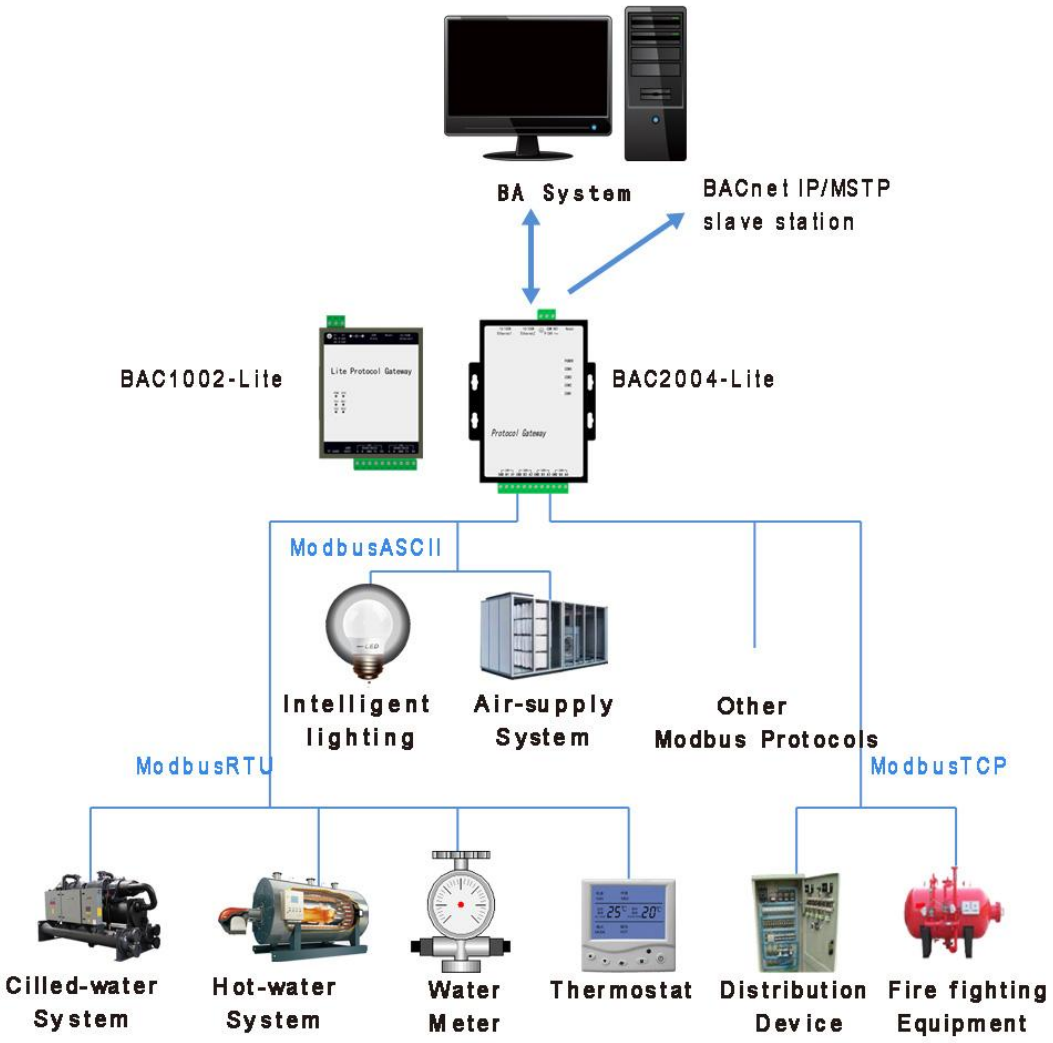
X2BACnet

User Manual

Applicable Product model: BAC1002-Lite、BAC2004-Lite



Shanghai Sunfull Automation Co., LTD

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1 Preface

1.1 Disclaimer

This user manual belongs to Shanghai Sunfull Automation Technology Co., Ltd. and authorised Licensor all rights, retain all rights. Without the company's written permission, no unit and individual may unauthorized excerpt, copy the content of the book part or all. The contents of this manual may be changed due to product version upgrades or other reasons. This manual is used in conjunction with Sunfull hardware gateway, and we do our best to provide accurate information in this manual.

1.2 Technical Support

- Email：support@opcmaster.com
- TEL：+86 021-58776098
- website：http://www.opcmaster.com/english/

  http://www.bacnetchina.com/english/

1.3 Software Install and Uninstall

X2BACnet software is a green installation.

- No operation of the registry
- Do not operate the sensitive area of the system, including the root directory of the system starting area, the installation directory (Windows directory), the program directory (Program Files), and the account specific directory.
- Do not write anything to the directory outside my directory.

  Because the program itself does not have any effect on any file other than its directory, there is no installation and unloading problem at all.

  The deletion of the program, as long as the directory of the program and the corresponding shortcut are deleted (if you manually set a shortcut on the desktop or other position), the program is completely clean from your computer, without leaving any garbage.
- No need to install, copy and copy at will.

2 Overview

2.1 Feature

- X2BACnet is a protocol gateway, X means standard and non-standard modbus communication protocol, 2 means to. BACnet means support standard BACnet IP/MSTP protocol. The software supports simulation test. (Note: BAC1002-Lite can't support BACnetMSTP protocol. The following is no longer repeated.)
- Definition: X2BACnet as a communication bridge, it transfer different protocol to BACnet Protocol. BACnet gateway make different machine seamless integration.
- Advantage:

  1. Easy to Configure and Operation.
  2. Support PC simulation with X2BACnet.
  3. Support the User review data and communication status. And download files and X2BACnet software from website.
  4. Support nearly Modbus protocols transfer to BACnetIP/MSTP.
  5. Gateway support analog linear transformation, support function, high and low byte exchange function.
  6. Support the user permission management.

2.2 Operation Platform

- Support Win 7/Win8/Win10/ XP/2000/2003
- WEB browser with Google Chrome、IE9 and above、Opera、Safari、and firefox

2.3 Supported Registered Type and Number

Internal support BACnetIP/MSTP server gateway，The default port is 47808，Device ID assigned by user, be careful not to conflict with other devices within the same network segment, the support of the server's register type and the number in the following table 2-3-1. BAC2004-LITE limit points to 1024 . BAC1002-LITE limit points to 256.

Note: gateway each register can build up another 1024 points, and the maximum 9 types of BACnet register a total of 1024 points, the specific points assigned by the users themselves.

BACnet register type	BAC1002-LITE Instance Number	BAC2004-LITE Instance Number
AI（read only）	256(0~255)	1024(0~1023)
AO（readable and writable）	256(0~255)	1024(0~1023)
AV（readable and writable）	256(0~255)	1024(0~1023)
BI （only read）	256(0~255)	1024(0~1023)
BO （readable and writable）	256(0~255)	1024(0~1023)
BV （readable and writable）	256(0~255)	1024(0~1023)
MI（read only）	256(0~255)	1024(0~1023)
MO（readable and writable）	256(0~255)	1024(0~1023)
MV（readable and writable）	256(0~255)	1024(0~1023)

Table 2-3-1 BACnet register number

2.4 Application Fields

Hardware gateway BAC2004 (2 Ethernets & 4 RS485s) and BAC1002-LITE(1 Ethernet & 2 RS485s) support different standard and non-standard Modbus protocols convert to BACnet protocol, can solve the problem that the large BA company is unable to connect to some of the less common configuration software control equipment. Through hardware gateway to convert different protocols to

BACnetIP/MSTP standard protocol, make BACnet client configuration software can access.

3 Configuration And Operation

X2BACnet is a configuration software running on the PC. It used to configure project, upload the project to the machine hardware gateway. Finally, monitor by hardware gateway. X2BACnet also can be used alone on the PC .

Double click X2BACnet-Lite.exe(It is recommended to run as an administrator), open the main interface, as the following figure 3-1.

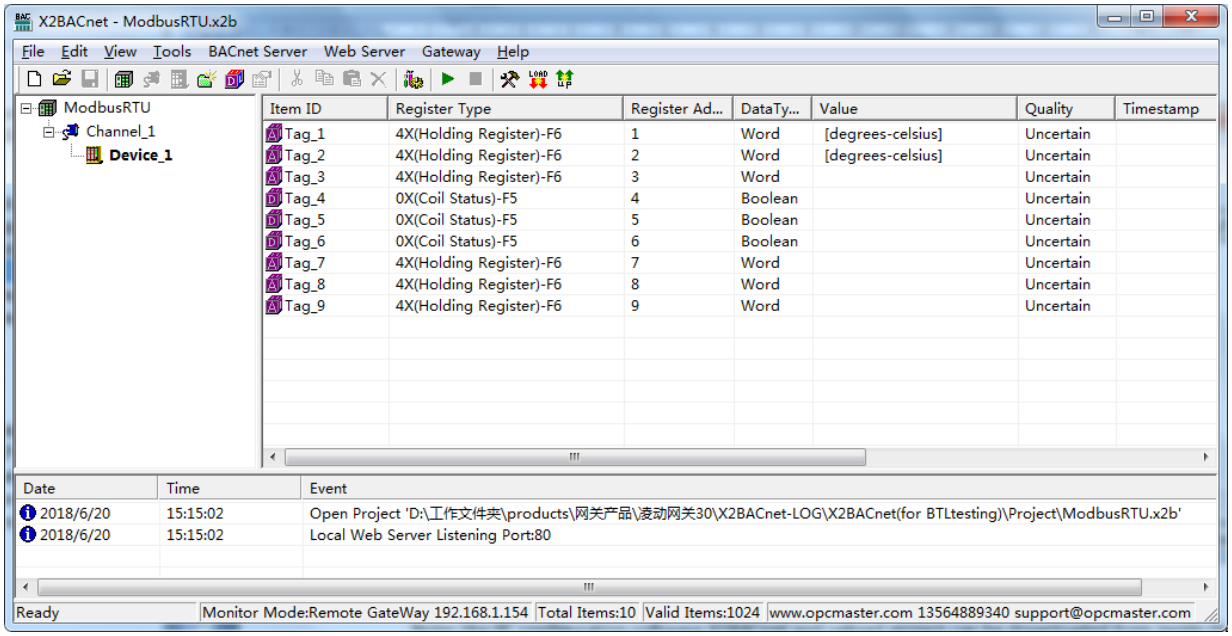


Figure 3-1 Main interface

The simple operation is as follows.

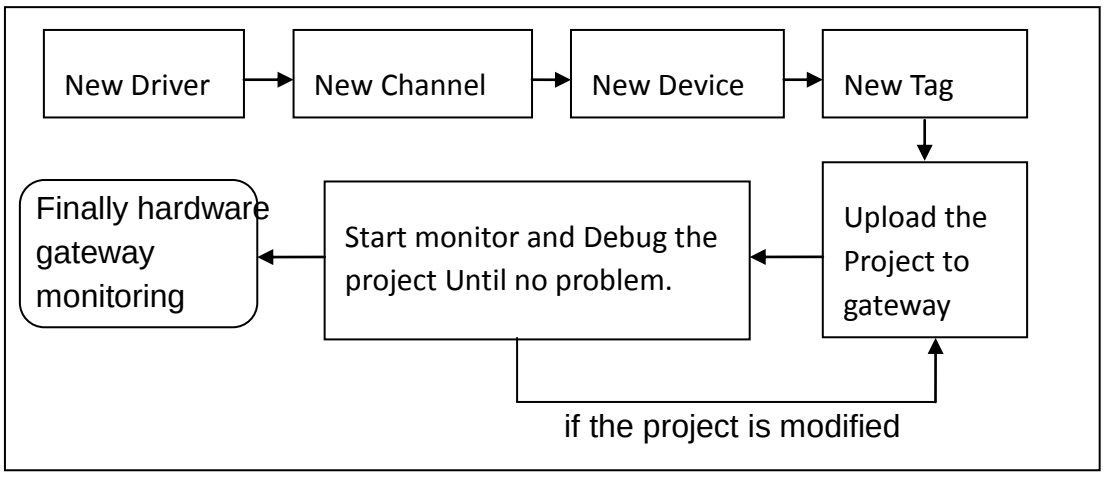


Figure 3-2 Simple operation flow

3.1 New Driver

Click “Edit“ of the menu bar to choose "New driver" or click on the toolbar

icon , open the Driver Properties window as the following figure 3-1-1.

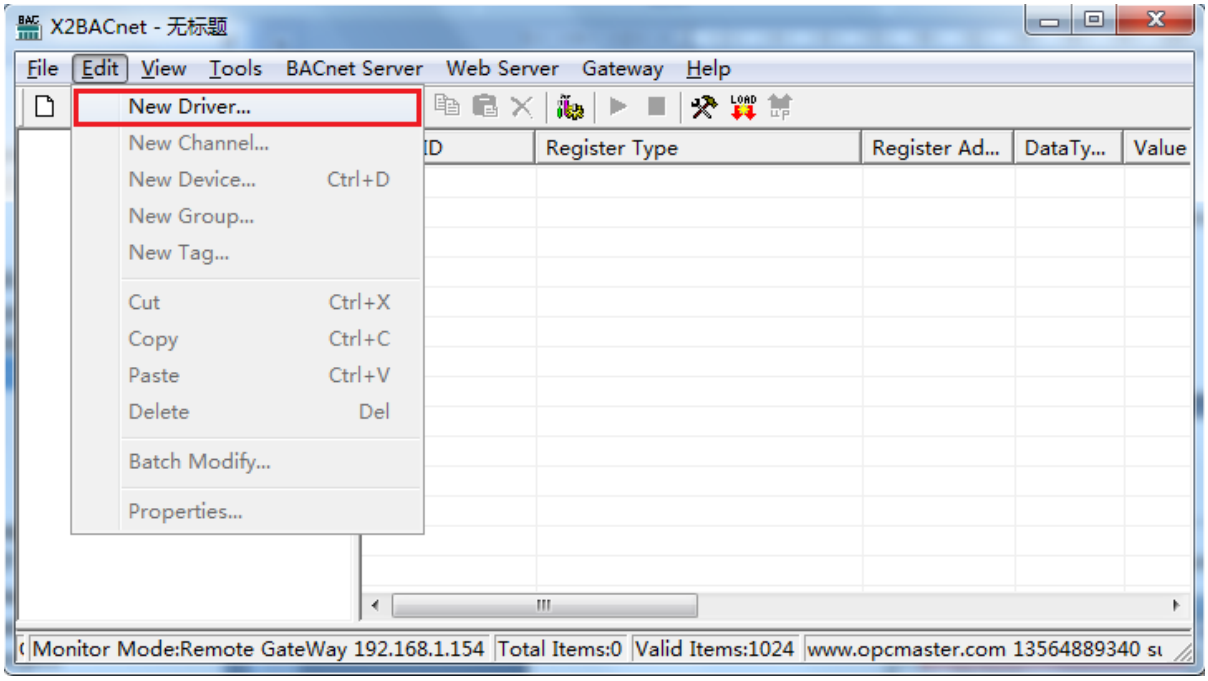


Figure 3-1-1 New Driver

In the pop-up window, Choose Driver Modbus RTU，As the below Figure 3-1-2。

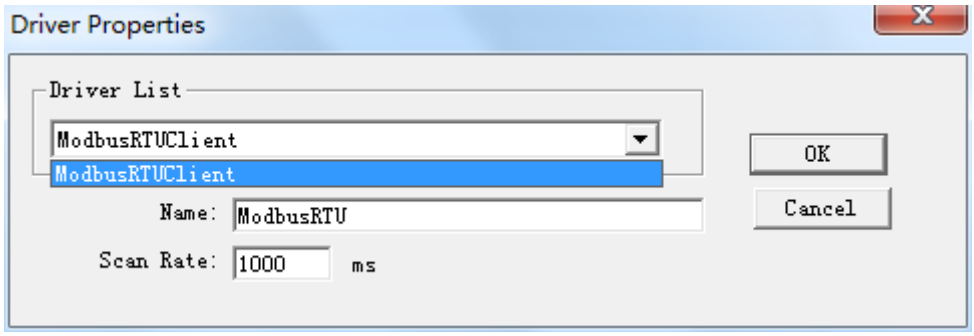


Figure 3-1-2 choose Driver

Input driver name in the name of the project, the default Scan Rate is 1000 milliseconds. Scan Rate can adjust the frequency of access to all devices. If the time required to access all the devices is greater than the set scan rate, this time is invalid. if the time required to access all the devices is less than the set scan rate, the waiting time needs to reach the set scan rate for the next visit. user can according to the actual situation, change the scan rate.

After finish adding driver, as the below figure 3-1-3.

