicle distributor for any possible interference of electronic parts by the modem.
- The modem should be connected to the vehicle's supply system by using a fuse-protected terminal in the vehicle's fuse box.
- Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after extended period.

**Protecting your modem**

- To ensure error-free usage, please install and operate your modem with care. Do remember the follow:
- Do not expose the modem to extreme conditions such as high humidity / rain, high temperatures, direct sunlight, caustic / harsh chemicals, dust, or water.
- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.

- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating conditions.
- Do not pull the antenna or power supply cable. Attach/detach by holding the connector.
- Connect the modem only according to the instruction manual. Failure to do it will void the warranty.
- In case of problem, please contact authorized distributor.

## Regulatory and Type Approval Information

**Table 1:** Directives

| 2002/95/EC | Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) | |
|---|---|---|
| 2002/96/EC | Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) | |
| 2003/108/EC | Directive of the European Parliament and of the Council of 8 December 2003 amending directive 2002/96/ec on waste electrical and electronic equipment (WEEE) | |

**Table 2:** Standards of the Ministry of Information Industry of the People's Republic of China

| SJ/T 11363-2006 | "Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products" (2006-06). | |
|---|---|---|
| SJ/T 11364-2006 | "Marking for Control of Pollution Caused by Electronic Information Products" (2006-06). According to the "Chinese Administration on the Control of Pollution caused by Electronic Information Products" (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Hardware Interface Description. Please see **Table 3** for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006. | |

**Table 3:** Toxic or hazardous substances or elements with defined concentration limits

| Name of the part | Hazardous substances | | | | | |
|---|---|---|---|---|---|---|
| | (Pb) | (Hg) | (Cd) | (Cr(VI)) | (PBB) | (PBDE) |
| Metal Parts | o | o | o | o | o | o |
| Circuit Modules | x | o | o | o | o | o |
| Cables and Cable Assemblies | o | o | o | o | o | o |
| Plastic and Polymeric parts | o | o | o | o | o | o |
| o: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006. x: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials for this part *might exceed* the limit requirement in SJ/T11363-2006. | | | | | | |

**Revision History**

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

| Release Date | Firmware Version | Details |
|---|---|---|
| 2013-12-18 | 1.00 | First Release |

# Contents

# Chapter 1.  Product Concept

## 1.1   Overview

Robustel GoRugged M1000 MP is a compact design cellular modem with serial/USB port and plastic housing, offering state-of-the-art 2G/3G connectivity for machine to machine (M2M) applications.

- Control via AT commands (Hayes 3GPP TS 27.007 and 27.005).

- TCP/IP, SMS, CSD access via AT commands.

- 1 serial port and 1 mini USB 2.0 high speed interface.

- Wide range input voltages and extreme operating temperature.

- The plastic enclosure can be mounted on a DIN-rail or on the wall, also with extra ground screw.

## 1.2   Packing List

Check your package to make certain it contains the following items:
- Robustel GoRugged M1000 MP modem x1



- 3.5mm 2-pin pluggable terminal block for power connector x1



- CD with user guide x1

*Note*: *Please notify your sales representative if any of the above items are missing or damaged.*

Optional accessories (can be purchased separately):
- SMA antenna (Stubby antenna or Magnet antenna optional) x1

| *Stubby antenna* | *Magnet antenna* |
|---|---|
|  |  |

- Serial cable for RS232 (DB9 Female to DB9 Male, 1 meter) x1
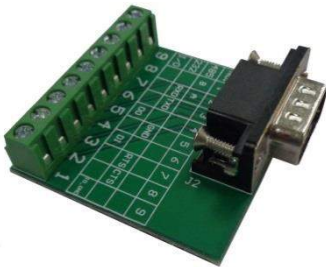


- Mini USB cable x1



- Wall Mounting Kit



- 35mm Din-Rail mounting kit



- AC/DC Power Supply Adapter (12VDC, 1A) x1

- DB9 Male to terminal block for serial port



## 1.3    Specifications

**Cellular Interface**
- Standards: GSM/GPRS/EDGE/UMTS/HSDPA/HSPA+
- GPRS: max. 86 kbps (DL & UL), class 10
- EDGE: max. 236.8 kbps (DL & UL), class 12
- UMTS: max. 384 kbps (DL & UL)
- HSDPA: max. 3.6 Mbps/384 kbps (DL/UL)
- HSPA+: max. 14.4/5.76 Mbps (DL/UL)
- Frequency: 850/900/1800/1900 MHz for GPRS/EDGE, 900/2100 MHz or 850/900/1900/2100 MHz for UMTS/HSDPA/HSPA+
- CSD: Up to 9.6 kbps
- SIM: 1 x (3V & 1.8V)
- Antenna Interface: SMA Female

**Serial Interface**
- Number of Ports: 1 x DB9 Female
- Serial Standards: RS232 or RS485
- ESD Protection: ±15KV
- Parameters: 1200bps to 115200bps
- RS-232: DCD, RxD, TxD, DTR, GND, DSR, RTS, CTS, RI
- RS-485: Data+ (A), Data- (B), GND

**USB Interface**
- Number of Ports: 1 x mini USB Female
- Speed: USB 2.0 High Speed (480 Mbit/s)

- ESD Protection: 15KV

**System**
- LED Indicators: RUN

**Power Supply and Consumption**
- Power Supply Interface: 2-pin 3.5mm pluggable terminal block
- Input Voltage: 6 to 18 VDC (2G model)
          6 to 26 VDC (3G model)
- Power Consumption: Idle: 50-60 mA@12 V
- Data Link: 100 to 200 mA (peak)@12 V

**Physical Characteristics**
- Housing & Weight: Plastic, 105g
- Dimension(L x W x H): 75 x 85 x 28 mm
- Installation: 35mm Din-Rail or wall mounting or desktop

## 1.4   Dimensions
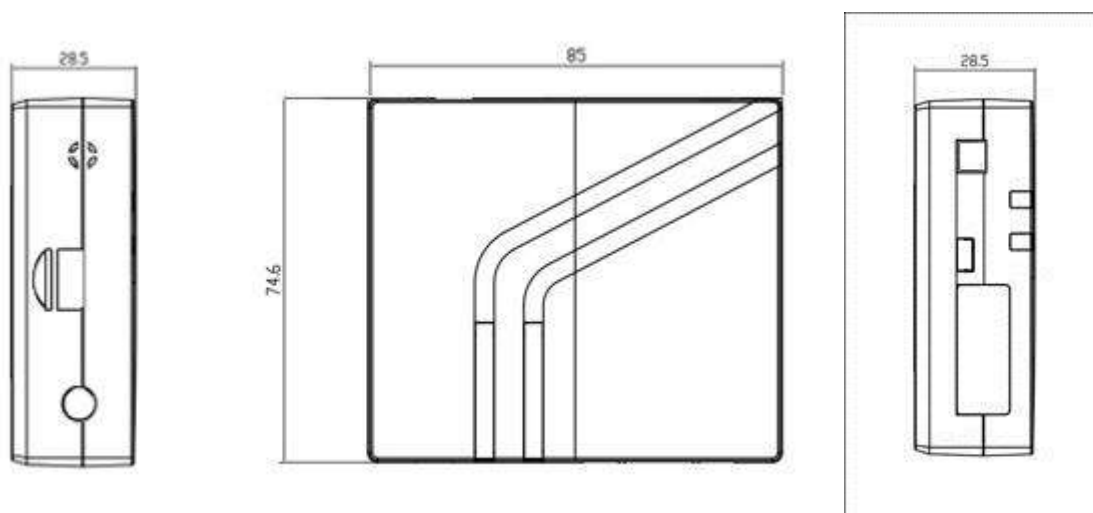


## 1.5   Selection and Ordering Data

| Model No. | Description | Operating Environment | Input Voltage |
|---|---|---|---|
| M1000-MP2GA | 1 port RS232, GSM/GPRS 850/900/1800/1900 MHz | -40 to 85°C/5 to 95% RH | 6 to 18 VDC |
| M1000-MP2GB | 1 port RS485, GSM/GPRS 850/900/1800/1900 MHz | -40 to 85°C/5 to 95% RH | 6 to 18 VDC |
| M1000-MP3HA | 1 port RS232, 1 mini USB port, UMTS/HSDPA 900/2100 MHZ, Quad band GSM/GPRS/EDGE | -40 to 85°C/5 to 95% RH | 6 to 26 VDC |
| M1000-MP3PA | 1 port RS232, 1 mini USB port, UMTS/HSPA+ 850/900/1900/2100 MHz, Quad band GSM/GPRS/EDGE | -40 to 85°C/5 to 95% RH | 6 to 26 VDC |

# Chapter 2.   Installation

## 2.1   Overview
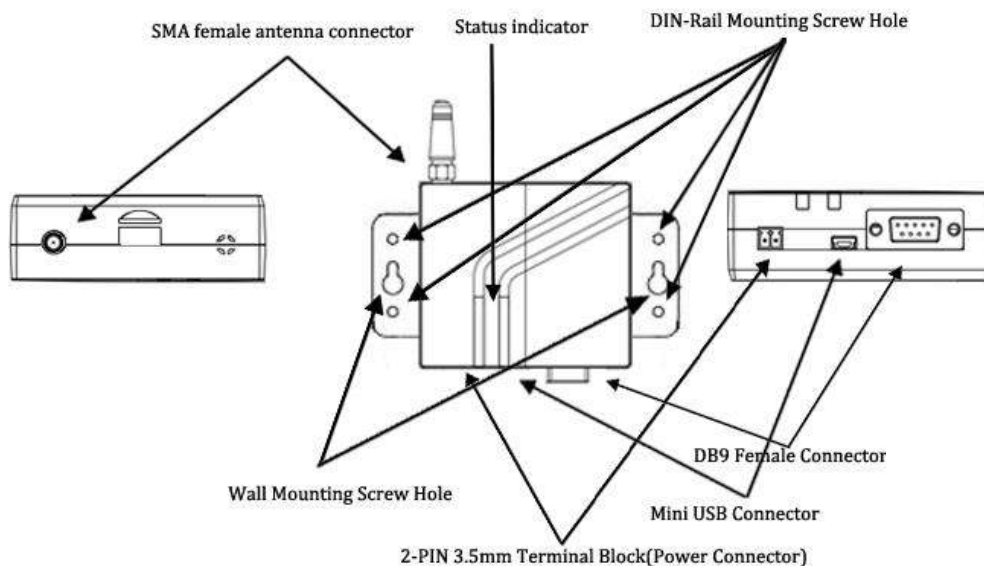


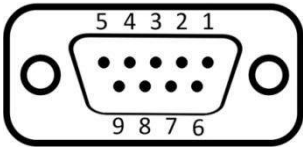## 2.1   LED Indicator
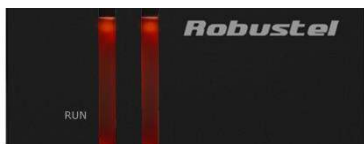


| Name | Color | Status | Description |
|------|-------|--------|-------------|
| RUN  | Green | On     | M1000 MP is powered up. |
|      |       | Off    | M1000 MP is powered off. |

## 2.2   PIN assignment



| PIN | RS232 | RS485 (2-wire) | Direction |
|-----|-------|----------------|-----------|
| 1 | DCD | Data+ (A) | M1000 MP → Device |
| 2 | RXD | | M1000 MP → Device |
| 3 | TXD | | Device → M1000 MP |
| 4 | DTR | | Device → M1000 MP |
| 5 | GND | | - |
| 6 | DSR | Data- (B) | M1000 MP → Device |
| 7 | RTS | | Device → M1000 MP |
| 8 | CTS | | M1000 MP → Device |
| 9 | RI | | M1000 MP → Device |

## 2.3   USB interface

USB interface can be used for sending/receiving data and power supply. When USB interface of M1000 MP is used for sending/receiving data as well as power supply, current/voltage output of USB interface which connects to M1000 MP's USB interface shall at least reach to **1A**/5V.

*Note: Normally, current/voltage outpu*t *of PC's USB 2.0 interface is only 0.5A/5V. So when you use USB interface for sending/receiving data, you should use power input interface for power supply (please check section **2.8** **Power Supply***).



