MQTT Gateway Configuration Software
SST-MQT-CFG

Software Content

V 4.2

SST Automation

E-mail: support@sstautomation.com

www.SSTAutomation.com

Important Information

Warning

The data and examples in this manual cannot be copied without authorization. SST Automation reserves the right to upgrade the product without notifying users.

The product has many applications. The users must make sure that all operations and results are in accordance with the safety of relevant fields, and the safety includes laws, rules, codes and standards.

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Catalog

1 Notes before Configuration

1.1 Overview

SST-MQT-CFG is the configuration software which can be used to configure GT200-MQ-IE, GT100-MQ-IE and GT100-MQ-RS.
This content introduces the specific usage and cautions of the software SST-MQT-CFG. Please read this manual carefully before using the software.

1.2 Revision History

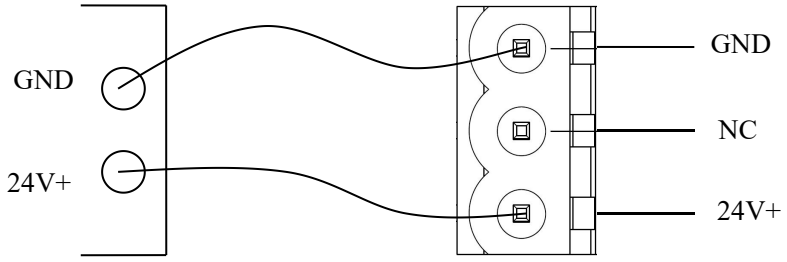
Revision	Date	Chapter	Description
V4.2	2/7/2023	ALL	New release for SST-MQT-CFG V4.2
V3.2, Rev C	6/22/2021	Chapter 6	MQTT configuration updated
V3.2, Rev B	5/21/2021	-	Cover picture updated
V3.2, Rev A	4/1/2021	Chapter 3~11	Pictures updated
V3.2	3/2/2021	ALL	New release

2 Quick Start Guide

2.1 For GT200-MQ-IE

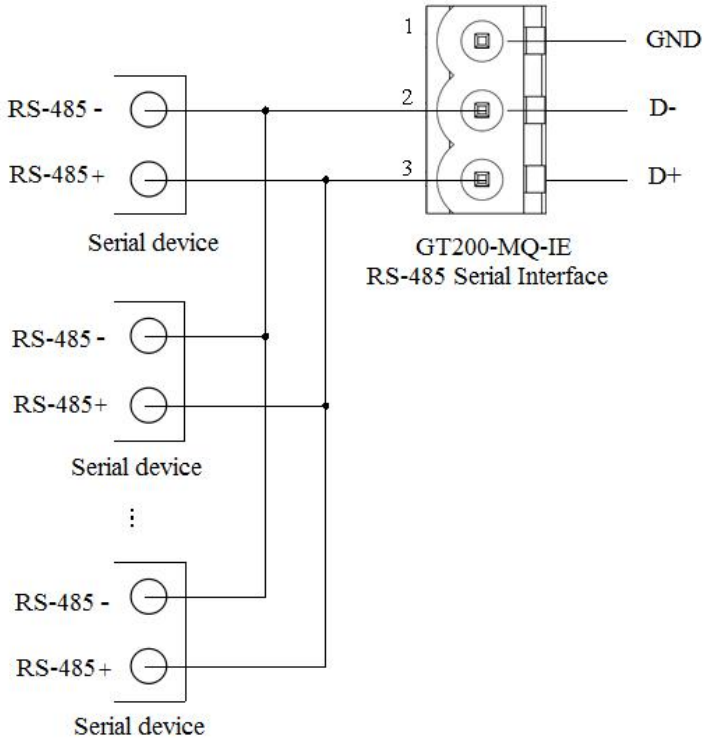
2.1 2.1.1 Connection

1. Insert the Micro SIM card into the slot behind the GT200-MQ-IE correctly.
2. Connect the power supply as follows.
   Note: Please do not power on the devices before finishing all the connections.



24V DC Power GT200-MQ-IE Power Interface

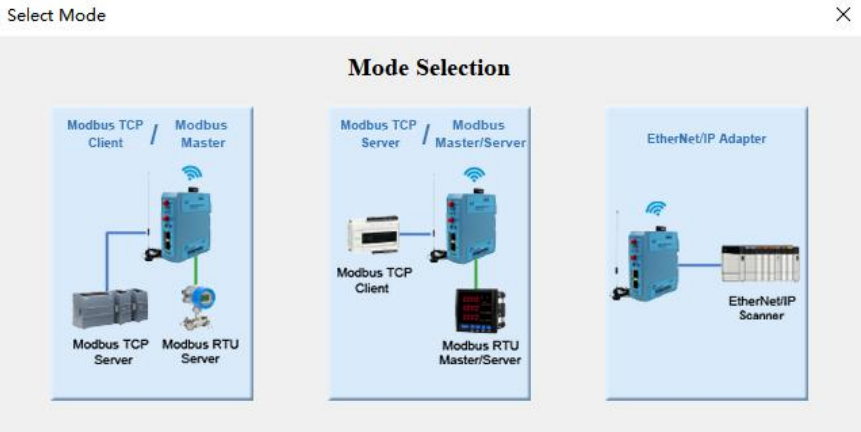
3. Connect the serial devices. (Under EtherNet/IP Adapter mode, the serial interface is disabled.)
   Note: The GT200-MQ-IE doesn't have the terminal resistor in the RS-485 serial interface. When connecting multiple RS-485 serial devices, it's recommended to connect a terminal resistor (120Ω, 1/2W) in parallel at both ends of the communication lines to ensure stable communication.



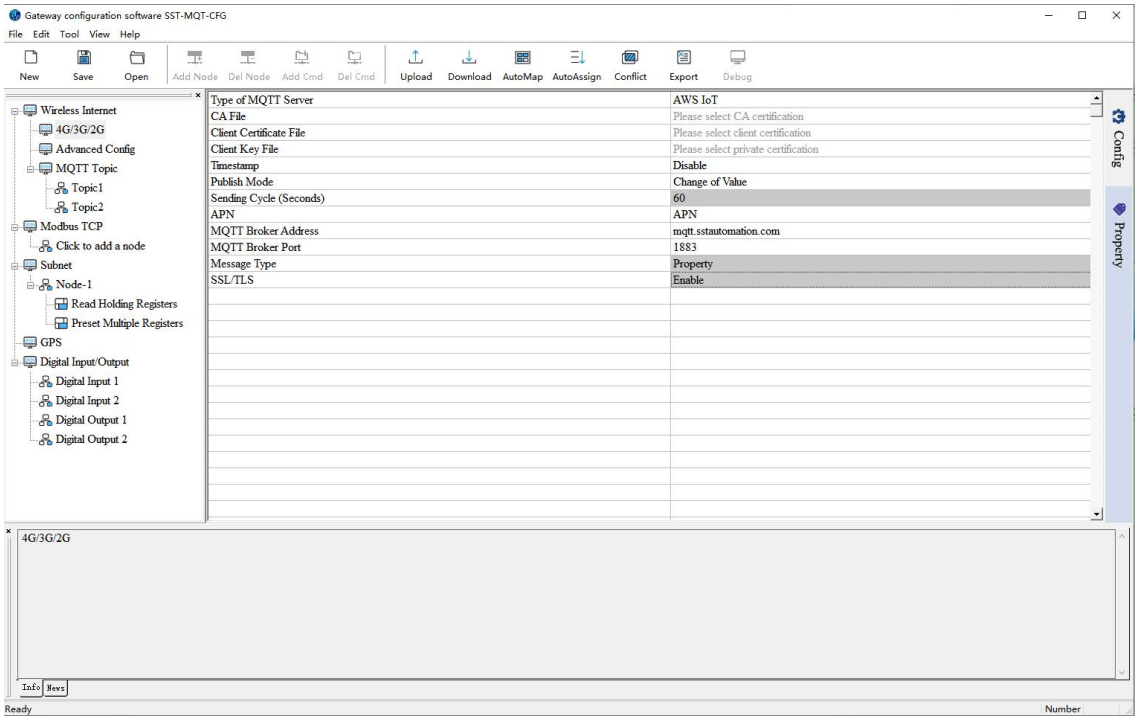
4. Connect the Ethernet/IP scanner (master) or Modbus TCP clients/servers via Ethernet cable.
5. Connect the GT200-MQ-IE with the PC via Ethernet cable.
6. Power on the GT200-MQ-IE.

2.2 2.1.2 Configuration

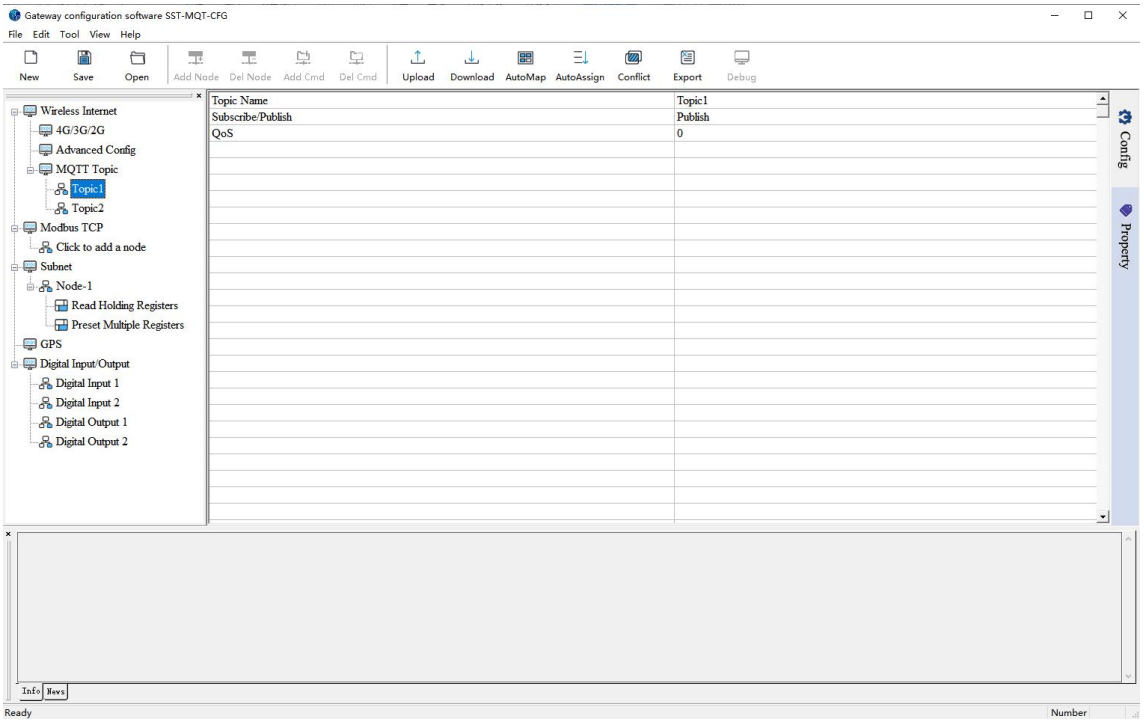
1. Download the configuration software SST-MQT-CFG from www.sstautomation.com and install it. Open the software and select a device.



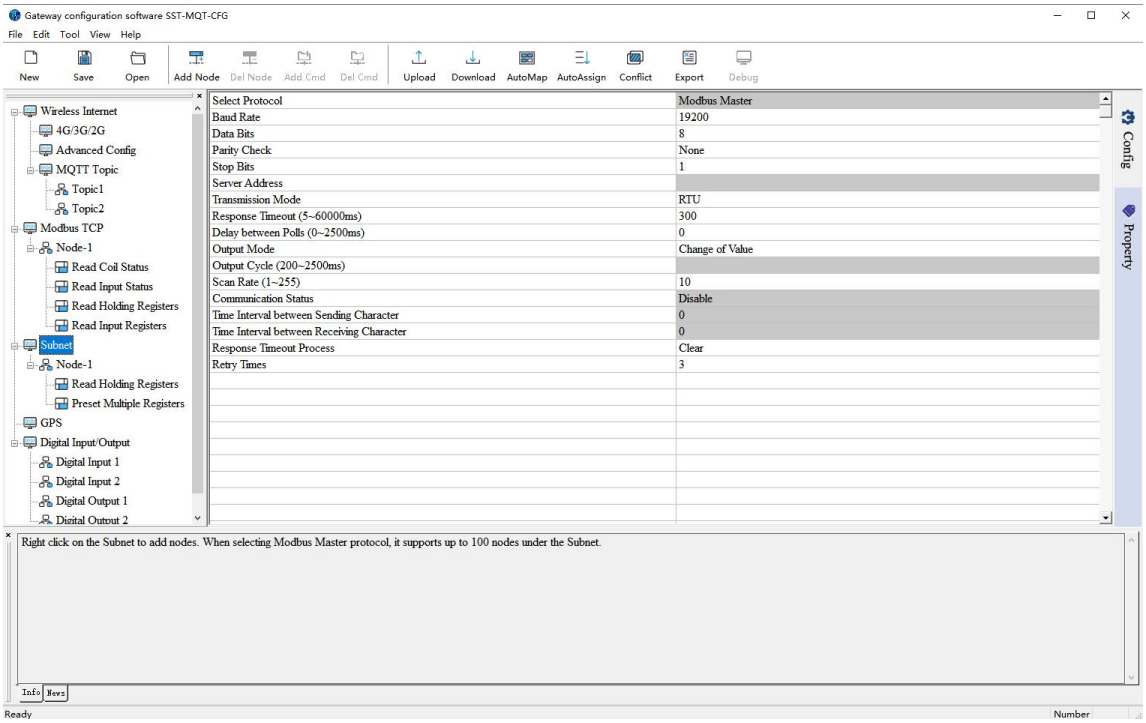
2. Configure the Wireless Internet (MQTT Server configuration).



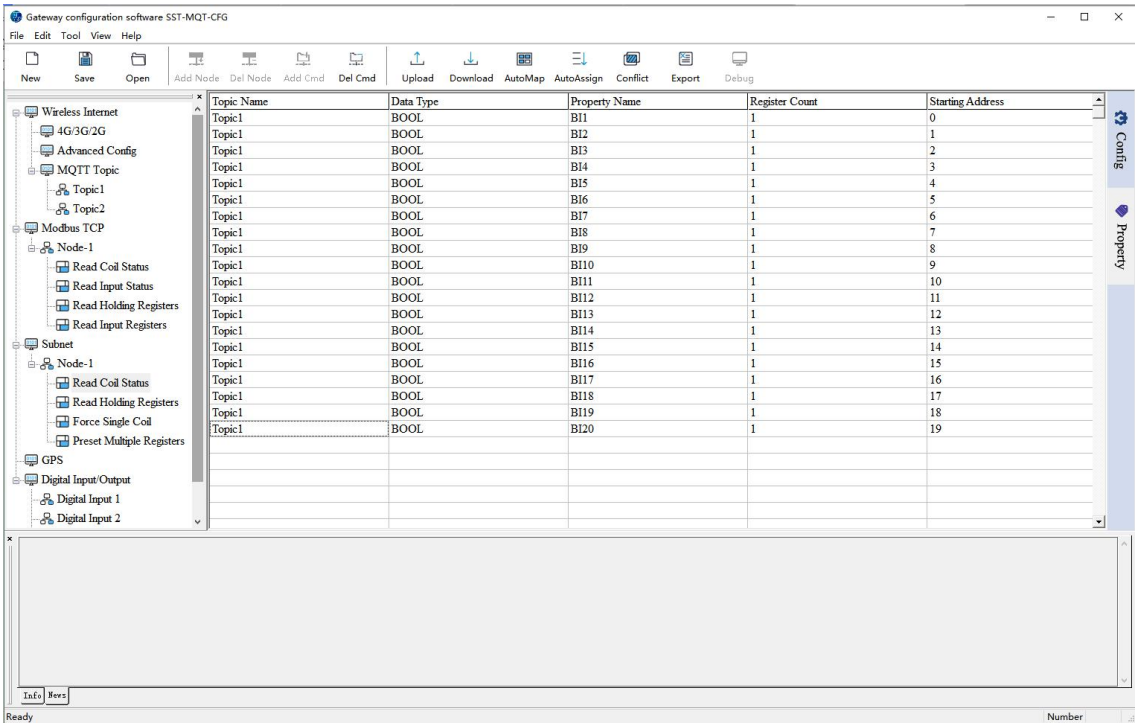
3. Add or edit MQTT Topic.



4. Configure the Digital Input/Output, Modbus TCP, Subnet and EtherNet/IP Interface parameters.



5. Configure the properties. Please see "Properties Operations" for details.



6. Check the mapping buffer and the property names. Use the "Auto Mapping" and "Name Properties in Order" functions.
7. Save the configuration project and download it to the GT200-MQ-IE.

2.2 For GT100-MQ-IE

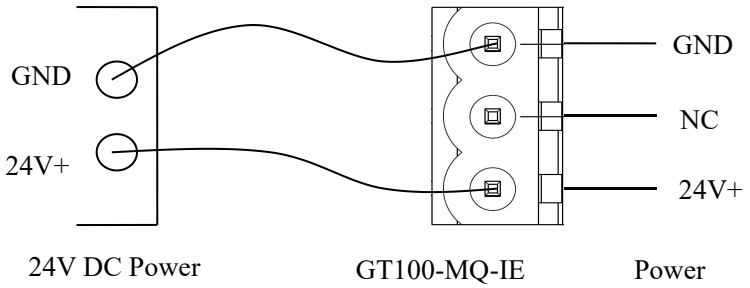
2.2.1 Connection

1. Insert the Nano SIM card into the slot behind the GT100-MQ-IE correctly.

2. Connect NB-IoT /eMTC network antenna (long straight antenna) and GPS antenna (square head antenna).

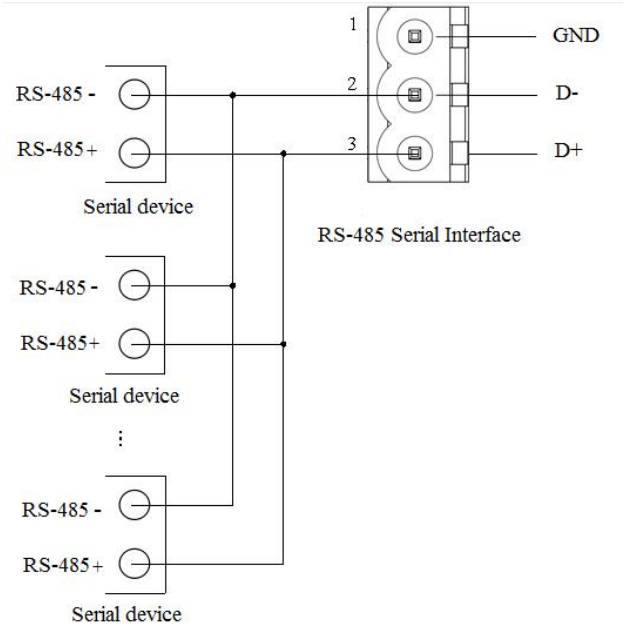
3. Connect the power supply as follows.

Note: Please do not power on the devices before finishing all the connections.



4. Connect the serial devices.

Note: The GT100-MQ-IE doesn't have the terminal resistor in the RS485 serial interface. When connecting multiple RS485 serial devices, it's recommended to connect a terminal resistor (120Ω, 1/2W) in parallel at both ends of the communication lines to ensure stable communication.



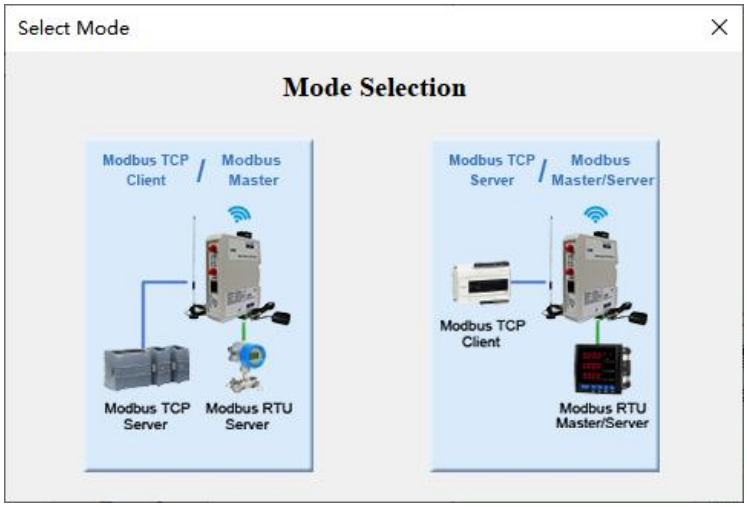
5. Connect the Modbus TCP clients/servers via Ethernet cable.

6. Connect the GT100-MQ-IE with the PC via Ethernet cable.(Use when configuring)

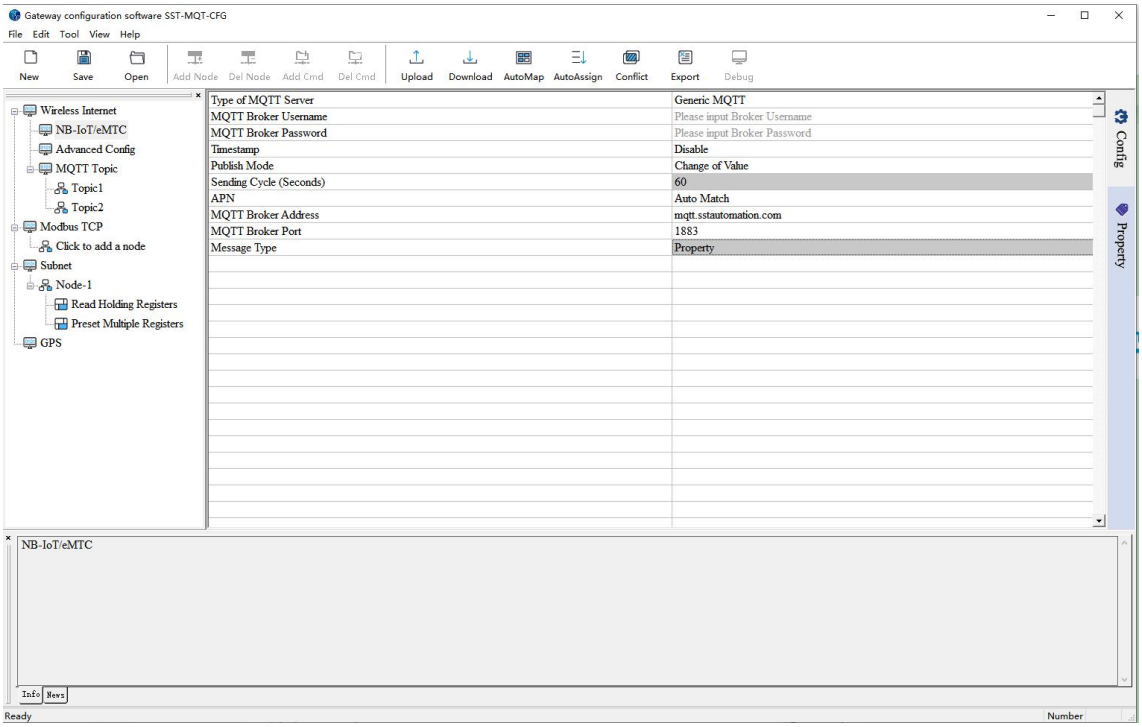
7. Power on the GT100-MQ-IE.