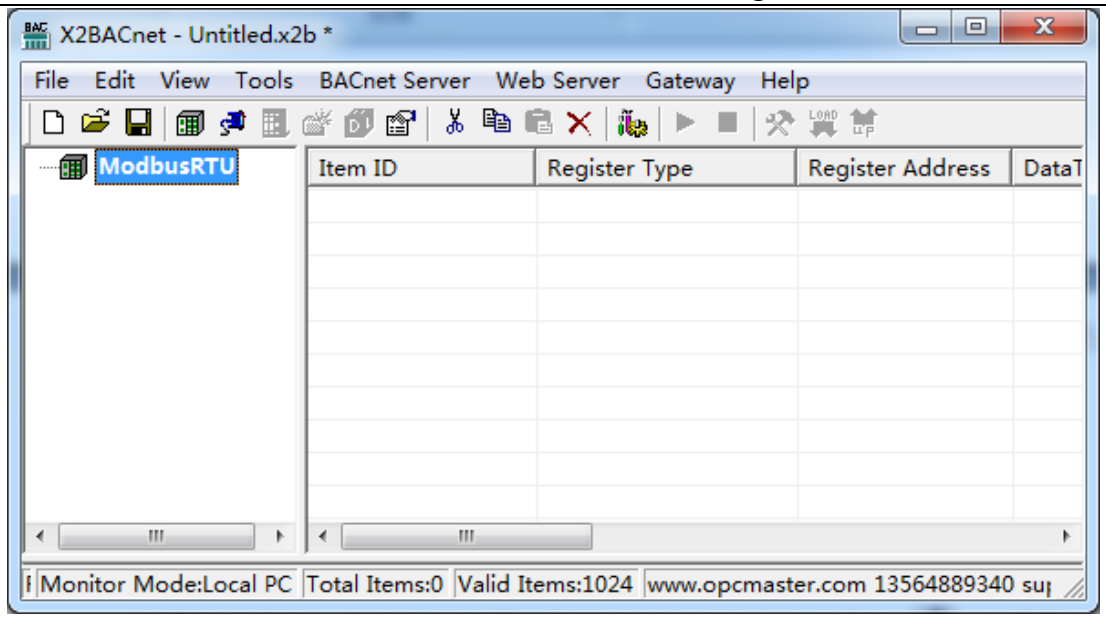


Figure 3-1-3 Finish adding driver

3.2 New Channel

In the current driver, right click to select "New Channel" or click on the toolbar , As the following figure 3-2-1.

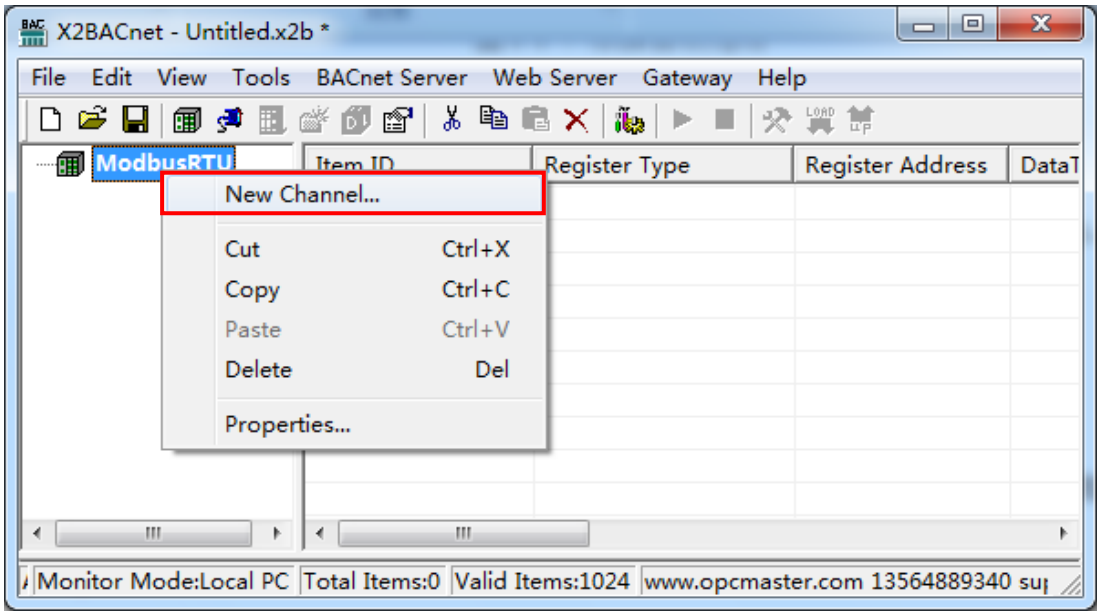


Figure 3-2-1 New Channel

In the pop-up window, according to corresponding set by the driver communication protocol channel names can be arbitrary naming, As the following figure 3-2-2.

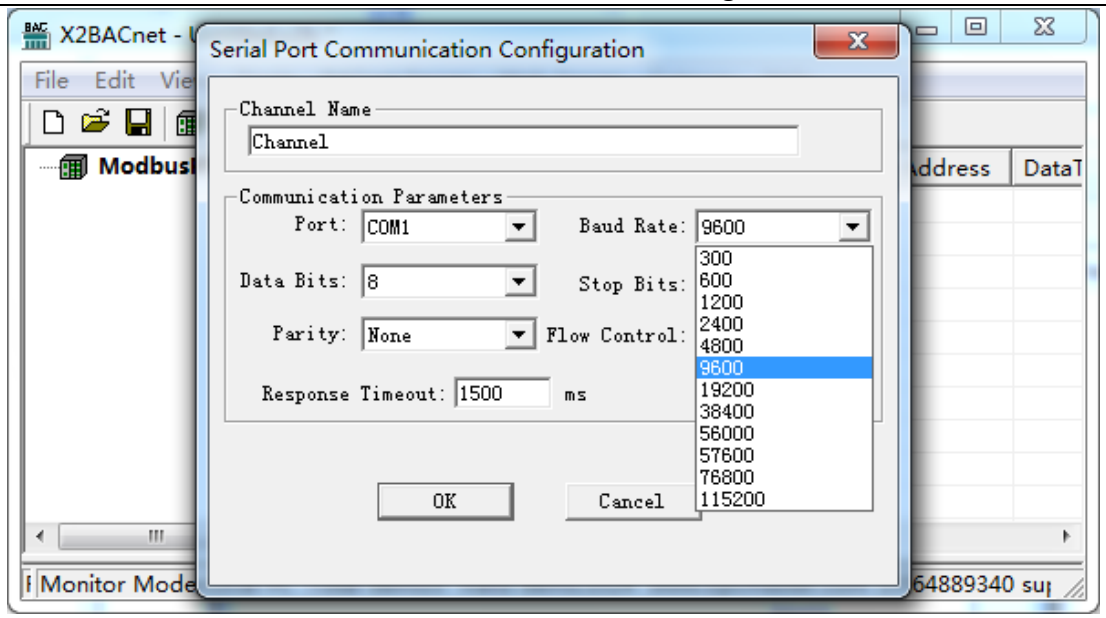


Figure 3-2-2 Set communication parameters

Since the acquisition terminal is intended to collect data from Modbus slave stations, so the setting of the setting of serial communication parameters should be consistent with the parameters in Modbus Slave.

When communication is normal, response timeout set longer does not affect communication speed. If the response speed of the device is relatively slow, it is recommended to set up a bit longer to avoid communication failure, As the following figure 3-2-3.

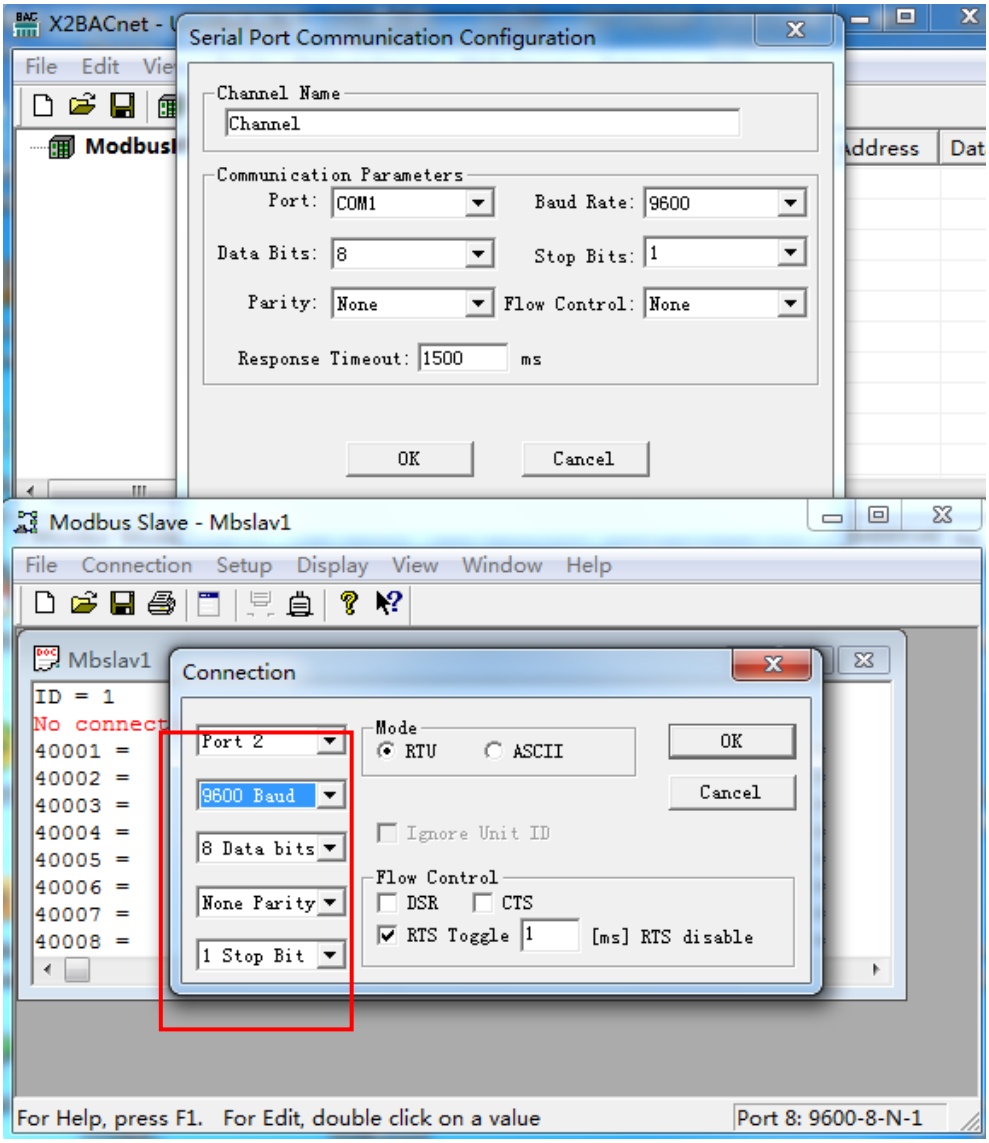


Figure 3-2-3 Channel parameters are consistent

After finish adding the channel, As the following figure 3-2-4.

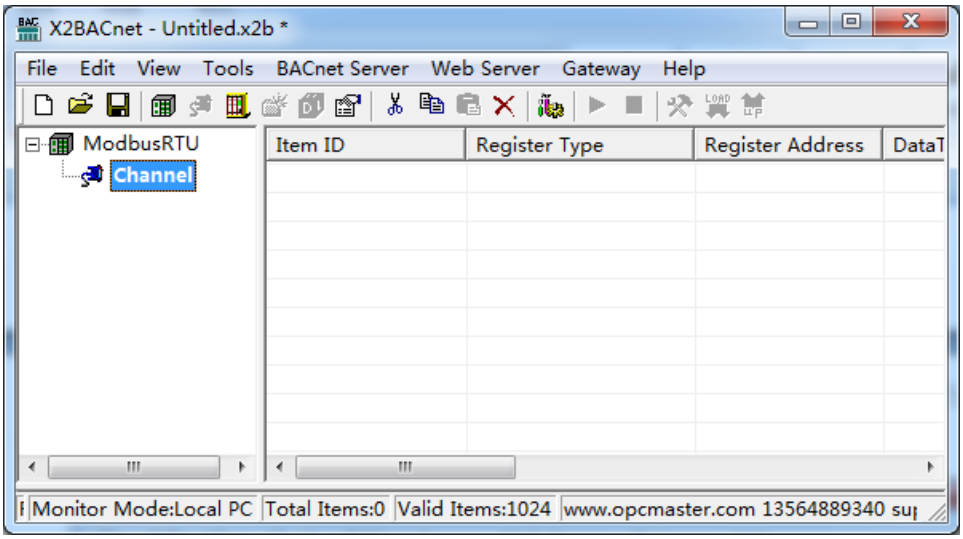


Figure 3-2-4 finish adding Channel

3.3 New Device

In the current Channel, Right-click to choose "New Device", or click on the toolbar , As the following figure 3-3-1.

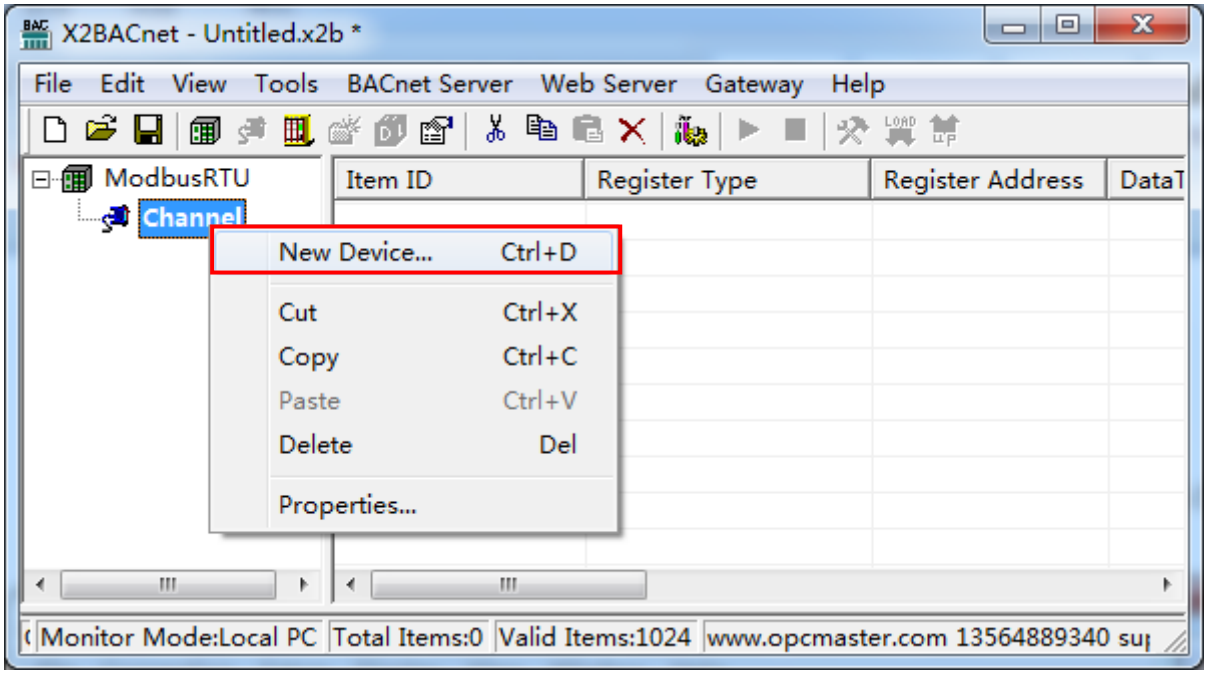


Figure 3-3-1 New Device

In the pop-up window set device properties , As the following figure 3-3-2.

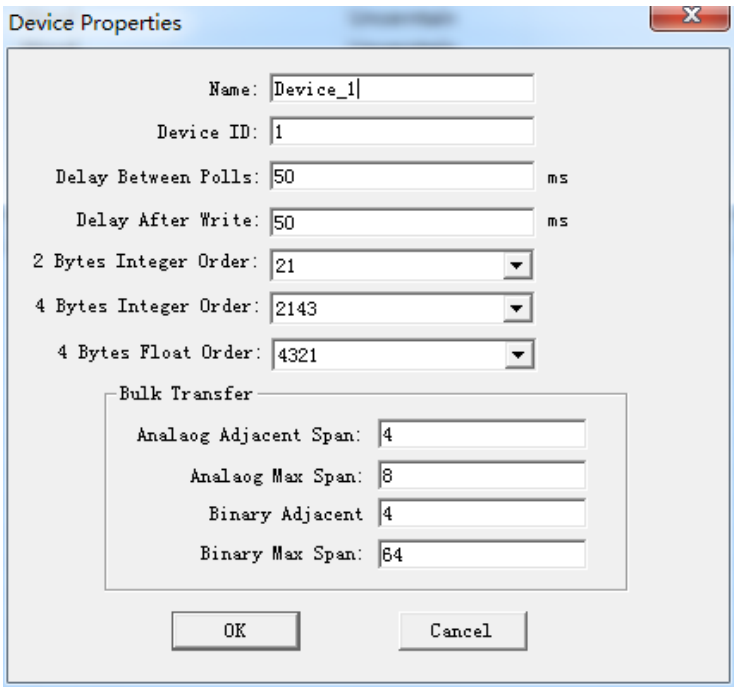


Figure 3-3-2 Device Properties

In order to improve the communication speed, the packet register communication can be realized under the continuous register address. When the device does not support packet communication, the parameters of the group package should be set to 0. In addition, when the response time of the device is slow, you can set the time interval between the data frame and the frame (that is Delay Between Polls) . The default of Delay Between Polls is 100 microseconds. As the following figure 3-3-3.