USB
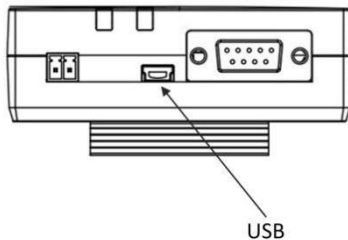
## 2.4   Install SIM Card

Be sure to insert a SIM card before you use the modem.
**Note**: *A SIM card set with PIN code cannot be used normally in the modem without the correct PIN code.*
*Make sure to disconnect the adapter and switch off your modem before inserting or removing your SIM/USIM card.*

- ■ **Inserting SIM Card**
1. Make sure your adapter is disconnected.
2. Insert the SIM card, and you need press the SIM card with your fingers until you hear "a cracking sound".
- ■ **Removing SIM card**
1. Make sure your adapter is disconnected.
2. Press the SIM card until you hear "a cracking sound", then the SIM card will pop up to be pulled out.

**Note:**
1. *Don't touch the metal surface of the SIM card in case information in the card is lost or destroyed.*
2. *Don't bend or scratch your SIM card. Keep the card away from electricity and magnetism.*
3. *Make sure to disconnect the power source from your modem before inserting and removing your SIM card.*



## 2.5   Connect the External Antenna (SMA Type)

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the correct frequency as your mobile operator with impedance of 50ohm, and also connector is secured tightly.
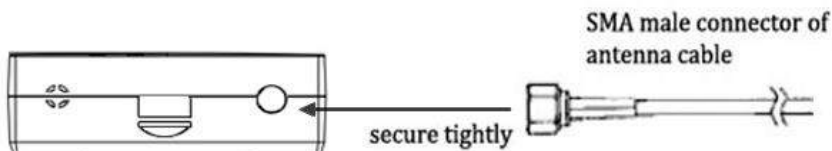
## 2.6 Connect the Modem to External Device

User can use the serial cable to connect the modem's DB9 female connector to external controller / computer.



DB9 Male Connector          DB9 Female Connector

RS-232 port of PC
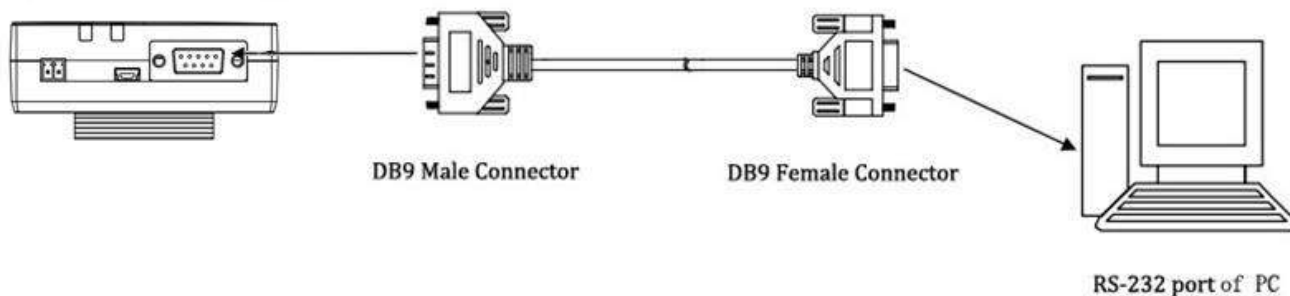
User can use the USB cable to connect the modem's Mini USB Connector to external controller / computer.



Mini USB interface          USB interface

USB port of PC
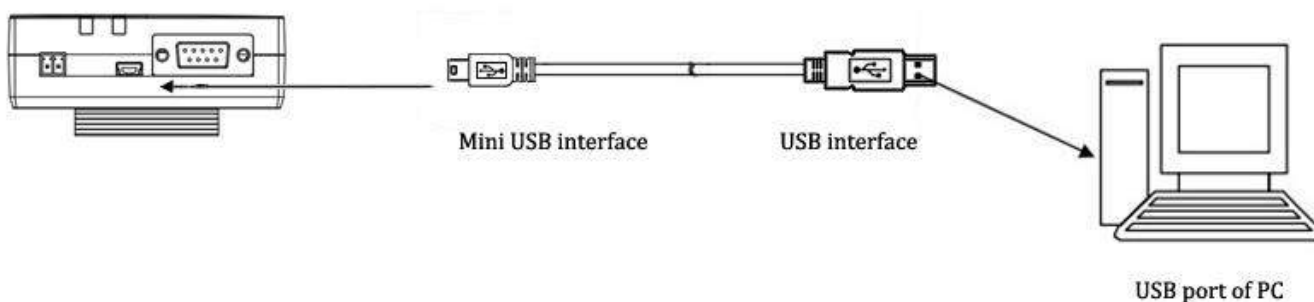
## 2.7 Mount the Modem

Use 2 pcs of M3 screw to mount the modem on the wall.



Wall Mounting Screw Hold
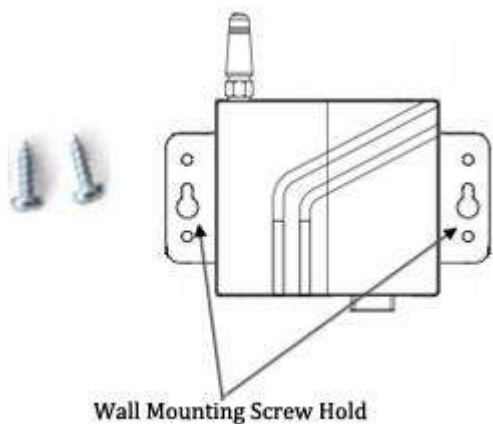
Or to mount the modem on a DIN rail, you need three pcs of M3 screws.

## 2.8   Power Supply



Positive Polarity          Negative Polarity
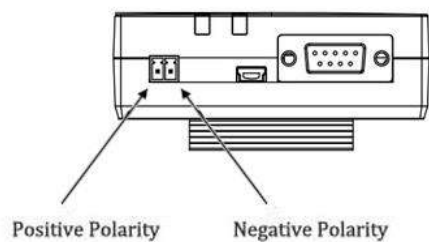
*Note*: Please take care about the polarity, and do not make reverse connection.

# Chapter 3.  Operate the Modem

We can operate and configure M1000 MP via AT commands through mini USB port or serial port. This chapter will introduce mainly AT commands examples while configuring M1000 MP.

## 3.1    AT Command Set

M1000 MP supports the guidelines known as the "AT Command Set." AT Command Set is the industry standard line-oriented command language used to communicate with the modem.

*Note: You can enter AT commands to configure M1000 MP from serial software such as secureCRT which you can download via: https://app.box.com/s/arkn6xk1asgs1myvuuie .*

### 3.1.1  Start SecureCRT

1.  Double click SecureCRT Potable.exe .



2.  File->Connect->New Session
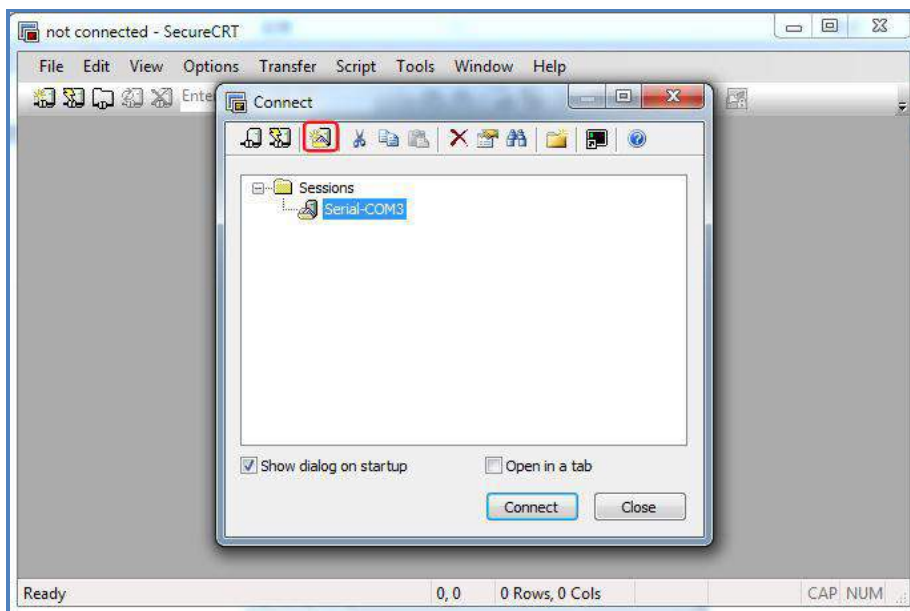
3. Select Protocol as "Serial".



4. Select relevant COM port and match the parameters as below, click the "Next" button to finish this session.
   *Note:you need to match the serial parameters as: 115200,8,n,1, and disable "RTS/CTS".*

## 3.1.2 AT Commands Examples

Followings are examples of some AT commands. Please refer to the AT command guide for a full description.

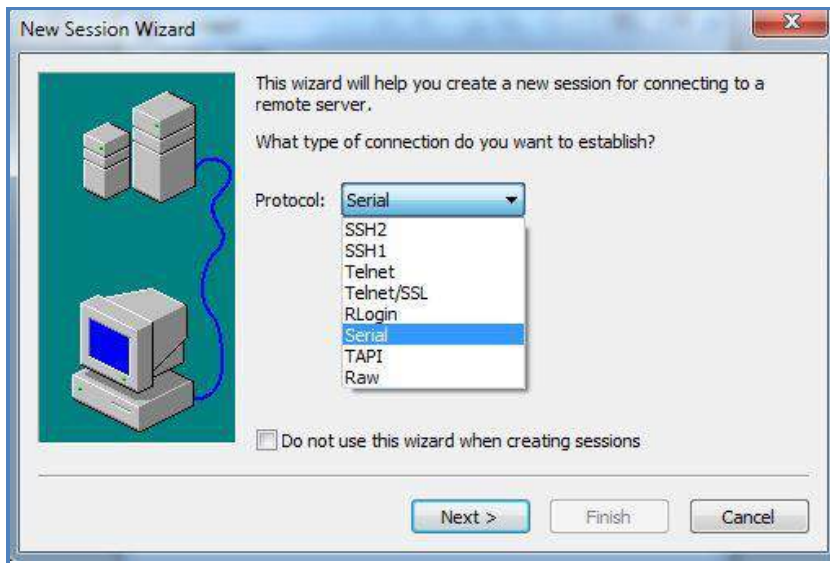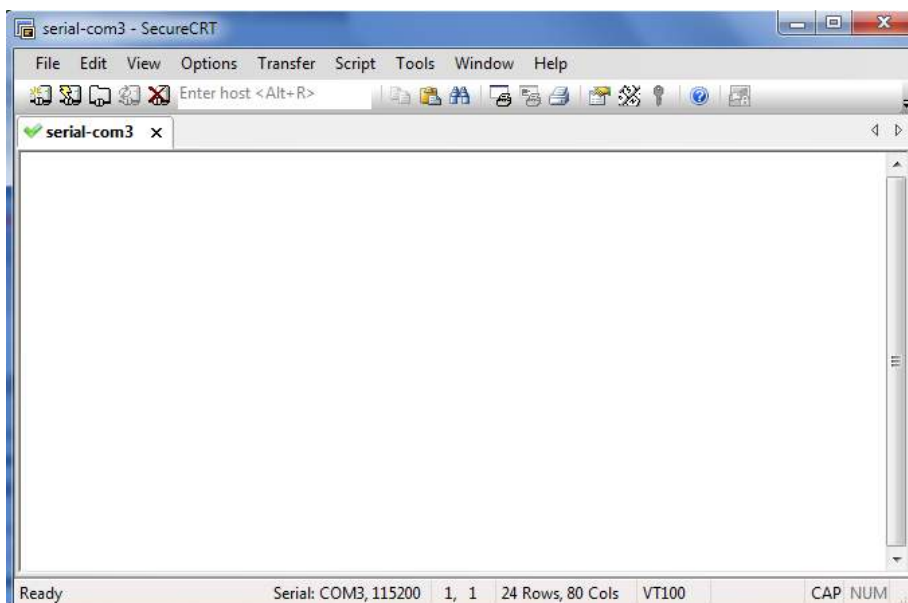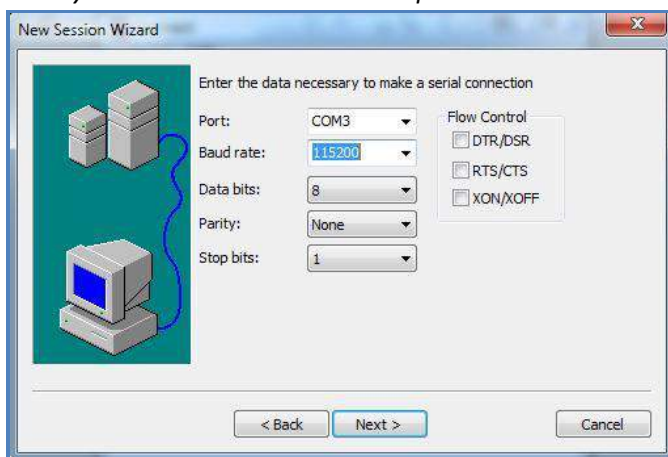| Description | AT commands | Modem response | Comments |
|---|---|---|---|
| Modem acknowledgement | AT | OK | Responding OK indicates that the modem is ready. |
| Receiving signal strength | AT+CSQ | +CSQ: 19,99 | The first parameter has to be at least 15 for normal communication. |
| Query current PIN status | AT+CPIN? | +CPIN: READY | SIM card is correctly inserted and modem is not pending for any password |
| | | +CPIN: SIM PIN | PIN1 is required |
| | | +CPIN: SIM PUK | PUK1 is required |
| Saves parameters in non-volatile memory | AT&W | OK | The configuration settings are stored. |