2.2.1 Configuration

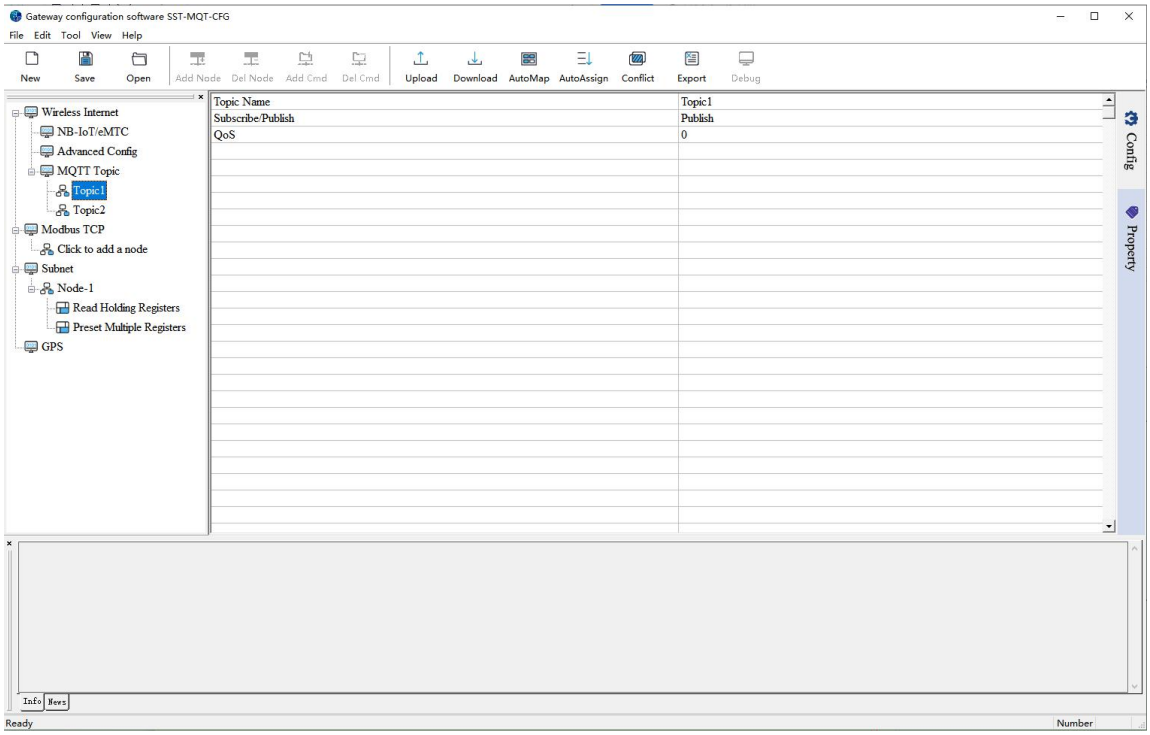
1. Download the configuration software SST-MQT-CFG from https://www.sstautomation.com/Download1/ and install it. Open the software and select the GT100-MQ-IE, then confirm the gateway mode.



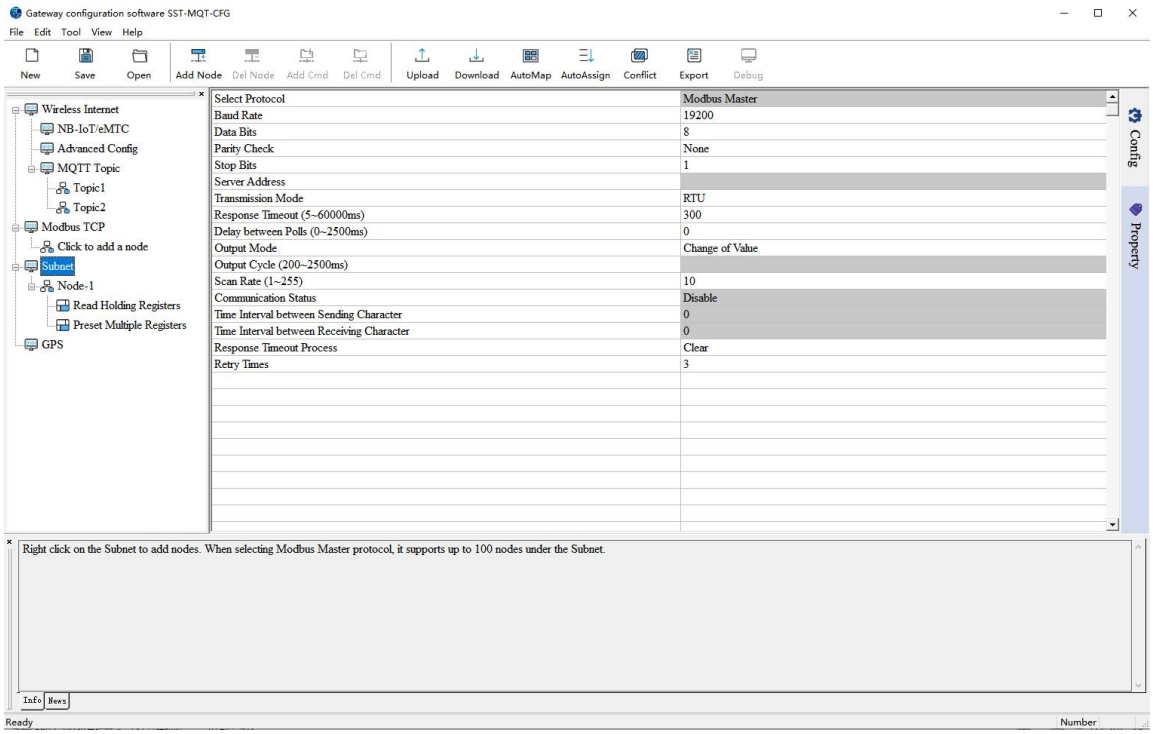
2. Configure the Wireless Internet (MQTT Server configuration).



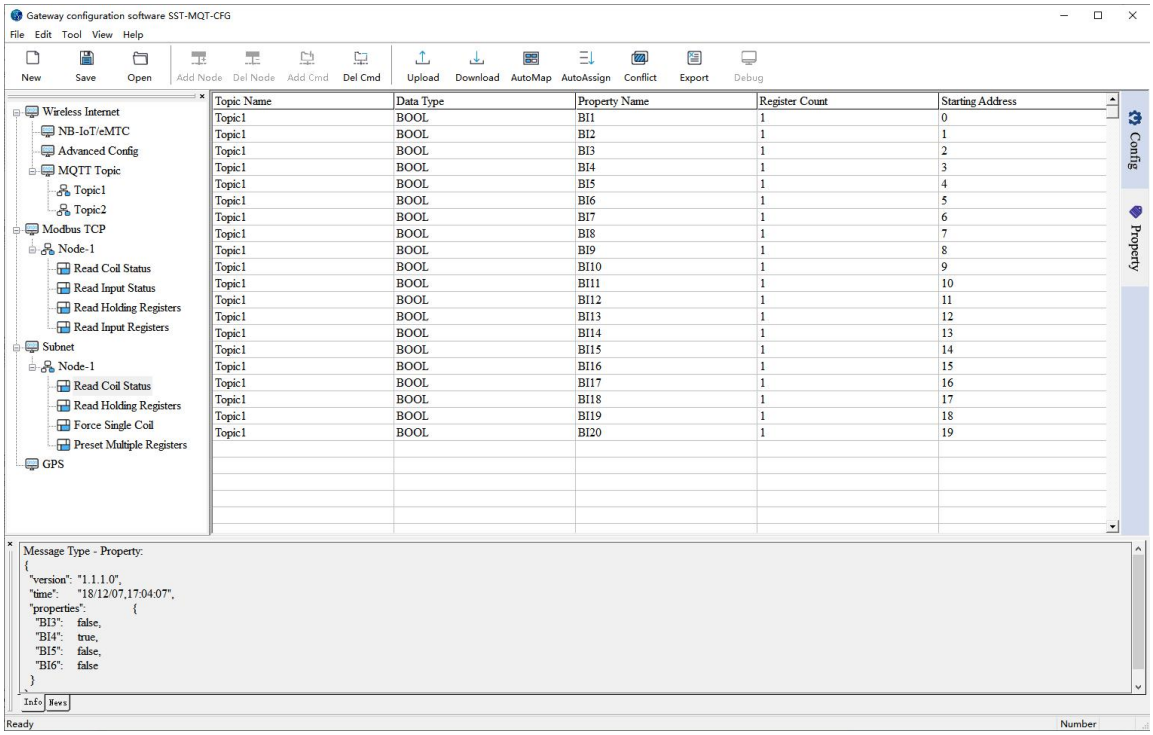
3. Add or edit MQTT Topic.



4. Configure the Modbus TCP and Subnet Interface parameters.



5. Configure the properties.



6. Check the mapping buffer and the property names. Use the “Auto Mapping” and “Name Properties in Order” functions.

7. Save the configuration and download to GT100-MQ-IE through network cable configuration.

Notes:

1. Make sure that the GT100-MQ-IE and your computer are in the same network segment.

2. If you can’t discover any gateways, please test the network connection first. Please refer to the note “How to Use the Ping Command” located on our Support page on the sstautomation.com website.

3. If the Assign IP mode is DHCP, and there is no DHCP Server or you can’t search the GT100-MQ-IE. Please power on, then press and hold the button for 3 seconds. At this time, the IP address is restored to 192.168.0.10, and the device can be searched under the same network segment as the gateway and computer, and the configuration can be uploaded and downloaded.

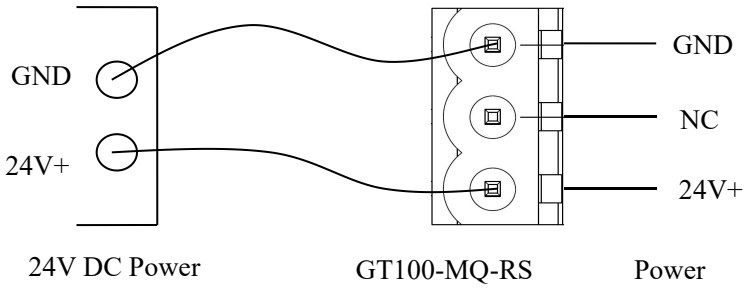
2.3 For GT100-MQ-RS

2.3.1 Connection

1. Connect the device to the Internet through the network cable.

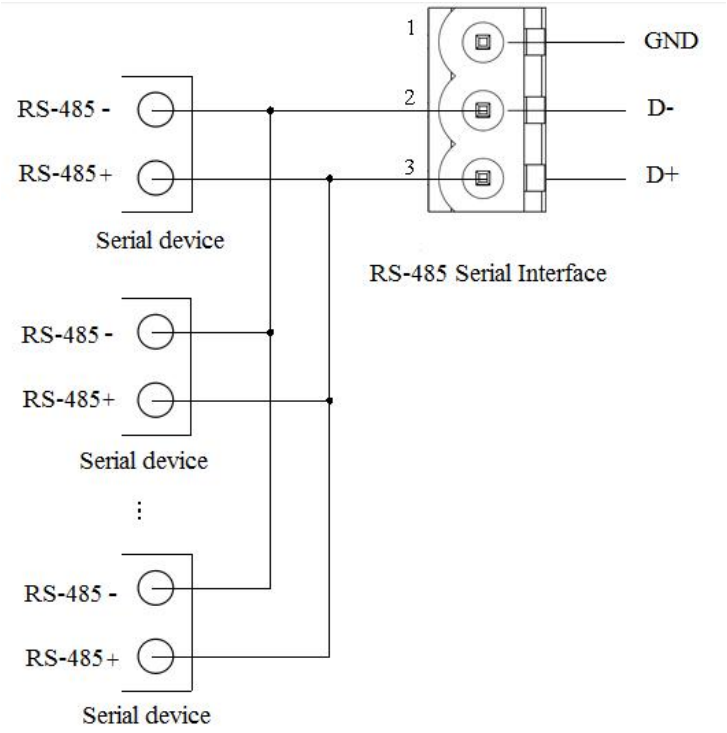
2. Connect the power supply as follows.

Note: Please do not power on the devices before finishing all the connections.



3. Connect the serial devices.

Note: The GT100-MQ-RS doesn't have the terminal resistor in the RS-485 serial interface. When connecting multiple RS-485 serial devices, it's recommended to connect a terminal resistor (120Ω, 1/2W) in parallel at both ends of the communication lines to ensure stable communication.



4. Connect the GT100-MQ-RS with the PC via Ethernet cable.

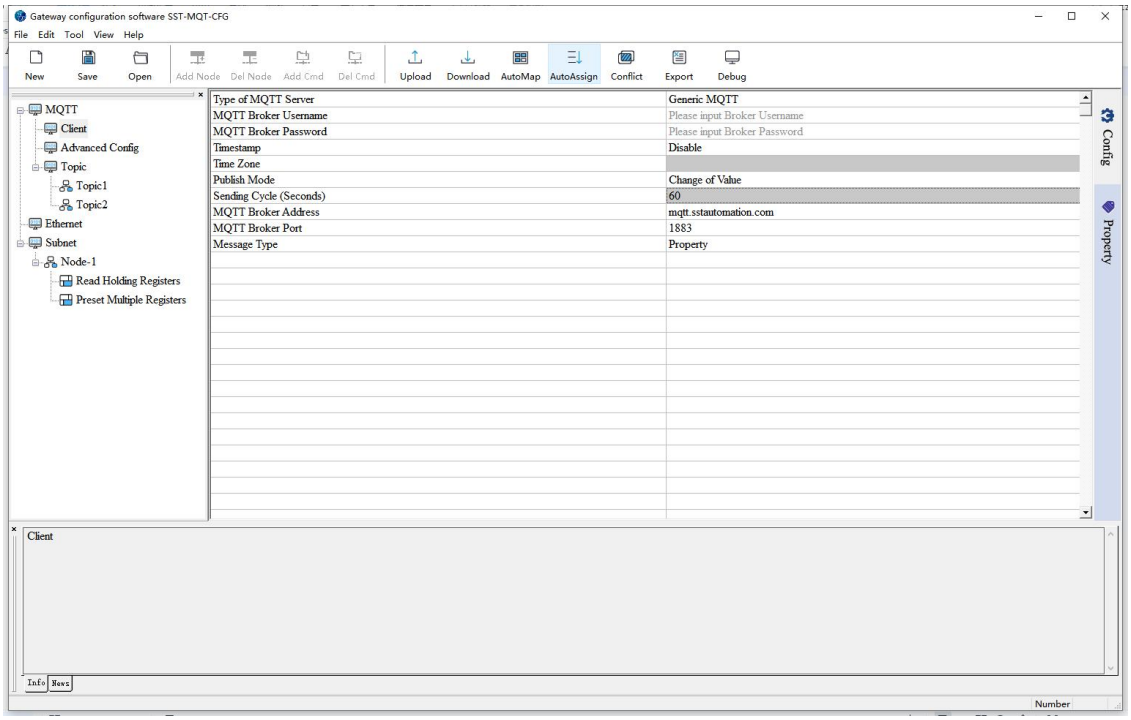
5. Power on the GT100-MQ-RS.

2.3.2 Configuration

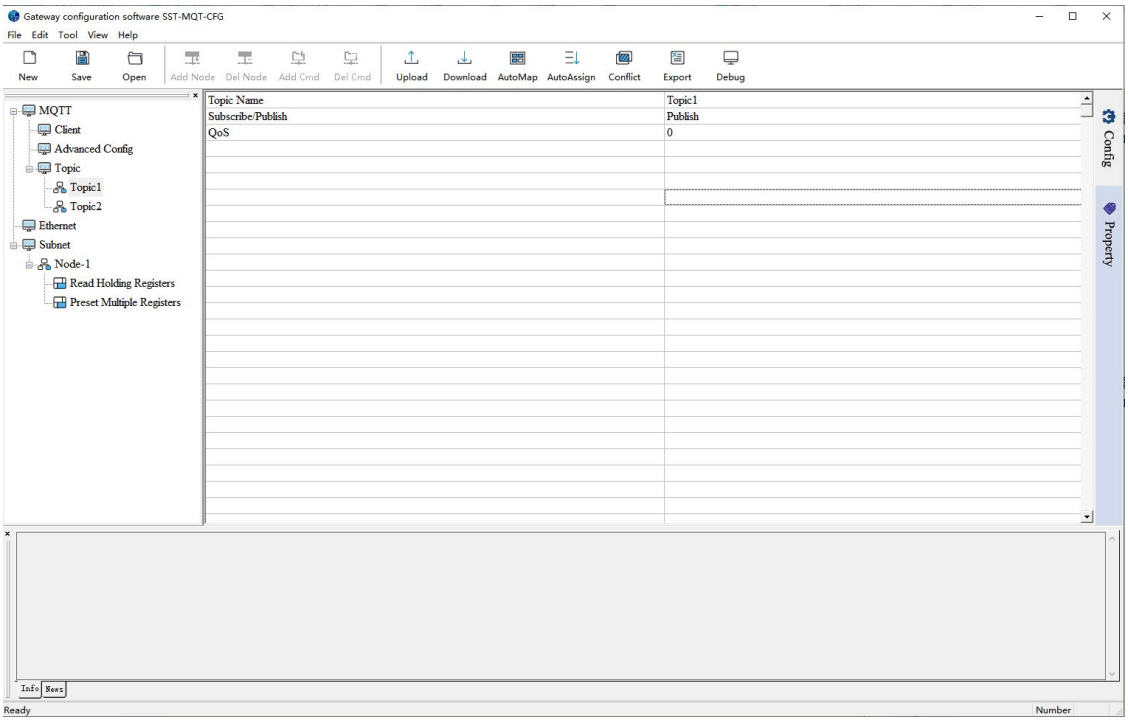
Please see "SST-MQT-CFG Software Content" for details.

1. Download the configuration software SST-MQT-CFG from www.sstautomation.com and install it. Open the software and select the GT100-MQ-RS.

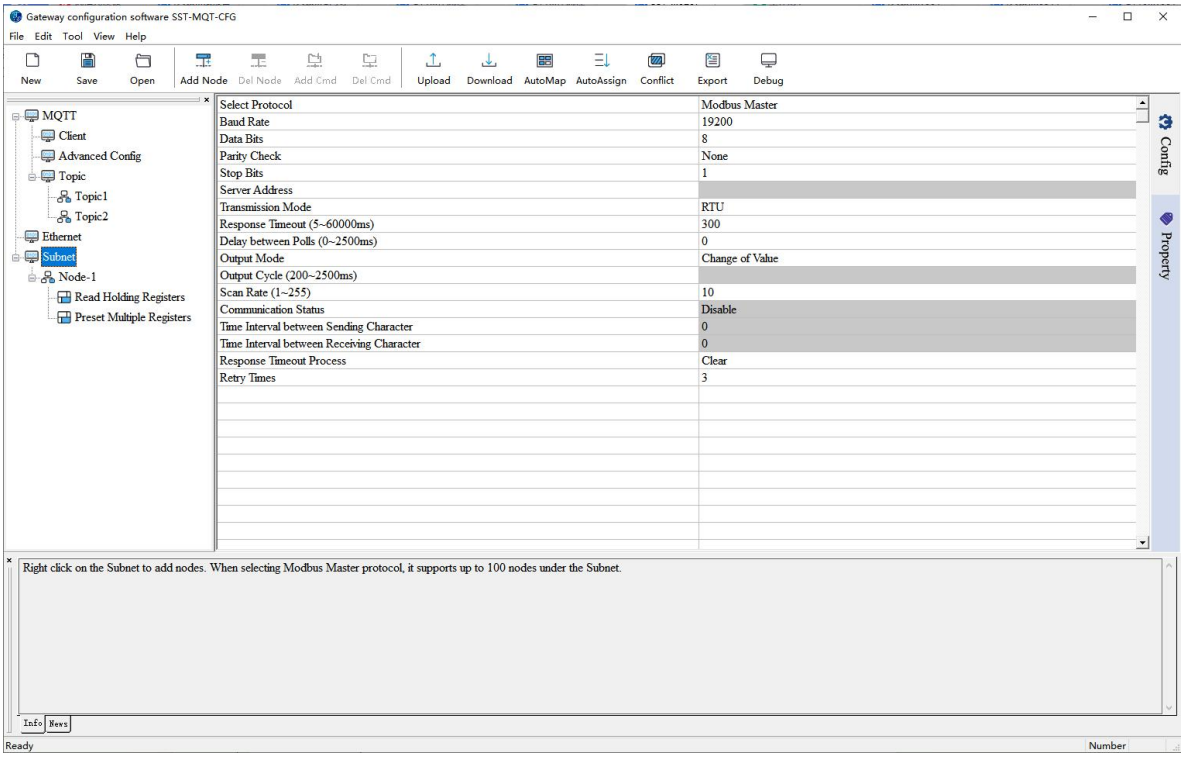
2. Configure the Client (MQTT Client configuration).



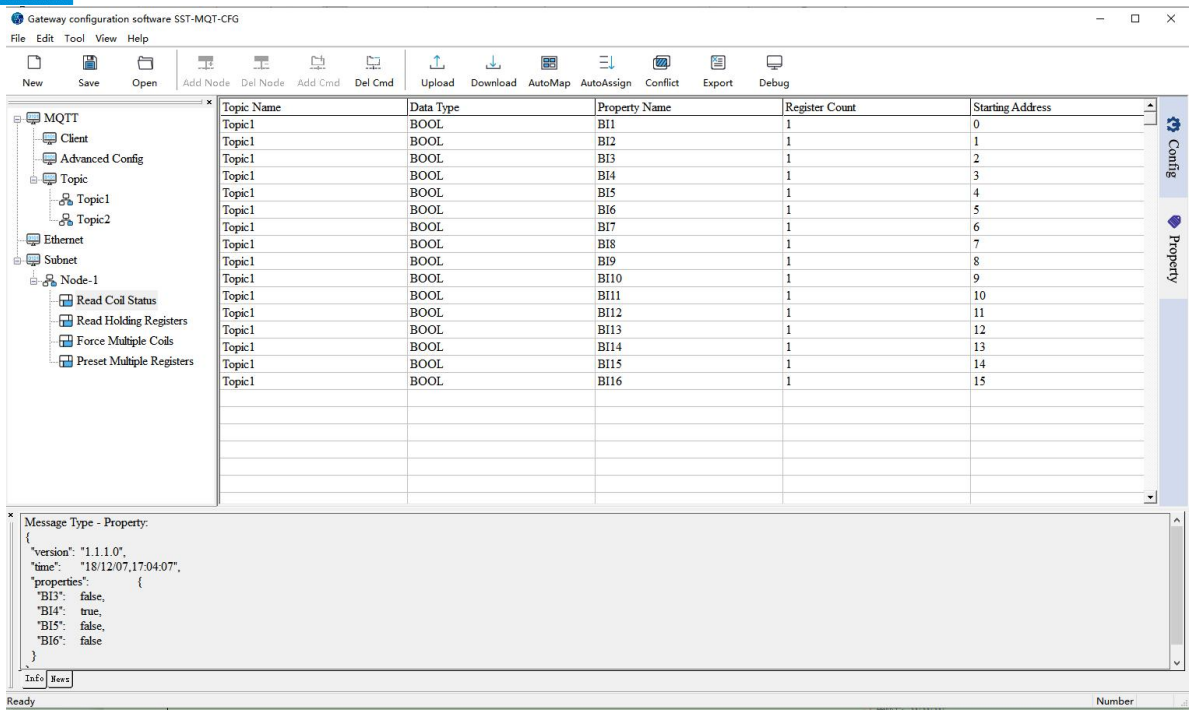
3. Add or edit MQTT Topic.