2 Bytes Integer Order, 4Bytes Integer Order, and 4 Bytes Float Order means the combination of integer or floating point byte order, the default is 4321. These parameters are used in combination with field devices for data transmission.For example, some meters adjust the sequence of high and low byte in the transmission of data, which will be used at this time. The default parameters are generally used, As the following figure 3-3-3.

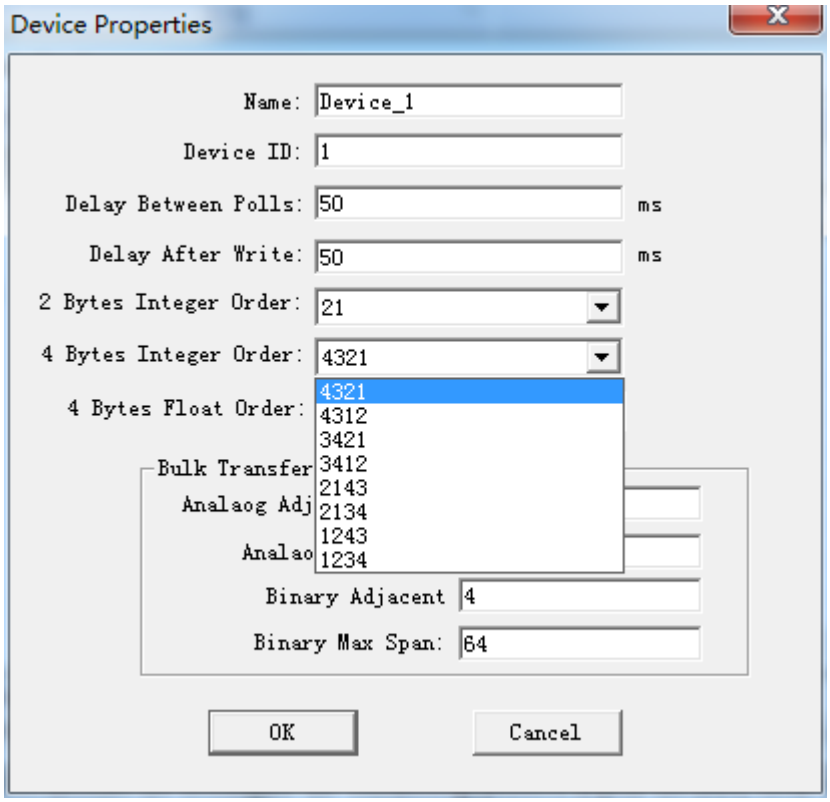


Figure 3-3-3 Byte order

After finish adding the device, As the following figure 3-3-4.

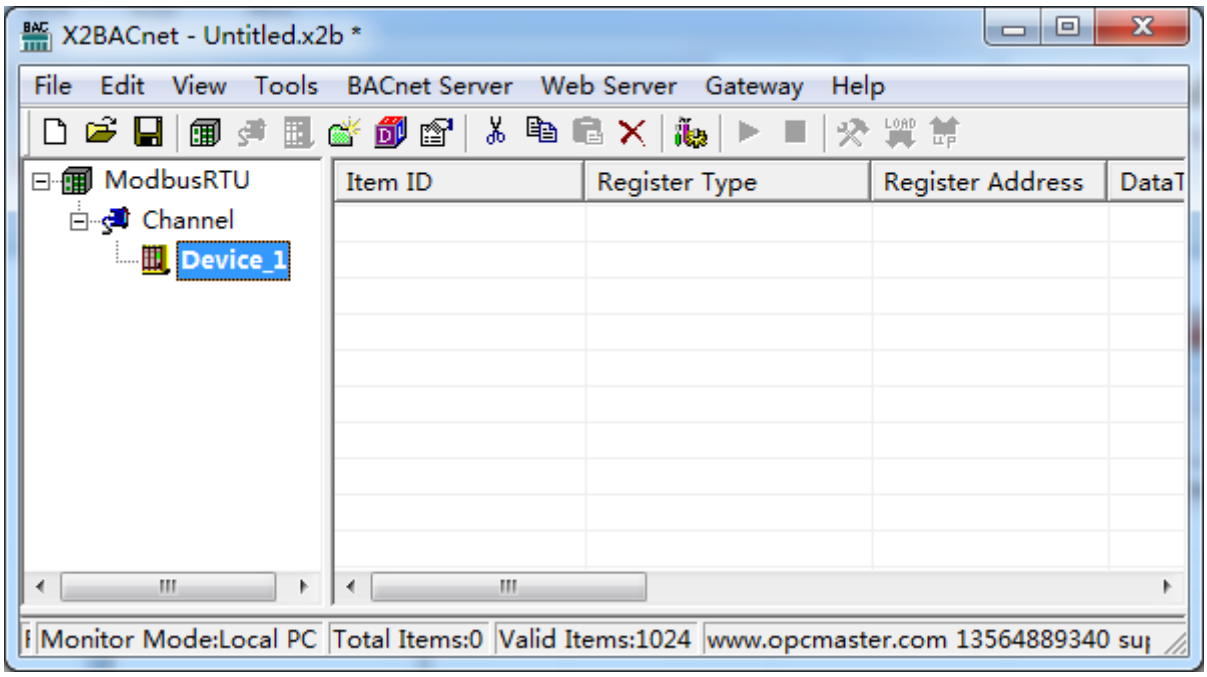


Figure 3-3-4 finish adding device

3.4 New Tag

In the current Channel, Right-click to choose directly add tag (also add group first, and then new tag in the group), or click on the toolbar , As the following figure 3-4-1.

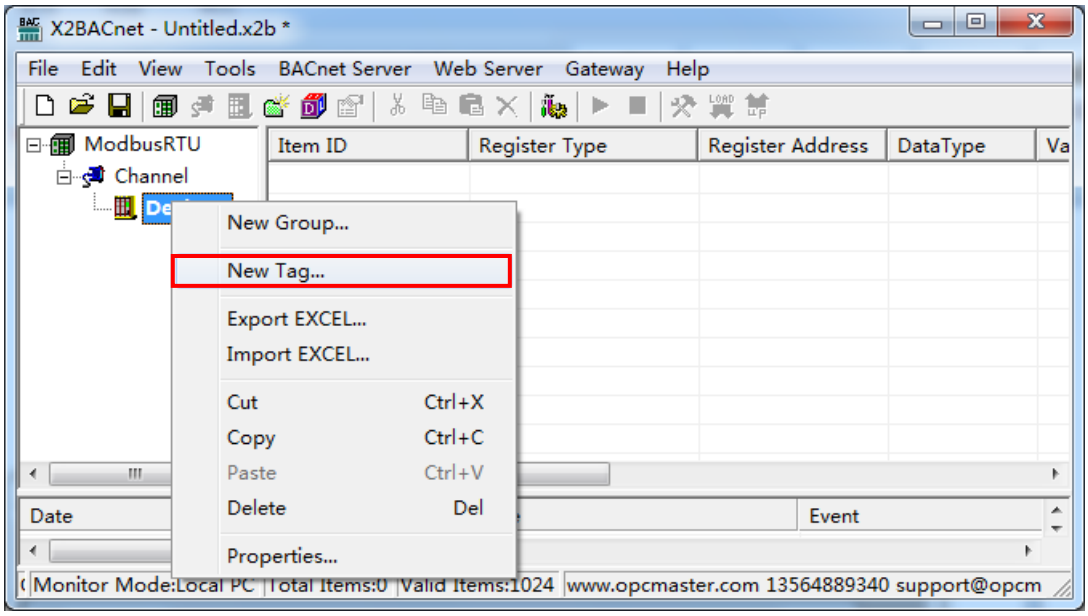


Figure 3-4-1 New Tag

Or right-click on the right side of the edit box blank space, add a new tag. As the following figure 3-4-2.

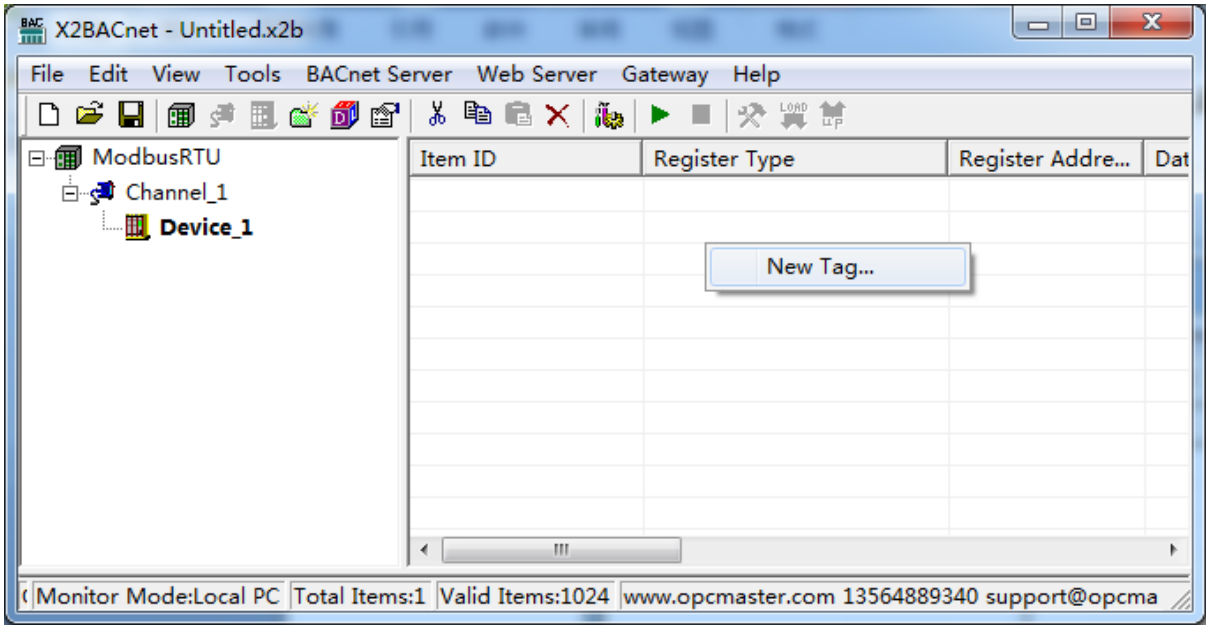


Figure 3-4-2 New Tag

In the pop-up window, Set the parameters of collection and transfer(BACnet Server), As the following figure 3-4-3.

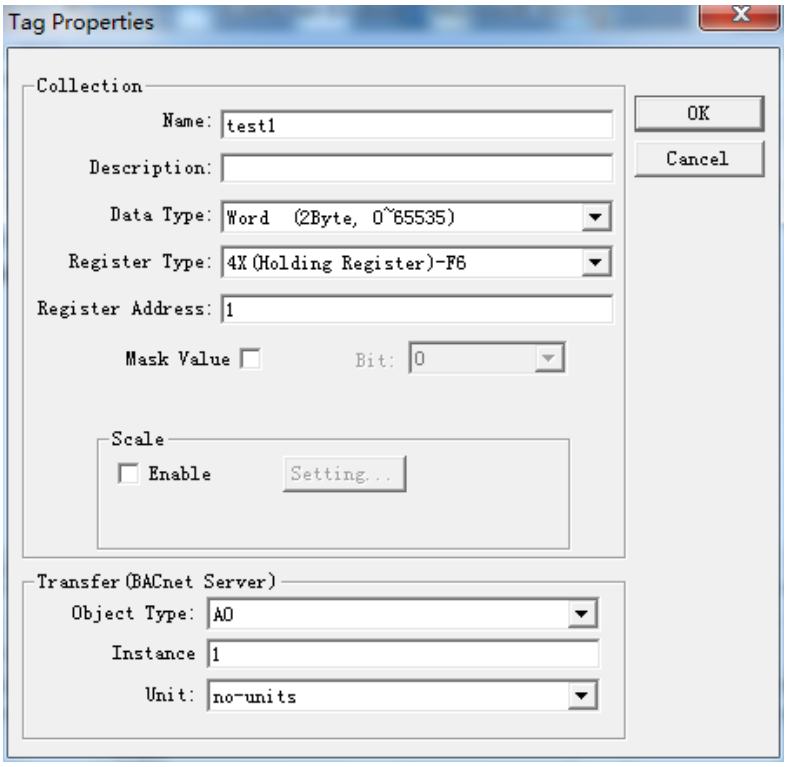


Figure 3-4-3 Tag Properties

In the tag properties pop-up window ,fill in the Name, Description, Data type, register, Register Type, Register address etc. As above figure, a register address of

collection end is 40001 , data type is Word .

When the data type is Short, Word, Long or DWord, can be valued by byte data bits. Click “Mask Value”, you can pick up a byte 0-15. As the following figure 3-4-4.

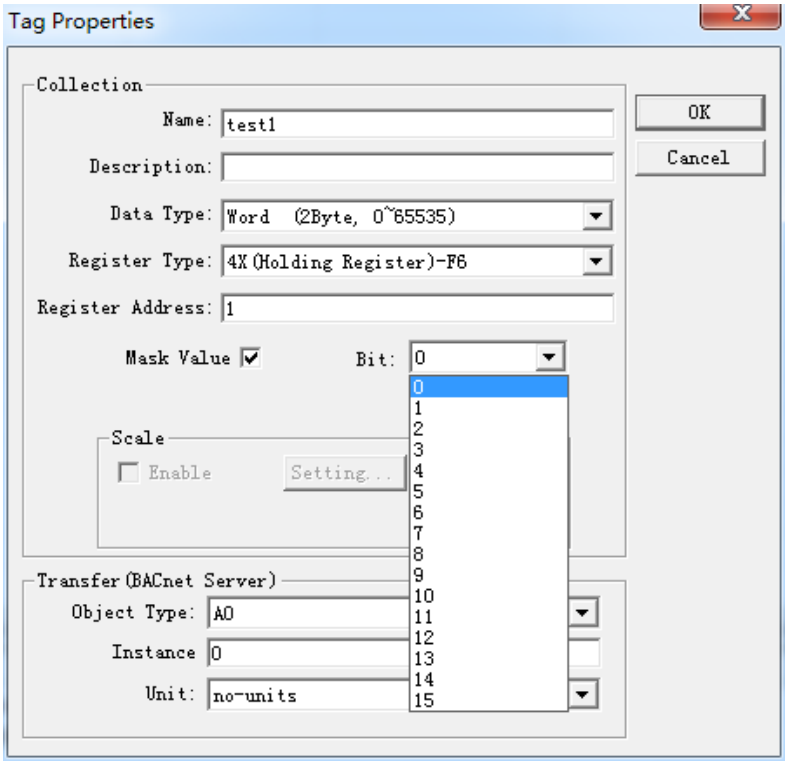


Figure 3-4-4 Mask Value

For some special data, we can also enable the linear transformation function to realize the linear amplification and reduction of data. Note that the initial address of the BACnet server's address is from 0. As above figure, the value of the Modbus register is collected and stored in the AV0 address of the BACnet server.

The supported type of registers are 0X, 1X, 3X, 4X. For the 0X and 4X register types, 0x (Coil Status) -F5 and 4x (Holding Register) -F6 are generally chosen by default. A write function code Behind the bar line.

Click “Scale”, You can do the linear transformation, and two minimum value is invalid, you just need to set a maximum. To expand 100 times, Raw Data is set to 1, Engineer Date can be set to 100. As the following figure 3-4-5.

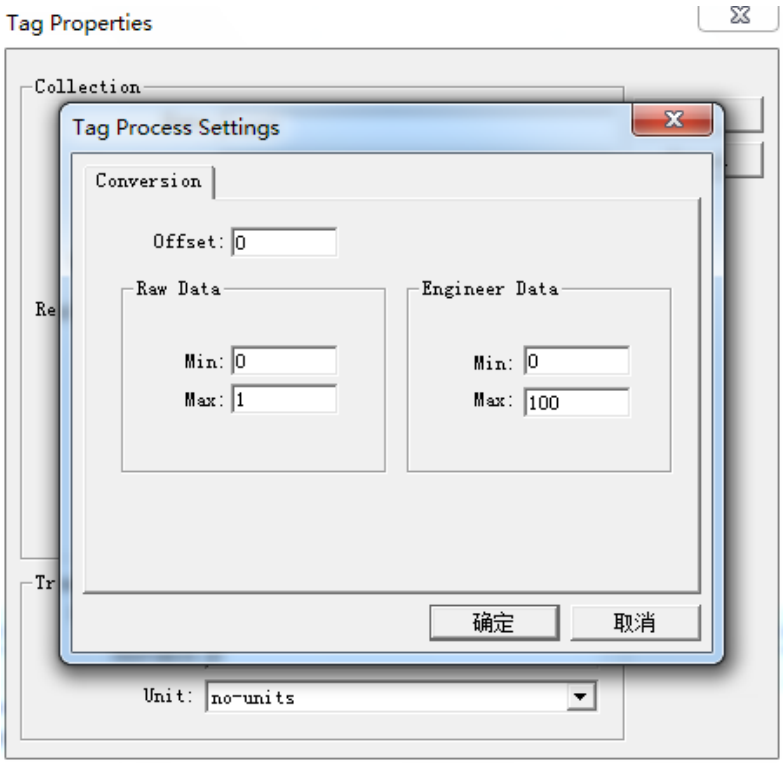


Figure 3-4-5 Tag Process Settings

After finish adding a tag, As the following figure 3-4-6.