## 3.2 CSD Connection

## 3.2.1 Overview
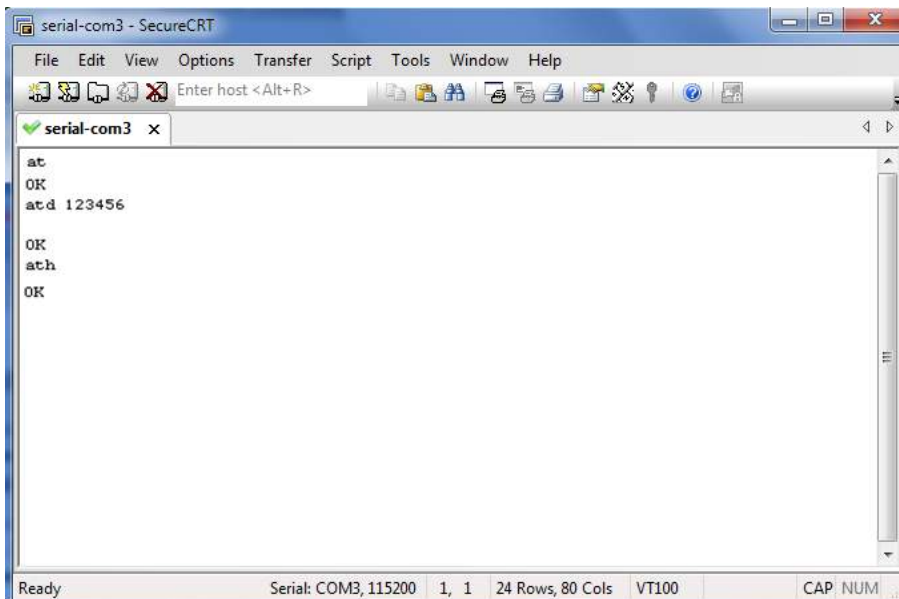
A Circuit-Switched Data Connection makes the wireless modem work in a manner similar to a regular analog modem. CSD (Circuit Switched Data) is the original form of data transmission developed for cellular systems. By using a single radio time slot, CSD is able to deliver 9.6 to 14.4 kbit/s data transmission to both the CELLULAR Network and PSTN Switching Subsystem through direct calls. Most of the time, it is initiated by standard AT commands. Using the modem to access remote devices by CSD is often more convenient than installing cables and data lines. Data collection and monitoring will be more flexible since CSD can be used for applications that are hard to wire or hard to access.

*Note: Ensure that your SIM card has the CSD Service activated. For most regions, you must apply to your mobile service provider to receive this service.*
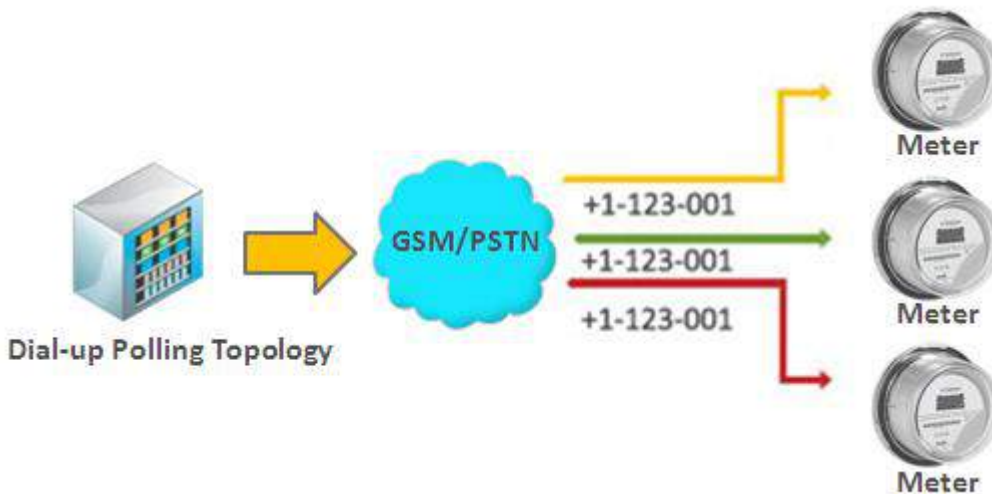
## 3.2.2 Establishing a CSD Connection

1. Start SecureCRT with default serial parameters 115200,8,n,1.
2. Type **ATD <*phone number*>** and press **Enter** to establish a CSD connection. (e.g. ATD 123456, in which 123456 is the phone number.)
3. After remote side answering the CSD call, then the CSD connection has been established successfully.
4. To close the CSD connection, type **+++**. The modem will respond with OK to indicate that you have already switched back to the command mode. It means you can enter AT commands again via SecureCRT.
5. Type **ATH** and press **Enter** to disconnect.



*Note:*
- *+++ is the escape sequence, and **ATH** is the hang-up command.*
- *For international calls, the local international prefix does not need to be set, but does need to be replaced by the + character. E.g., you would type **ATD+86**123456, in which +86 is the country code.*

## 3.2.3 Answering a CSD Connection

1. When secureCRT displays the RING response, type **ATA**, and press **Enter**.
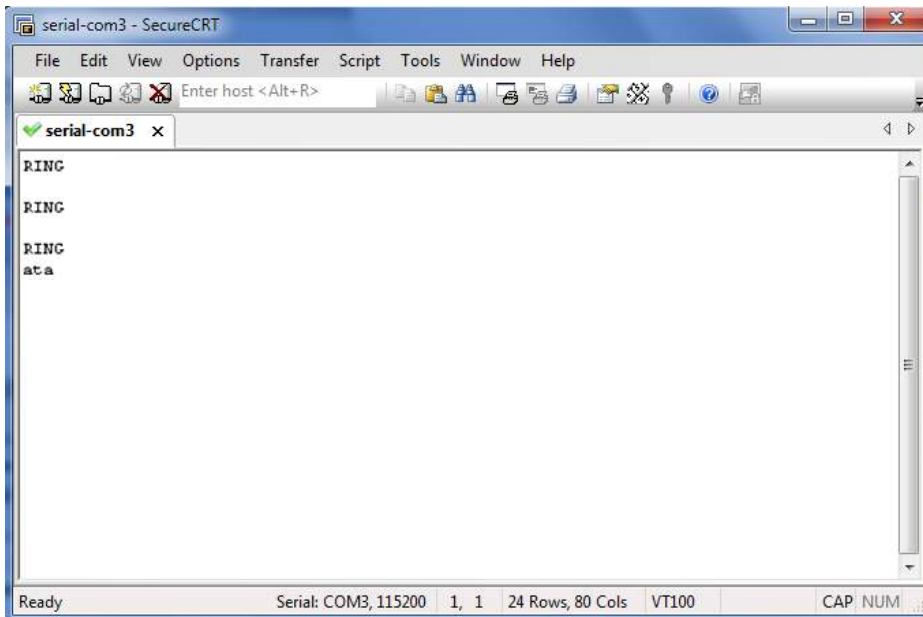
2. In the secureCRT window, type **ATS0=x** and press Enter. For **x**, substitute the number of rings that the modem should receive before answering the call. For example, to answer after the first ring, type ATS0=1.
3. Type **AT&W** and press Enter.
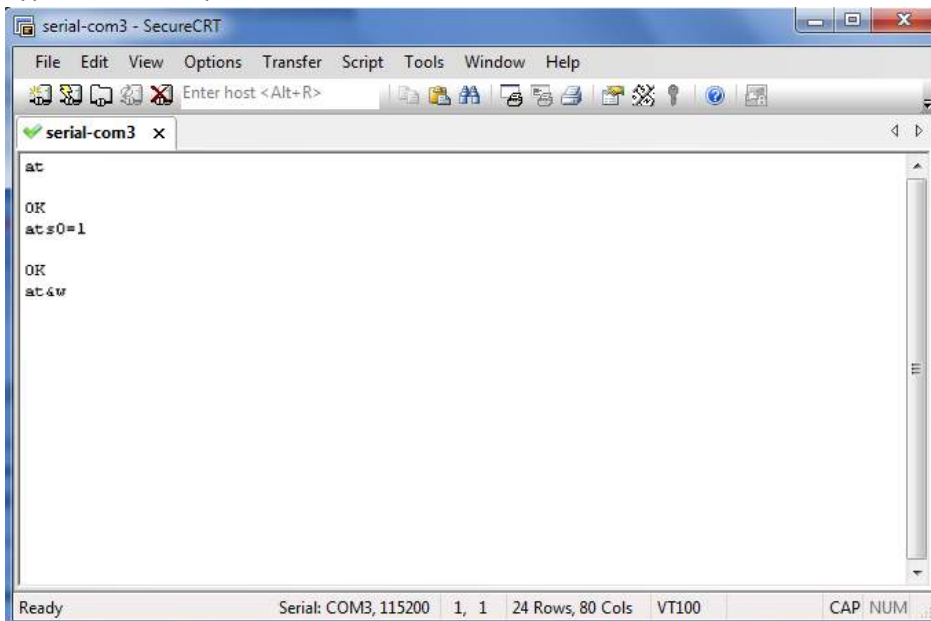


4. To close the CSD connection, type **+++**. The modem will respond with OK to indicate that you have already switched back to the command mode.
5. Type **ATH** and press Enter to disconnect.

## 3.3 Using Short Message Service
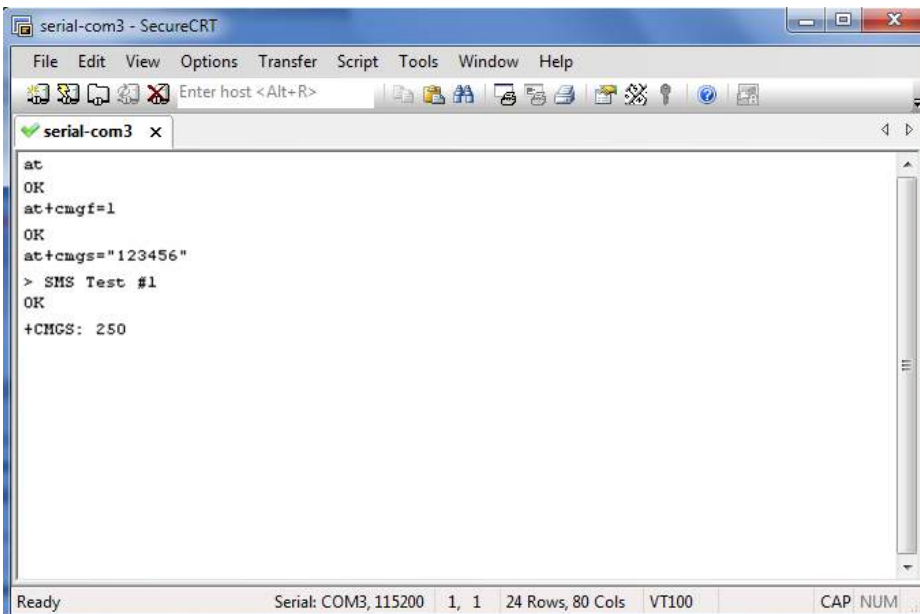
Cellular technology offers the benefit of using SMS (short message service) as an easy way to communicate over the mobile network.