4. Configure the Ethernet for internet connection and Subnet Interface parameters for fieldbus communication.



5. Configure the properties.



6. Check the mapping buffer and the property names. Use the “Auto Mapping” and “Name Properties in Order” functions.

7. Save the configuration and download to GT100-MQ-RS through network cable configuration.

Notes：

1. Make sure that the GT100-MQ-RS and your computer are in the same network segment.

2. If you can’t discover any gateways, please test the network connection first. Please refer to the note “How to Use the Ping Command” located on our Support page on the sstautomation.com website.

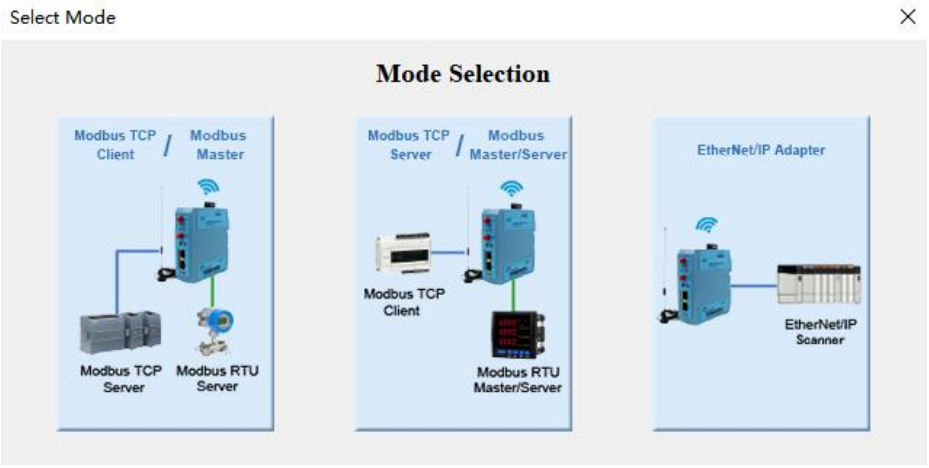
3. If you can’t discover any gateways, after powering on, press and hold the button for 3 seconds. At this time, the IP address is restored to 192.168.0.10, and the device can be searched under the same network segment as the gateway and computer, and the configuration can be uploaded and downloaded.

3 Start

Take GT200-MQ-IE as an example.

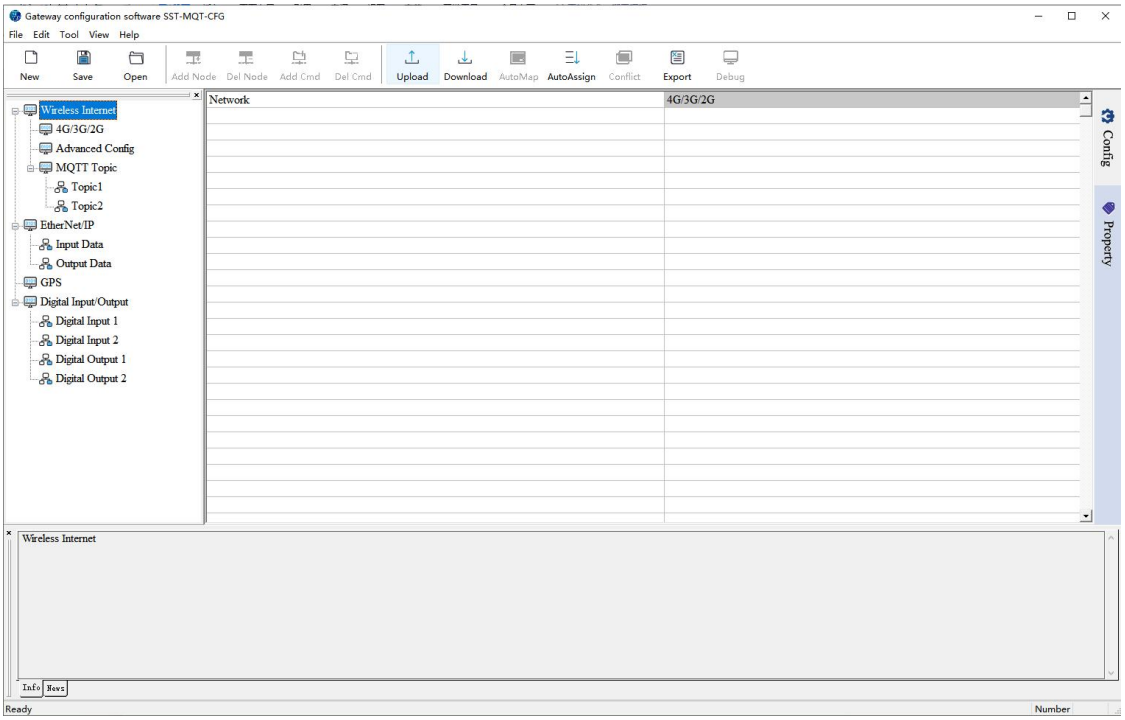
Double click on the SST-MQT-CFG icon to enter Device Select interface.

Note: Please select the corresponding device according to the actual running mode of the GT200-MQ-IE. If they do not match, please modify the running mode referring to the User Manual.



For example, select "EtherNet/IP Adapter" and enter configuration interface.

Software Content

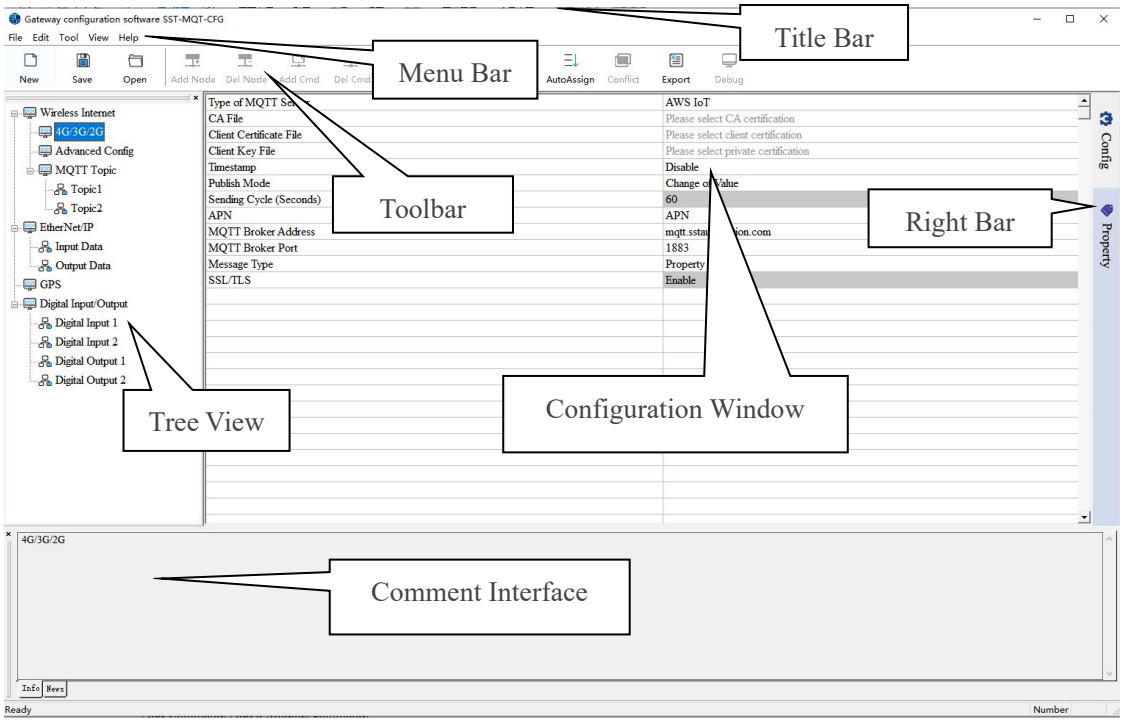


4 User Interface

4.1 Main Interface

The software interface includes: Title bar, Menu bar, Toolbar, Configuration Window and Tree View.

Note: The gray parameters cannot be changed.



4.2 Toolbar

The toolbar is shown as bellow:

The toolbar provides icon shortcuts to major functions.

New: Create a new configuration project.

Save: Save the current configuration.

Open: Open a configuration project.

Add Node: Add a Modbus node.

Delete Node: Delete a Modbus node.

Add Command: Add a Modbus command.

Delete Command: Delete a Modbus command.

Upload: Upload the configuration from the gateway.

Download: Download the configuration to the gateway.

Auto Map: Automatically calculate the mapped data address of each command.

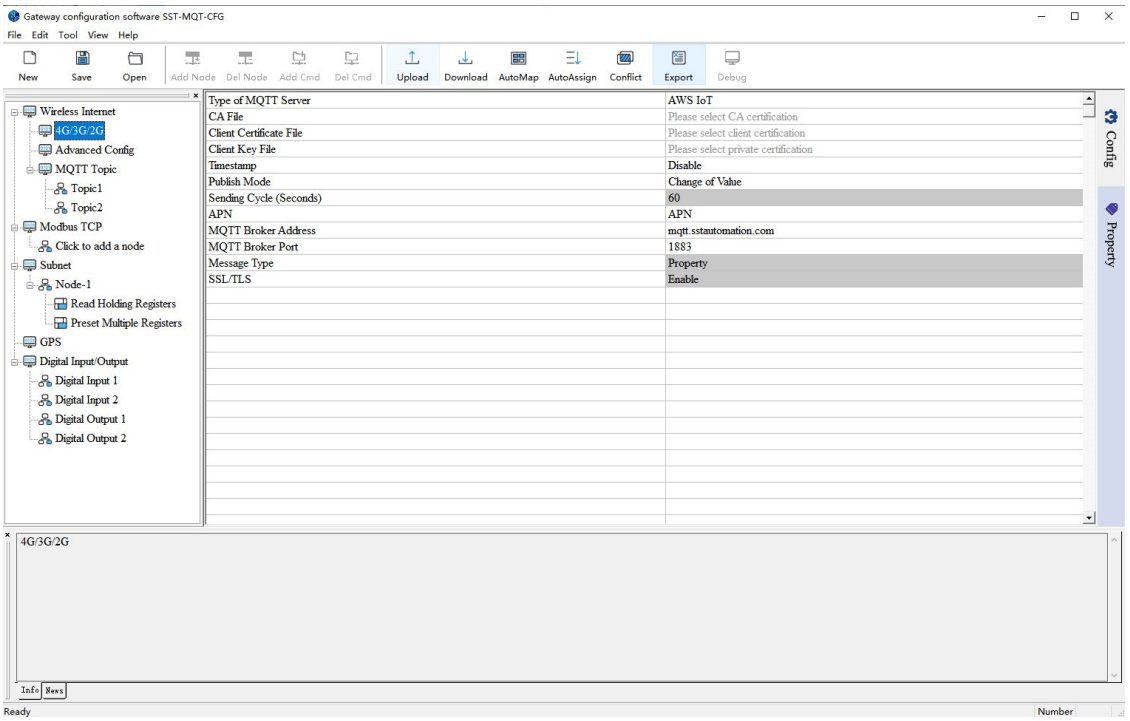
Conflict Detection: Check whether the configured commands' mapped data addresses conflict with others in the gateway data buffer.

Export Excel: Export current configuration as a table and save it as *.xls file.

Debug: Unused. Monitor I/O Data.

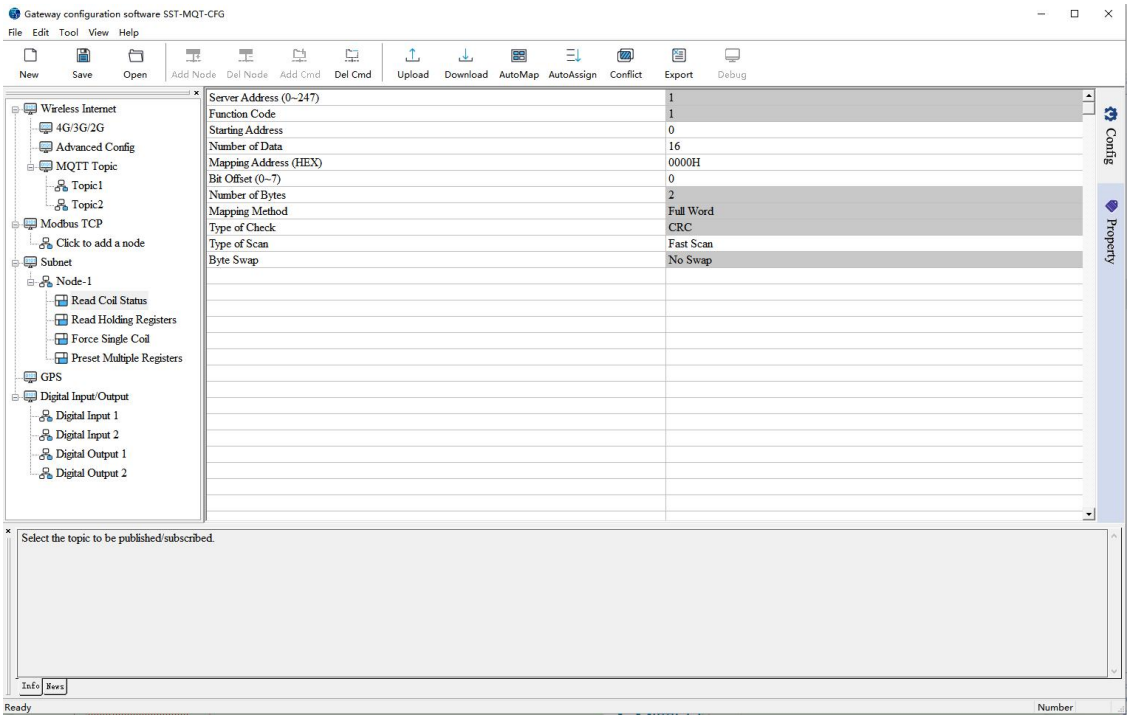
4.3 Configuration Window

Select "Config" in the right bar to enter configuration window.



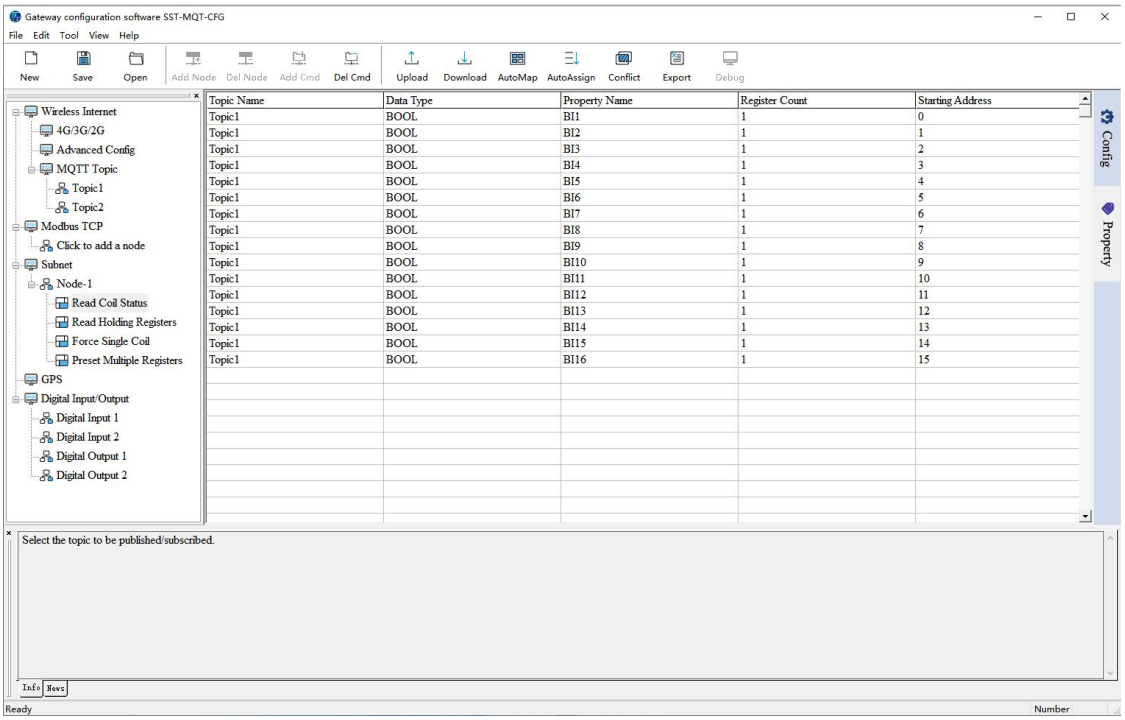
4.4 Comments Interface

The comments interface displays the explanation of the corresponding configuration item. For example, when selecting "Mapping Address (HEX)", the comments interface is as below:



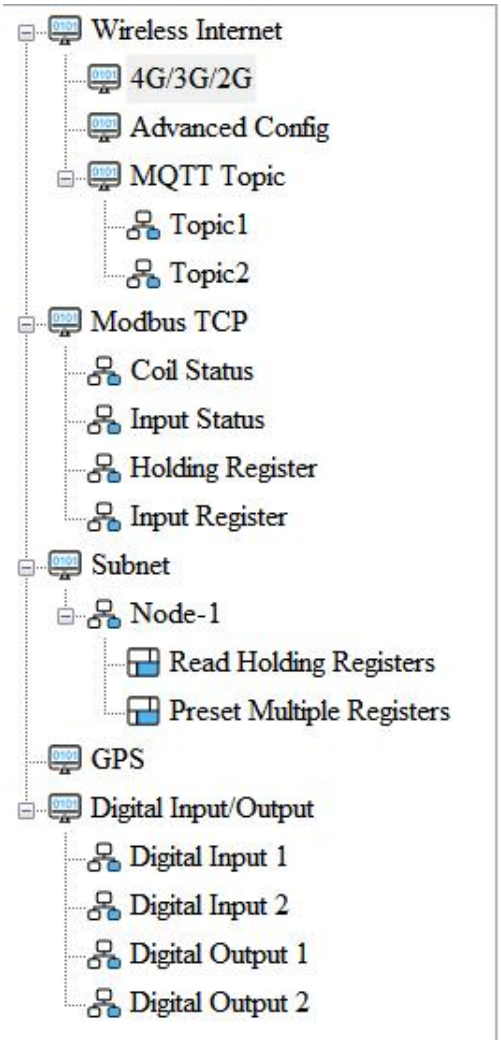
4.5 Property Window

When selecting the added Topics, Digital input/output, Modbus blocks, Modbus commands or EtherNet/IP input/output data in the left tree view, users can select "Property" in the right bar to enter property window.

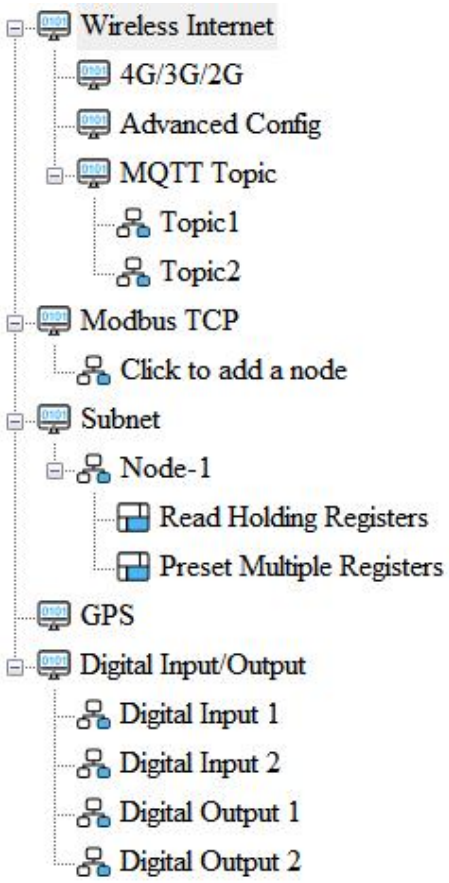


5 Tree View Operations

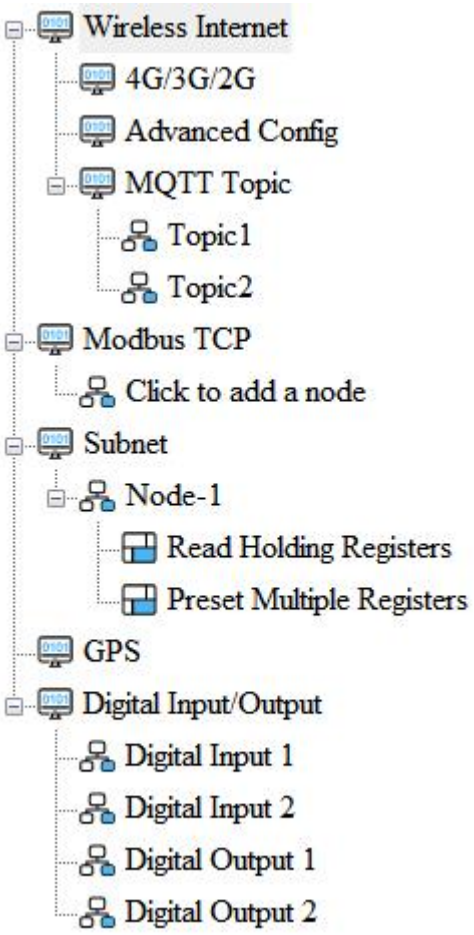
When selecting "Modbus TCP S / Modbus M/S" device, the tree view is shown as below:



When selecting "Modbus TCP C / Modbus M" device, the tree view is shown as below:



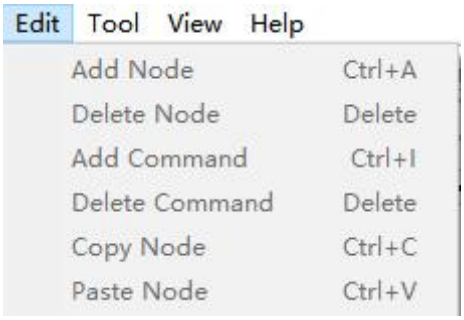
When selecting "EtherNet/IP Adapter" device, the tree view is shown as below:



5.1 Edit the Items in the Left Tree View

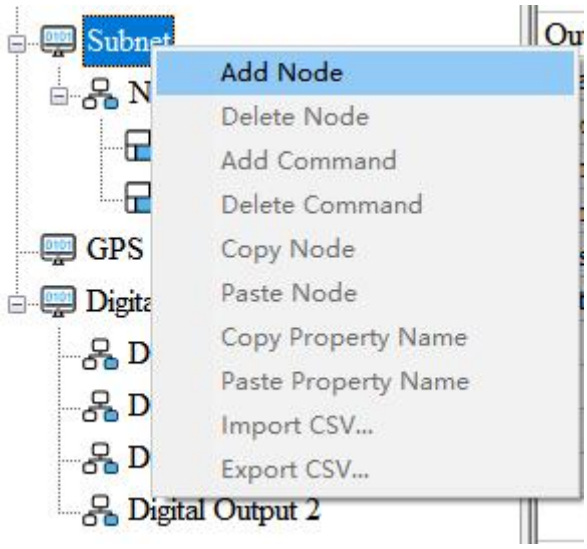
Users can edit the items in the left tree view three different ways:

1. Edit with the commands in the menu.



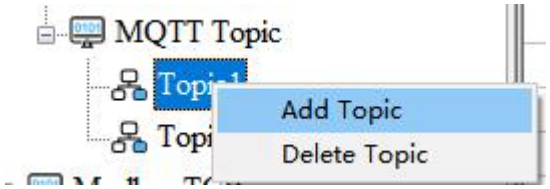
2. Edit with the icon in the toolbar. Please see "Toolbar" chapter for details.