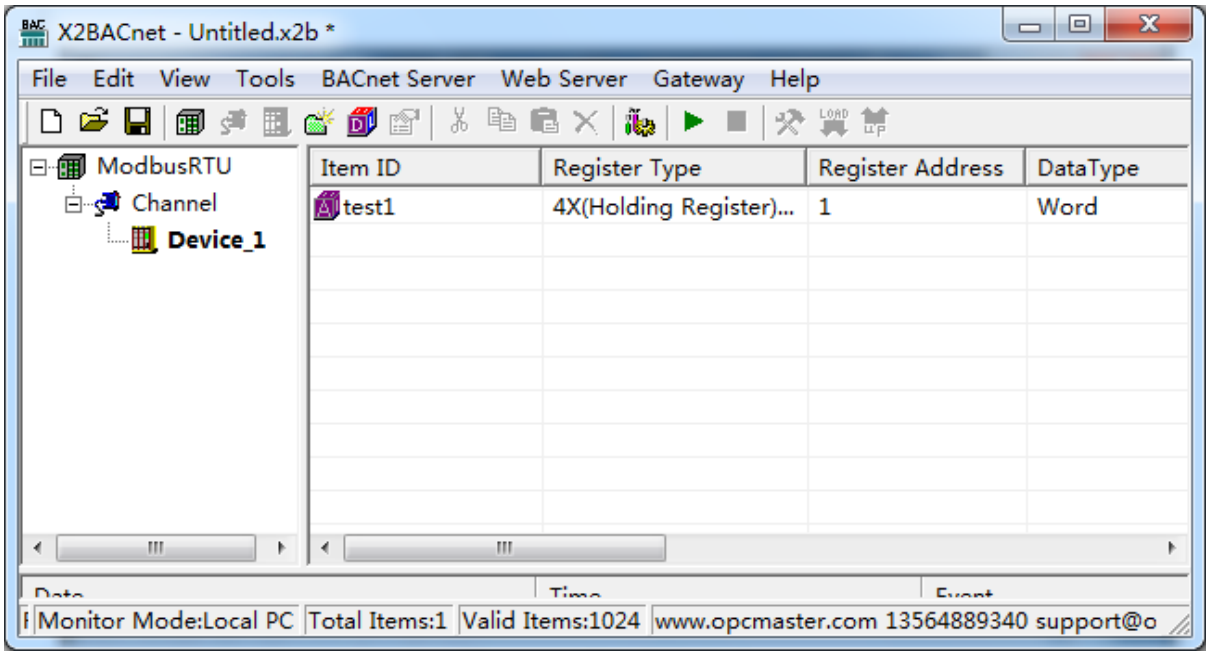


Figure 3-4-6 finish adding a tag

You can continue to add steps one by one, and suggest using the copy and paste of the toolbar. Select a tag to copy, click the copy button in the toolbar, or choose the copy on the right button, or use shortcut key Ctr+C and Ctrl+V, as the following figure 3-4-7。

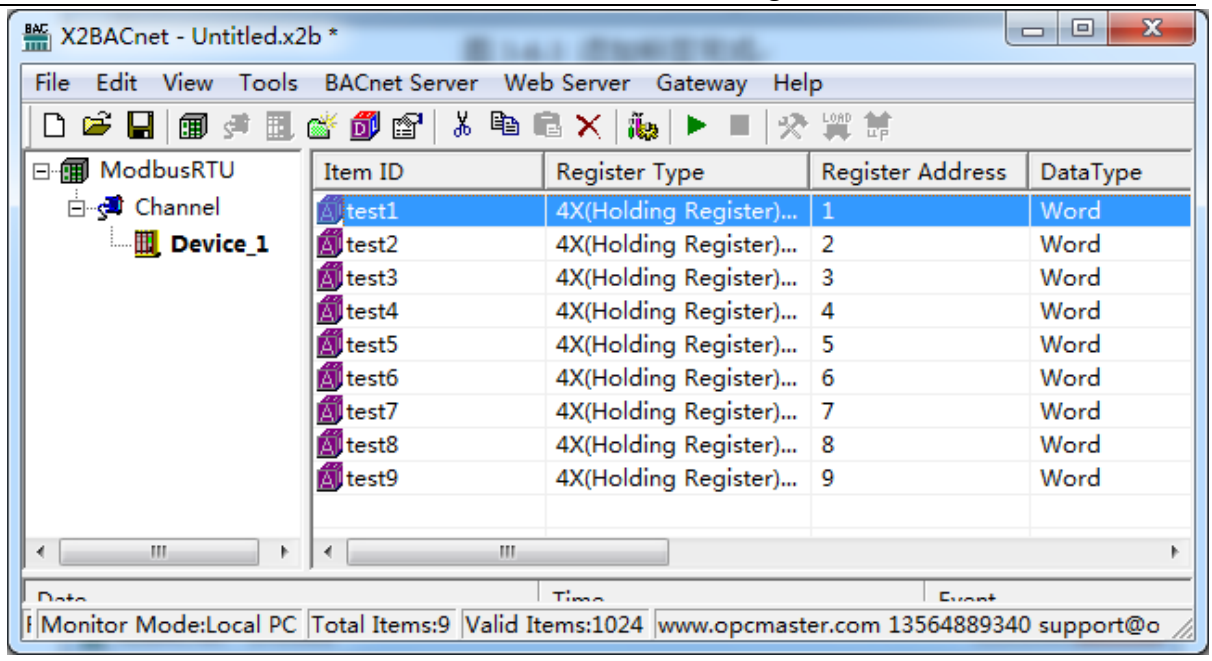


Figure 3-4-7 Copy Tag

It can also be edited in the EXCEL table, and then edit the engineering point by importing excel and exporting excel functions.

Right-click the device to choose “Export Excel”, As the figure 3-4-8. Save as xls file.

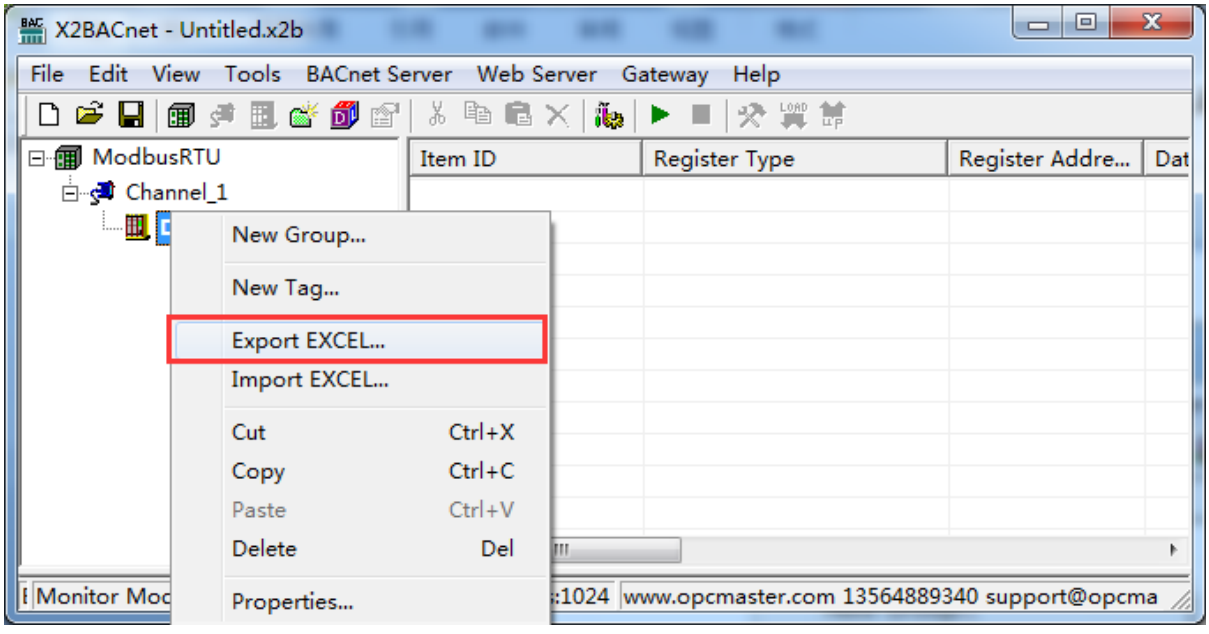


Figure 3-4-8 Export EXCEL

Save the completed, open the EXCEL for editing, As the figure 3-4-9.

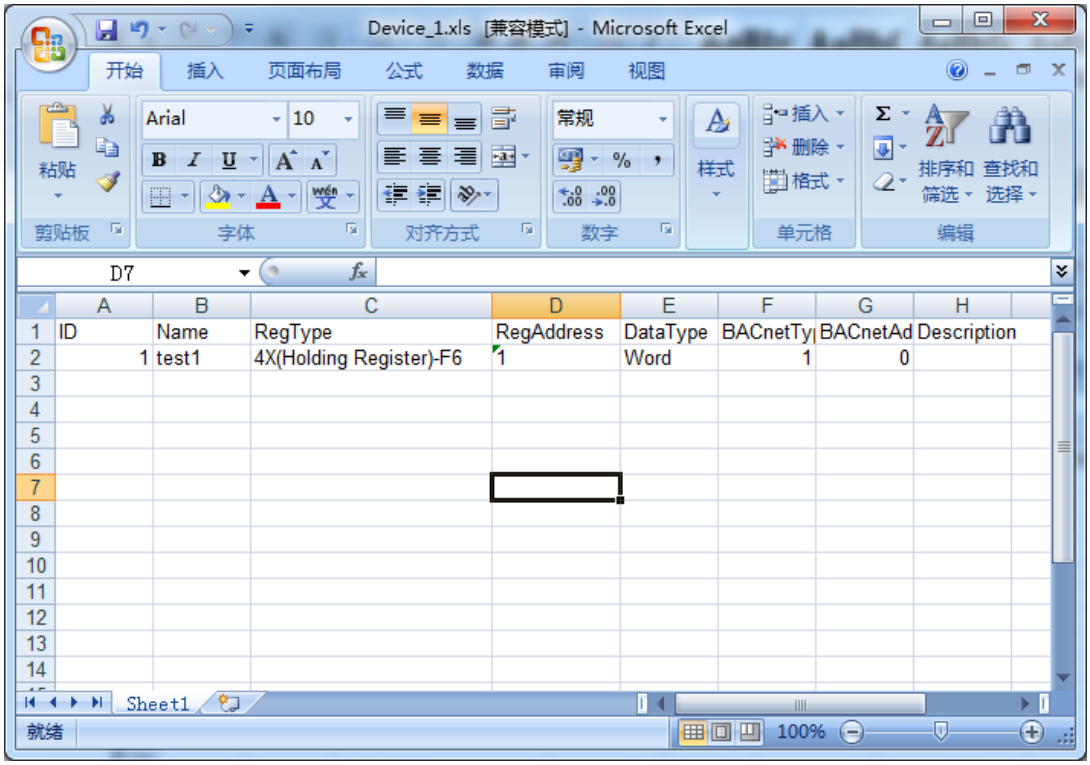


Figure 3-4-9 Open the EXCEL

After editing the Excel file, As the figure 3-4-10.

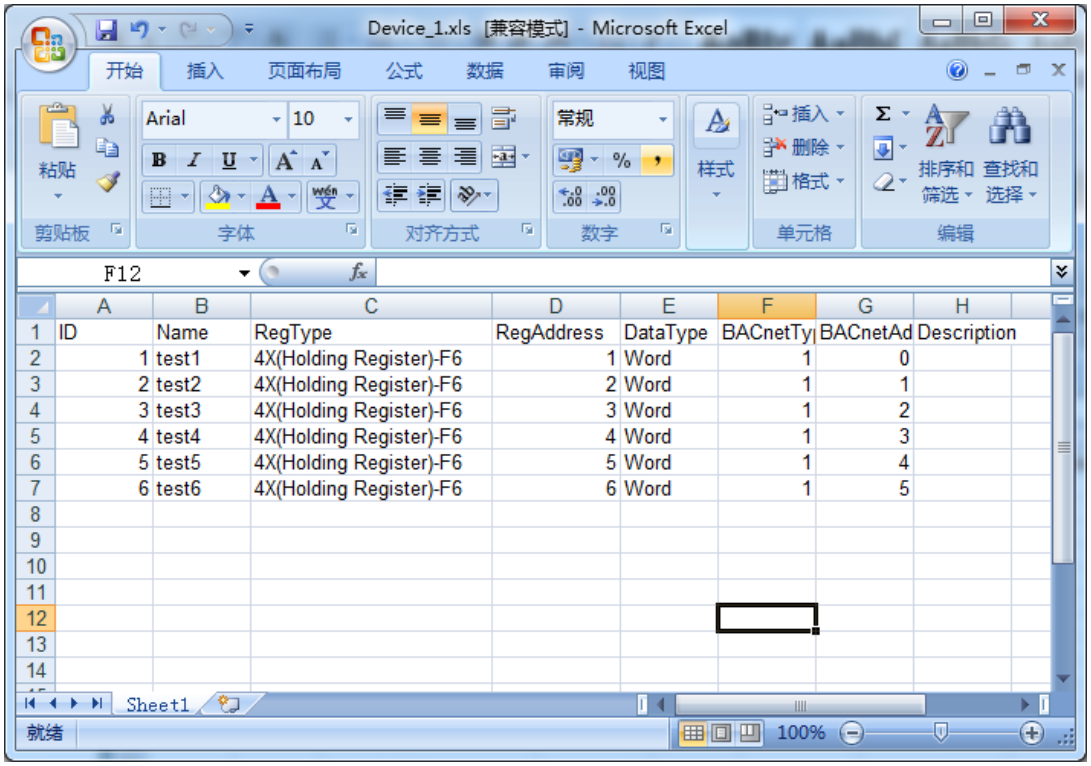


Figure 3-4-10 Edit the EXCEL

Back to X2BACnet software, Right-click the device to choose “Import Excel”, find the edited Excel file to import. As the following figure 3-4-11.

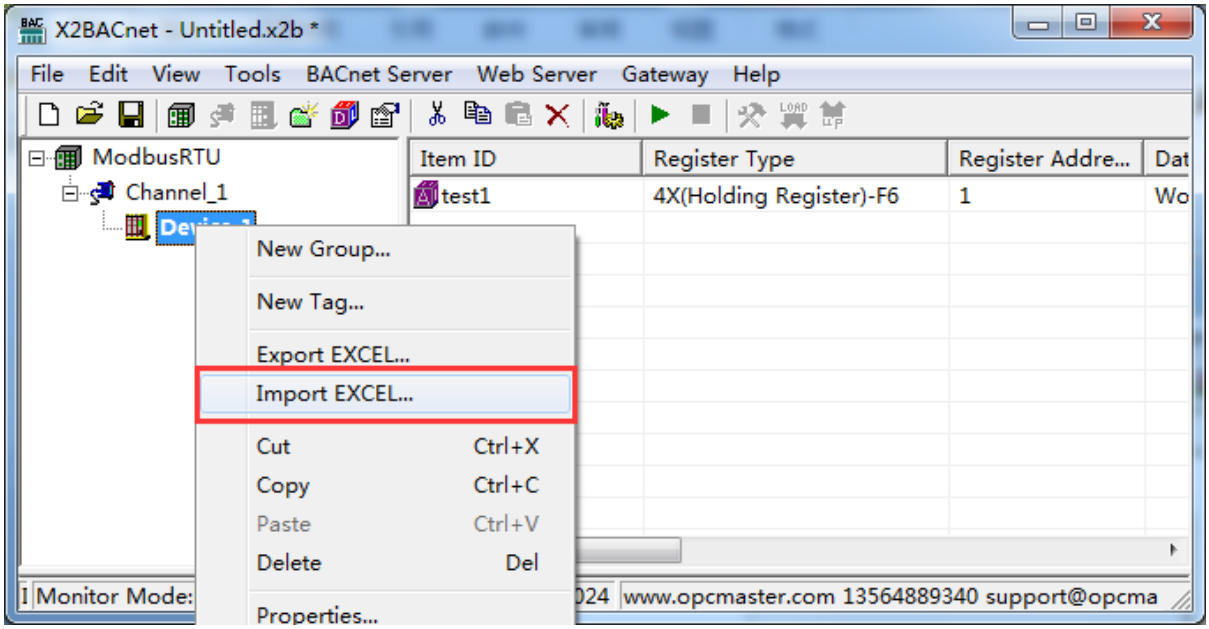


Figure 3-4-11 Import EXCEL

The import is complete, the following figure 3-4-12.