The following topics are covered in this chapter:
1. Sending a Short Message
2. Reading a Short Message
3. Deleting a Short Message

## 3.3.1  Sending a Short Message

1. Type **AT+CMGF=1** and press **Enter**.
2. Type **AT+CMGS="<*phone number>*"** and press **Enter.** The terminal will automatically move to the next line, which starts with >. Type your message on the right of the >.
3. Enter **Ctrl + Z** deliver the message.



*Note*: *AT+CMGF=1 sets the SMS to Text mode.*

## 3.3.2  Reading a Short Message

1. Type **AT+CMGF=1** and then press **Enter**.
2. Type **AT+CNMI=2,1** and then press **Enter**.
3. When a short message is received, the modem will show the storage number of the message after "**+CMIT: "SM", x"** (where the *x* is the storage number).
4. Type **AT+CMGR=*x*** to read the message.
5. In the example shown below, the *x=5* means that the message is stored in the 5th storage location.

## 3.3.3 Deleting a Short Message

Type **AT+CMGD=*x,n*** and then press **Enter**.

This is where ***x*** represents one of the following options:

**"REC UNREAD"** Shows received unread messages.

**"REC READ"** Shows received read messages.

**"STO UNSENT"** Shows stored unsent messages.

**"STO SENT"** Shows stored sent messages.

**"ALL"** Shows messages.

This is where ***n*** represents one of the following options:

**0** Delete message at location <include the index number>

**1** Delete all READ messages.

**2** Delete all READ and SENT messages.

**3** Delete all READ, SENT, and UNSENT messages.

**4** Delete ALL messages. "REC UNREAD" Shows received unread messages.

*Note: Refer to the Documentation and Software CD / AT_Commands / AT_Commands.pdf for further detail commands information using SMS.*

## 3.4 GPRS Connection

## 3.4.1 Overview

GPRS is a packet-switched technology, which means that multiple users share the same transmission channel. In addition, GPRS transmits only when there is outgoing data. This means that the available bandwidth can be dedicated solely to data communication when needed. In general, a GPRS network can be viewed as a special IP network that offers IP connectivity to IP terminals. Devices such as PCs, embedded computers, and PLCs that are PPP-enabled can be easily connected to the IP network and the Internet.



**PPP Enabled PLC**          **GSM/GPRS**          **Center**
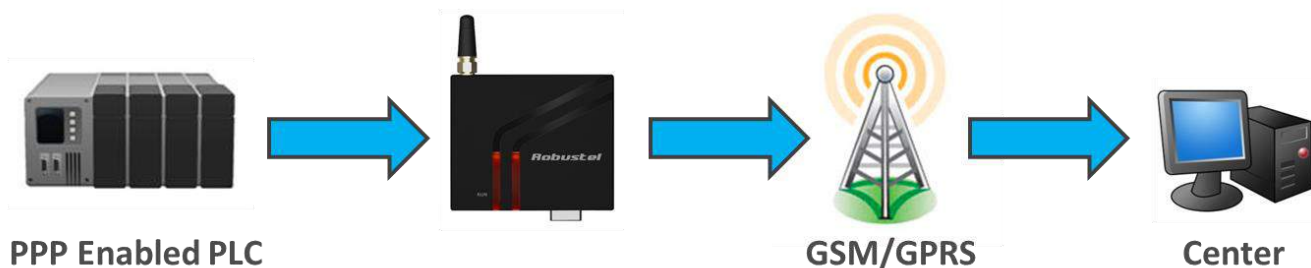
## 3.4.2 Windows GPRS Access

The modem can use Windows DUN (Dial-up Networking) to provide the Internet access through the GPRS mobile network. Instructions are described in the following chapters.
*Note: The specific steps may vary depending on your version of Windows and your Windows settings. Following steps are basing on Windows 7.*

● **Change baudrate of modem**
1. Confirm modem's baudrate is set as 115200,8,n,1.

- **Installing the Modem Driver**

1. In the Control Panel, open "**Phone and Modem**" Options and click the "Modem" tab. Click **Add** to add a new modem.
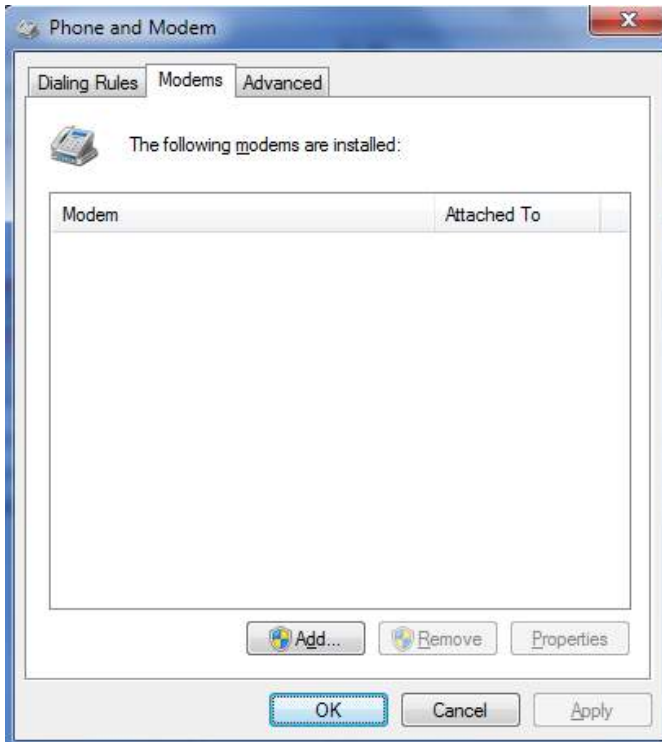


*Note: The first time you access the **Phone and Modem** Options, Windows will ask you to input the area code. Enter the area code to proceed.*

2. When the Install Mode window opens, select **Don't detect my modem, I will select it from a list** and then click **Next**.
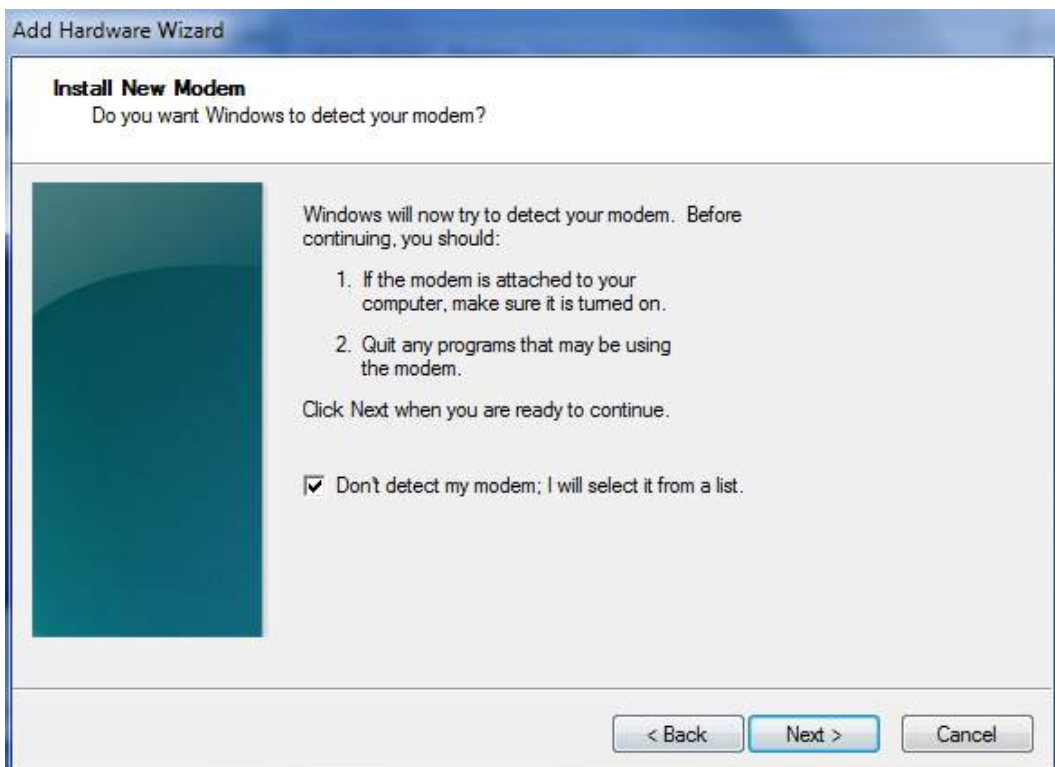
3. Click **Standard Modem Types->Standard 33600 bps Modem,** then click **Next**.

**Add Hardware Wizard**

**Install New Modem**

Select the manufacturer and model of your modem. If your modem is not listed, or if you have an installation disk, click Have Disk.

| Manufacturer | Models |
|---|---|
| (Standard Modem Types) | Standard 28800 bps Modem |
| | Standard 33600 bps Modem |
| | Standard 56000 bps Modem |
| | Standard PCMCIA Card Modem |

This driver is digitally signed.
Tell me why driver signing is important

Have Disk...

< Back    Next >    Cancel

4. Select the port you want to install the modem on (the port which M1000 MP connects to PC), then click **Next**.

**Add Hardware Wizard**

**Install New Modem**
Select the port(s) you want to install the modem on.

You have selected the following modem:

Standard 19200 bps Modem

On which ports do you want to install it?