3. Right click on the item.



Note:

The Topic items only support right-click edit.

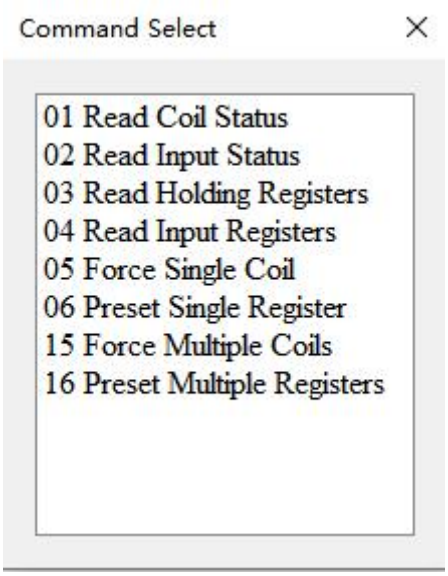


5.2 Modbus Node and Command Operations

Users can edit Modbus nodes and commands by three operation ways in the "Tree View Operations" chapter.

1. Add node: Select the "Subnet" and add a new node. A new node named "Node-X" will be added under the Subnet. The maximum number of nodes is 100.
2. Delete node: When deleting a node, all commands under the node will be deleted.
3. Add command: Select a node and add a command. The pop-up window shows the Modbus command list. Double click on the command and the new command will be added under the node. The maximum command number is 100.

Supports 01, 02, 03, 04, 05, 06, 16 and 16 function codes.



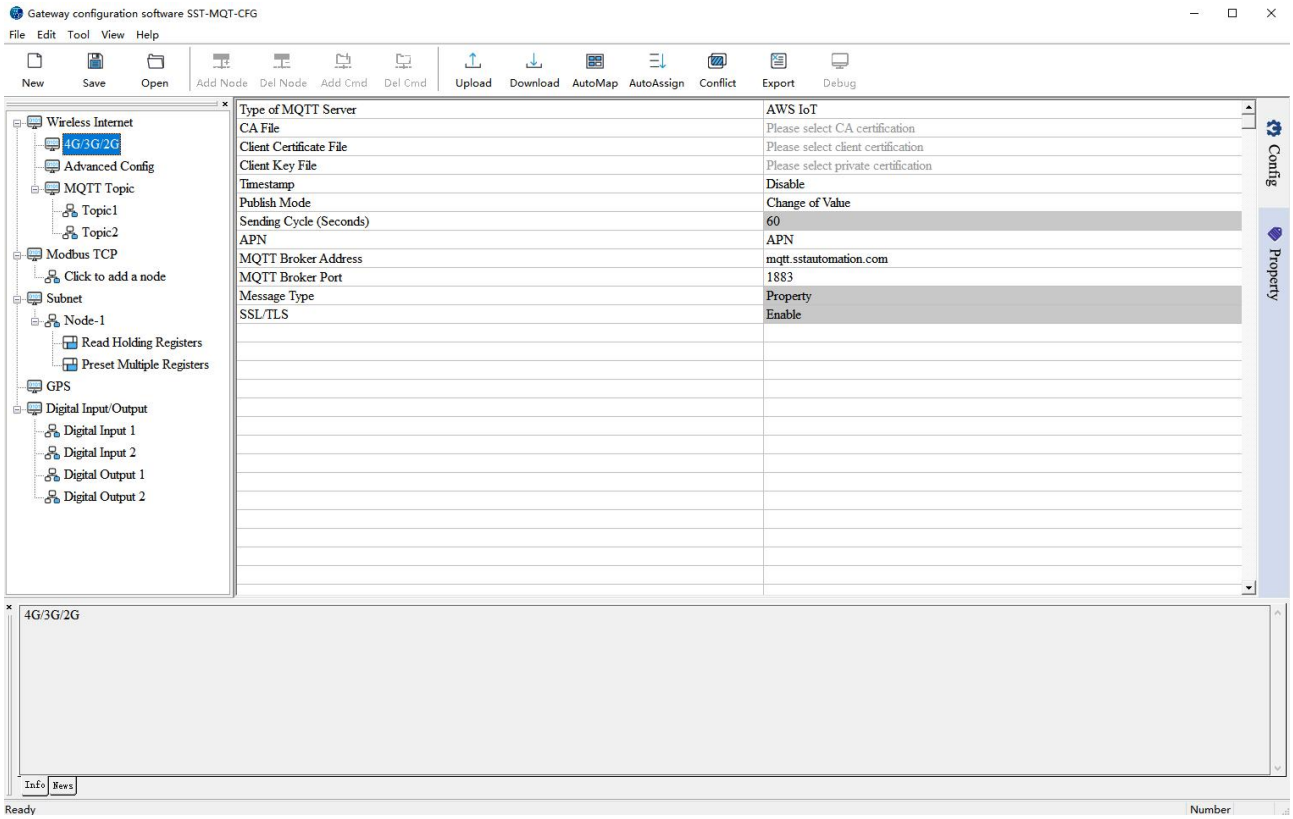
4. Delete command: Select a command and then delete it.
5. Copy node: Select an existing node and copy the node. The commands under the node will be copied at the same time.
6. Paste node: Select the Subnet or an existing node and paste the node. The pasted node has the same parameters with the copied node.

6 Communication Configuration

6.1 Internet Connection

6.1.1 Wireless Internet (for GT200-MQ-IE)

Select the 4G/3G/2G in the left tree view and enter the 4G/3G/2G configuration window.



Type of MQTT Server: Supports AWS IoT and Generic MQTT.

1. AWS IoT configuration

CA File: The CA certificate is provided by AWS. Please refer to AWS IoT Core Developer Guide.

Client Certificate File: The client certificate is provided by AWS IoT Core.

Client Key File: The private key is provided by AWS IoT Core.

2. Generic MQTT configuration

MQTT Broker Username: The username is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

MQTT Broker Password: The password is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

3. Universal configuration

Timestamp: The time when the data is collected by the gateway, and will be published together with the data when enabled.

Publish Mode: Supports two publish mode: Change of Value and Cyclic.

Change of Value: Publish messages when value changes.

Cyclic: Publish Messages periodically.

Sending Cycle: The cycle time when publishing messages periodically. Range: 5~100000s. The default value is 60s. It's valid when the Publish Mode is "Cyclic".

Note:

In Cyclic mode, the minimum cycle time depends on the actual configuration:

A. When the Message Type is "Property", the minimum cycle time depends on the number of properties.

Property No.	Recommended Cycle Time (s)
1 -- 100	> 5
10 -- 200	> 10
200 -- 500	> 30
500 --1000	> 60

B. When Message Type is "Register" or "Data Only", the minimum cycle time depends on the number of Modbus commands or EtherNet/IP input/output bytes.

Command No.	Recommended Cycle Time (s)
1 -- 20	> 5
20 -- 50	> 20
50 -- 100	> 40

APN: The APN (Access Point Name) is used to identify the mobile network type. Please ask the network operator for details. If the SIM does not require the APN authentication, users can skip the APN configuration.

Note: Some wireless network carriers require exact APN settings, which is mandatory when configuring the GT200-MQ-IE. Please refer to the carriers' support information. For example, the SIM card of AT&T and T-Mobile will work with the following settings:

Carrier	APN	Username	Password
AT&T	m2m.com.attz	No user name or password is typically required	
	m2m64.com.attz (OneRate SIMs)	No user name or password is typically required	
T-Mobile	fast.t-mobile.com	No user name or password is typically required	

Note: Please refer to your network carrier for the latest APN configuration information.

APN Username: It is provided by the network operator and used for authentication.

APN Password: It is provided by the network operator and used for authentication.

MQTT Broker Address: The URL or IP Address to connect with the MQTT broker. Please refer to the guide of corresponding MQTT Server.

MQTT Broker Port: The access port of the MQTT broker. Please refer to the guide of corresponding MQTT Server.

Message Type: Register/Data Only type and Property type are optional.

Register/Data Only type: The data is directly transmitted in the following message:

```
{
   "version":      "1.1.1.0",
   "type":          "MODBUS_TCP_SLAVE",
   "block":           1,
   " addr ":          3,
   "npoint":          2,
```

```
   "data":          "18",
   "time":          "18/12/27,16:23:35"
}
```


Property type: The data is transmitted with the properties in the following message:


```
{
   "version":      "1.1.1.0",
   "time":          "19/03/07,17:04:07",
   "properties":{
   "BI3":          false,
   "BI4":          true,
   "BI5":          false,
   "BI6":          false
   }
}
```


Remote Update Server Address: The default remote update service IP Address is 54.222.133.11. The gateway can be updated remotely by SST Automation. Please do not change this IP address.

Remote Update Server Port: The default remote update server port is 8885. The gateway can be updated remotely by SST Automation. Please do not change this port.

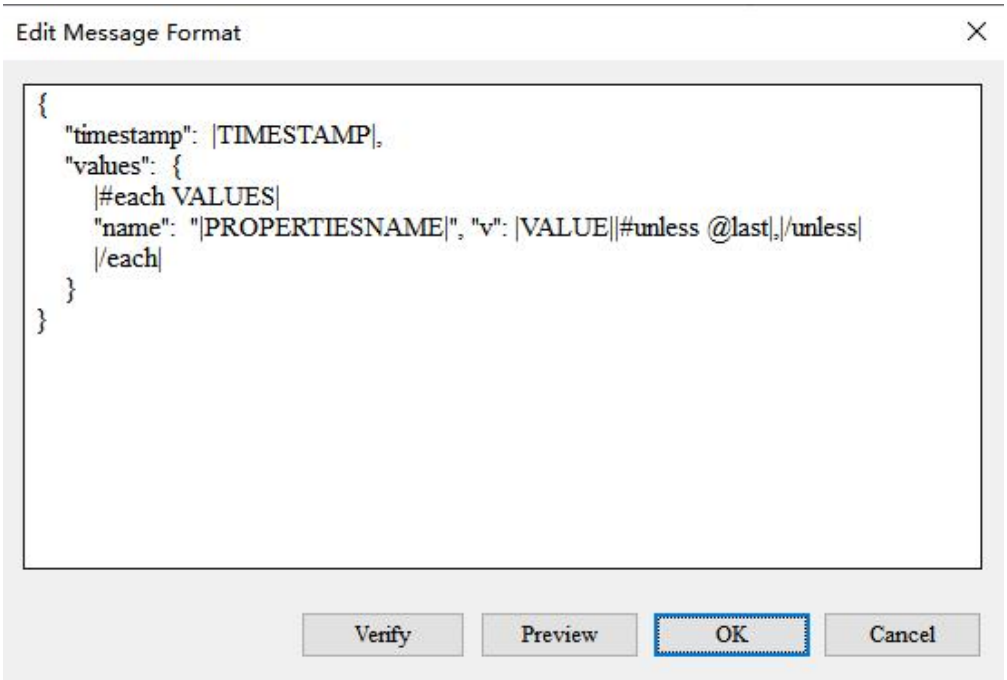
Client ID: The Client ID is specified for the gateway. The default ID is the serial number of the gateway. When connecting to a MQTT Server, each Client should have a unique ID. It's recommended to use the default ID.

SSL/TLS: If enable, the gateway supports the connection under SSL/TLS. Please refer to the corresponding MQTT Server guide.

4. Special Configuration for "Modbus TCP S / Modbus M/S" running mode

Custom Message Format: If disable, the message format is set by "Message Type".

Edit Message Format:

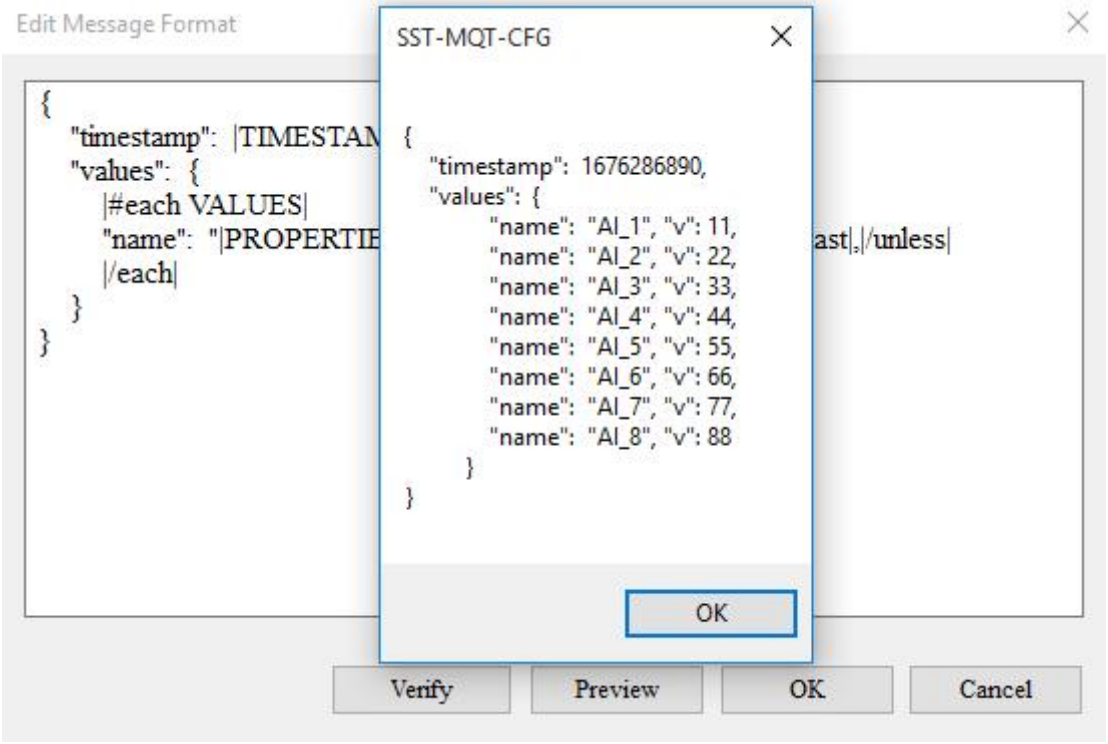


For example:

```
{
   "timestamp": |TIMESTAMP|,
   "values":   {
                |#each VALUES|
                "name": "|PROPERTIESNAME|","v": |VALUE||#unless @last|,|/unless|
                |/each|
   }
}
```

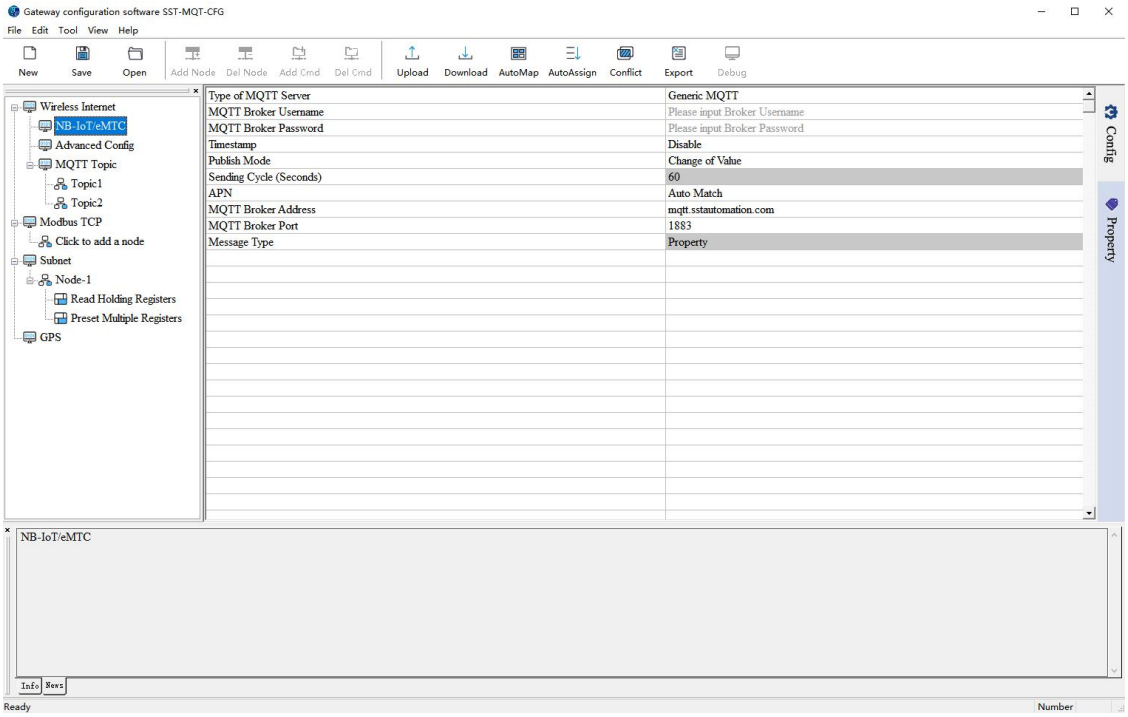
|PROPERTIESNAME| is the property name, |VALUE| is the value of the tag, and |TIMESTAMP| is the time to read the tag. Please see "Custom Message Format" chapter for details.

Click "Verify" to verify the JSON format. Click "Preview" to see message preview.



6.1.2 NB-IoT/eMTC (for GT100-MQ-IE)

Select the “NB-IoT/eMTC” in the left tree view and enter the NB-IoT/eMTC configuration window.



Type of MQTT Server: Support Generic MQTT.

MQTT Broker Username: The username is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

MQTT Broker Password: The password is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

Timestamp: The time when the data is collected by the gateway, and will be published together with the data when enabled.

Publish Mode: Supports two publish mode: Change of Value and Cyclic.

Change of Value: Publish messages when value changes.

Cyclic: Publish Messages periodically.

Sending Cycle: The cycle time when publishing messages periodically. Range: 5~100000s. The default value is 60s. It's valid when the Publish Mode is "Cyclic".

APN: Supports Auto Match and Customize. The APN (Access Point Name) is used to identify the mobile network type. At default, users can select Auto Match. If Auto Match is not working, please select Customize and input the APN name. Please ask the network operator for details.

Note: Some wireless network carriers require exact APN settings, which is mandatory when configuring the

GT100-MQ-IE. Please refer to the carriers' support information. For example, the SIM card of AT&T and T-Mobile will work with the following settings:

Carrier	APN	Username	Password
AT&T	m2m.com.attz	No user name or password is typically required	
	m2m64.com.attz (OneRate SIMs)	No user name or password is typically required	
	m2mNB16.com.attz (NB-IoT OneRate)	No user name or password is typically required	
T-Mobile	fast.t-mobile.com	No user name or password is typically required	

Note: Please refer to your network carrier for the latest APN configuration information.

MQTT Broker Address: The URL or IP Address to connect with the MQTT broker. Please refer to the guide of corresponding MQTT Server.

MQTT Broker Port: The access port of the MQTT broker. Please refer to the guide of corresponding MQTT Server.

Message Type: Register and Property type are optional.

Register: The data is directly transmitted in the following message:

```
{
   "version":      "1.1.1.0",
   "type":          "MODBUS_TCP_SLAVE",
   "block":           1,
   " addr ":          3,
   "npoint":          2,
   "data":             "18",
   "time":           "18/12/27,16:23:35"
}
```

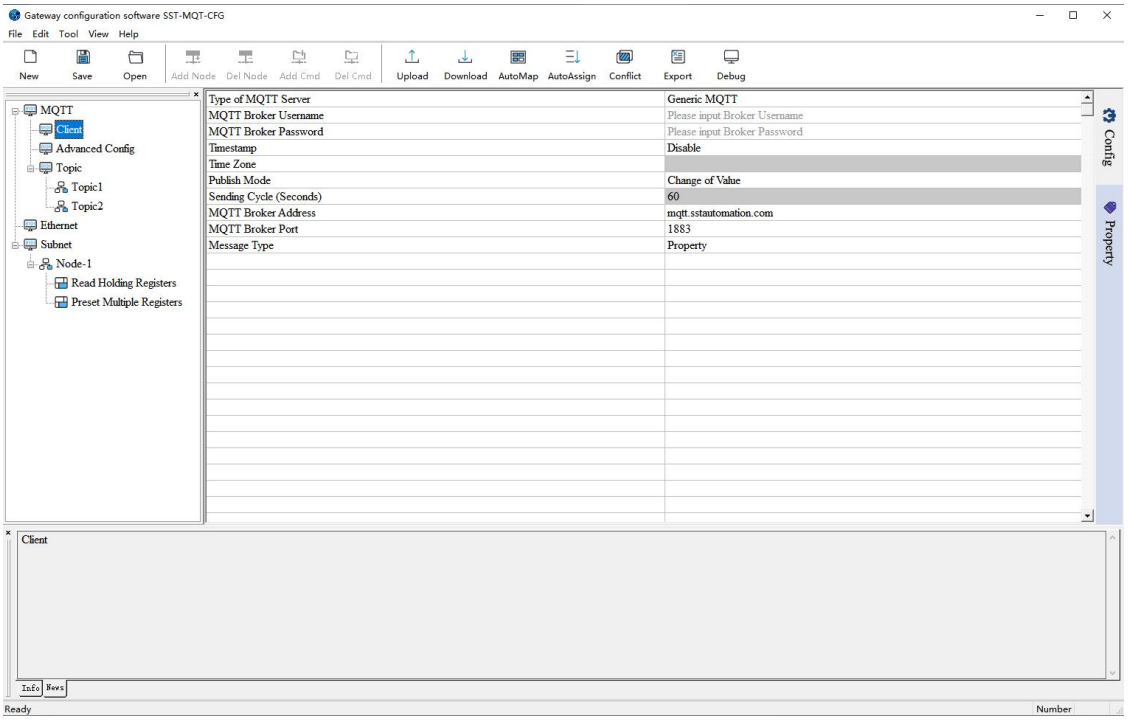
Property: The data is transmitted with the properties in the following message:

```
{
   "version":      "1.1.1.0",
   "time":           "19/03/07,17:04:07",
   "properties":{
```

"BI3": false,
"BI4": true,
"BI5": false,
"BI6": false
}
}

6.1.3 Wired Connection (for GT100-MQ-RS)

Select the “Client” in the left tree view and enter the configuration window.



Type of MQTT Server: Support Generic MQTT.

MQTT Broker Username: The username is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

MQTT Broker Password: The password is used for authentication on the MQTT broker, please refer to the corresponding MQTT server guide.

Timestamp: The time when the data is collected by the gateway, and will be published together with the data when enabled.

Publish Mode: Supports two publish mode: Change of Value and Cyclic.

Change of Value: Publish messages when value changes.

Cyclic: Publish Messages periodically.

Sending Cycle: The cycle time when publishing messages periodically. Range: 5~100000s. The default value is 60s. It's valid when the Publish Mode is "Cyclic".

MQTT Broker Address: The URL or IP Address to connect with the MQTT broker. Please refer to the guide of corresponding MQTT Server.

MQTT Broker Port: The access port of the MQTT broker. Please refer to the guide of corresponding MQTT Server.

Message Type: Register and Property type are optional.