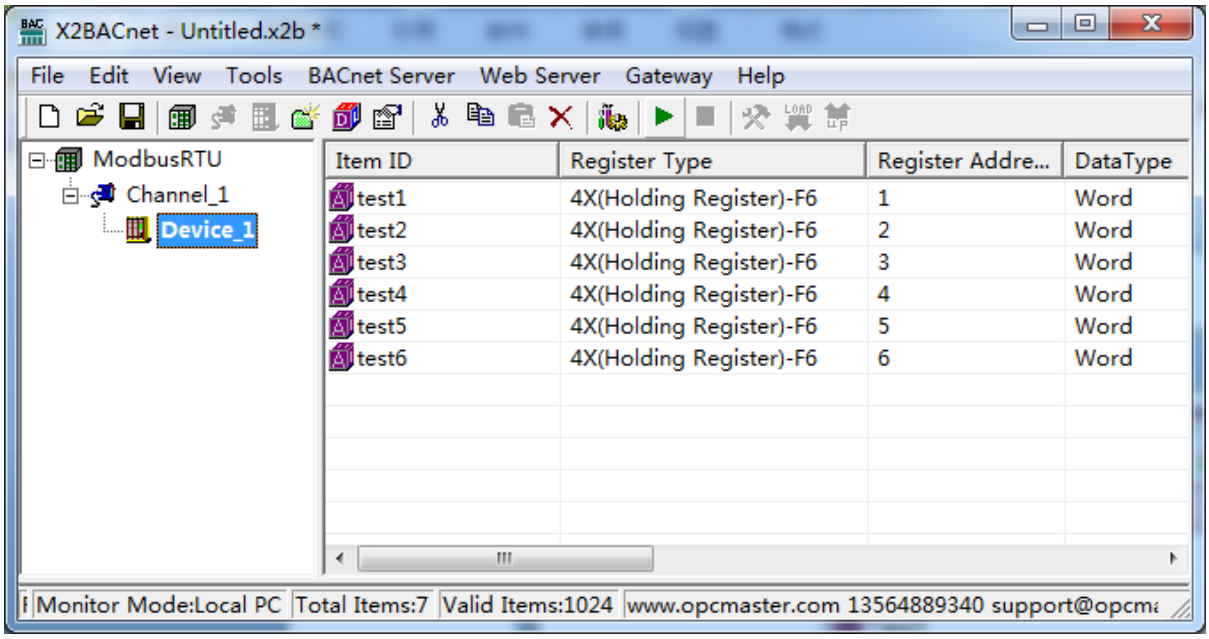


Figure 3-4-12 Complete the import

3.5 BACnet Server

3.5.1 BACnet IP Setting

BACnet server support BACnet IP protocol and BACnet MSTP protocol. Click on the menu bar "BACnet server" option "BACnet IP Setting"，As the following figure 3-5-1-1.

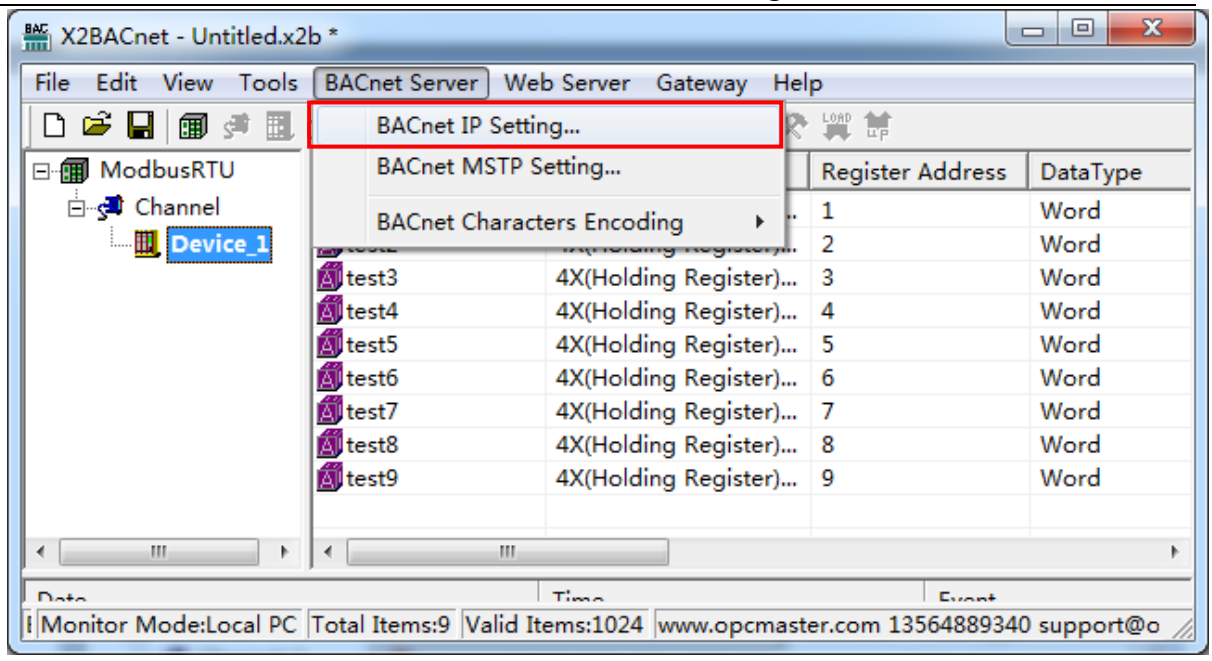


Figure 3-5-1-1 BACnet IP Setting

Set the BACnet device ID in the pop up dialog, fixed port number is 47808, as below the 3-5-1-2. Note that device ID should not repeat with other BACnet devices in the same network segment, otherwise it will lead to communication failure. In addition, the gateway can be named in order to quickly distinguish different address gateways in the upper computer system.

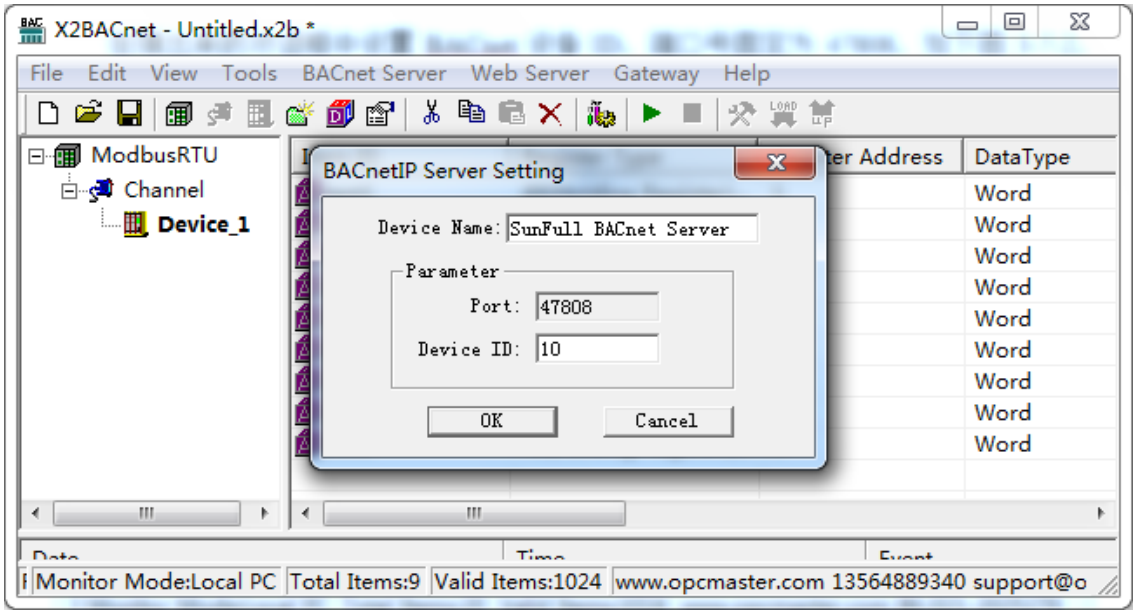


Figure 3-5-1-2 BACnetIP Server Setting

3.5.2 BACnet MSTP Setting

Click on the menu bar "BACnet server" option "BACnet MSTP Setting", As the following figure 3-5-2-1.

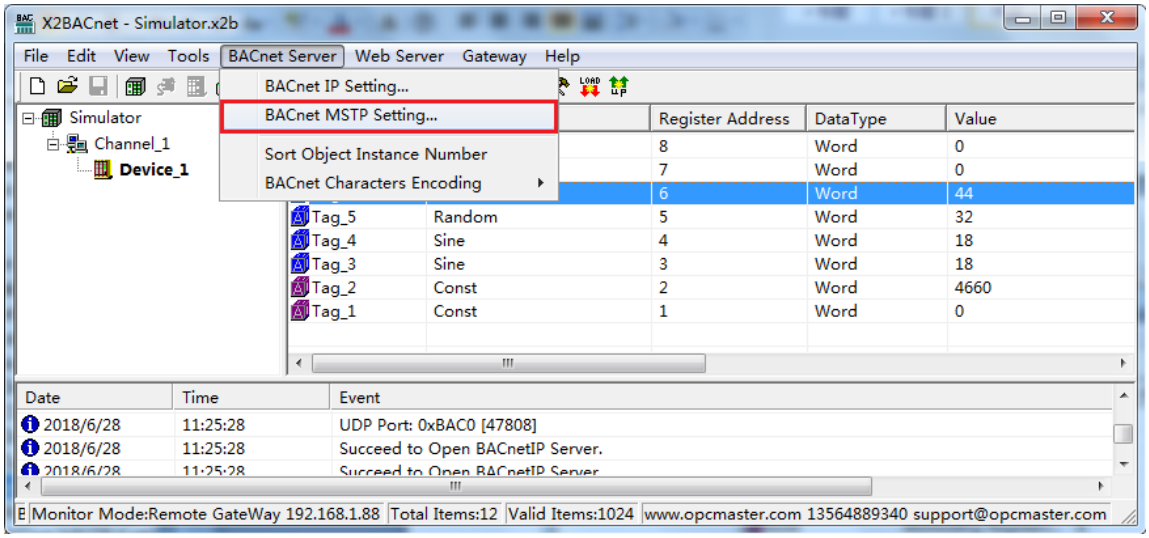


Figure 3-5-2-1 BACnetMSTP Server Setting

In the pop-up dialog, select “Enable MSTP Slave”, set the DeviceID and MAC address (the device ID and Mac address are as consistent as possible), the serial channel, the baud rate and other parameters of the BACnet slave device. The gateway can also be named, so that the different gateways can be distinguished in the upper computer configuration, and the device ID in the BACnetMSTP server and the device ID in the BACnetIP server are shared. The specific setting is as shown in figure 3-5-2-2.

It is suggested that the COM1 port be used as the BACnetMSTP communication port.

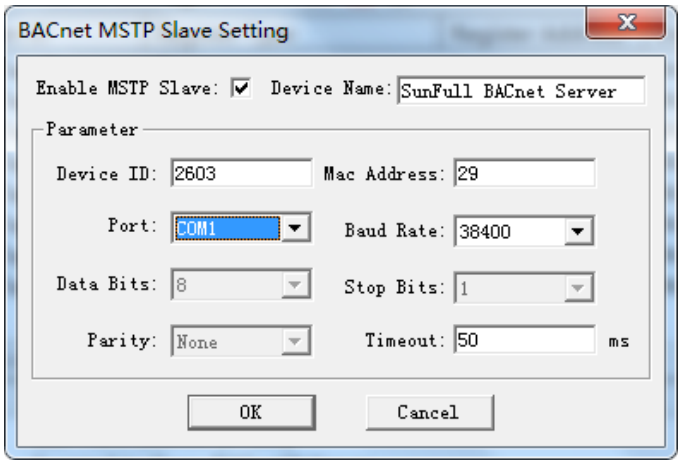


Figure 3-5-2-2 BACnetMSTP Server Setting

3.6 Upload the project(Remote Gateway Monitor Mode)

Before uploading project, we must ensure that the monitoring mode is Remote Gateway mode, and the specific mode switching operation is as follows.

- on the menu bar , monitor mode under the tool need to be chosen “Remote Gateway”.
- Double click the “Monitor Mode” of the status bar at the bottom of the software can also switch monitoring mode.

After Configuring the project, the project can be uploaded to the hardware gateway(BAC2004-LITE/BAC1002-LITE) to debug by starting monitor.

If the project is modified, it is necessary to upload the project to the gateway for debugging until there is no problem, finally monitor by hardware gateway.

Click "Gateway" on the menu bar to choose "Upload " or click on the toolbar to upload the project，As the Figure 3-6-1.

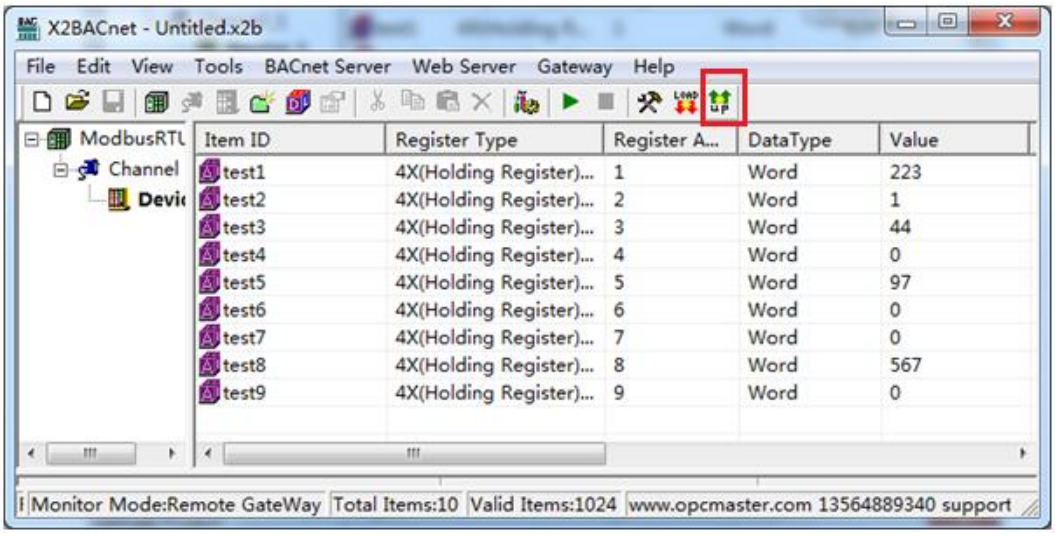


Figure 3-6-1 Upload the project

In the pop up dialog box enter the gateway IP address, click the "Upload"，As the Figure 3-6-2.

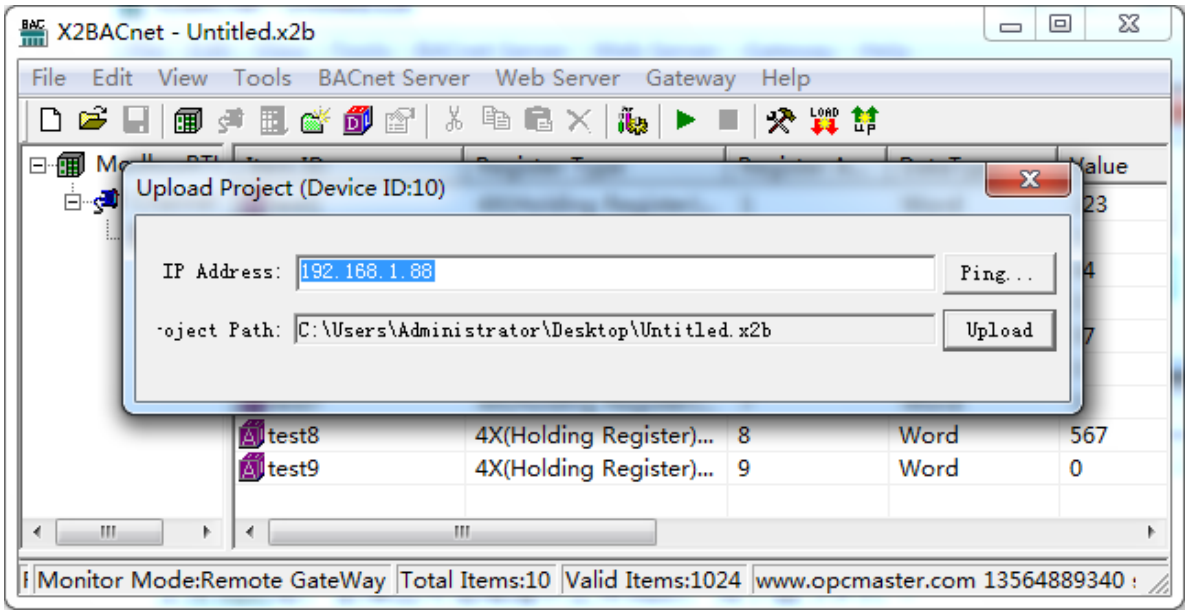


Figure 3-6-2 Upload

After uploading, the pop-up dialog prompt succeed to upload, As the Figure 3-6-3.

If uploading is failed, it will also pop up the failure prompt box.