○ All ports
⦿ Selected ports

COM3

< Back    Next >    Cancel
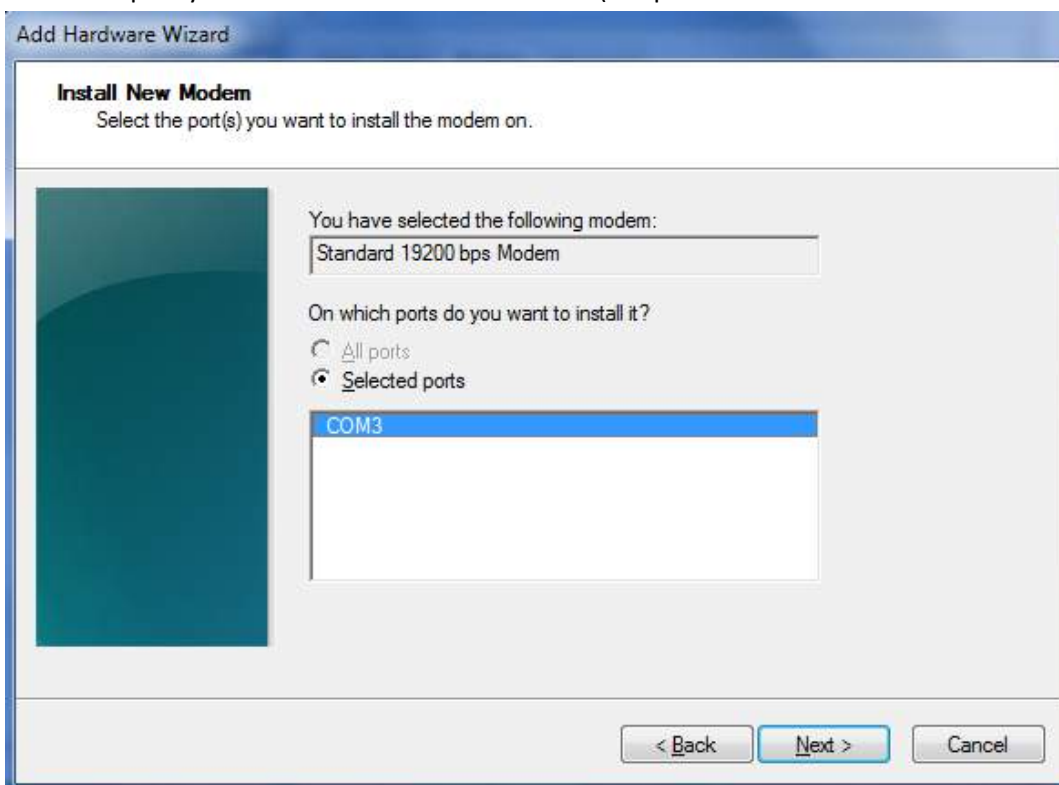
5.  The modem installation is finished, click **Finish**.
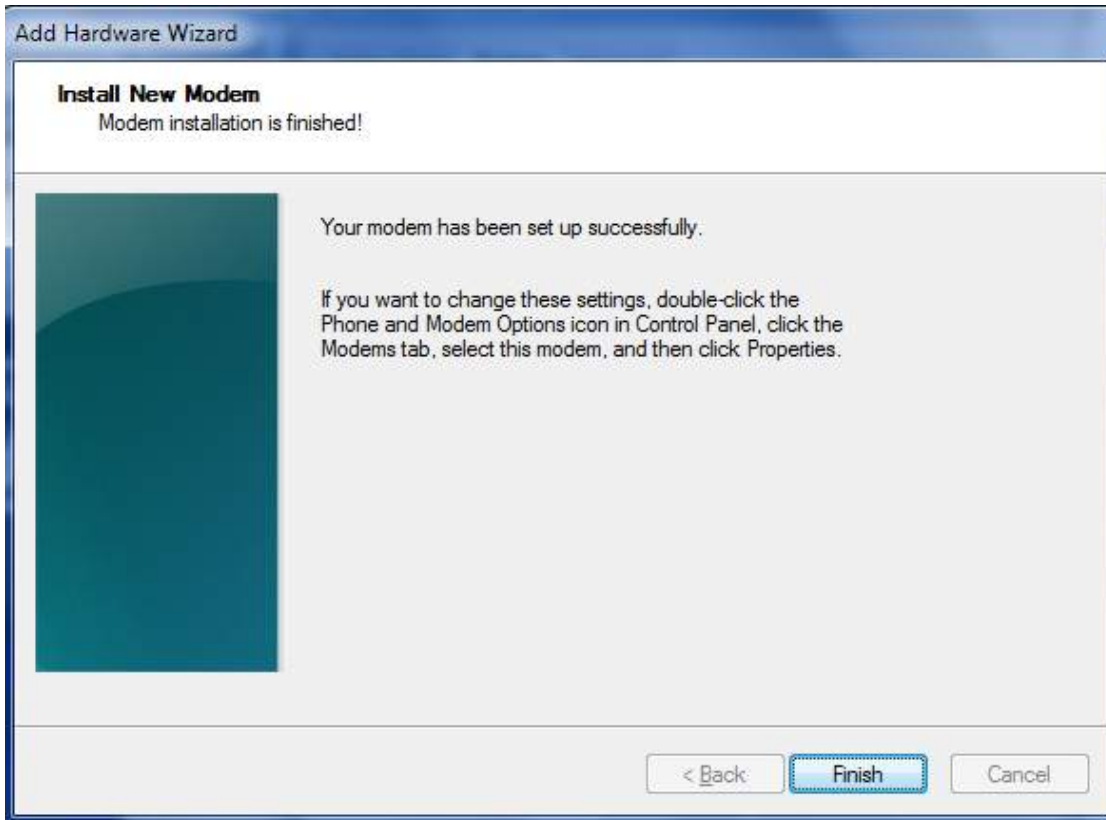


6.  At this point, the modem driver should be listed on the **Modems** tab under **Phone and Modem Options.**
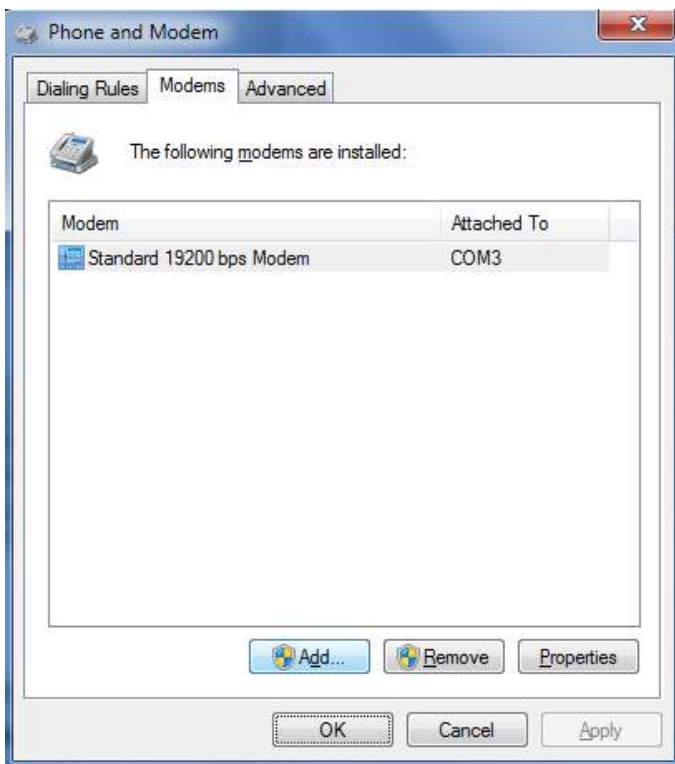
● **Set Maximum Port Speed**

1. Click *Properties*.
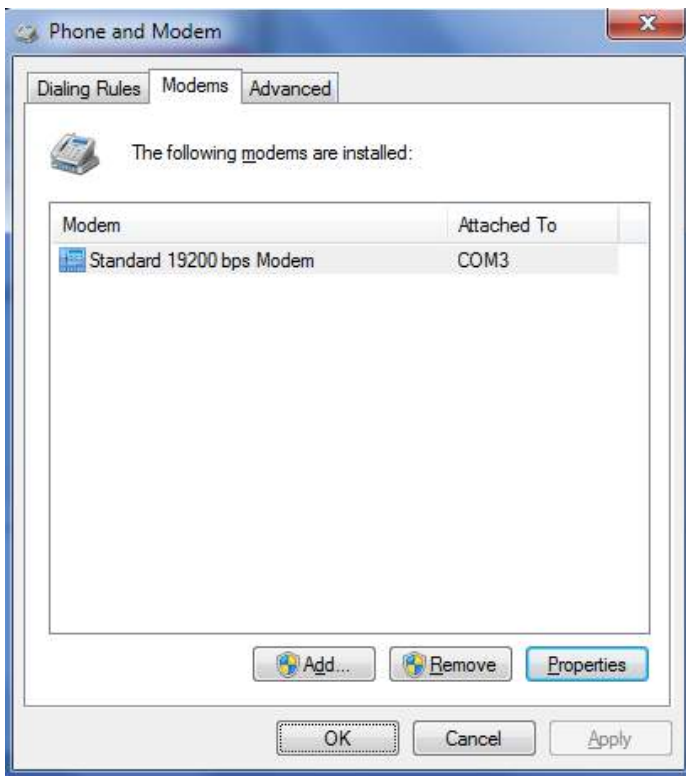


2. Click the *Modem* tab next, select 115200 at *Maximum Port Speed* then click *OK*.
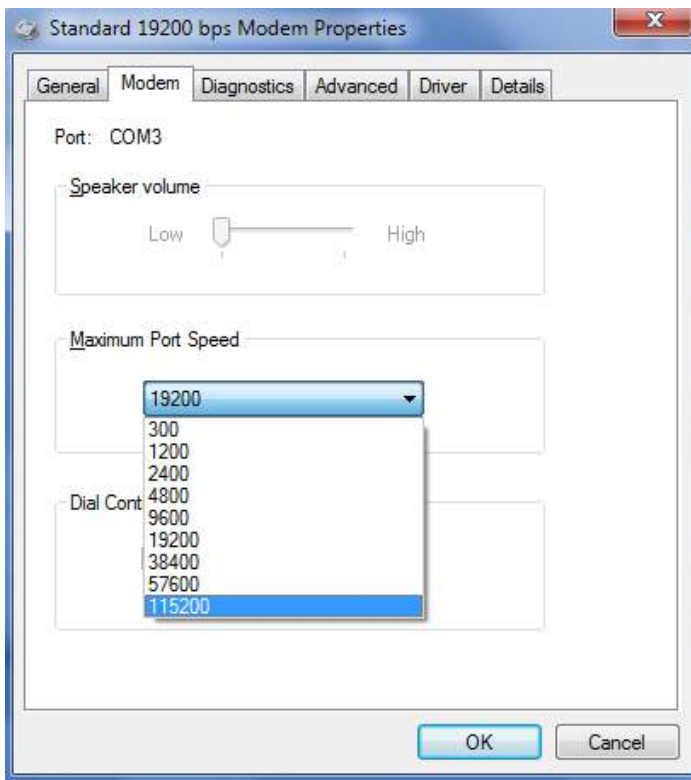
● **Modem Diagnostics**

Follow these steps to verify that the modem is installed properly and has been activated.

1. Click the *Diagnostics* tab, and then click **Query Modem**. After that it will popup "**Please Wait**" window. This process will almost take you 20seconds.
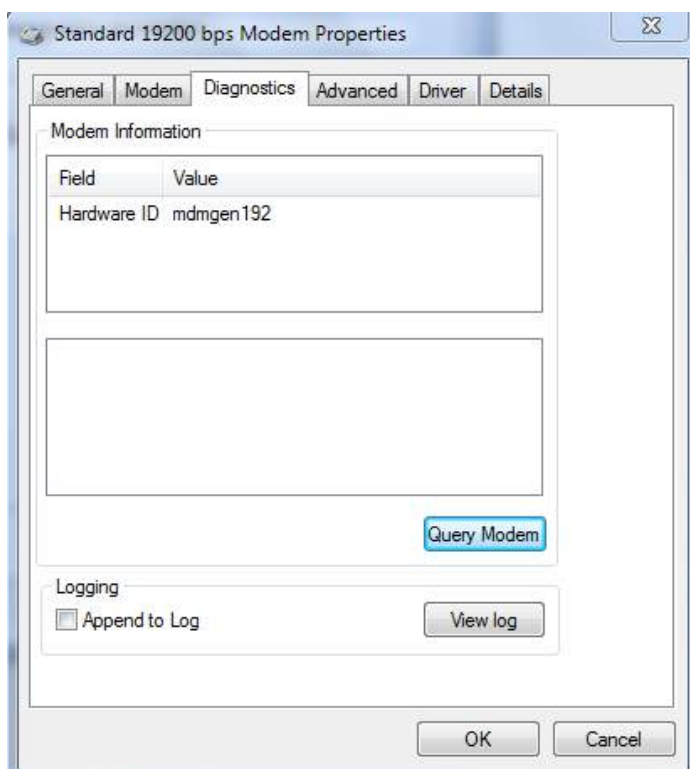
2. If the query is successful, both commands sent to the modem and responses from the modem will be displayed.
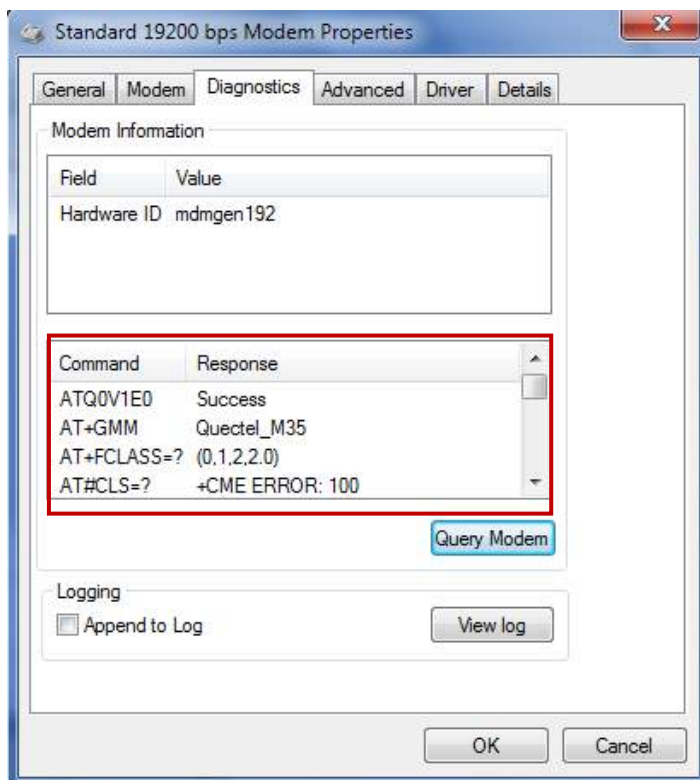
● **Setting up the APN**

Before using the GPRS on the Windows DUN, the APN (Access Point Name) must be added as a modem initialization command. Detailed instructions are shown below.