Register: The data is directly transmitted in the following message:

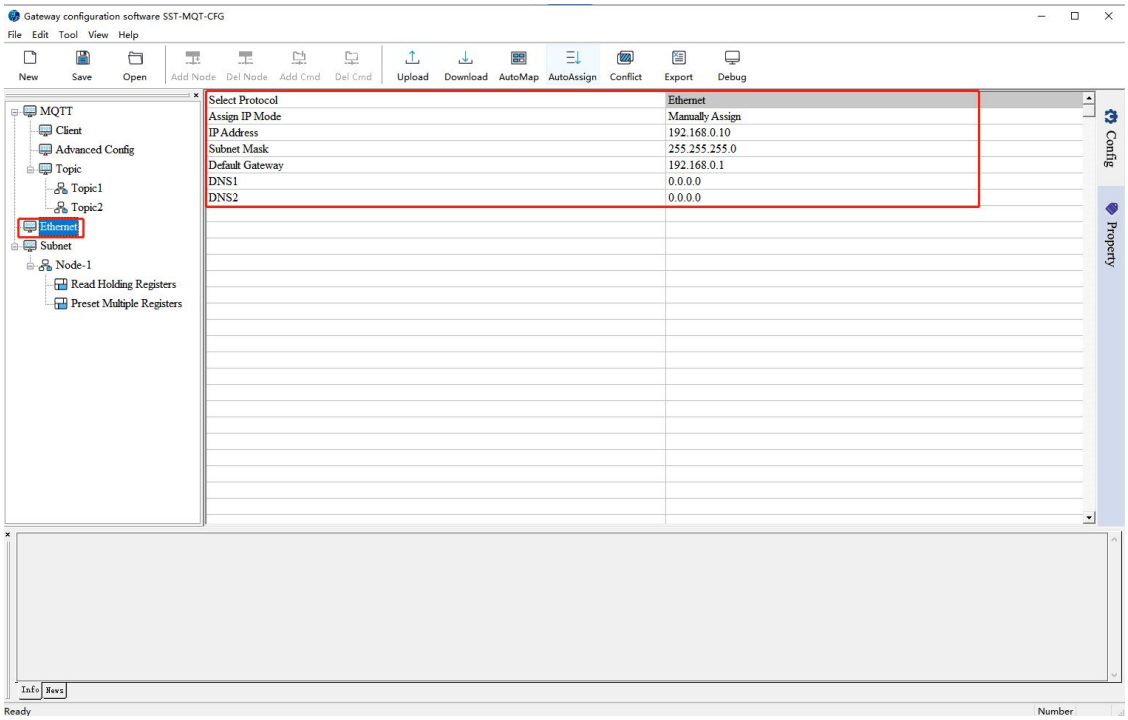

```
{
   "version":      "1.1.1.0",
   "type":          "MODBUS_TCP_SLAVE",
   "block":           1,
   " addr ":          3,
   "npoint":          2,
   "data":             "18",
   "time":            "18/12/27,16:23:35"
}
```


Property: The data is transmitted with the properties in the following message:


```
{
   "version":      "1.1.1.0",
   "time":            "19/03/07,17:04:07",
   "properties":{
   "BI3":          false,
   "BI4":          true,
   "BI5":          false,
   "BI6":          false
   }
```

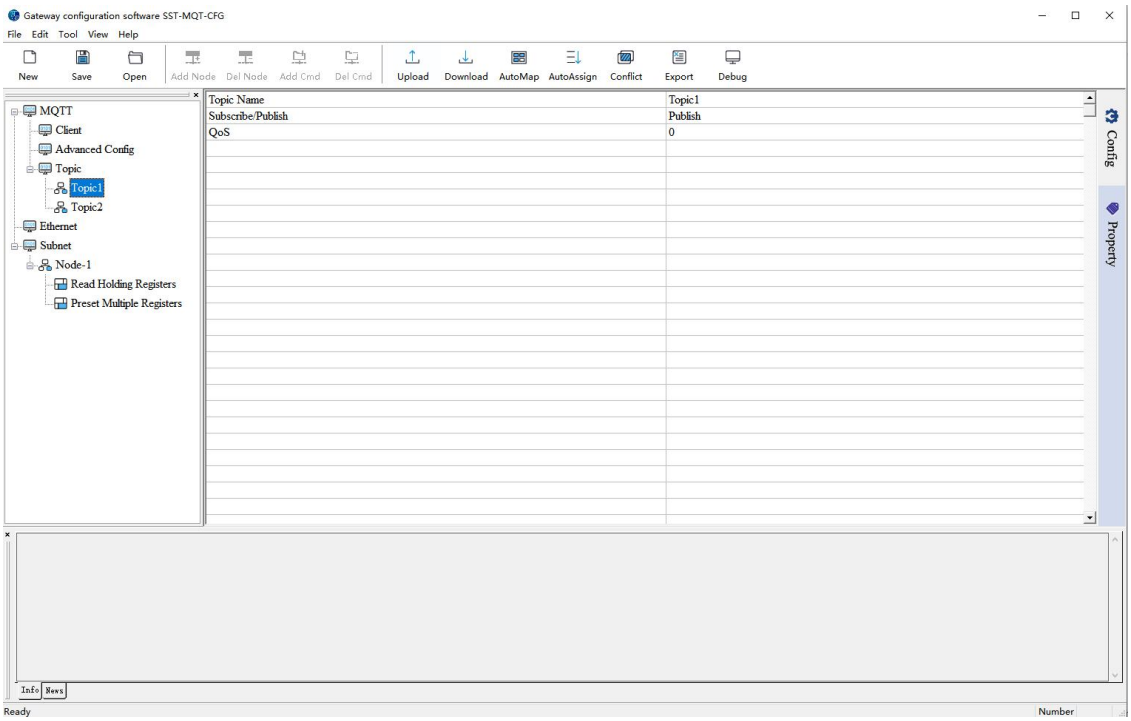
}

For Internet connection, please correctly configure Assign IP Mode, IP Address, Subnet Mask, Default Gateway and DNS information in the Ethernet part.



6.2 MQTT Topic

After adding a Topic, select the Topic in the left tree view to enter Topic configuration window:



Topic Name: Topic name can consist of character, number, "_" , "/" , "-" and "$" . The length should be less than 123 bytes.

Subscribe/Publish: There are three options: "Publish", "Subscribe", "Publish and Subscribe".

Publish: The gateway publishes the data to the MQTT Server.

Subscribe: The gateway subscribes the data from the MQTT Server.

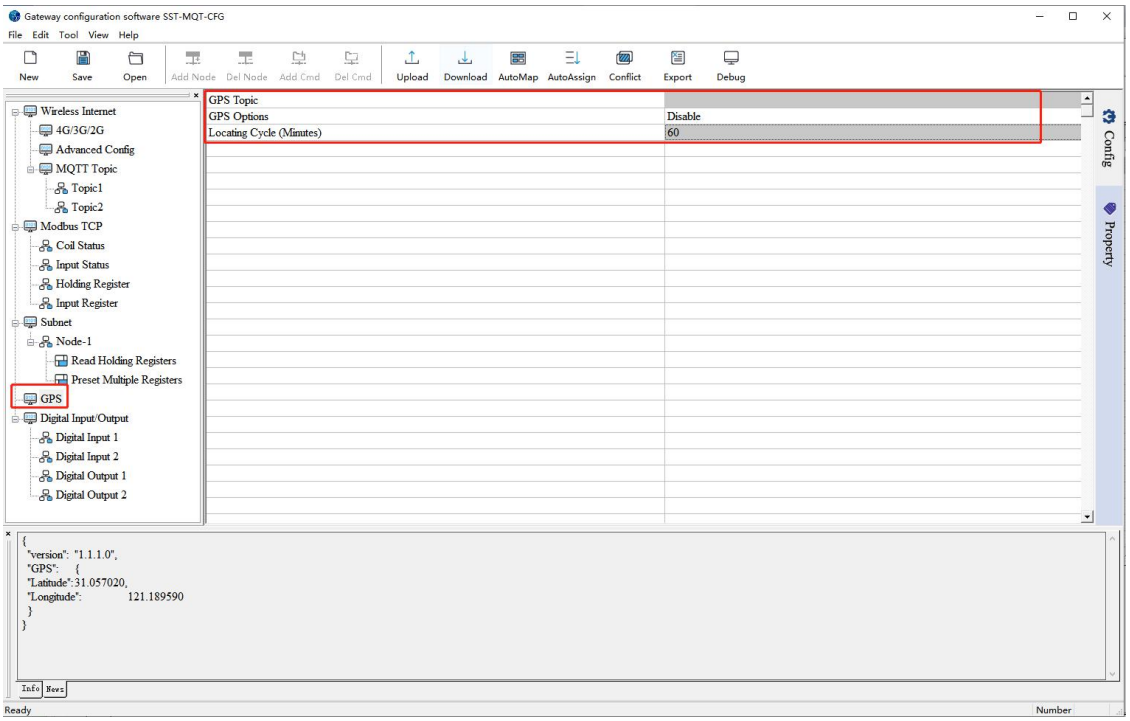
QoS: Supports QoS 0 and 1.

QoS 0: The gateway will send the data package only once, whether it is received or not. It applies to the less important data.

QoS 1: There will be an ACK to ensure that the Client or Server receives the data. The data will be sent all the time until it is successfully received.

6.3 GPS

Select the GPS in the left tree view to enter the GPS configuration window.



GPS Topic: Only "Publish" topic can be selected.

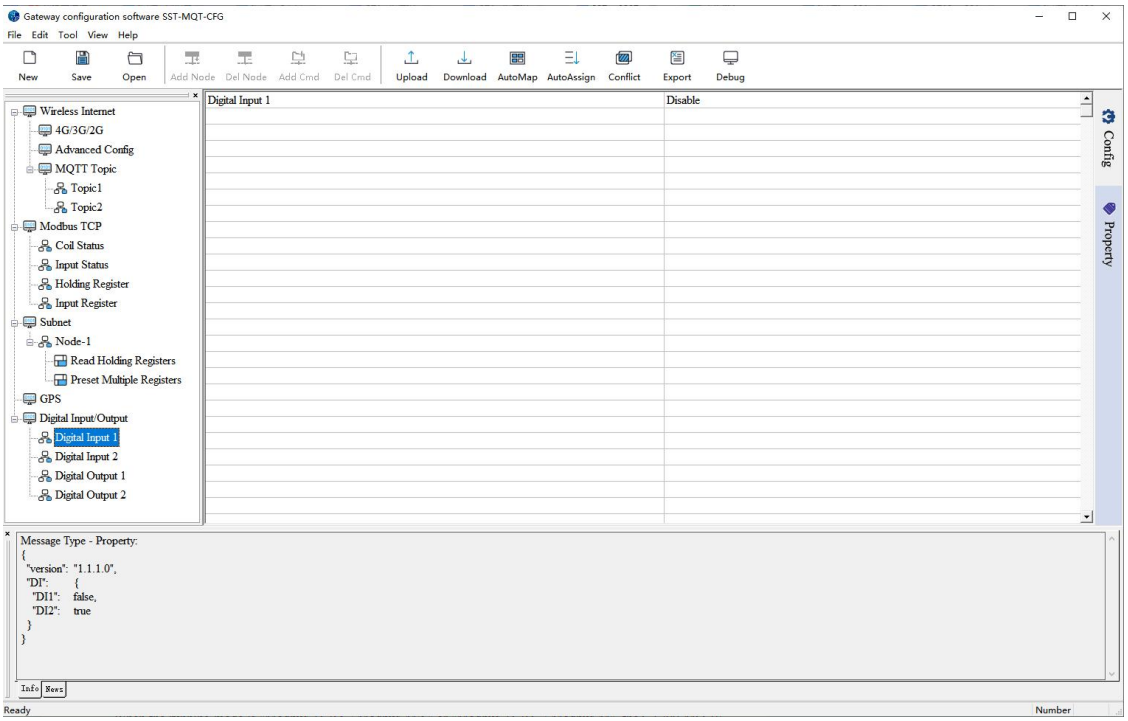
GPS Options: Three options: Disable, Locate once at boot, Cyclic.

This function is influenced by network quality. The data transmission may be slowed down when locating the device. It suggests to locate the device once at boot or set a large locating cycle.

Locating Cycle (Minutes): The cycle time when locating the device. It's valid when the GPS Location Mode is "Cyclic". Range: 1~65535min. The default value is 60min.

6.4 Digital Input/Output View Interface

Select the Digital Input/output in the left tree to enter the configuration window.

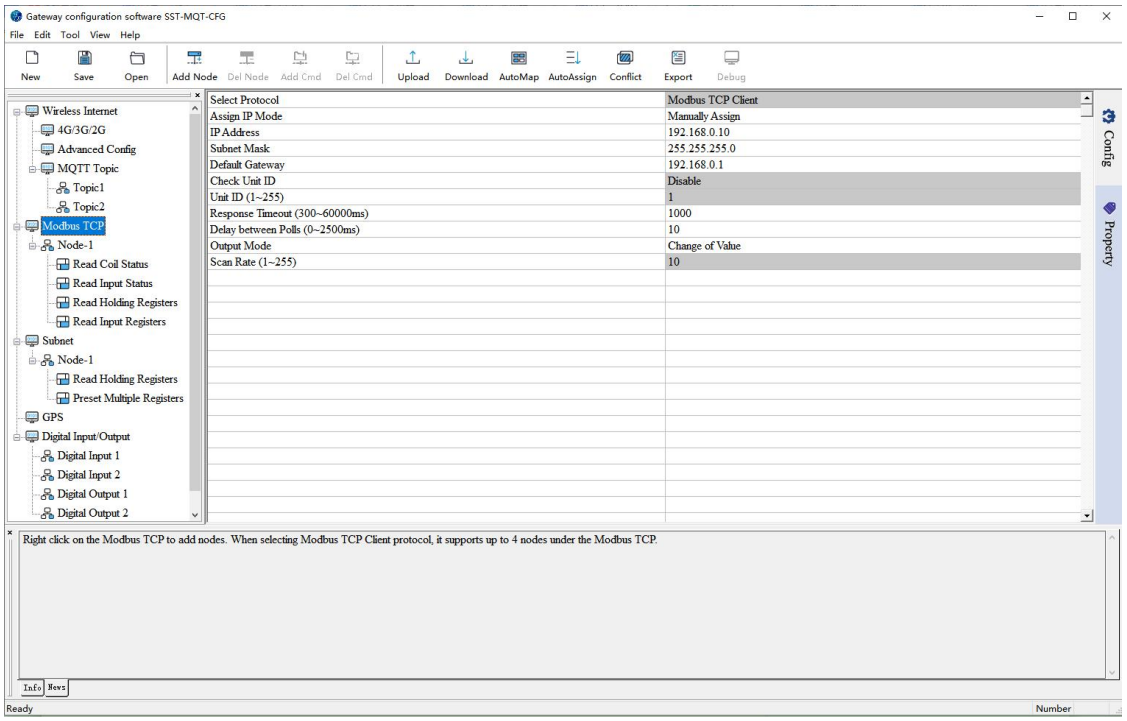


The GT200-MQ-IE has two DIs and two DOs. If enable, the DI/DO interface is available.

6.5 Modbus TCP Client / Server Configuration

6.5.1 Modbus TCP Interface Configuration

When the running mode is "Modbus TCP S / Modbus M/S" or "Modbus TCP C / Modbus M", the GT200-MQ-IE enables the Modbus TCP interface. Select the corresponding device at the start.
Select the "Modbus TCP" in the left tree view to enter Modbus TCP interface configuration window.



Select Protocol: The current protocol. It depends on the selected device type at the start.

Assign IP Mode: Supports Manual Assign / DHCP.

IP Address: IP Address of the GT200-MQ-IE. The device can be searched when the IP address is in the same network segment with the computer.

Subnet Mask: Subnet mask of the GT200-MQ-IE.

Gateway Address: Gateway address of the GT200-MQ-IE.

Check Unit ID: Enable or disable the check of the Unit ID.

Unit ID: Not configurable. The Unit ID of the Modbus TCP server. When accessing the Modbus TCP server at the same IP address, the slave address can't be the same.

Response Timeout: Time to wait for response from Modbus TCP server after client sends a command. Range: 300ms~60000ms. The default value is 1000ms.

Delay between Polls: Delay time between the last response (or times out) and the new command. The actual delay time is the multiples of 10. If the input value is 9, the actual polling delay time is 0ms. If the input value is 15, the actual polling delay time is 10ms.

Output Mode: Three output modes: Cyclic, Forbidden, Change of Value.

Cyclic: The write command will be sent periodically.

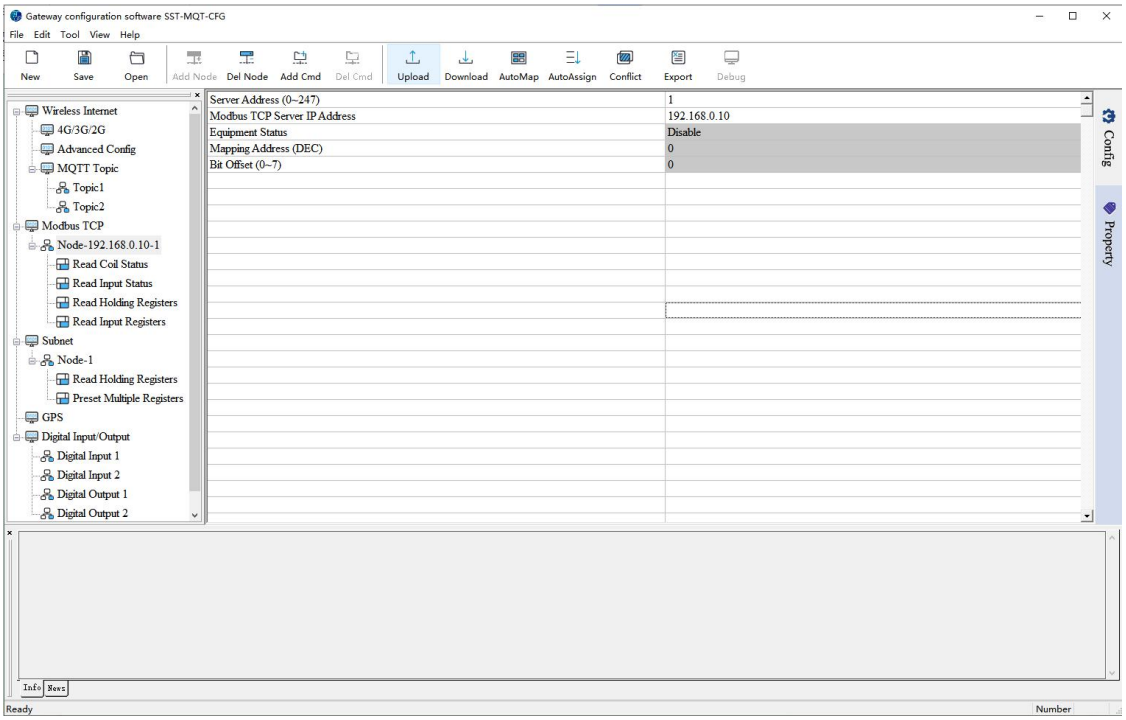
Forbidden: The write command won't be sent.

Change of Value: When the output data change, the write command will be sent.

Scan Rate: The ratio of fast-scan command to slow-scan command. If the value is set to 10, a slow-scan command will be sent once every ten fast-scan commands are sent. The range is 1 to 255.

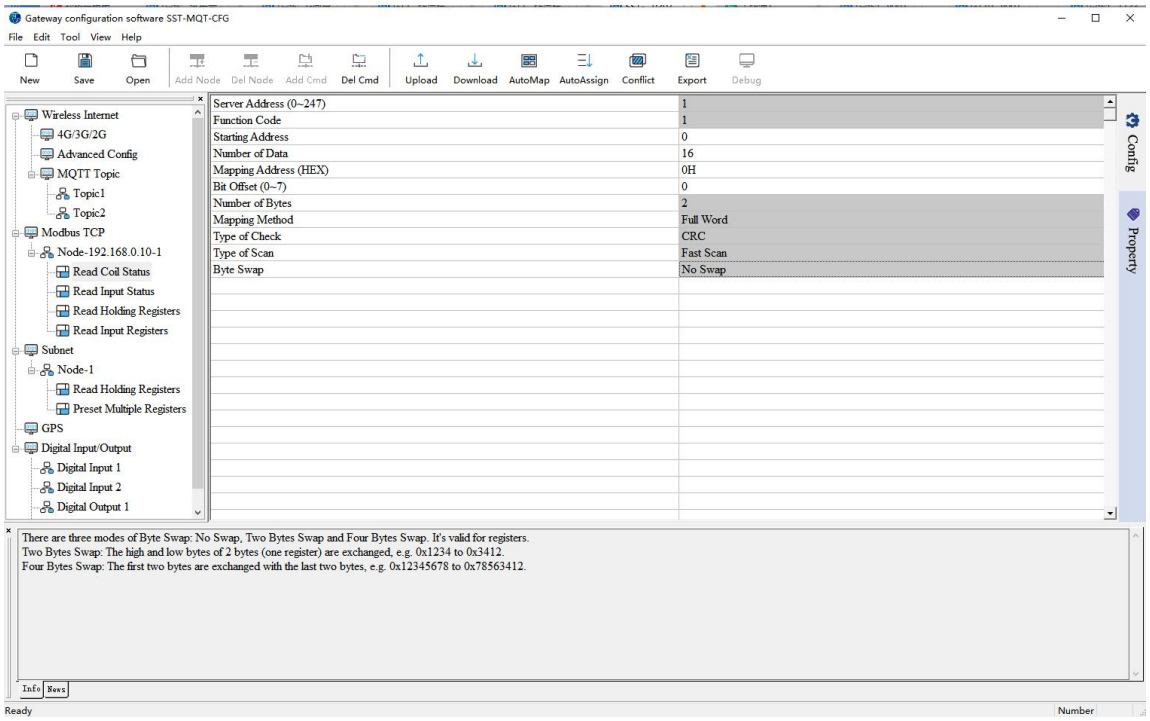
6.5.2 Modbus TCP Client Configuration

The Modbus TCP Client Interface is enabled when the device running mode is "Modbus TCP C / Modbus M". Please see "Modbus Node and Command Operations" chapter to add nodes/commands.
After adding nodes under the Modbus TCP client, select an existing node to enter the Modbus TCP client's node configuration window:



Slave Address: Modbus Server address. For a Modbus TCP server, it's the Unit ID.
Modbus TCP Server IP address: When accessing the Modbus TCP Server at the same IP address, the slave address cannot be the same.
Equipment Status: Unused.
Mapping Address: Unused.
Mapping Bit: Unused.