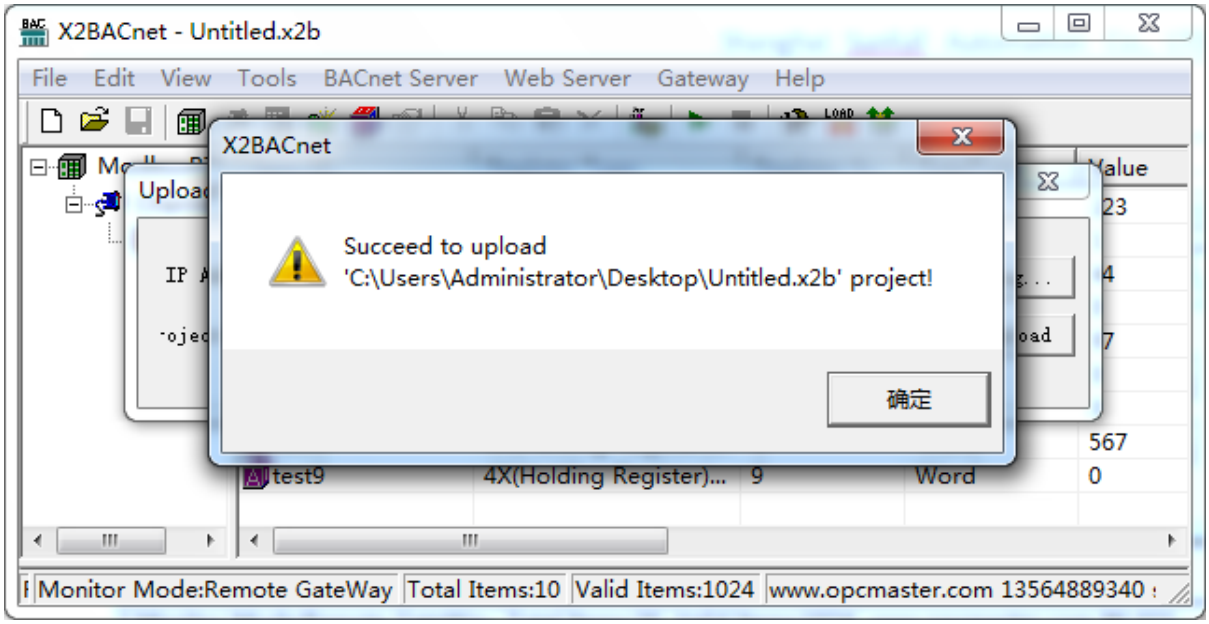


Figure 3-6-3 Succeed to upload

Note: the IP address of the gateway must be correct.

the default gateway IP address is 192.168.1.88, the IP address of PC to set up to

the same network segment, the project can be uploaded after successfully Ping.

After uploading the project, click the menu bar "Tools" to select "Start Monitor" or click the toolbar icon ,you can see real time data on the device. As the Figure 3-6-4, The collected data is consistent with the slave simulated data.

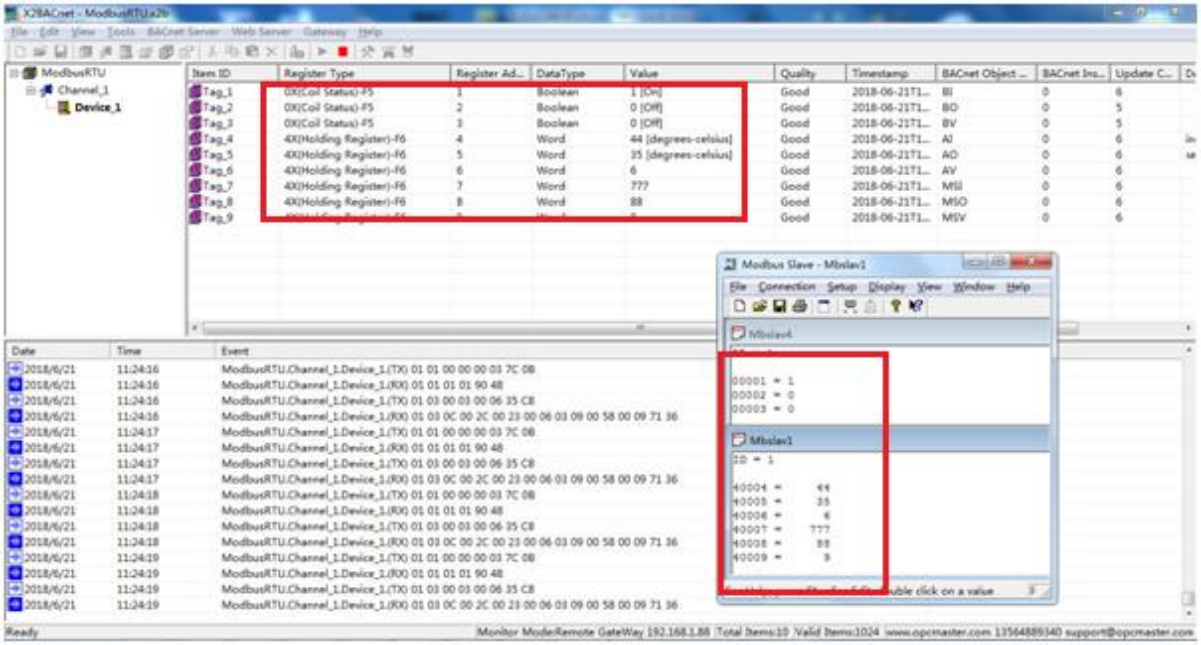


Figure 3-6-4 Remote gateway monitor

3.7 Download the Project

Before uploading project, we must ensure that the monitoring mode is Remote Gateway mode, and the specific mode switching operation is as follows.

- on the menu bar , monitor mode under the tool need to be chosen “Remote Gateway”.
- Double click the “Monitor Mode” of the status bar at the bottom of the software can also switch monitoring mode.

Download project is to download the last configuration project from the hardware gateway to PC, and edit the project and view real-time data on the PC to facilitate user debugging. Click on the "Gateway" choose "Download ", user name: admin, password: admin123456. As the Figure 3-7-1.

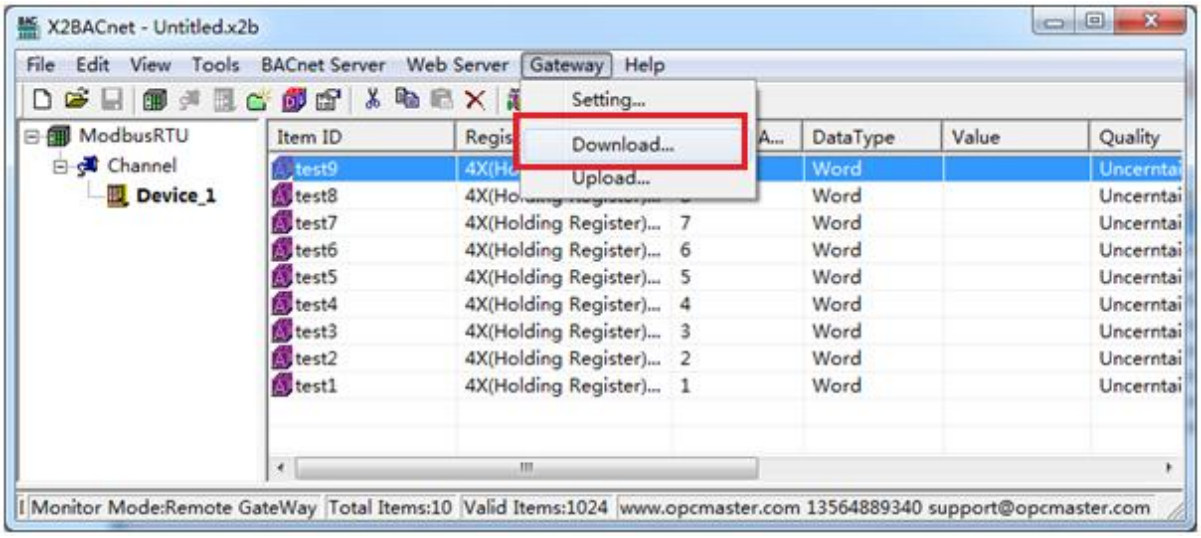


Figure 3-7-1 Download Project

In the pop up dialog box enter the gateway IP address, can be downloaded from the gateway of the current project，as the Figure 3-7-2.

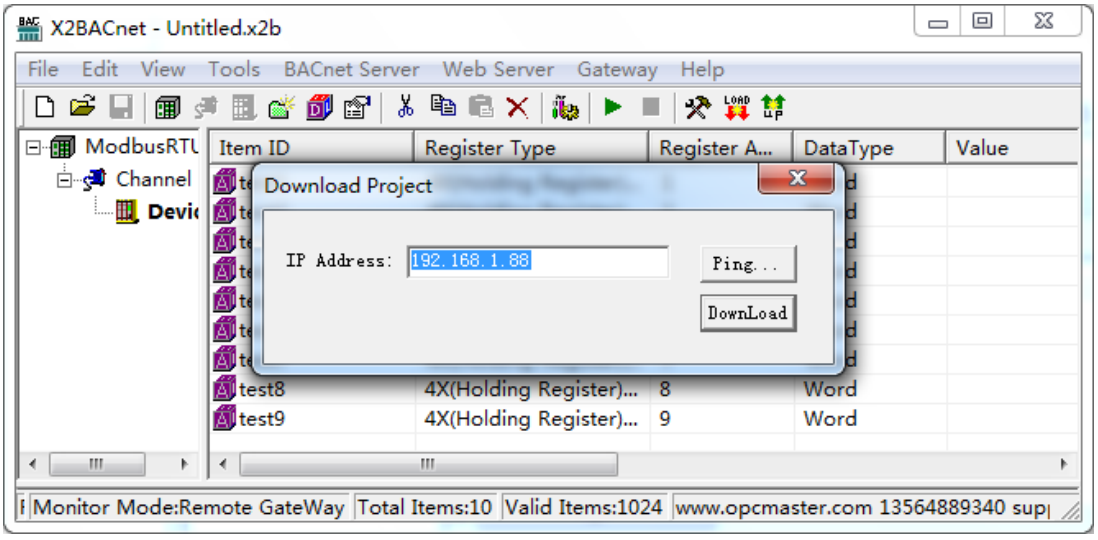


Figure 3-7-2 Download Project

Users can also through the WEB server log in to the gateway, download the project.

3.8 Local PC Monitor

After completing the project configuration, click the menu bar "Tools" to select "Start Monitor" or click the toolbar icon ▶, as shown in figure 3-8-1 below. It will start the X2BACnetRunTime.exe program. User only need to start the program in the background to realize the function of gateway conversion on PC.

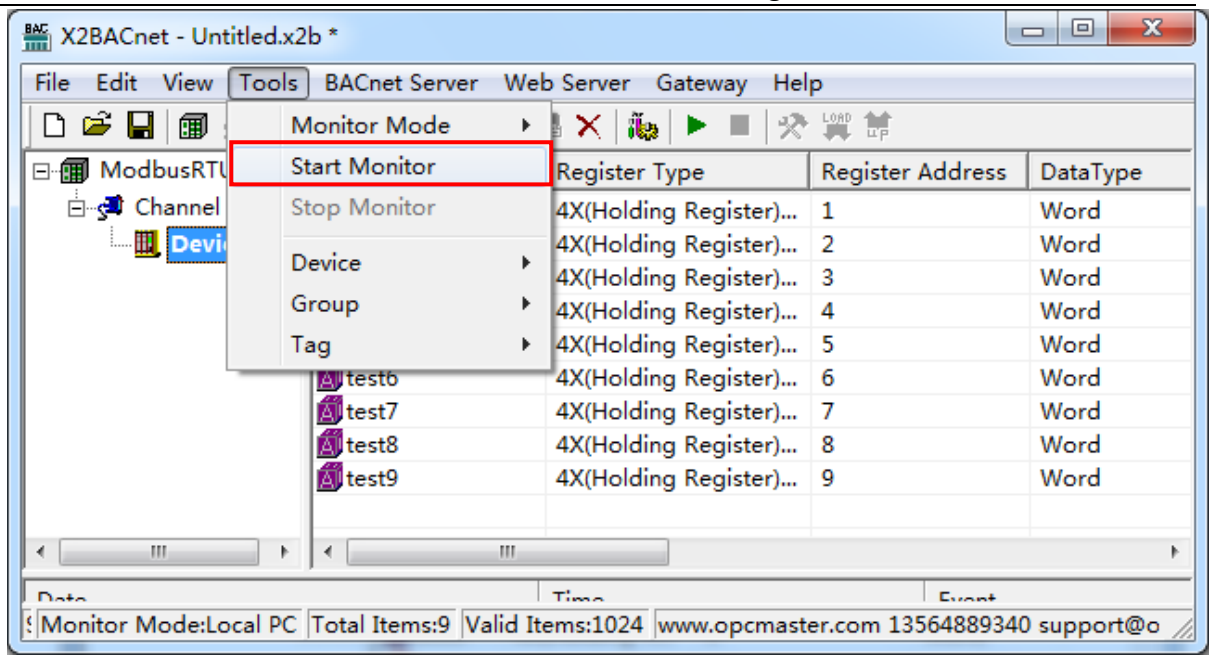


Figure 3-8-1 Start Monitor

X2BACnetRunTime run successfully. We can view the running log .As the Figure 3-8-2.

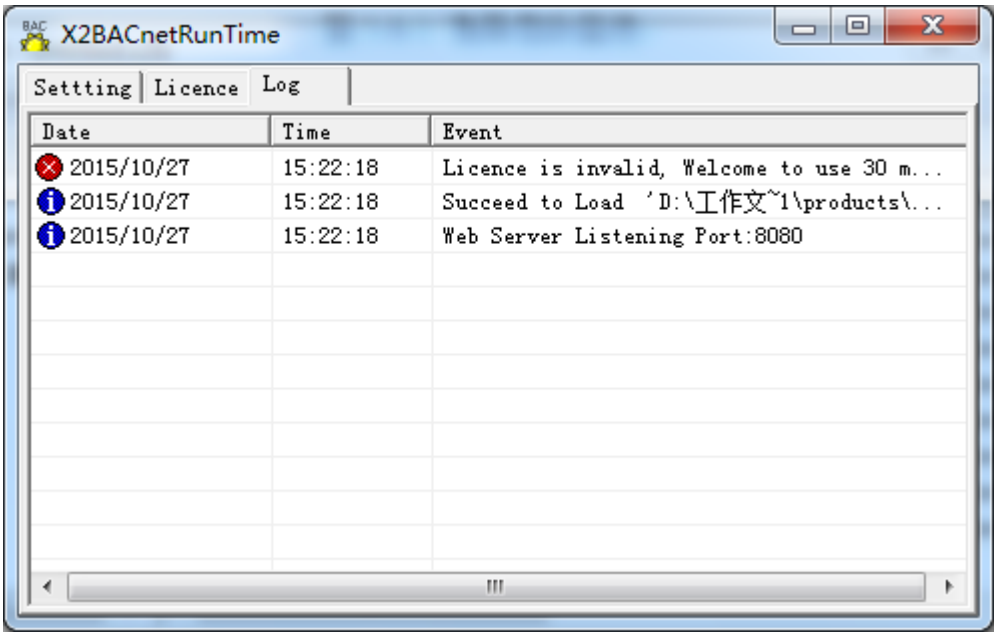


Figure 3-8-2 Log

Return procedure monitoring interface, can see some real time data on the device and the data on the interface is consistent, As the Figure 3-8-3.

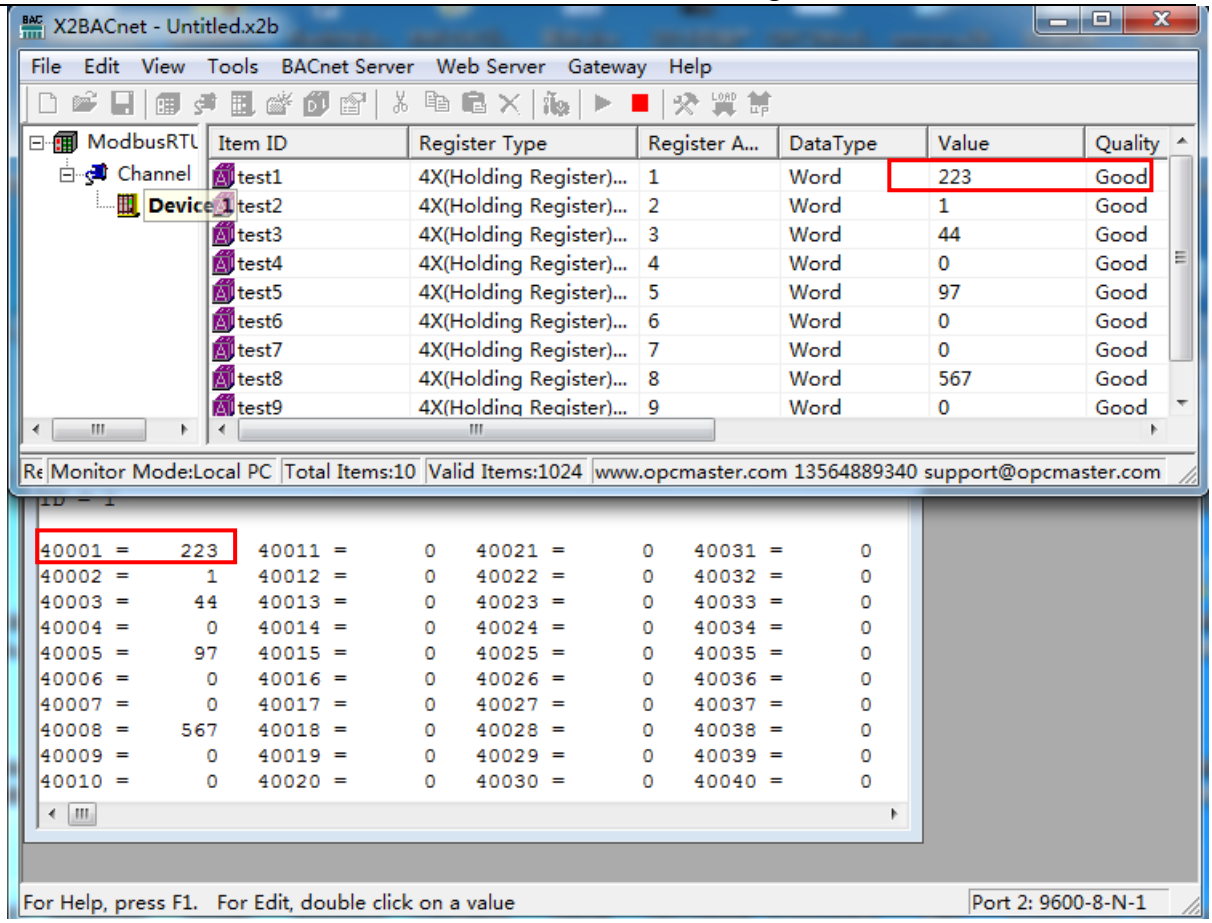


Figure 3-8-3 Successful Communication

4 WEB Server

BACnet Gateway with a WEB server, the default port is fixed for 80. Users can through the browser can login to the WEB server, in a WEB page can modify hardware gateway IP address, serial interface communication mode, view real-time data, download X2BACnet PC configuration software and project etc.