1. Click the **Advanced** tab.
2. Enter the following commands in the field of **Extra initialization commands:**.

   **AT+CGDCONT=1,"IP","<APN>"**

   Replace <APN> with the correct service for your account. For example:

   **AT+CGDCONT=1,"IP","3gnet"**
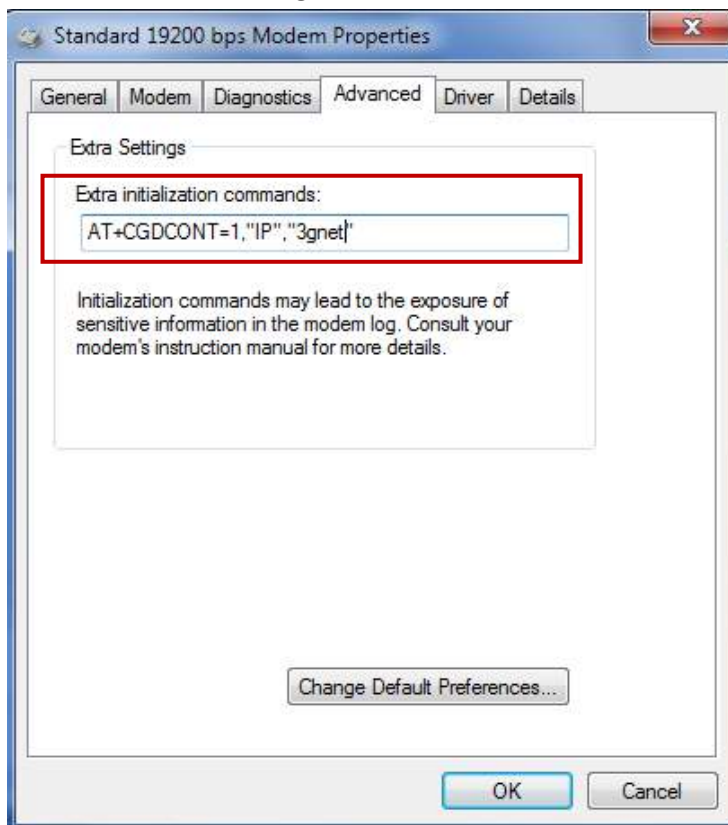


3. Click **Change Default Preferences**.
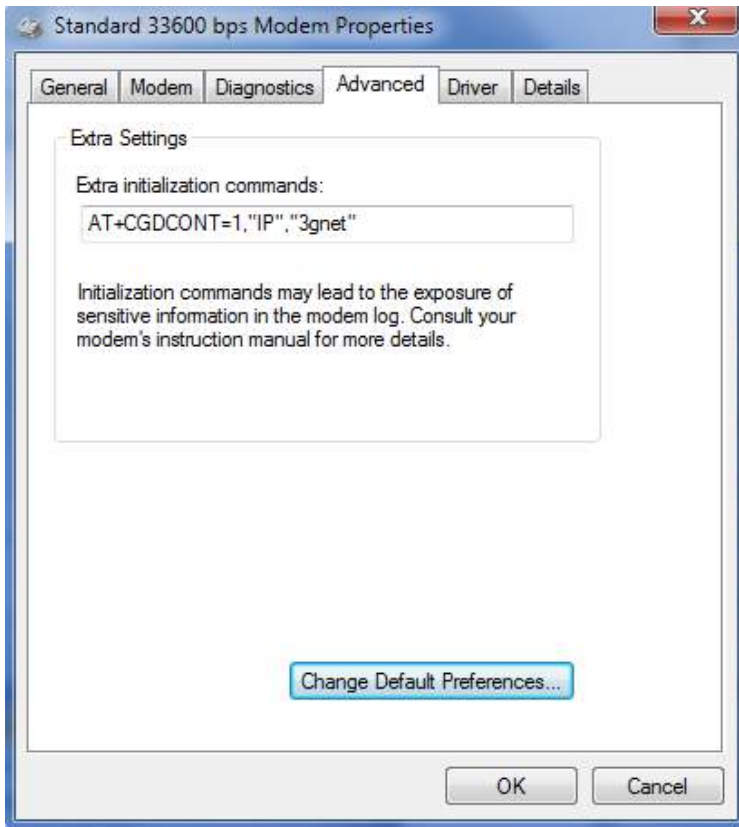
4.  Select Port speed as **115200** and Flow control as **None,** and then click **OK**.
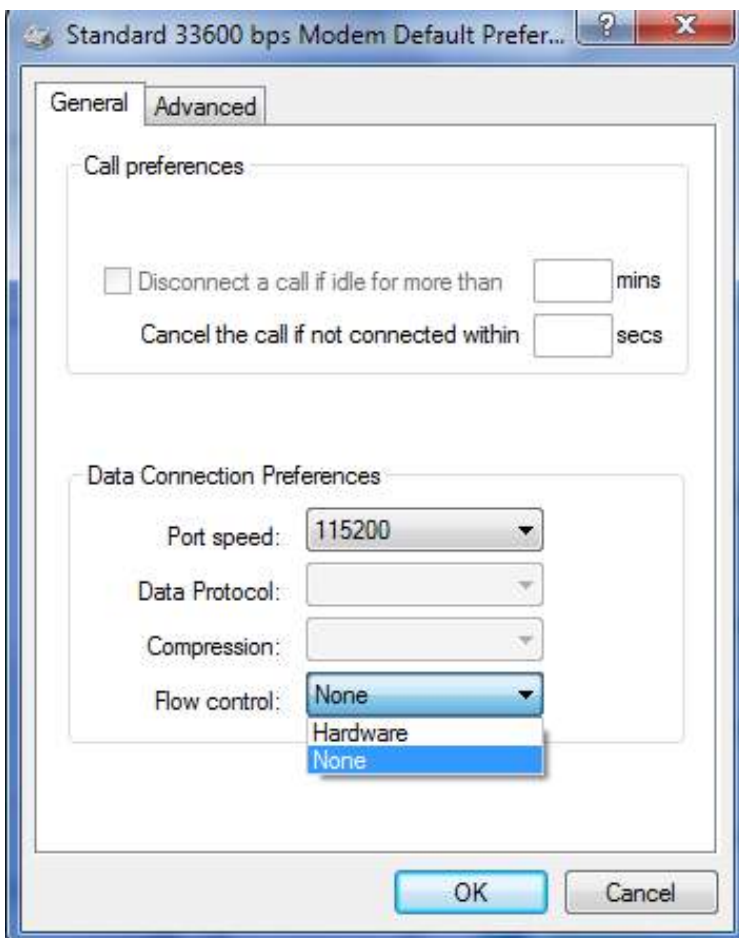
5. Click *OK* to close the *Properties* window.
6. Click *OK* to close the *Modems* window.
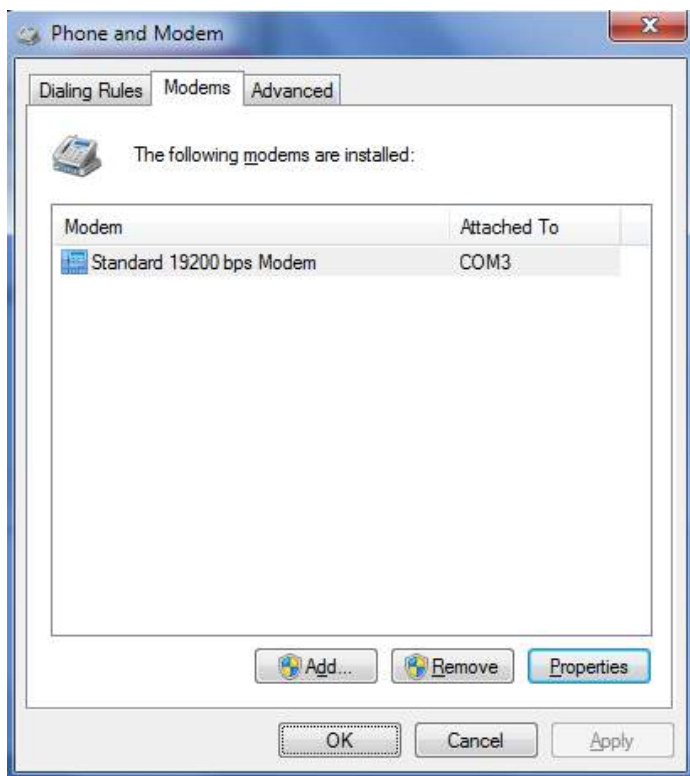


- **Adding Windows DUN**

Follow these steps to add Windows Dial-up Networking.

1. In the Control Panel, open *Network and Sharing Center*, and then click *Set up a new connection or network*.
2. When the *Set Up a Connection or Network* window opens, select the *Connect to the Internet* option, and then click *Next*.
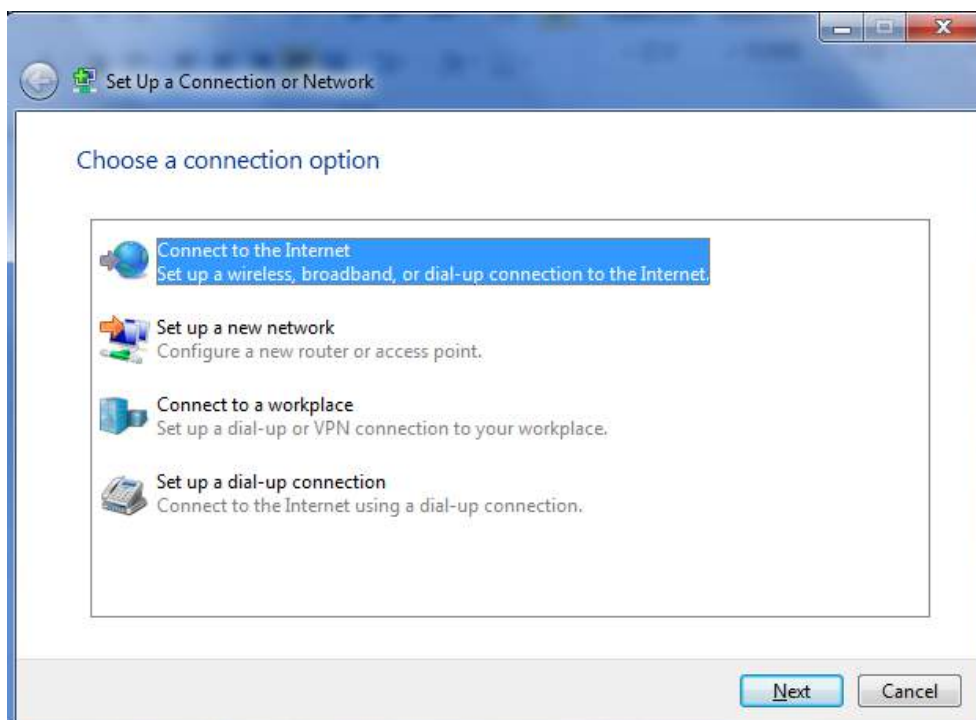
3.  Select the *No, create a new connection* option, and then click *Next.*
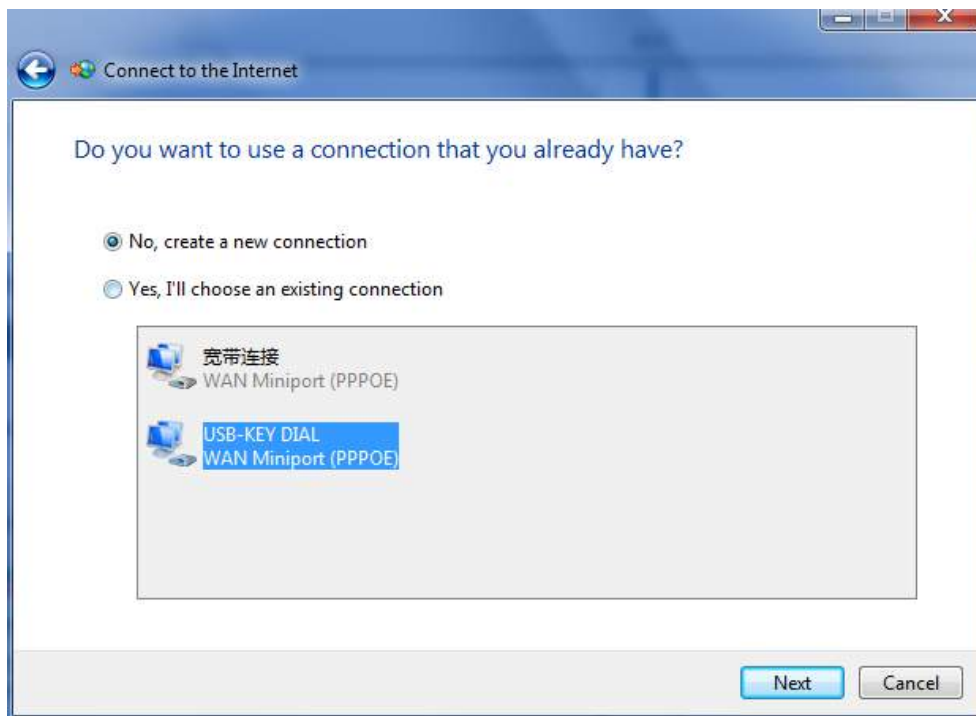