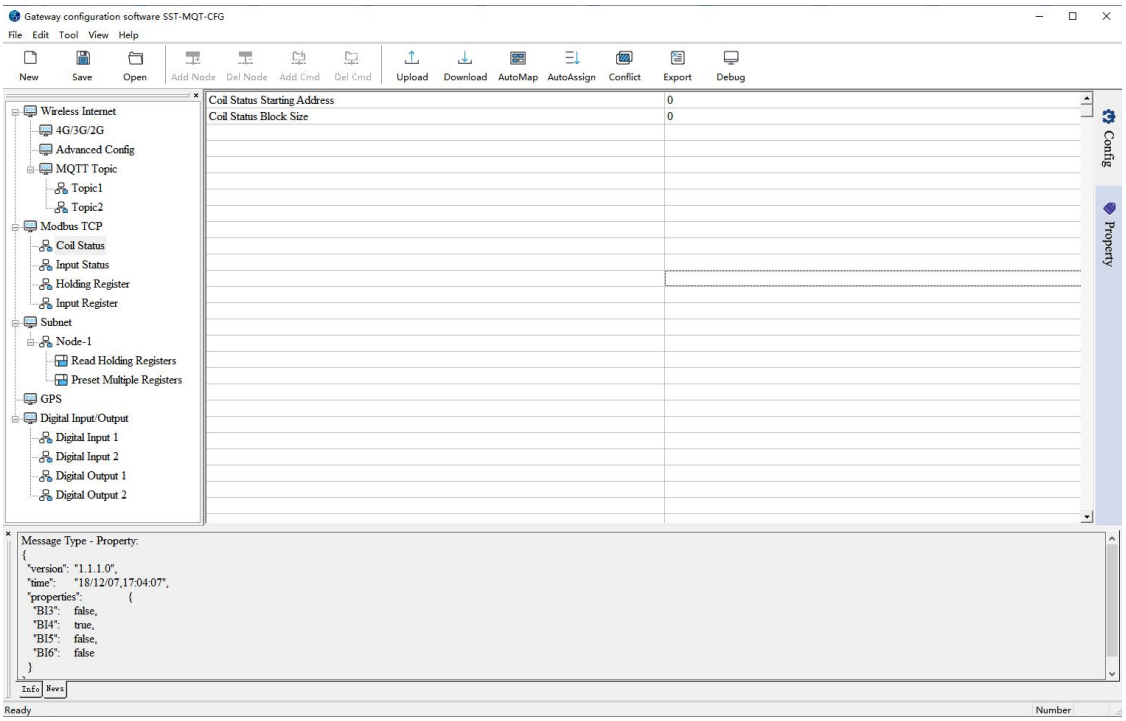
After adding nodes under the Modbus TCP client, select a node to enter the node configuration window.



Please see "Modbus Command Configuration" chapter to configure the Modbus commands.

6.5.3 Modbus TCP Server Configuration

The Modbus TCP Server Interface is enabled when the device running mode is "Modbus TCP S / Modbus M/S". Select a Status/Register block to enter Modbus TCP server block configuration window.



Coil/Input Status Starting Address: The start address of 0/1XXXX area. The range is 0~65535, and the default is 0.

Coil/Input Status Block Size: The block size of the 0/1XXXX area. The range is 0~512, and the default is 0.

Holding/Input Register Starting Address: The start address of the 4/3XXXX area. The range is 0~65535, and the default is 0.

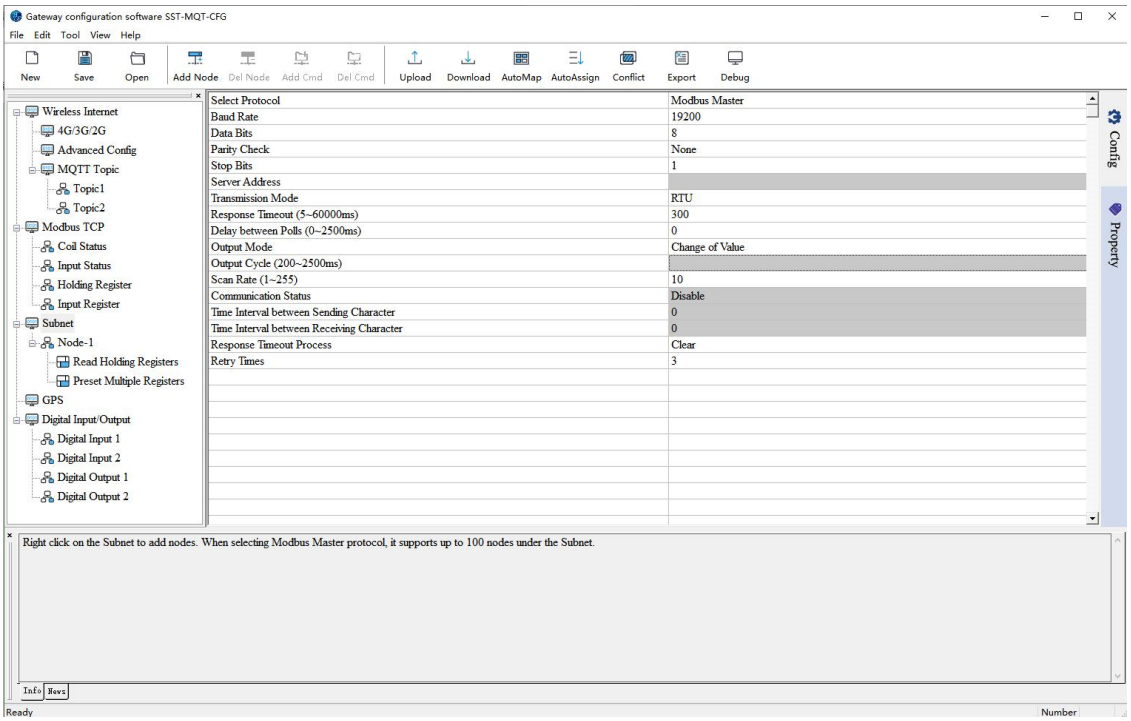
Holding/Input Register Block Size: The block size of the 4/3XXXX area. The range is 0~256, and the default is 0.

6.6 Subnet (Serial Interface) Configuration

6.6.1 Modbus Master Interface configuration

When the running mode is "Modbus TCP S / Modbus M/S" or "Modbus TCP C / Modbus M", the GT200-MQ-IE enables the Modbus RTU/ASCII master interface. Select the corresponding device at the start.

Select the "Subnet" in the left tree view to enter Modbus interface configuration window.



Select Protocol: The current protocol. Select "Modbus Master".

Baud Rate: Baud Rate of the serial interface. Supports 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

Data Bits: The number of data bits of each byte.

Parity Check: Supports Odd, Even, None, Mark and Space.

Stop Bits: 1 or 2.

Slave Address: It's invalid when selecting "Modbus Master" protocol.

Transmission Mode: Modbus transmission mode. Supports RTU and ASCII.

Response Timeout: Time to wait for response from Modbus Server after Modbus Master sends a command. Range: 5~60000ms.

Delay between Polls: Delay time before Modbus master send a new command after the previous command is sent and Modbus Server gives correct response or response times out. Range: 0~2500ms. The actual polling delay time is the multiples of 10. If the input value is 9, the actual polling delay time is 0ms; if the input value is 15, the actual polling delay time is 10ms.

Output Mode: Three options: Cyclic, Forbidden, Change of Value.

Cyclic: The write command will be sent periodically.

Forbidden: The write command won't be sent.

Change of Value: When the output data change, the write command will be sent.

Output Pulse: The cycle time to send write command. It's valid when the Output Mode is "Cyclic". Range: 200~2500ms.

Scan Rate: The ratio of fast-scan command to slow-scan command. If the value is set to 10, a slow-scan command will be sent once every ten fast-scan commands are sent.

Communication Status: Unused. Modbus command status. It's off by default and can't be modified. The first few bytes indicate the Modbus command status. Bit0 of Byte1 represents the first command and Bit1 of Byte2

represents the tenth command...

The initial value is 0. When the communication is normal, the value is 1.

Time Interval between Sending Character: Unused. Every byte will be sent at this interval.

Time Interval between Receiving Character: Unused. The interval determines when to stop receiving a frame of data.

Response Timeout Process: When the gateway doesn't receive the response within the time set in "Response Timeout".

Clear: Sets the response data in the input buffer to zero.

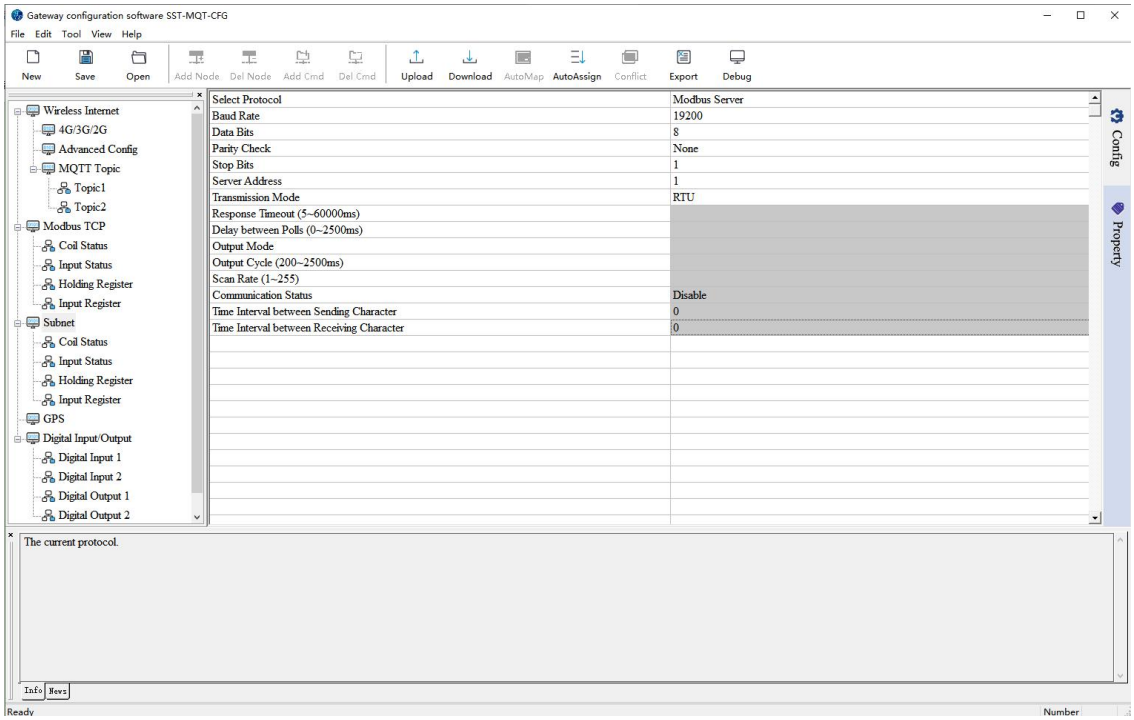
Hold: The data in the input buffer remains the same.

Retry Times: The number of retries to send the command when response error. Range: 2~254. The default value is 3.

6.6.2 Modbus Server Interface Configuration

When the running mode is "Modbus TCP S / Modbus M/S", the GT200-MQ-IE enables the Modbus RTU/ASCII slave interface. Select the corresponding device at the start.

Select the "Subnet" in the left tree view to enter Modbus interface configuration window.



Select Protocol: The current protocol. Select "Modbus Server".

Baud Rate: Baud Rate of the serial interface. Supports 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

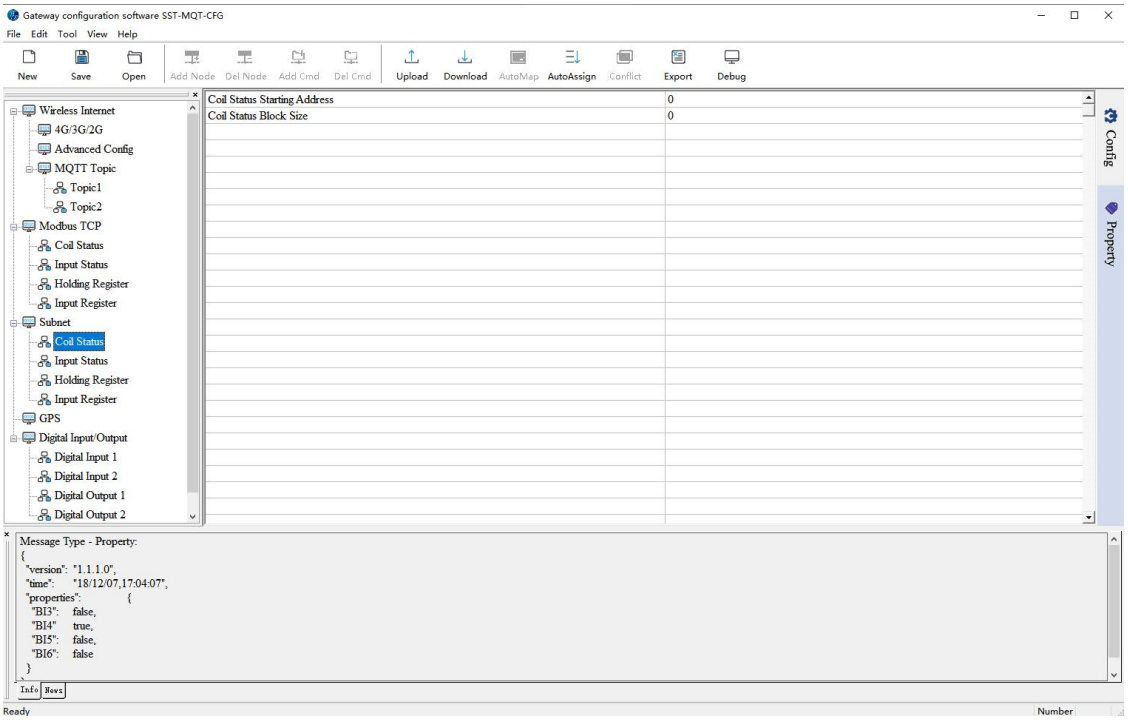
Data Bits: The number of data bits of each byte.

Parity Check: Supports Odd, Even, None, Mark and Space.

Stop Bits: 1 or 2.

Slave Address: It's the gateway's address as a Modbus Server. The range is 0 to 247.
Transmission Mode: Modbus transmission mode. Supports RTU and ASCII.
Response Timeout: Invalid for "Modbus Server" protocol.
Delay between Polls: Invalid for "Modbus Server" protocol.
Output Mode: Invalid for "Modbus Server" protocol.
Output Pulse: Invalid for "Modbus Server" protocol.
Scan Rate: Invalid for "Modbus Server" protocol.
Communication Status: Unused.
Time Interval between Sending Character: Unused.
Time Interval between Receiving Character: Unused.

Select a Status/Register block to enter Modbus Server block configuration window.

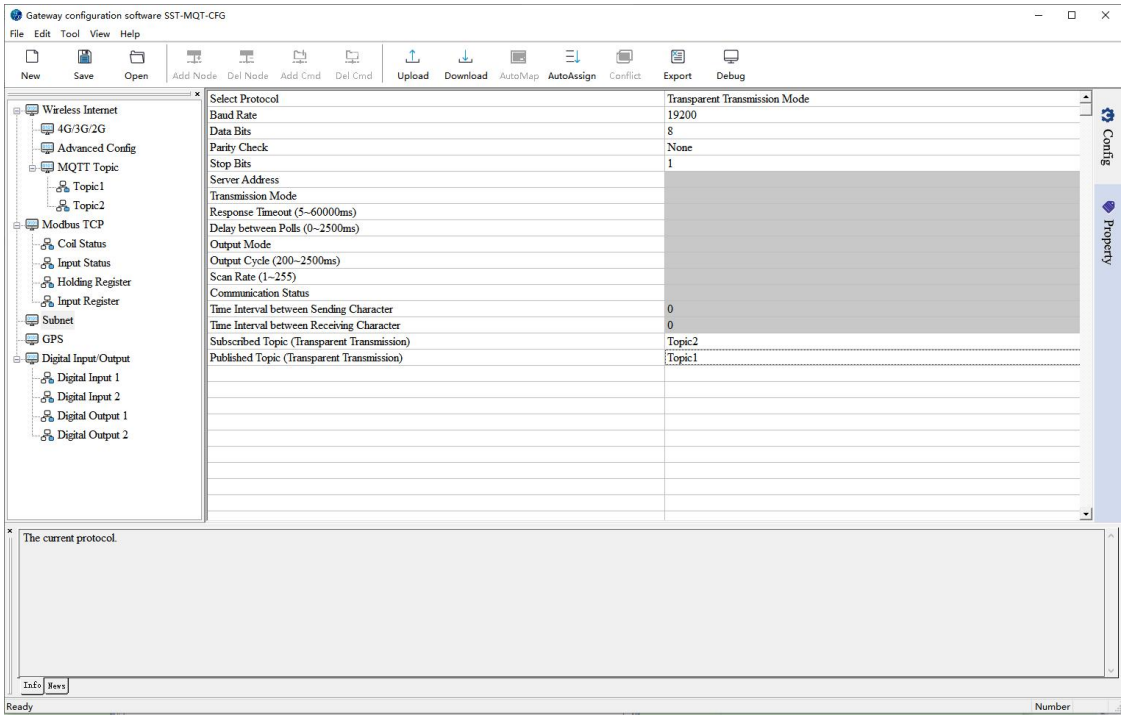


Coil/Input Status Starting Address: The start address of 0/1XXXX area. The range is 0~65535, the default is 0.
Coil/Input Status Block Size: The block size of the 0XXXX area. The range is 0~512, and the default is 0.
Holding/Input Register Starting Address: The start address of the 4/3XXXX area. The range is 0~65535, and the default is 0.
Holding/Input Register Block Size: The block size of the 4/3XXXX area. The range is 0~256, and the default is 0.

6.6.3 Transparent Transmission Configuration

When the running mode is "Modbus TCP S / Modbus M/S", the GT200-MQ-IE supports transparent transmission. Select the corresponding device at the start.

Select the "Subnet" in the left tree view to enter transparent transmission configuration window.

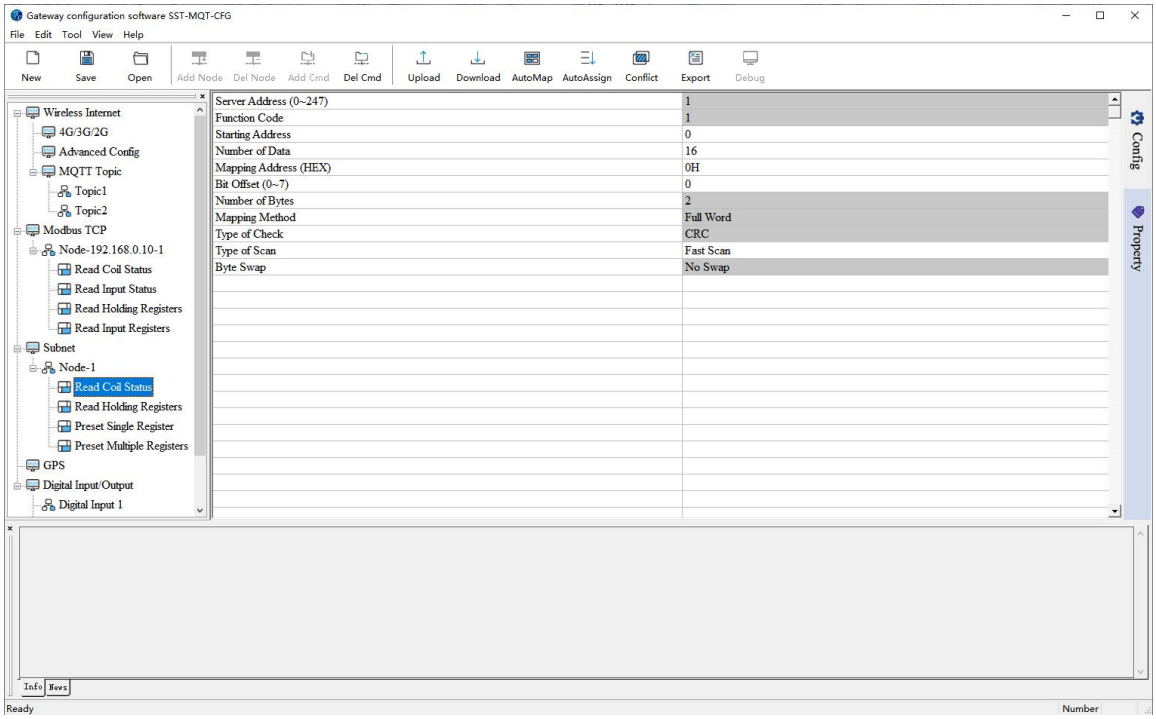


Select Protocol: The current protocol. Select "Transparent Transmission Mode".
Baud Rate: Baud Rate of the serial interface. Supports 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.
Data Bits: The number of data bits of each byte.
Parity Check: Supports Odd, Even, None, Mark and Space.
Stop Bits: 1 or 2.
Slave Address: Invalid for "Transparent Transmission Mode".
Transmission Mode: Invalid for "Transparent Transmission Mode".
Response Timeout: Invalid for "Transparent Transmission Mode".
Delay between Polls: Invalid for "Transparent Transmission Mode".
Output Mode: Invalid for "Transparent Transmission Mode".
Output Pulse: Invalid for "Modbus Server" protocol.
Scan Rate: Invalid for "Transparent Transmission Mode".
Communication Status: Unused.
Time Interval between Sending Character: Unused.
Time Interval between Receiving Character: Unused.
Subscribed Topic: The topic can be "Subscribe" or "Subscribe and Publish" Topic.
Published Topic: The topic can be "Publish" or "Subscribe and Publish" Topic.

6.7 Modbus Command Configuration

Please see "Modbus Node and Command Operations" to add commands. Select a command in the left tree view to

enter the Modbus command configuration window.

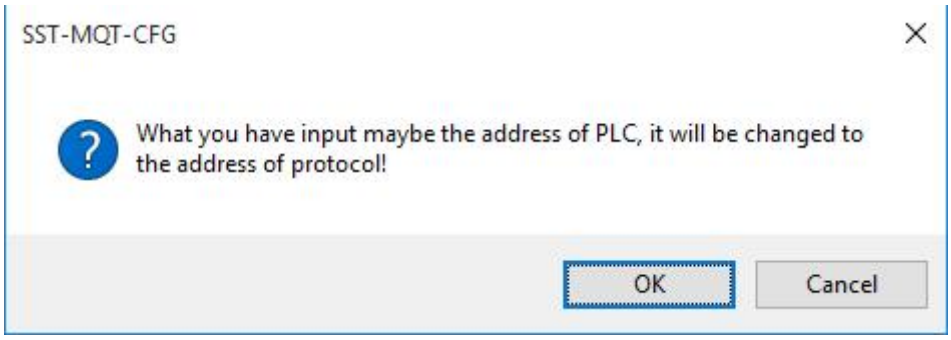


Slave Address: Modbus Server address. For a Modbus TCP server, it's the Unit ID.

lFunction Code: Modbus Function Code.

Starting Address: The starting address of status or register. Range: 0~65535.

Note: This address refers to the protocol address. When the user enters the PLC address, there will be a pop-up window asking for confirmation. Click "OK" to convert the input address into a protocol address. Click "Cancel" to refuse the converting.



Examples of PLC addresses and corresponding protocol addresses:

Block	PLC Address	Protocol Address
Coil Status	00001~00010	00000~00009
Input Status	10001~10010	00000~00009
Holding Register	40001~40010	00000~00009
Input Register	30001~30010	00000~00009

Number of Data: The number of data(registers or coils or status). The range is 1~122 (Modbus function code

3,4,16) or 1~244 (Modbus function code 1,2,15)

Mapping Address (HEX): The starting address of data in the buffer.

Read command: 0x0000~0x01FF

Write command: 0x4000~0x41FF.

When users want to exchange the data between slave devices, the write command can be mapping in 0x0000～0x01FF.

Mapping Bit Offset (0-7): When reading/writing a coil or reading input status, its value will be mapped into bits of input or output buffer.

Number of Byte: The number of the data bytes.

Mapping Method: Unused. Support only full-word mapping now. When reading or writing a register, you can map a full word into the buffer, or only map MS/LS byte into the buffer.

Check Type: Data communication error check.