Note: the factory default gateway IP address is 192.168.1.88, the user to change the IP address for the first time, users only need to direct connect a network cable and gateway. Need to set the PC and gateway to the same network segment, and then in the browser input 192.168.1.88 complete gateway IP address changes.

In the pop up window enter the user name and password to login, As the Figure 4-1.

Username: admin

Password: admin123456

Figure 4-1 Login

4.1 Download

Click “Download”, you can download the following files, As the Figure 4-1-1.

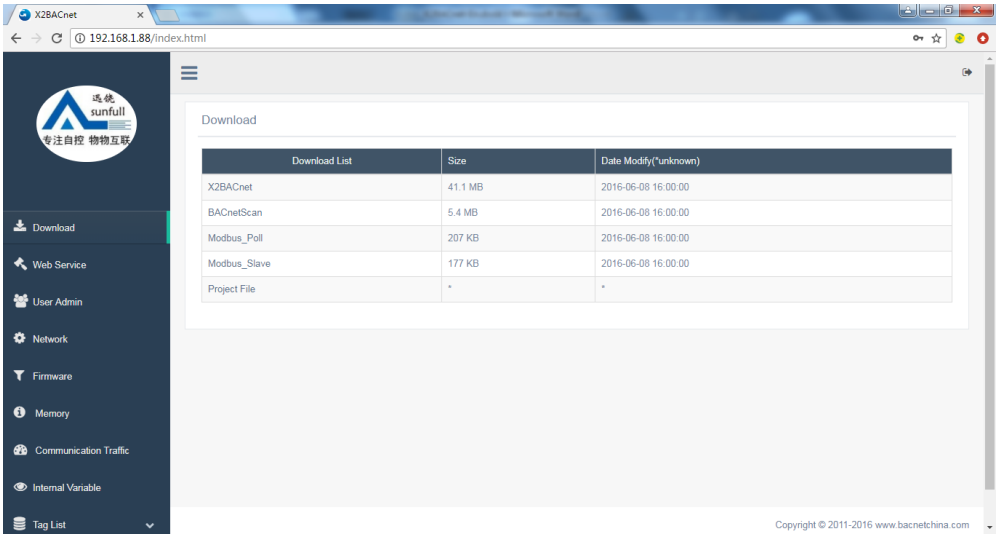


Figure 4-1-1 Download

X2BACnet: Configuration Software

BACnetSCAN: the tool of Scanning BACnet device

Modbus_Poll: the tool that simulate Modbus master station

Modbus_Slave: the tool that simulate Modbus Slave station

Project Files: the last configuration project that Upload to gateway

4.2 Network

Click “Network”, you can set gateway IP address, as shown in figure 4-2-1 below.

- Ethernet 1: 172.24.13.88
- Ethernet 2: 192.168.1.88(Communication port)

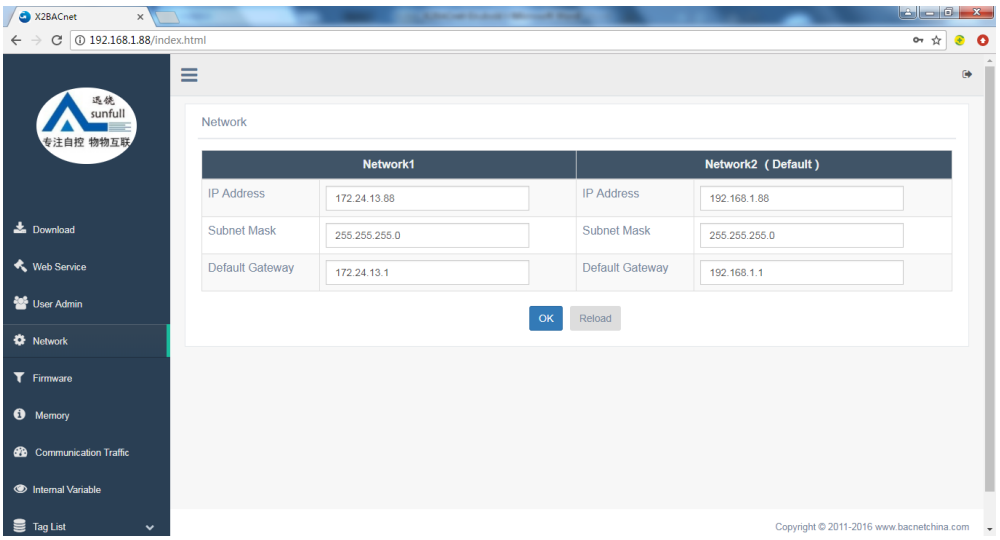


Figure 4-2-1 Network

4.3 User Admin

Users can manage their landing accounts by adding, modifying, deleting, and so on, as shown in figure 4-3-1 below.

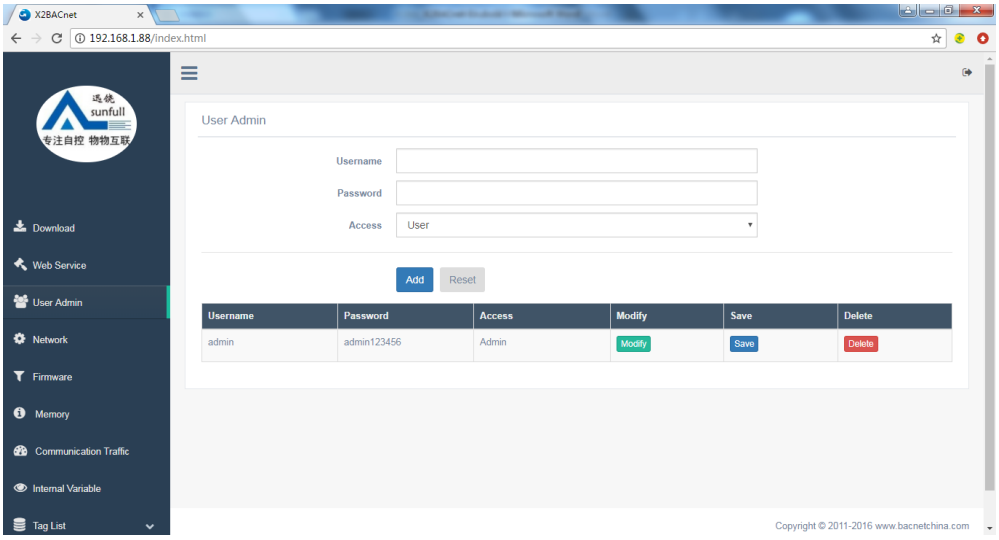


Figure 4-3-1 User Admin

4.4 Firmware

In this page, user can view the firmware version information, machine code and license key.

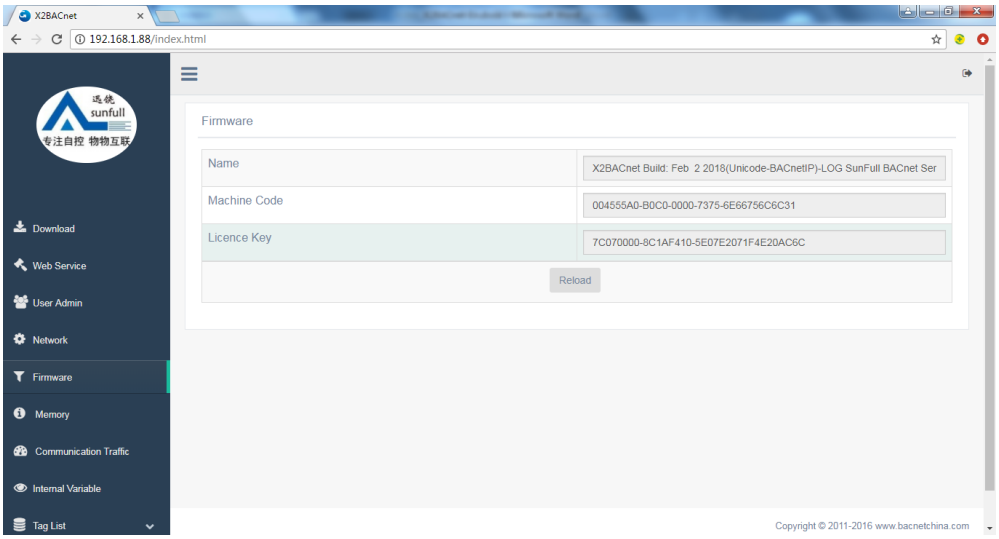


Figure 4-4-1 Firmware

4.5 Memory

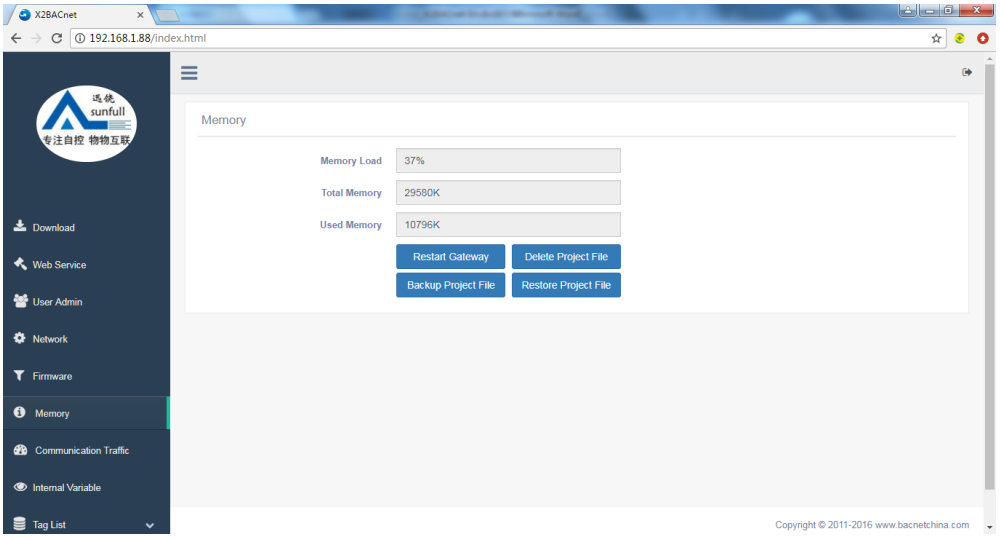


Figure 4-5-1 Memory

1. check the system memory usage. (this function automatically refreshes the gateway memory information every 5S).

2. Restart Gateway (remote restart the current gateway).

3. Delete Project File (delete the current gateway configuration project).

4. Backup Project File (can backup the current project to the isolation area).

5. Restore Project File (restore a project that has been backed up by the user).

The project can be backed up to the isolation area, which has 2 advantages.

First, it prevents the wrong operation from uploading the wrong project and can be quickly restored.

Two, it is easy to debug. Once the project is modified, it can be quickly restored.

4.6 Communication Traffic

In addition, the real-time dynamic data frame can be viewed in the web page to facilitate the user to understand the real-time communication state intuitively. Through the analysis of the data frame, the cause of the failure can be found, which brings great convenience to the user.

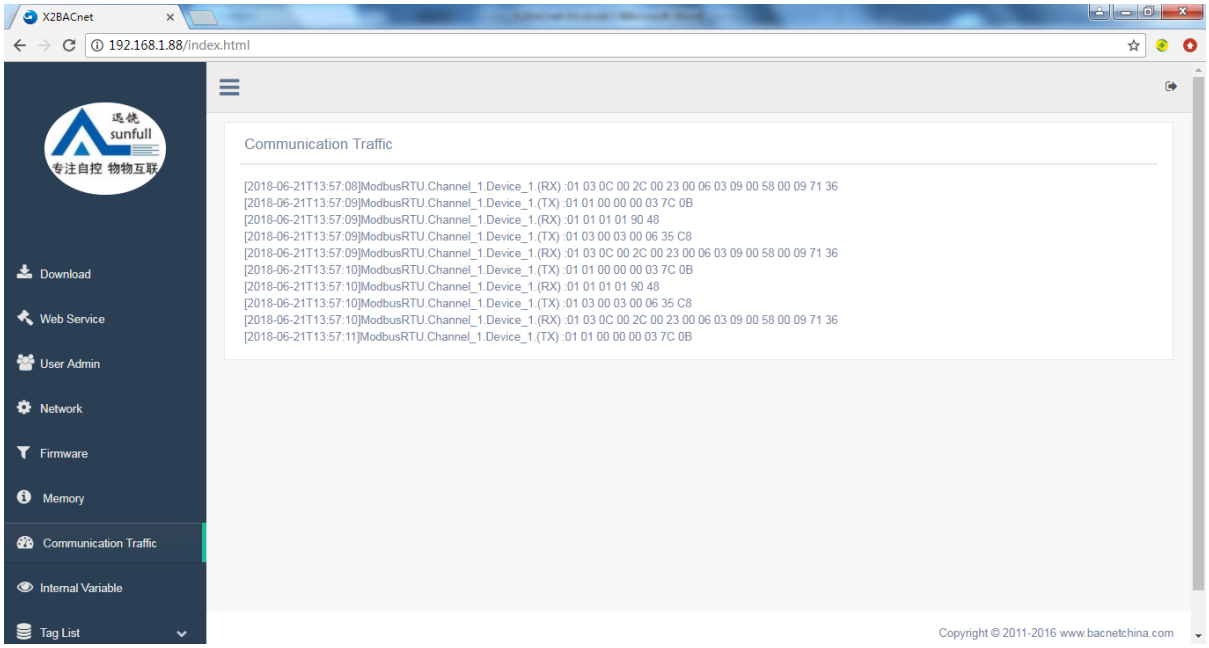


Figure 4-6-1 Communication Traffic

4.7 Real-time Data

Check the equipment real-time data on the web, as the Figure 4-7-1.

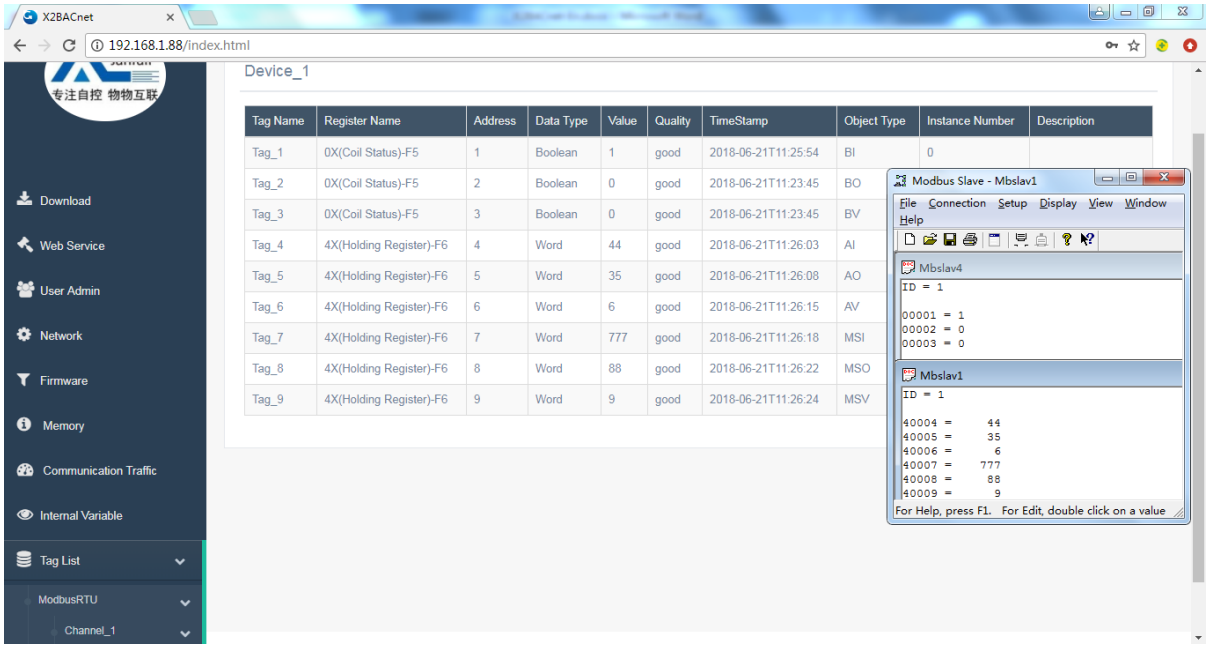


Figure 4-7-1 Real-time data

Click the tag, in the pop-up window user can also write value on a web page, as the Figure 4-3-2.