4.  Select the *Dial up* option.
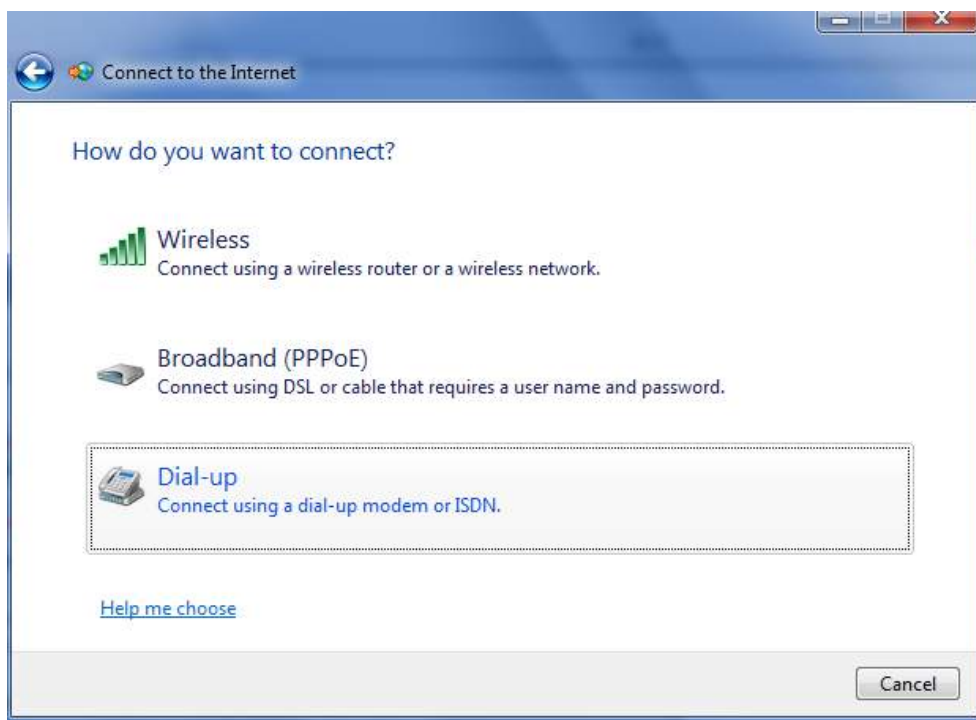


5.  Type *99\*\*\*1#* in the Phone number text input box, and type the *User name* and *Password* in the appropriate text boxes, and then click *Connect*.
    *Note: User Name and Password is used for cellular dial-up connection, you can check with local ISP whether you need to enter and what you need to enter.*
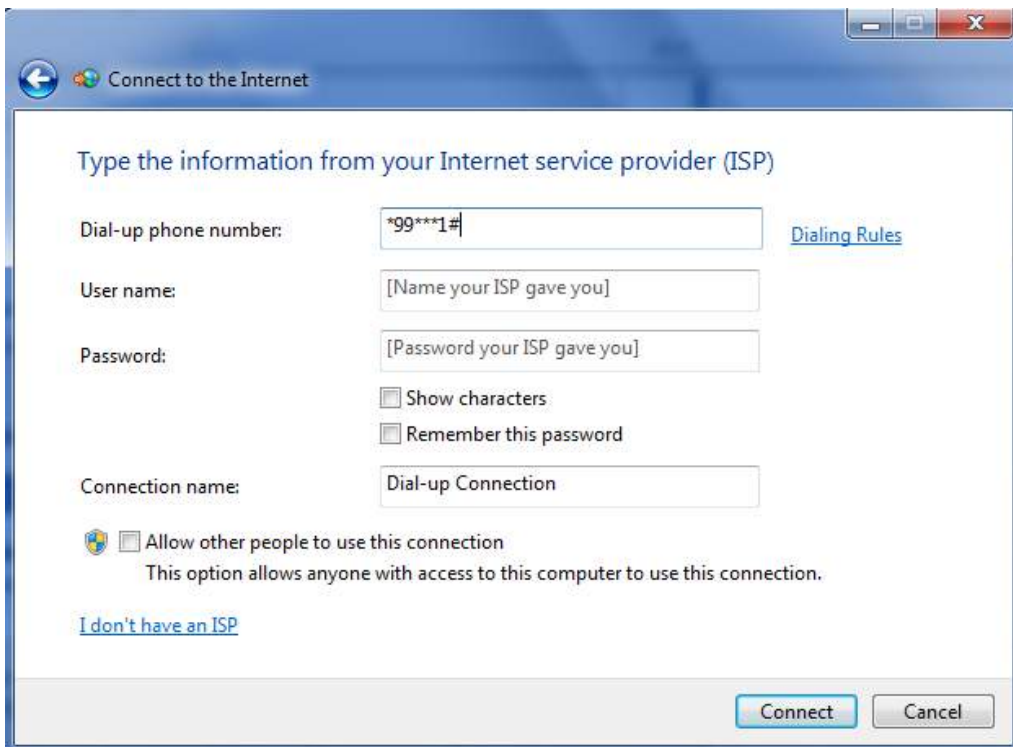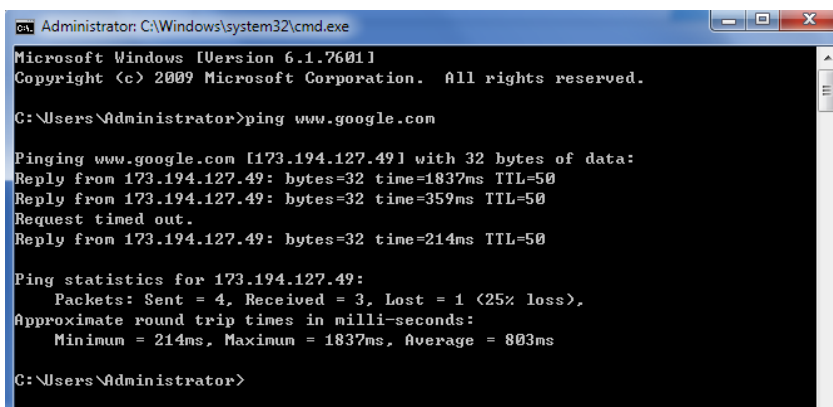
6.  After dial up successfully, it will show window below.



7.  Also you can try to ping to www.google.com to check whether GPRS connection has been established.

# Chapter 4.   Appendix

## 4.1   GSM Alphabet

Standard SMS can contain 160 characters. However, the characters typed must be part of the so-called 7-bit default alphabet as specified by GSM 3.38. You can see in the table below that this alphabet contains all ASCII characters and some accented characters.

For example, u umlaut (ü) and e with grave (è), are in this set. Please study the table below to have a complete overview. Using any character not in this set, will make the SMS a Unicode SMS and limit the length of the SMS to 70 characters.

Note: a few characters actually count as two characters. These characters are:

{}[]~|\ and the Euro symbol: €

You can also see that in the table below in the hex column. These characters need to be escaped.

Below is the 7 bit default alphabet as specified by GSM 03.38. The corresponding ISO-8859-1 decimal codes are shown in the rightmost column. Note that the euro sign (€) is also included.

| Hex | Dec | Character name | Character | ISO-8859-1 DEC |
|------|-----|----------------|-----------|----------------|
| 0×00 | 0 | COMMERCIAL AT | @ | 64 |
| 0×01 | 1 | POUND SIGN | £ | 163 |
| 0×02 | 2 | DOLLAR SIGN | $ | 36 |
| 0×03 | 3 | YEN SIGN | ¥ | 165 |
| 0×04 | 4 | LATIN SMALL LETTER E WITH GRAVE | è | 232 |
| 0×05 | 5 | LATIN SMALL LETTER E WITH ACUTE | é | 233 |
| 0×06 | 6 | LATIN SMALL LETTER U WITH GRAVE | ù | 249 |
| 0×07 | 7 | LATIN SMALL LETTER I WITH GRAVE | ì | 236 |
| 0×08 | 8 | LATIN SMALL LETTER O WITH GRAVE | ò | 242 |
| 0×09 | 9 | LATIN CAPITAL LETTER C WITH CEDILLA | Ç | 199 |
| 0×0A | 10 | LINE FEED | | 10 |
| 0×0B | 11 | LATIN CAPITAL LETTER O WITH STROKE | Ø | 216 |
| 0×0C | 12 | LATIN SMALL LETTER O WITH STROKE | ø | 248 |
| 0×0D | 13 | CARRIAGE RETURN | | 13 |
| 0×0E | 14 | LATIN CAPITAL LETTER A WITH RING ABOVE | Å | 197 |
| 0×0F | 15 | LATIN SMALL LETTER A WITH RING ABOVE | å | 229 |
| 0×10 | 16 | GREEK CAPITAL LETTER DELTA | Δ | |
| 0×11 | 17 | LOW LINE | _ | 95 |
| 0×12 | 18 | GREEK CAPITAL LETTER PHI | Φ | |
| 0×13 | 19 | GREEK CAPITAL LETTER GAMMA | Γ | |
| 0×14 | 20 | GREEK CAPITAL LETTER LAMBDA | Λ | |
| 0×15 | 21 | GREEK CAPITAL LETTER OMEGA | Ω | |
| 0×16 | 22 | GREEK CAPITAL LETTER PI | Π | |
| 0×17 | 23 | GREEK CAPITAL LETTER PSI | Ψ | |