Scan Mode: Every Modbus command can be set to fast scan or slow scan. The gateway will send Modbus command according to the Scan Rate. Scan Rate is the ratio of fast-scan command to slow-scan command.

Byte Swap: There are three modes of Byte Swap: No Swap, Double-byte Swap and Four-byte Swap. It's valid for registers.

Double-byte Swap: The high and low bytes of 2 bytes (one register) are exchanged,e.g., 0x1234 to 0x3412

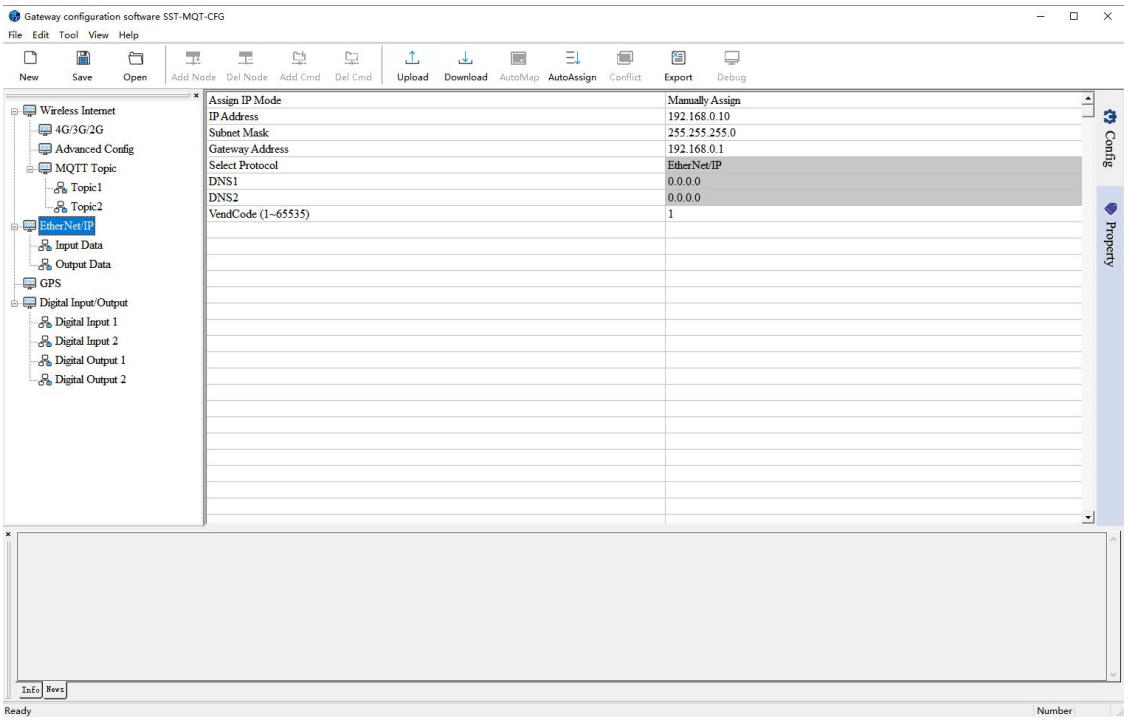
Four-byte Swap: The first two bytes are exchanged with the last two bytes,e.g., 0x12345678 to 0x78563412

6.8 EtherNet/IP Configuration

6.8.1 EtherNet/IP Interface Configuration

When the running mode is "EtherNet/IP Adapter", the GT200-MQ-IE enables the EtherNet/IP adapter interface. Select the corresponding device at the start.

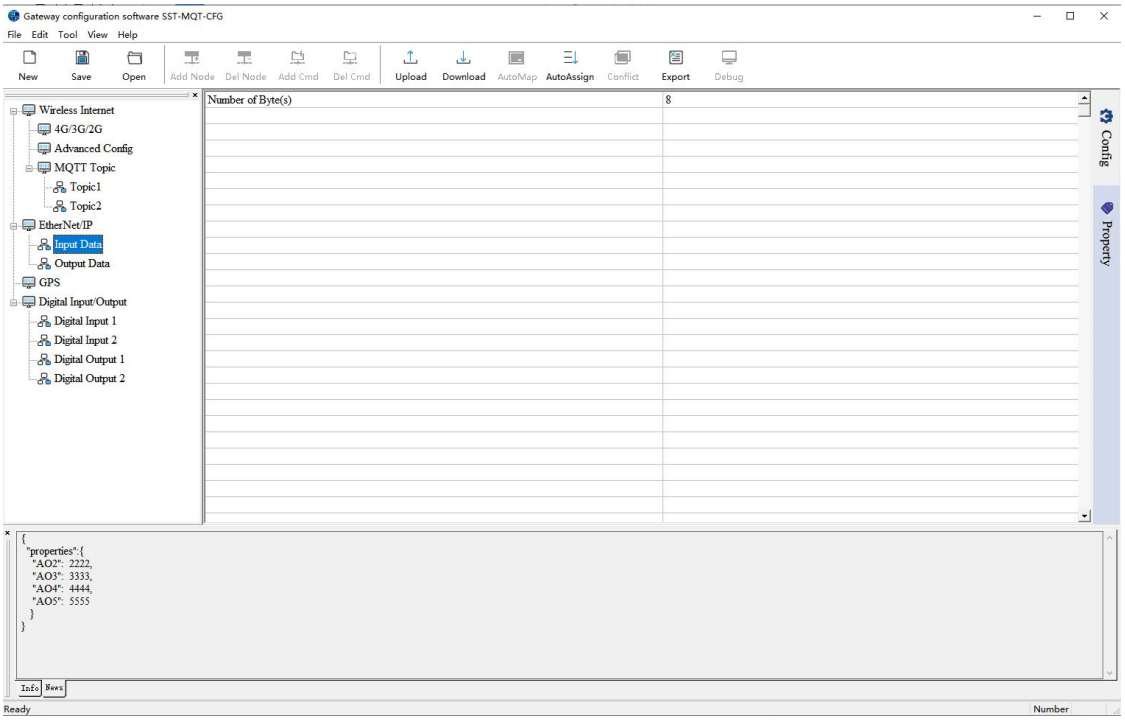
Select the EtherNet/IP in the left tree view to enter EtherNet/IP configuration window.



Assign IP Mode: Supports Manual Assign / DHCP.
IP Address: IP Address of the GT200-MQ-IE. The device can be searched when the IP address is in the same network segment with the computer.
Subnet Mask: Subnet mask of the GT200-MQ-IE.
Gateway Address: Gateway address of the GT200-MQ-IE.
Select Protocol: Not configurable. The current protocol is "EtherNet/IP".
DNS1: The IP address of the primary DNS server of the network where GT200-MQ-IE is located.
DNS2: The IP address of the secondary DNS server of the network where GT200-MQ-IE is located.
VendCode: Manufacturer ID for the GT200-MQ-IE. Range: 1~65535. Default value: 1.

6.8.2 Input/Output Data Configuration

Select the Input/output data under the EtherNet/IP to enter the configuration window.

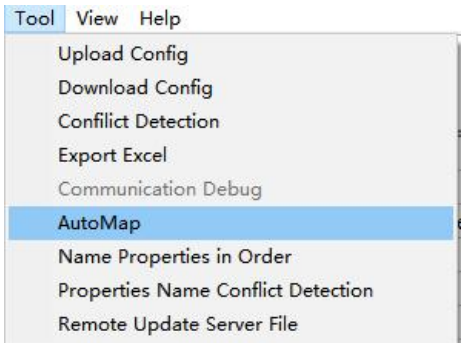


Number of Data: The input/output data of the EtherNet/IP Adapter interface. Range (byte): 0~492.

7 Mapping Buffer Operations

7.1 Auto Mapping

The Auto Mapping function is to automatically calculate the mapping address and fill in the values. There is no address conflict in the mapping buffer after automatic mapping.
Users can select the function in the "Tool" menu or click on the "AutoMap" icon.

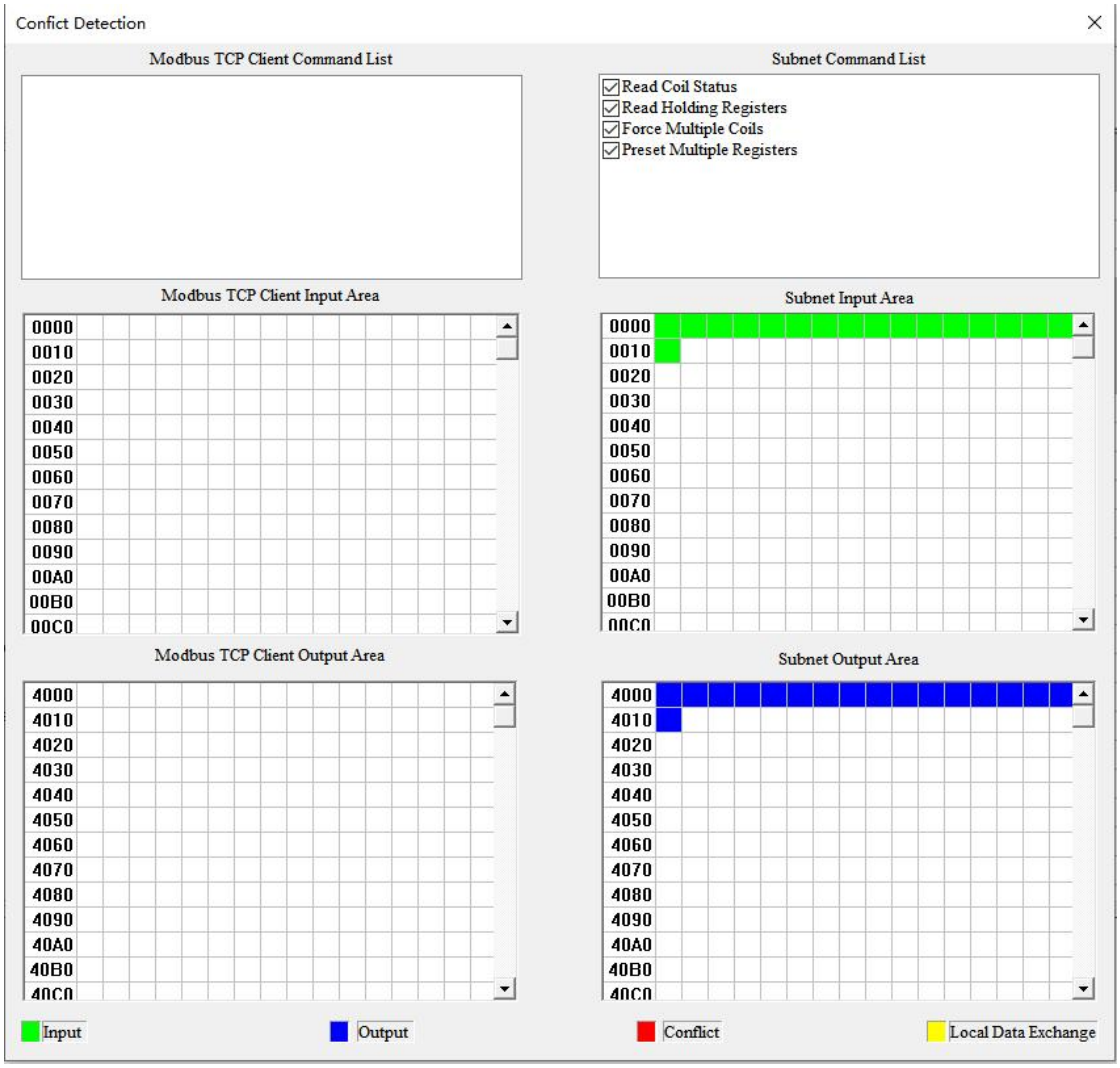


7.2 Conflict Detection

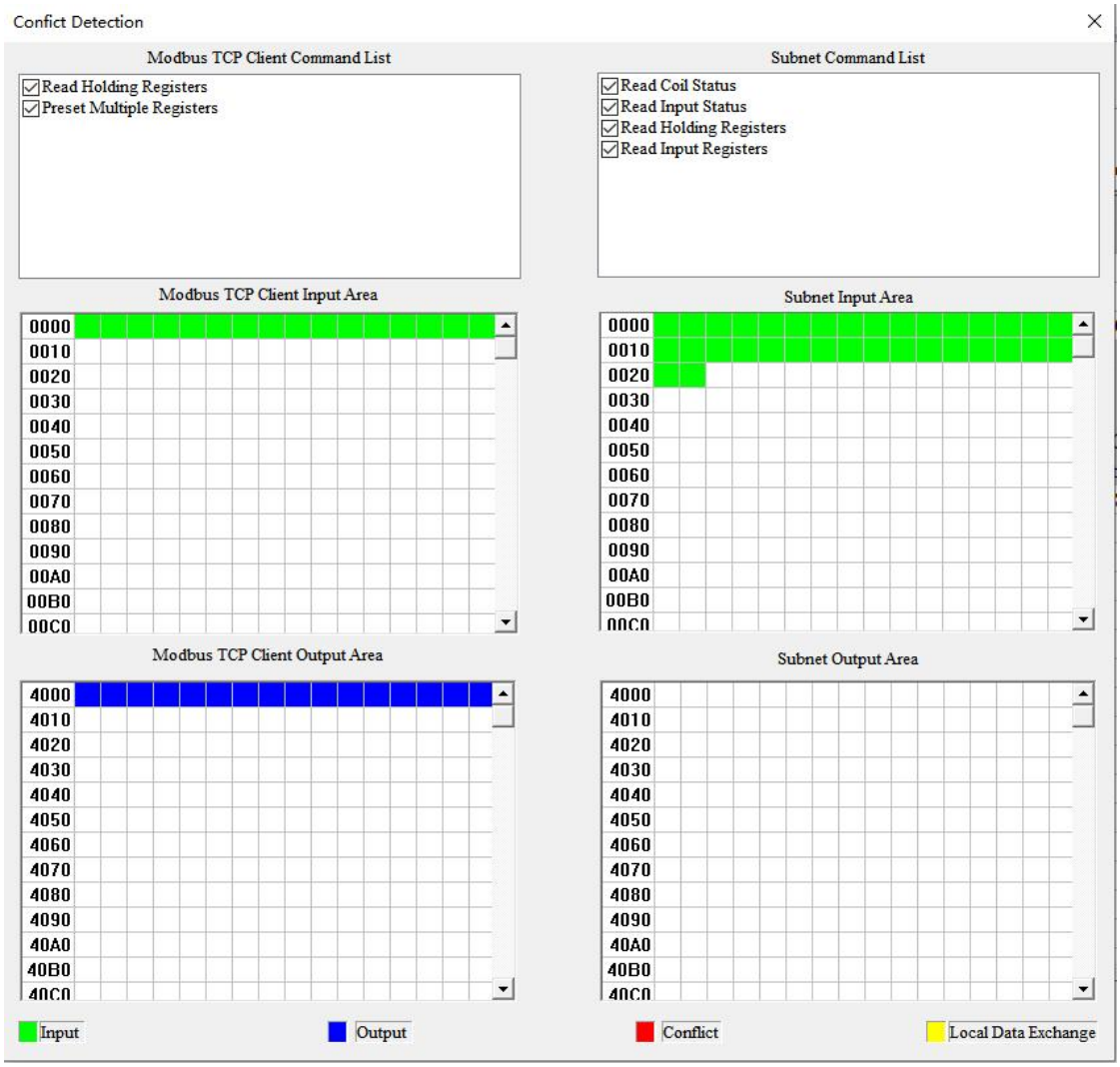
To detect whether there are address conflicts in the mapping buffer. The configuration cannot be downloaded to the gateway if there are conflicts. This function is used for Modbus commands.

Select "Conflict Detection" in the "Tool" menu or click on the "Conflict" icon to open the conflict detection window.

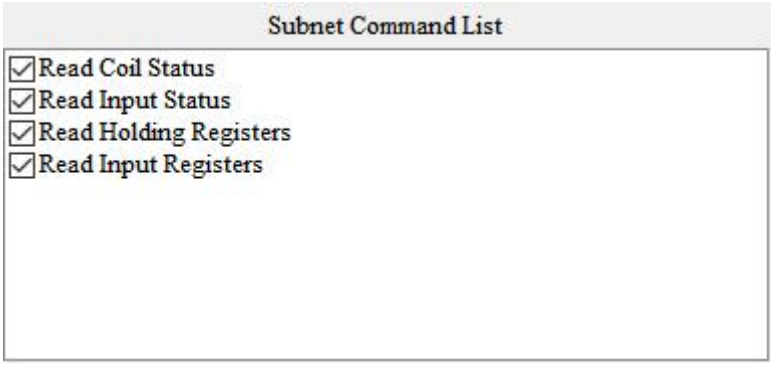
For "Modbus TCP S / Modbus M/S" device, when the Subnet is set as a Modbus Master, the Conflict Detection window is as below:



For "Modbus TCP C / Modbus M" device, the Conflict Detection window is as below:



The Command List displays all configured Modbus commands. Tick the box before a command to check its mapping address.

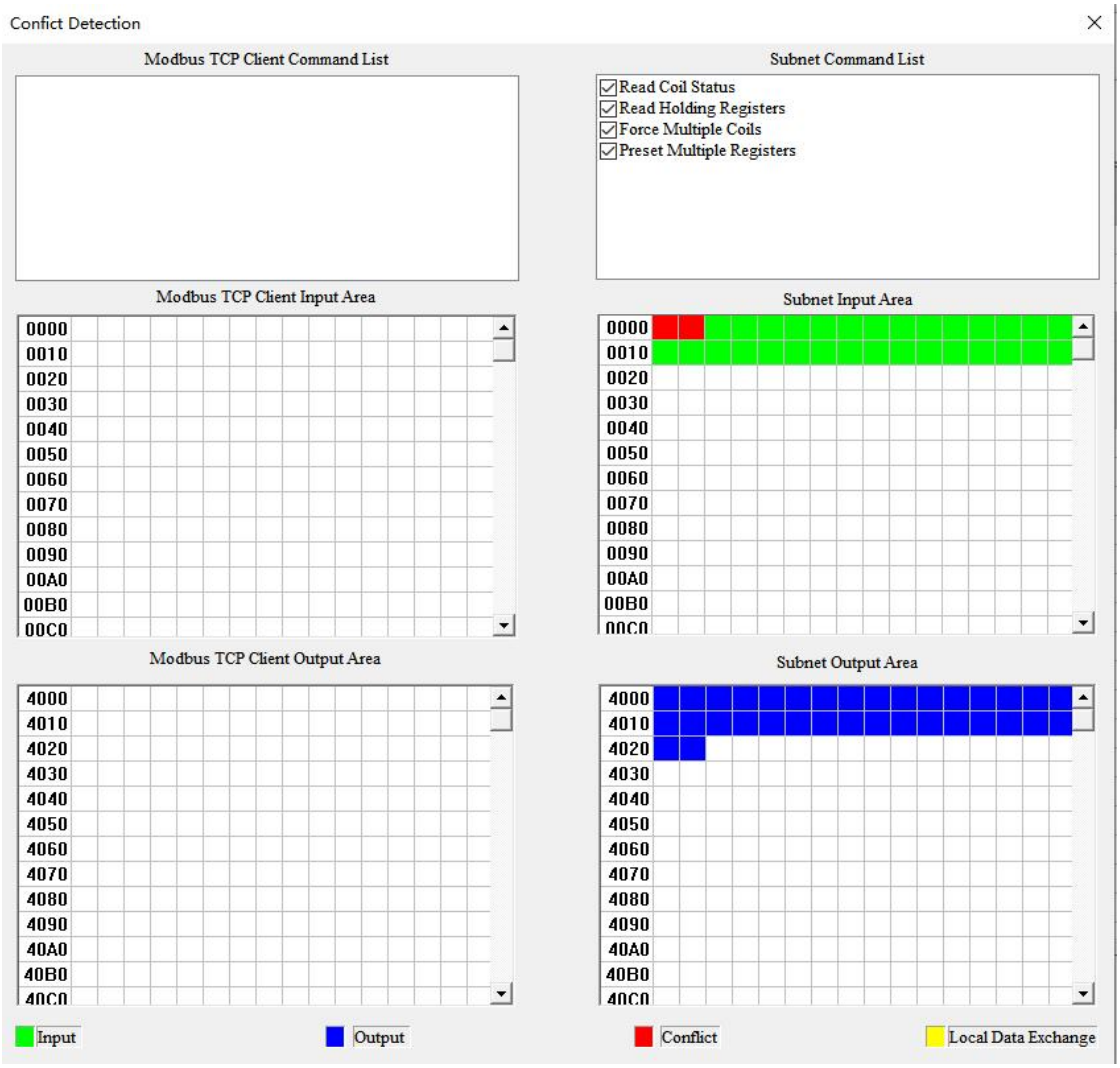


The mapping buffer is divided into input area and output area.

Input area address is from 0x0000 to 0x3FFF;

Output area address is from 0x4000 to 0x7FFF.

Each square represents a byte. The colors indicate the status of the address.



Green: No conflict of read commands in input area.

Yellow: The write commands are used to exchange data between slave devices and there is no conflict.

Blue: No conflict of write commands in output area.

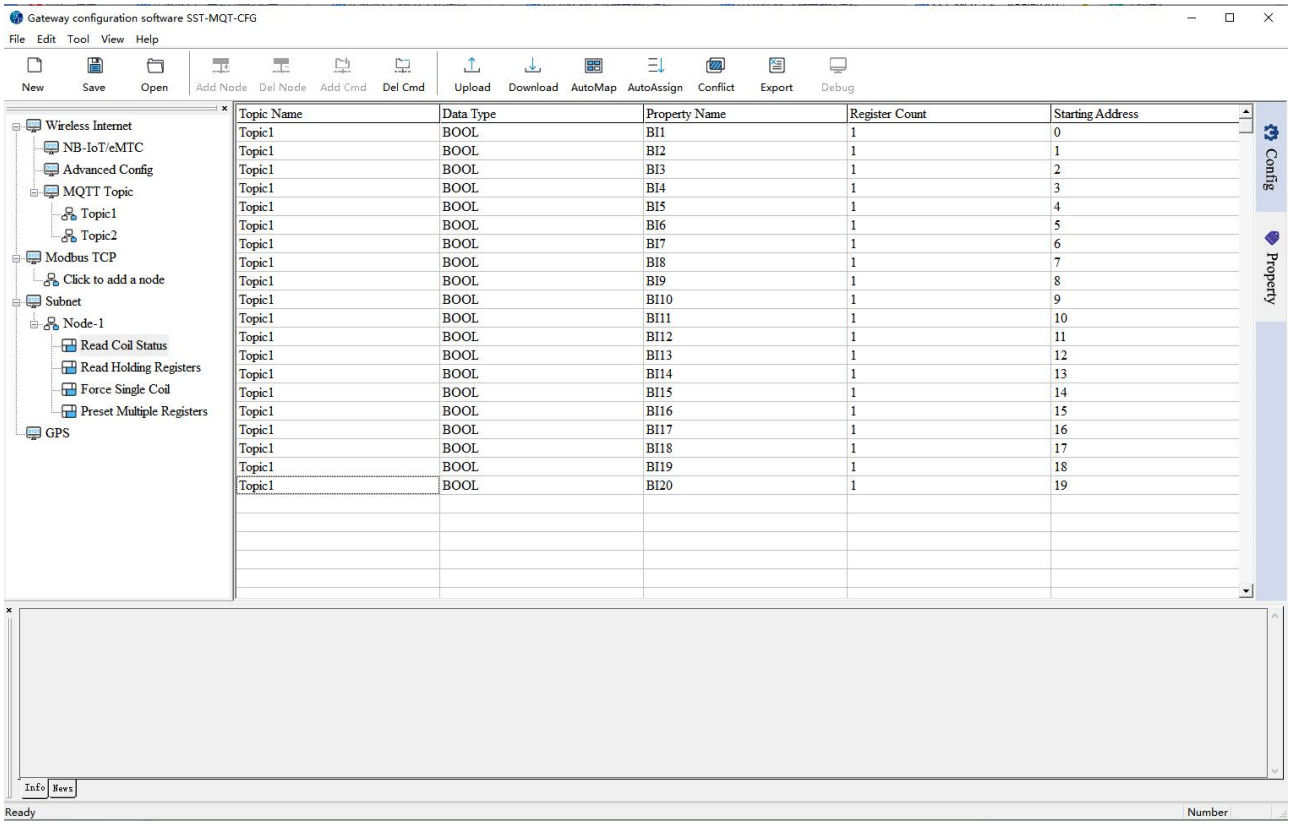
Red: Address conflicts.

White: None data is mapped in this address.

8 Property Operations

8.1 Property Configuration

Click "Property" in the right bar to enter the property window. Please refer to "Property Window" chapter.



Topic Name: Select the topic for properties.

Data Type:

For command 1, 2, 5 and 15:

The data type can be BOOL.

For command 3, 4, 6 and 16:

When using 1 register, the data type can be UINT/INT16.

When using 2 registers, the data type can be UINT32/INT32/Float/UINT32V/INT32V/FloatV.

When using 4 registers, the data type can be UINT64/INT64/Double/UINT64V/INT64V/DoubleV.

"V" refers to exchange of the bytes.

For example: Float 12.56 corresponds to HEX F5 C3 41 48. FloatV 12.56 corresponds to HEX 41 48 F5 C3. Double 3.38 corresponds to HEX D7 0A 70 A3 0A 3D 40 0B. DoubleV 3.38 corresponds to 40 0B 0A 3D 70 A3 D7 0A.

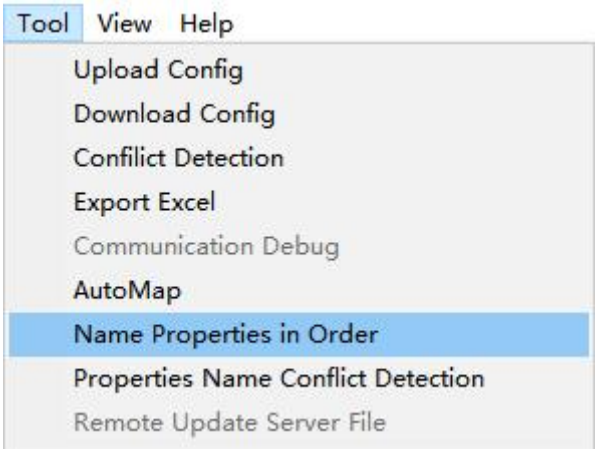
Property Name: The property can be named automatically in orders or as custom names.

Register Count / Number of Byte: The number of the register/data byte.

Starting Address: The starting address of data.

8.2 Name Properties in Order

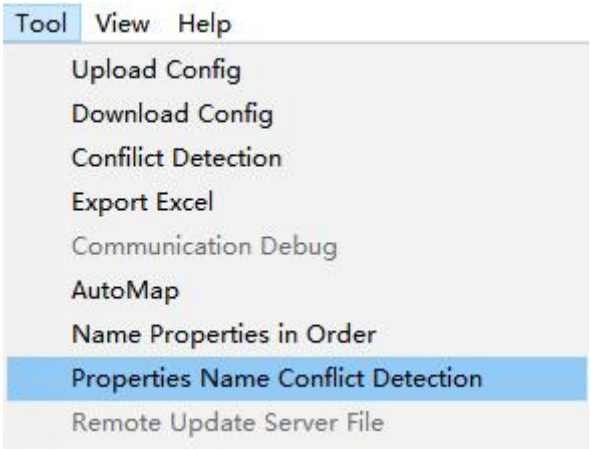
The Name Properties in Order function is to automatically sort the properties of one topic and name them in order, with no conflict.



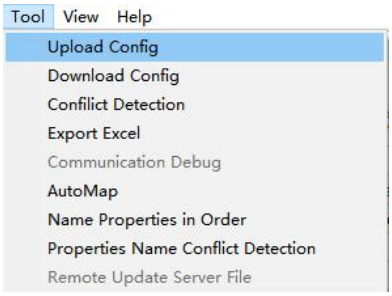
8.3 Property Name Conflict Detection

The Property Name Conflict Detection function is to automatically detect whether there are repeated property names in the same Topic and pop up the prompt.

Select "Tool" >> "Property Name Conflict Detection" to use this function.

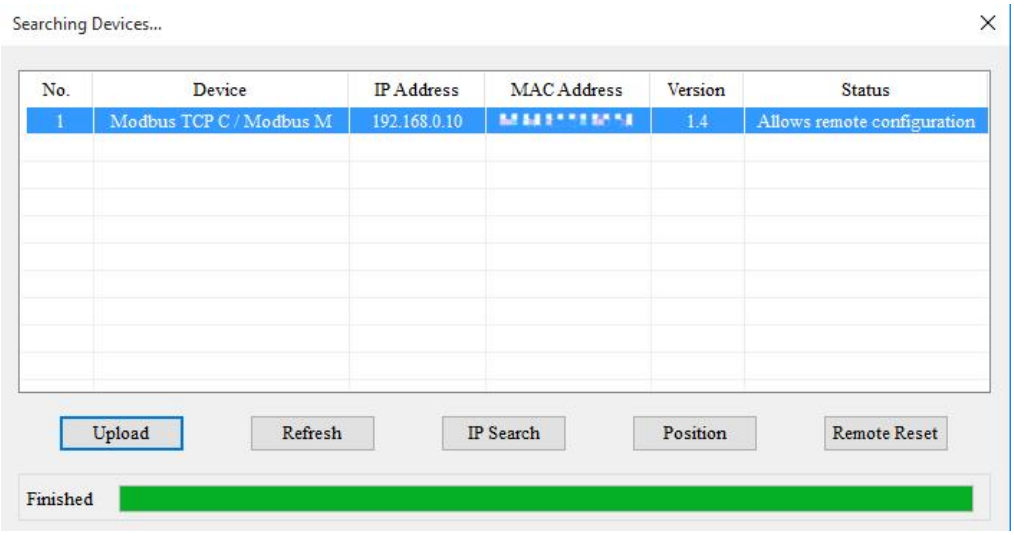


9 Upload/Download Configuration

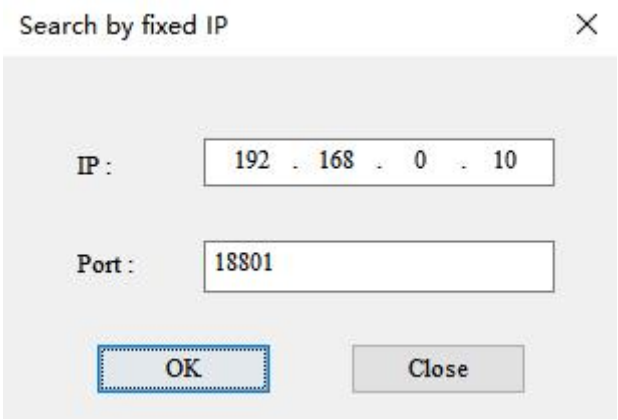


9.1 Search Device

Click "Upload" or "Download" icon in the "Toolbar" to open the search window. It will automatically search the available devices once after opening the search window.



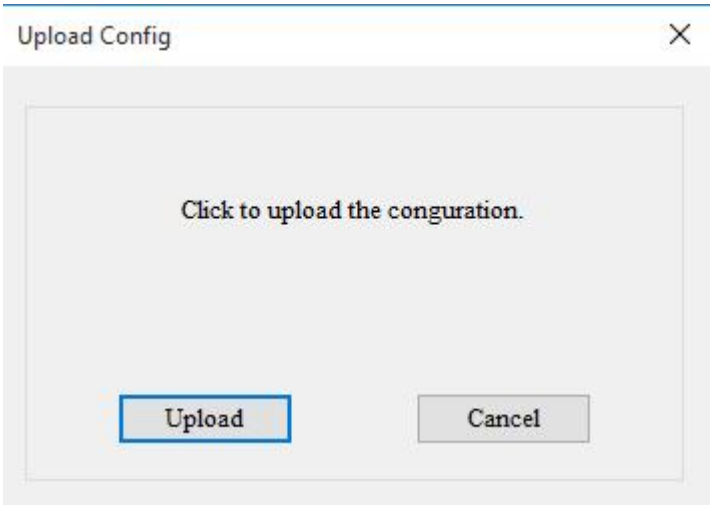
Login: Select the device and click "Login" to upload / download the configuration.
Position: Select the device and click "Position", the ENS indicator on the selected gateway will turn red.
IPSearch: Search the device in specific IP address and port.



Refresh: Search the device again.
Cancel: Close the search window.

9.2 Upload Configuration

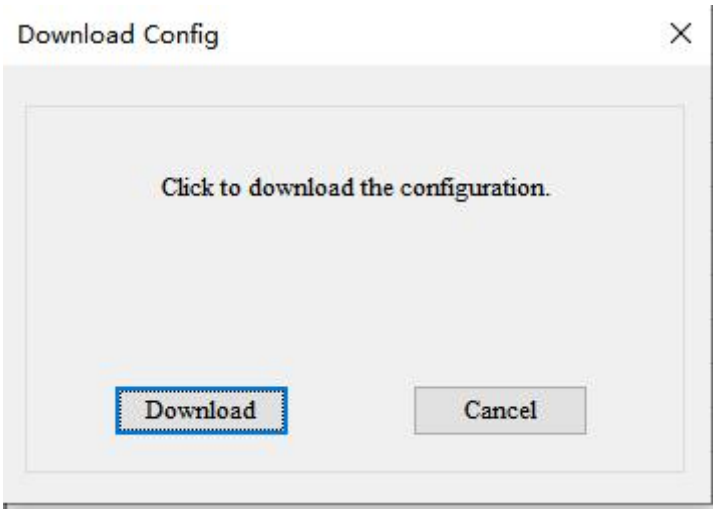
When uploading the configuration from the gateway to the software, the pop-up window is as below:



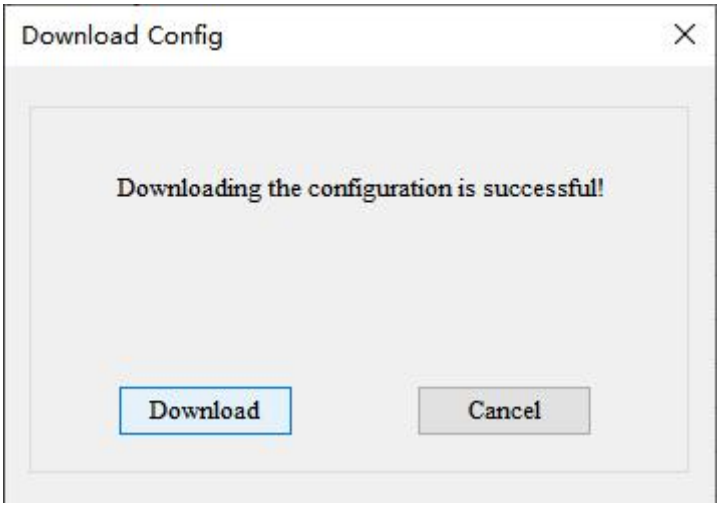
If uploading is successful, the pop-up window is as below:

9.3 Download Configuration

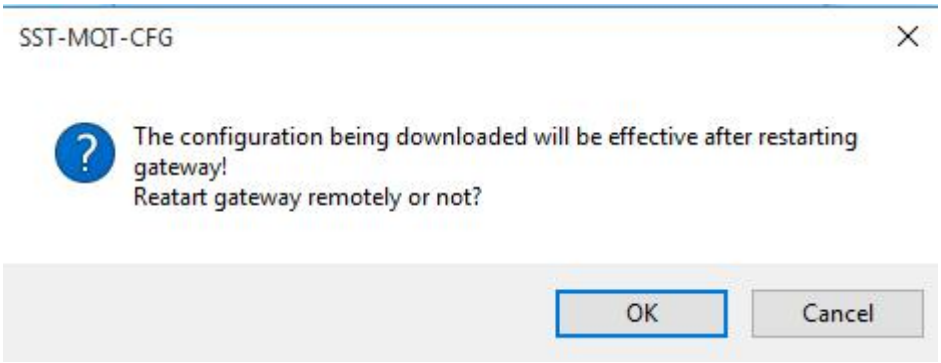
When downloading the configuration to the gateway, the pop-up window is as below:



If downloading is successful, the pop-up window is as below:



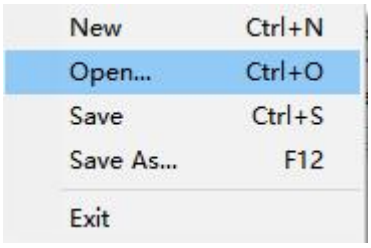
Click "Cancel" and the pop-up window will ask for remote restart. The new configuration is effective after restarting. Click "OK" to restart the gateway. Click "Cancel" to refuse to restart.



10 Open/Save Project

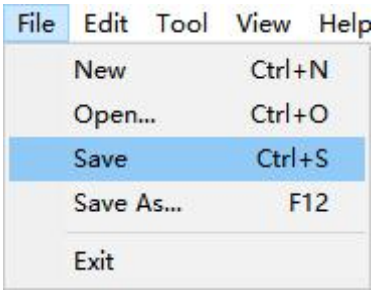
10.1 Open Configuration Project

Select "Open" to open an existing configuration project:



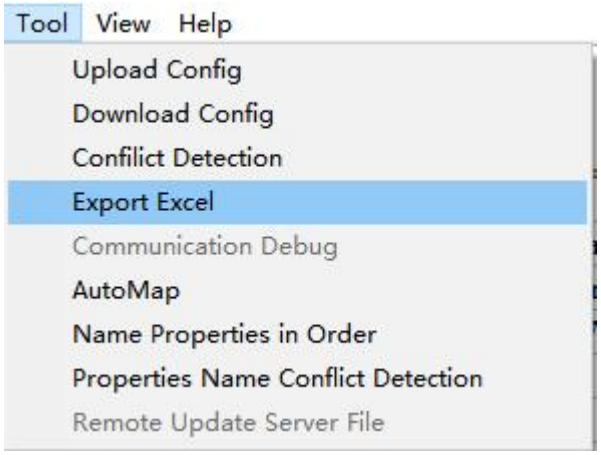
10.2 Save Configuration Project

Select "Save" or "Save As..." to save the configuration project as a .json file.



11 Export Excel

The configuration can be exported as a table.
Please confirm that Microsoft Excel is installed on your computer before using this function.



Appendix A: MQTT Message Format

A.1 Default Format

A.1.1 Publish Message

Note: "//" indicates the comments part.

Property type:

GPS: ***//Global Positioning System***

```
{
    "version":      "1.1.1.0",
    "GPS":{
    "Latitude":     31.057020,
    "Longitude":    121.189590
    }
}
```

DI: ***//Digital Input***

```
{
    "version":      "1.1.1.0",
    "DI":       {
    "DI1":      false,
    "DI2":      true
    }
}
```

Read Coil Status / Input Status:

```
{
    "version":      "1.1.1.0",          //Version information
    "time":     "19/03/07,17:04:07",    //Time stamp
    "properties":{
    //When publishing messages in property type, the GT200-MQ-IE can publish 8 properties at most in one
    message. If more than 8 properties need to be transmitted, the GT200-MQ-IE will publish multiple messages
    of 8 or less properties.
    "BI3":      false,
    "BI4":      true,
    "BI5":      false,
    "BI6":      false

    }
```

}

Read Holding Register / Input Register:

```
{
    "version":      "1.1.1.0",
    "time":   "19/03/07,17:10:03",
    "properties":{
    "AI2":    999999.500000,    //The data type (for example, Float) consists with the property configuration
    "AI3":    888888.500000,
    "AI4":    777777.500000,
    "AI5":    666666.500000
    }
}
```

Register / Data only type:

GPS:

```
{
    "version":      "1.1.1.0",
    "type":   "GPS",
    "Latitude":     31.057243,
    "Longitude":    121.188759
}
```

DI:

When two DI are enabled:

```
{
    "version":      "1.1.1.0",
    "type":   "DI1,DI2",     //The data type
    "npoint": 2,             //The number of data
    "data":   "00,ff"
}
```

When only one DI is enabled:

```
{
    "version":      "1.1.1.0",
    "type":   "DI1",
    "npoint": 1,
    "data":   "ff"
}
```

Modbus Master:

Read Coil Status/Read Input Status:

Example (Read Coil Status):

```
{
    "version":      "1.1.1.0",
    "type":   "MODBUS_MASTER",
    "slave id":     1,           //The slave address of the field device
```

```
    "fc": 1,                    //Modbus function code
    " addr ":  0,               //Modbus coil/register starting address, starting form 0
    "npoint": 2,                //The number in data
    "data":    "42,81",         //The data type consists with that in Modbus protocol
    "time":    "19/02/27,16:05:14"//Time stamp. If disable, the message will not contain this line.
}
```

Read Holding Register/Read Input Register:

Example (Read Holding Register):

```
{
    "version":      "1.1.1.0",
    "type":    "MODBUS_MASTER",
    "slave id":      1,
    "fc": 3,
    " addr ":  0,
    "npoint":32,
    "data":"11,11,00,00,33,33,00,00,55,55,00,00,77,77,00,00,99,99,00,00,11,11,00,00,13,13,00,00,15,15,00,00"
}
```

Modbus Server / Modbus TCP Server:

Coil Status:

When only one coil' status changes:

```
{
    "version":      "1.1.1.0",
    "type":    "MODBUS_TCP_SLAVE",
    "block":  0,        //Modbus Block. For example, "0" indicates the Coil Status block.
    " addr ":  2,       //Modbus status/register starting address, starting form 0
    "npoint":    1,
    "data":    "FF",    //00 or FF indicates 0 or 1.
    "time":    "19/02/27,16:13:40"
}
```

When multiple coils' status change:

Example 1:

```
{
    "version":      "1.1.1.0",
    "type":    "MODBUS_TCP_SLAVE",
    "block":  1,
    " addr ":  3,       //Modbus coil/register starting address, starting form 0
    "npoint": 2,
    //In this example, the 4th and 5th bits of the 1st byte are the two coils' statue.
    "data":    "18",    //It's HEX data.
    "time":    "19/02/27,16:23:35"
}
```

Example 2:

```
{
    "version":      "1.1.1.0",
    "type":   "MODBUS_TCP_SLAVE",
    "block":  0,
    " addr ":  6,          //Modbus coil/register starting address, starting form 0
    "npoint": 4,
    //In this example, the 1st bit of the 1st byte, the 7th and 8th bits of the 2nd byte is the three coils' status.
    "data":   "c0,03",
    "time":   "19/02/27,16:35:01"
}
```

Holding Register:

Example:

```
{
    "version":      "1.1.1.0",
    "type":   "MODBUS_TCP_SLAVE",
    "block":  4,
    " addr ":  1,
    "npoint": 4,
    "data":   "11,22,33,44",
    "time":   "19/02/27,16:48:39"
}
```

A.1.2 Subscribe Message

Note: "//" indicates the comments part.

Property type: (Up to 8 properties can be changed at one time)

DO: ***//Digital Output***

```
{
    "DO":{
    "DO1":   false,
    "DO2":   true
    }
}
```

Modbus Master/Slave / Modbus TCP Server

Change Coil/Input Status:

```
{
    "properties":   {
    "BO3":   false,
    "BO4":   true,
```

```
    "BO5":    false
    }
}
```

Change Holding/Input Register:

```
{
"properties":   {
    "AO3":    123.5,
    "AO4":    321.5,
    "AO5":    555.6
    }
}
```

Register / Data Only Type:

DO:

```
{
    "type":    "DO1",
    "npoint":  1,
    "data":    "00"
}
```

Modbus Master:

Force Single Coil:

```
{
    "type":    "MODBUS_MASTER",
    "slave id":       1,
    "fc": 5,                  //Modbus function code
    " addr ":  0,
    "npoint":  1,             //00 or FF indicates 0 or 1.
    "data":    "FF"
  }
```

Force Multiple Coils:

```
{
    "type":    "MODBUS_MASTER",
    "slave id":       1,
    "fc": 15,                 //Modbus function code
    " addr ":  0,
    "npoint":  2,
    //The data contains multiple coils' status.
    "data":    "ff,aa"
}
```

Preset Single Register:

```
{
    "type":    "MODBUS_MASTER",
```

```
    "slave id":      1,
    "fc": 6,
    " addr ":  0,
    "npoint":  2,
    "data":    "aa,bb"
 }
```

Preset Multiple Registers:

```
{
    "type":    "MODBUS_MASTER",
    "slave id":      1,
    "fc": 16,
    "addr":    0,
    "npoint":32,
    "data":"11,11,00,00,22,22,00,00,33,33,00,00,44,44,00,00,00,00,00,00,00,00,00,00,00,00,88,8
    8,00,00,99,99"
}
```

Modbus Server / Modbus TCP Server

Change single input status bit:

```
{
    "type":    "MODBUS_SLAVE",
    "block":  1,          //Modbus Block. "1" indicates the Input Status block.
    "addr ":  0,
    "npoint":  1,
    "data":    "FF"
 }
```

Change multiple input status bits:

```
{
    "type":    "MODBUS_SLAVE",
    "block":  1,
    "addr":    0,
    "npoint":  8,
    //In this example, 8 bits are sent in a byte.
    "data":    "aa"
 }
```

Change Input Register:

```
{
    "type":    " MODBUS_SLAVE ",
    "block":  3,
    "addr":    1,
    "npoint":  12,
    "data":    "02,22,03,33,04,44,05,55,06,66,07,77"
}
```

A.2 Custom Message Format

```
{
    "timestamp": |TIMESTAMP|,
    "values":   {
        |#each VALUES|
        "name": "|PROPERTIESNAME|", "v": |VALUE||#unless @last|,|/unless|
        |/each|
    }
}
```

(1) Variable description

|PROPERTIESNAME|: Property Name. For example, AI1.

|VALUE|: The value of the property.

|TIMESTAMP|: The time when the property was read.

(2) Grammar

```
|#each VALUES|
    |PROPERTIESNAME|, |VALUE|, |TIMESTAMP|,
|/each|
```

The "each" is to generate text for each property. Users just need to edit one single property template between "|#each VALUES|" and "|/each|" and it will be copied to every property. Up to 8 properties can be published in one message.

Template example:

```
{
    |#each VALUES|
        "|PROPERTIESNAME|_value": |VALUE|,
        "|PROPERTIESNAME|_timestamp": |TIMESTAMP|,
    |/each|
}
```

Message example:

```
{
    "AI1_value": 23,
    "AI1_timestamp": 1456150184825,
    "AI2_value": 17,
    "AI2_timestamp": 1456150184984,
    …
}
```

(3) Additional grammar description:

|#unless @last|,|/unless|

This line means "Must insert a comma at the end of each line, unless it's the last line".
It cancels the comma in the last line. If users regard the comma in the last line as a syntax error, the template must contain this line.