| 0×18 | 24 | GREEK CAPITAL LETTER SIGMA | Σ | |
|---|---|---|---|---|
| 0×19 | 25 | GREEK CAPITAL LETTER THETA | Θ | |
| 0×1A | 26 | GREEK CAPITAL LETTER XI | Ξ | |
| 0×1B | 27 | ESCAPE TO EXTENSION TABLE | | |
| 0×1B0A | 27 10 | FORM FEED | | 12 |
| 0×1B14 | 27 20 | CIRCUMFLEX ACCENT | ^ | 94 |
| 0×1B28 | 27 40 | LEFT CURLY BRACKET | { | 123 |
| 0×1B29 | 27 41 | RIGHT CURLY BRACKET | } | 125 |
| 0×1B2F | 27 47 | REVERSE SOLIDUS (BACKSLASH) | \ | 92 |
| 0×1B3C | 27 60 | LEFT SQUARE BRACKET | [ | 91 |
| 0×1B3D | 27 61 | TILDE | ~ | 126 |
| 0×1B3E | 27 62 | RIGHT SQUARE BRACKET | ] | 93 |
| 0×1B40 | 27 64 | VERTICAL BAR | | | 124 |
| 0×1B65 | 27 101 | EURO SIGN | € | 164 (ISO-8859-15) |
| 0×1C | 28 | LATIN CAPITAL LETTER AE | Æ | 198 |
| 0×1D | 29 | LATIN SMALL LETTER AE | æ | 230 |
| 0×1E | 30 | LATIN SMALL LETTER SHARP S (German) | ß | 223 |
| 0×1F | 31 | LATIN CAPITAL LETTER E WITH ACUTE | É | 201 |
| 0×20 | 32 | SPACE | | 32 |
| 0×21 | 33 | EXCLAMATION MARK | ! | 33 |
| 0×22 | 34 | QUOTATION MARK | " | 34 |
| 0×23 | 35 | NUMBER SIGN | # | 35 |
| 0×24 | 36 | CURRENCY SIGN | ¤ | 164 (ISO-8859-1) |
| 0×25 | 37 | PERCENT SIGN | % | 37 |
| 0×26 | 38 | AMPERSAND | & | 38 |
| 0×27 | 39 | APOSTROPHE | ' | 39 |
| 0×28 | 40 | LEFT PARENTHESIS | ( | 40 |
| 0×29 | 41 | RIGHT PARENTHESIS | ) | 41 |
| 0×2A | 42 | ASTERISK | * | 42 |
| 0×2B | 43 | PLUS SIGN | + | 43 |
| 0×2C | 44 | COMMA | , | 44 |
| 0×2D | 45 | HYPHEN-MINUS | - | 45 |
| 0×2E | 46 | FULL STOP | . | 46 |
| 0×2F | 47 | SOLIDUS (SLASH) | / | 47 |
| 0×30 | 48 | DIGIT ZERO | 0 | 48 |
| 0×31 | 49 | DIGIT ONE | 1 | 49 |
| 0×32 | 50 | DIGIT TWO | 2 | 50 |
| 0×33 | 51 | DIGIT THREE | 3 | 51 |
| 0×34 | 52 | DIGIT FOUR | 4 | 52 |
| 0×35 | 53 | DIGIT FIVE | 5 | 53 |
| 0×36 | 54 | DIGIT SIX | 6 | 54 |
| 0×37 | 55 | DIGIT SEVEN | 7 | 55 |
| 0×38 | 56 | DIGIT EIGHT | 8 | 56 |

| 0×39 | 57 | DIGIT NINE | 9 | 57 |
|------|----|-----------| --|----|
| 0×3A | 58 | COLON | : | 58 |
| 0×3B | 59 | SEMICOLON | ; | 59 |
| 0×3C | 60 | LESS-THAN SIGN | < | 60 |
| 0×3D | 61 | EQUALS SIGN | = | 61 |
| 0×3E | 62 | GREATER-THAN SIGN | > | 62 |
| 0×3F | 63 | QUESTION MARK | ? | 63 |
| 0×40 | 64 | INVERTED EXCLAMATION MARK | ¡ | 161 |
| 0×41 | 65 | LATIN CAPITAL LETTER A | A | 65 |
| 0×42 | 66 | LATIN CAPITAL LETTER B | B | 66 |
| 0×43 | 67 | LATIN CAPITAL LETTER C | C | 67 |
| 0×44 | 68 | LATIN CAPITAL LETTER D | D | 68 |
| 0×45 | 69 | LATIN CAPITAL LETTER E | E | 69 |
| 0×46 | 70 | LATIN CAPITAL LETTER F | F | 70 |
| 0×47 | 71 | LATIN CAPITAL LETTER G | G | 71 |
| 0×48 | 72 | LATIN CAPITAL LETTER H | H | 72 |
| 0×49 | 73 | LATIN CAPITAL LETTER I | I | 73 |
| 0×4A | 74 | LATIN CAPITAL LETTER J | J | 74 |
| 0×4B | 75 | LATIN CAPITAL LETTER K | K | 75 |
| 0×4C | 76 | LATIN CAPITAL LETTER L | L | 76 |
| 0×4D | 77 | LATIN CAPITAL LETTER M | M | 77 |
| 0×4E | 78 | LATIN CAPITAL LETTER N | N | 78 |
| 0×4F | 79 | LATIN CAPITAL LETTER O | O | 79 |
| 0×50 | 80 | LATIN CAPITAL LETTER P | P | 80 |
| 0×51 | 81 | LATIN CAPITAL LETTER Q | Q | 81 |
| 0×52 | 82 | LATIN CAPITAL LETTER R | R | 82 |
| 0×53 | 83 | LATIN CAPITAL LETTER S | S | 83 |
| 0×54 | 84 | LATIN CAPITAL LETTER T | T | 84 |
| 0×55 | 85 | LATIN CAPITAL LETTER U | U | 85 |
| 0×56 | 86 | LATIN CAPITAL LETTER V | V | 86 |
| 0×57 | 87 | LATIN CAPITAL LETTER W | W | 87 |
| 0×58 | 88 | LATIN CAPITAL LETTER X | X | 88 |
| 0×59 | 89 | LATIN CAPITAL LETTER Y | Y | 89 |
| 0×5A | 90 | LATIN CAPITAL LETTER Z | Z | 90 |
| 0×5B | 91 | LATIN CAPITAL LETTER A WITH DIAERESIS | Ä | 196 |
| 0×5C | 92 | LATIN CAPITAL LETTER O WITH DIAERESIS | Ö | 214 |
| 0×5D | 93 | LATIN CAPITAL LETTER N WITH TILDE | Ñ | 209 |
| 0×5E | 94 | LATIN CAPITAL LETTER U WITH DIAERESIS | Ü | 220 |
| 0×5F | 95 | SECTION SIGN | § | 167 |
| 0×60 | 96 | INVERTED QUESTION MARK | ¿ | 191 |
| 0×61 | 97 | LATIN SMALL LETTER A | a | 97 |
| 0×62 | 98 | LATIN SMALL LETTER B | b | 98 |
| 0×63 | 99 | LATIN SMALL LETTER C | c | 99 |

| 0×64 | 100 | LATIN SMALL LETTER D | d | 100 |
|------|-----|----------------------|---|-----|
| 0×65 | 101 | LATIN SMALL LETTER E | e | 101 |
| 0×66 | 102 | LATIN SMALL LETTER F | f | 102 |
| 0×67 | 103 | LATIN SMALL LETTER G | g | 103 |
| 0×68 | 104 | LATIN SMALL LETTER H | h | 104 |
| 0×69 | 105 | LATIN SMALL LETTER I | i | 105 |
| 0×6A | 106 | LATIN SMALL LETTER J | j | 106 |
| 0×6B | 107 | LATIN SMALL LETTER K | k | 107 |
| 0×6C | 108 | LATIN SMALL LETTER L | l | 108 |
| 0×6D | 109 | LATIN SMALL LETTER M | m | 109 |
| 0×6E | 110 | LATIN SMALL LETTER N | n | 110 |
| 0×6F | 111 | LATIN SMALL LETTER O | o | 111 |
| 0×70 | 112 | LATIN SMALL LETTER P | p | 112 |
| 0×71 | 113 | LATIN SMALL LETTER Q | q | 113 |
| 0×72 | 114 | LATIN SMALL LETTER R | r | 114 |
| 0×73 | 115 | LATIN SMALL LETTER S | s | 115 |
| 0×74 | 116 | LATIN SMALL LETTER T | t | 116 |
| 0×75 | 117 | LATIN SMALL LETTER U | u | 117 |
| 0×76 | 118 | LATIN SMALL LETTER V | v | 118 |
| 0×77 | 119 | LATIN SMALL LETTER W | w | 119 |
| 0×78 | 120 | LATIN SMALL LETTER X | x | 120 |
| 0×79 | 121 | LATIN SMALL LETTER Y | y | 121 |
| 0×7A | 122 | LATIN SMALL LETTER Z | z | 122 |
| 0×7B | 123 | LATIN SMALL LETTER A WITH DIAERESIS | ä | 228 |
| 0×7C | 124 | LATIN SMALL LETTER O WITH DIAERESIS | ö | 246 |
| 0×7D | 125 | LATIN SMALL LETTER N WITH TILDE | ñ | 241 |
| 0×7E | 126 | LATIN SMALL LETTER U WITH DIAERESIS | ü | 252 |
| 0×7F | 127 | LATIN SMALL LETTER A WITH GRAVE | à | 224 |

## 4.2   Troubleshooting

This section of the document describes possible problems encountered when using the Robustel M1000 MP and their solutions.

## 4.2.1  The modem's LED does not light:

- Check if modem has connected to a proper power supply.
- Check if the power connector is properly inserted.

## 4.2.2  The modem keep rebooting all the time:

- Please make sure you have inserted the SIM card.

## 4.2.3  No connection with modem through serial link

- Check if the serial cable has been connected properly.
- Check if the serial cable has been made by following pin assignment given in section 2.6 **PIN assignmen** for RS232.
- Check if your program has proper setting. Factory setting of the modem is 115200,8,n,1.
- Check if there is another program interfering with the communication program, such as conflict on communication port access.

## 4.2.4  Receiving "No Carrier" Message

If the modem returns a "No Carrier" message upon an attempted call (voice or data), then refer to the table below for possible causes and solutions.

| If the modem returns… | Then ask… | Action… |
|---|---|---|
| "No Carrier" | Is the received signal strong enough? | Use "AT+CSQ" to check RSSI, please check Signal Strength Indication. |
| | Is the antenna properly connected? | Refer to section 2.5 |
| "No Carrier" (when trying to issue a voice communication) | Is the semicolon (;) entered immediately after the phone number in the AT command? | Ensure that the semicolon (;) is entered immediately after the phone number in the AT command. e.g. ATD123456; |
| "No Carrier" (when trying to issue a data communication) | Is the SIM card configured for data / fax calls? | Configure the SIM card for data / fax calls (Ask your network provider if necessary). |
| | Is the selected bearer type supported by the called party? | Ensure that the selected bearer type is supported by the called party. |
| | Is the selected bearer type supported by the network? | Ensure that the selected bearer type is supported by the network. If no success, try bearer select type by AT command: AT+CBST=0,0,3 |

Signal Strength Indication

| Value of received signal strength indication (RSSI) | Interpretation of the received signal strength |
|---|---|
| 0 to 12 | Insufficient or weak |
| 13 to 19 | Average |
| 20 to 31 | Good |
| 99 | No signal |

## 4.3    Terms and Abbreviations

| Abbreviations | Description |
|---|---|
| AC | Alternating Current |
| APN | Access Point Name of GPRS Service Provider Network |
| CE | Conformité Européene (European Conformity) |
| CHAP | Challenge Handshake Authentication Protocol |
| CSD | Circuit Switched Data |
| CTS | Clear to Send |
| dB | Decibel |
| dBi | Decibel Relative to an Isotropic radiator |
| DC | Direct Current |
| DCD | Data Carrier Detect |
| DCE | Data Communication Equipment (typically modems) |
| DCS 1800 | Digital Cellular System, also referred to as PCN |
| DI | Digital Input |
| DO | Digital Output |
| DSR | Data Set Ready |
| DTE | Data Terminal Equipment |
| DTMF | Dual Tone Multi-frequency |
| DTR | Data Terminal Ready |
| EMC | Electromagnetic Compatibility |
| EMI | Electromagnetic Interference |
| ESD | Electrostatic Discharges |
| ETSI | European Telecommunications Standards Institute |
| GND | Ground |
| GPRS | General Package Radio Service |
| GSM | Global Standard for Mobile Communications |
| IMEI | International Mobile Equipment Identification |
| kbps | kbits per second |
| LED | Light Emitting Diode |
| MAX | Maximum |
| Min | Minimum |
| MO | Mobile Originated |
| MS | Mobile Station |
| MT | Mobile Terminated |
| PAP | Password Authentication Protocol |
| PC | Personal Computer |
| PCN | Personal Communications Network, also referred to as DCS 1800 |
| PCS | Personal Communication System, also referred to as GSM 1900 |

| PDU | Protocol Data Unit |
|---|---|
| PPP | Point-to-point Protocol |
| PIN | Personal Identity Number |
| PSU | Power Supply Unit |
| PUK | Personal Unblocking Key |
| R&TTE | Radio and Telecommunication Terminal Equipment |
| RF | Radio Frequency |
| RTC | Real Time Clock |
| RTS | Request to Send |
| Rx | Receive Direction |
| SIM | Subscriber Identification Module |
| SMA | Subminiature Version A RF Connector |
| SMS | Short Message Service |
| TCP/IP | Transmission Control Protocol / Internet Protocol |
| TE | Terminal Equipment, also referred to as DTE |
| Tx | Transmit Direction |
| UART | Universal Asynchronous Receiver-transmitter |
| USSD | Unstructured Supplementary Service Data |
| VSWR | Voltage Stationary Wave Ratio |