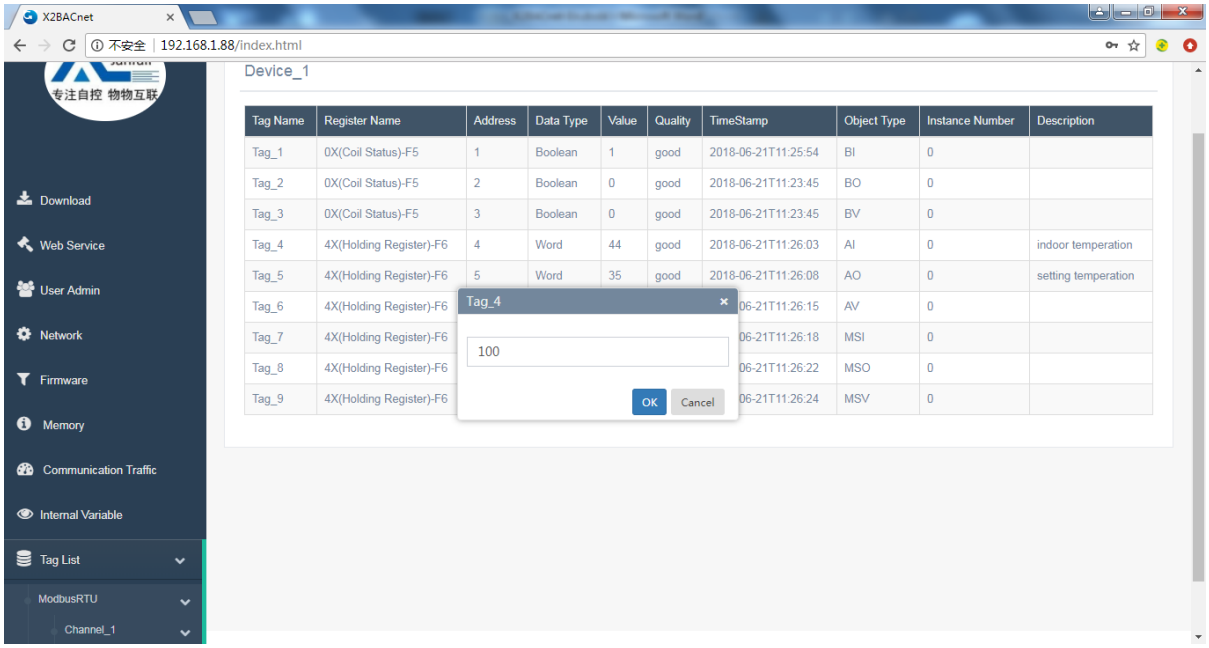


Figure 4-3-2 Write value

5 JS Script Editor

Hardware gateway also has JS script editor. Users can achieve some logic control by editing script language. There are some common functions in the script editor. The user can select some functions to edit the language. After the editor is complete, click "Syntax Check", and the syntax will be checked automatically. If there are any grammatical errors, it will prompt which specific line of grammar has problems.

5.1 Operation steps

Click the menu bar view to select the JS script editor, or click the toolbar to open the script editor, as shown in figure 5-1-1.

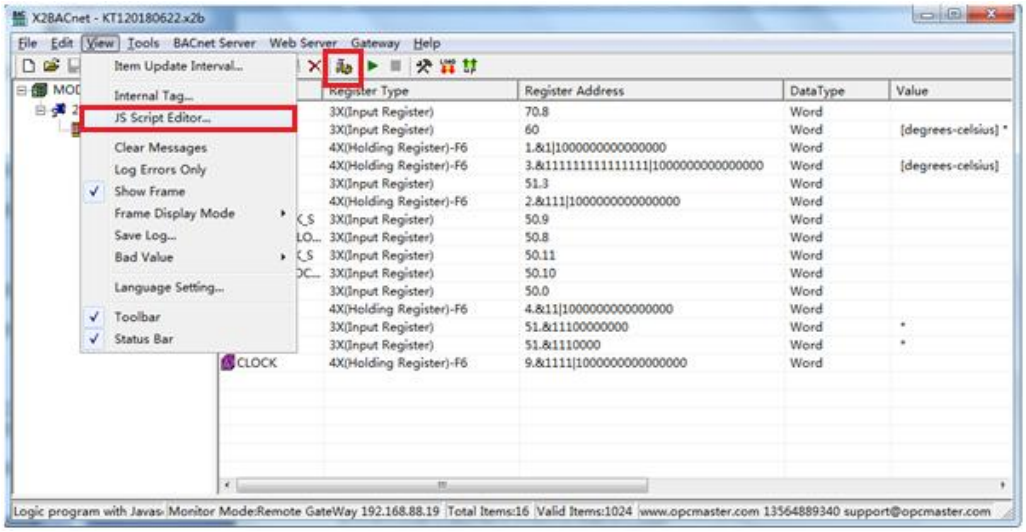


Figure 5-1-1 Open JS Script editor

Right click on the script editor to choose “New JS Script”, as shown in figure 5-1-2.

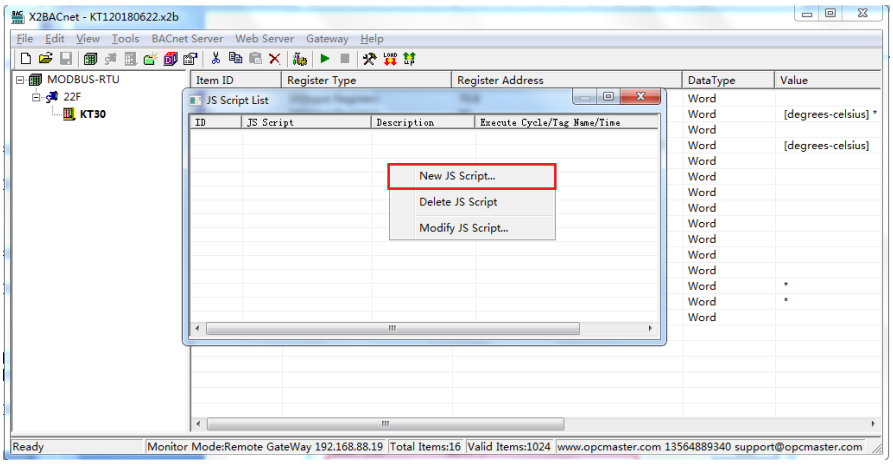


Figure 5-1-2 New JS Script

Open to see JS editing script, as shown in figure 5-1-3 below.

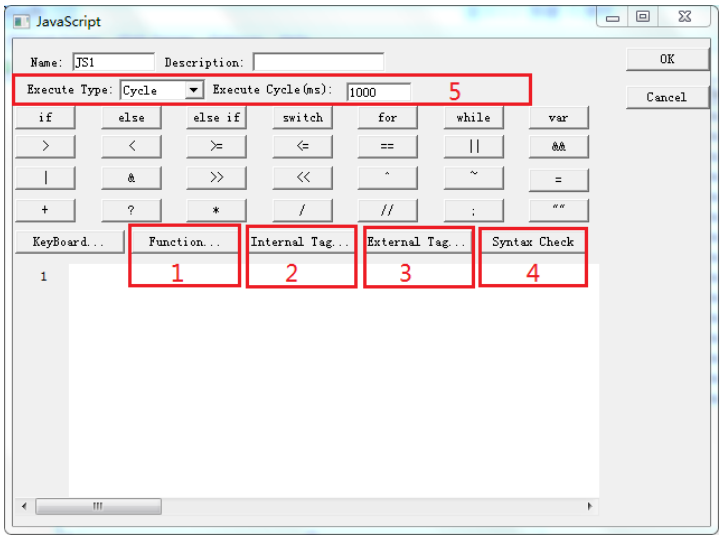


Figure 5-1-3 JS Script Editor

1. Function

Users can choose different functions to implement logical functions. See the 5-2 chapter for specific functions. As shown in figure 5-1-4.

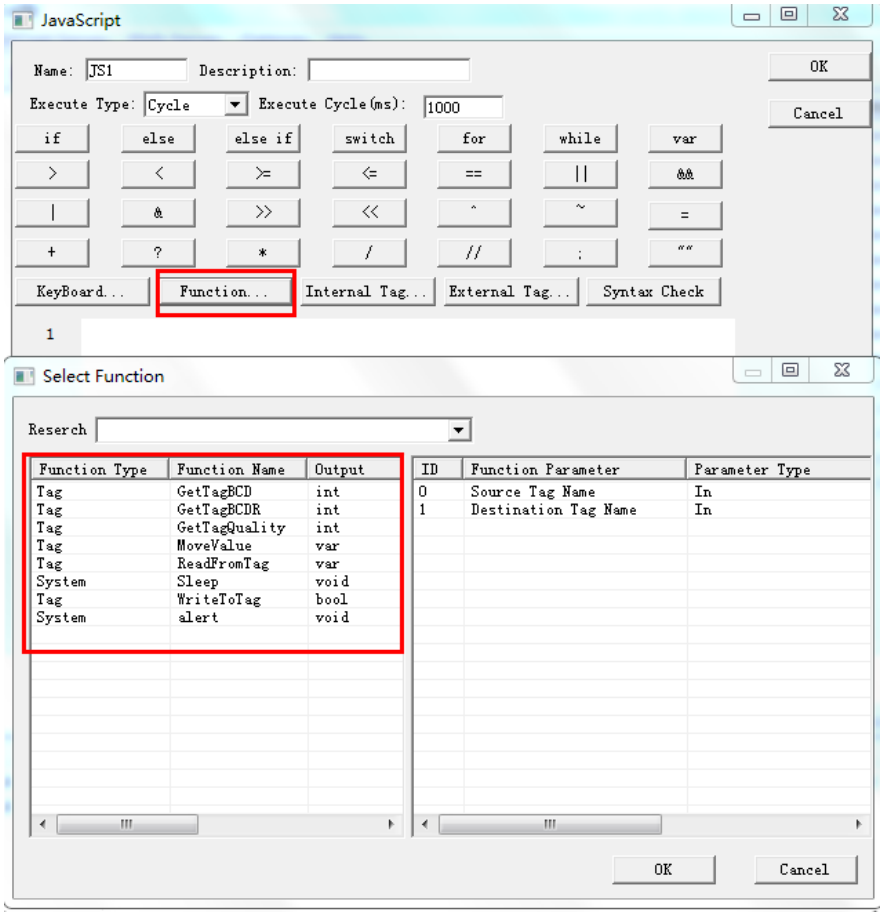


Figure 5-1-4 select Function

2. Internal Tag

Users can use the " Internal Tag" function to build a new variable and related functions, used to receive or store variable data, such as taking the current value of Tag, and mapping to a new internal variable. In the script editor, click the "Internal Tag", or In menu bar click “view” to select “Internal Tag”, open the window of Internal tag list. In the pop-up window, right click “New” ,as shown in figure 5-1-5.

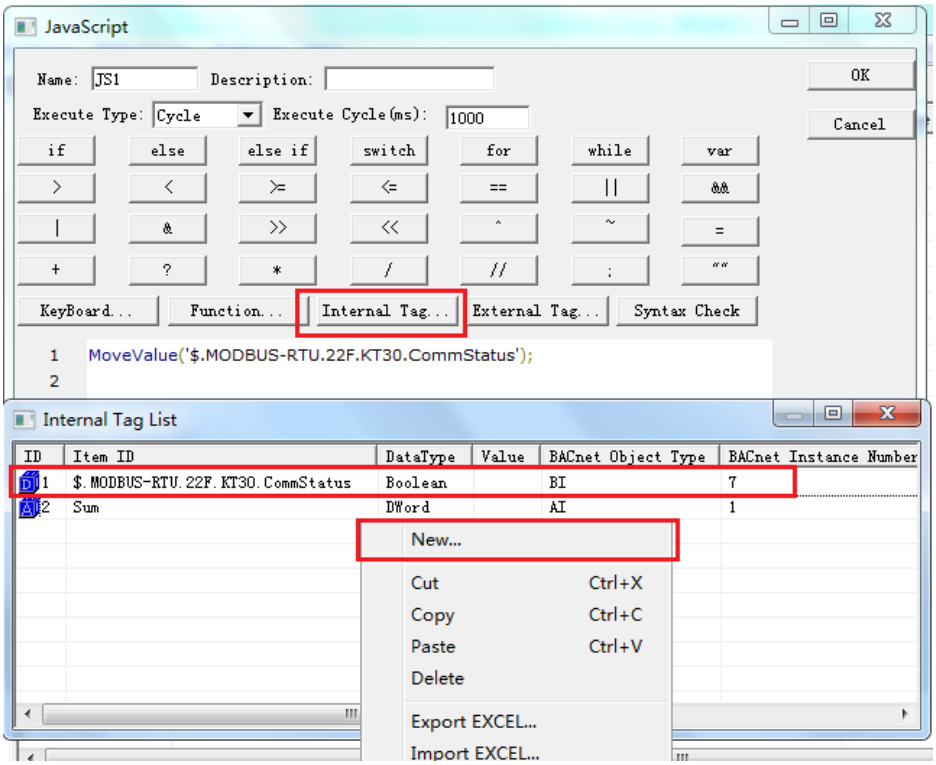


Figure 5-1-5 New Internal tag

Note: in the above figure, there is an internal variable BI point that address is 7, which represents the communication state of the Device”KT30”. at least one point is communicated normally under the device, the value of the internal variable is 1, if all the points under the device are not normal (that is, the device is off-line), this internal change The value of the quantity is 0. If there are currently N devices, it will automatically generate N internal variables. Users should avoid duplication of register addresses when configuring the project.

In the pop-up window, set the variable related properties. If you want to quickly view the current value of the internal variable, you can click the menu bar "view" option and select the "internal variable" to see the real time data in the pop-up window, as shown in figure 5-1-6.

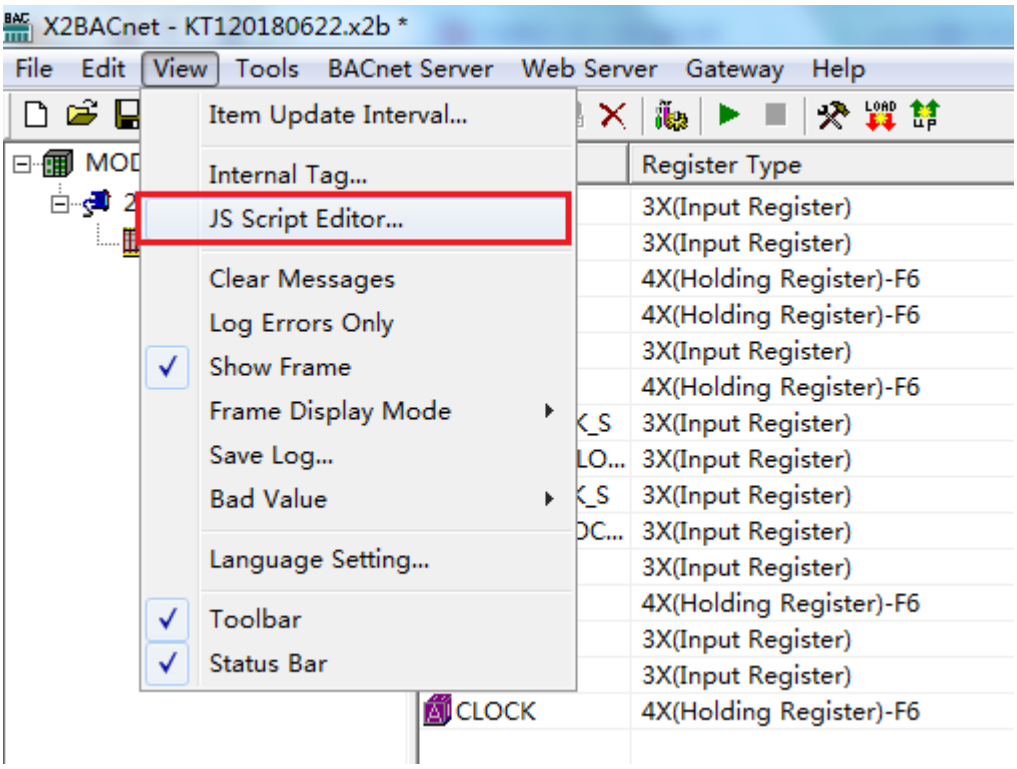


Figure 5-1-6 Open Internal tag to check real-time data

Click on the internal variable, as shown in figure 5-1-7.

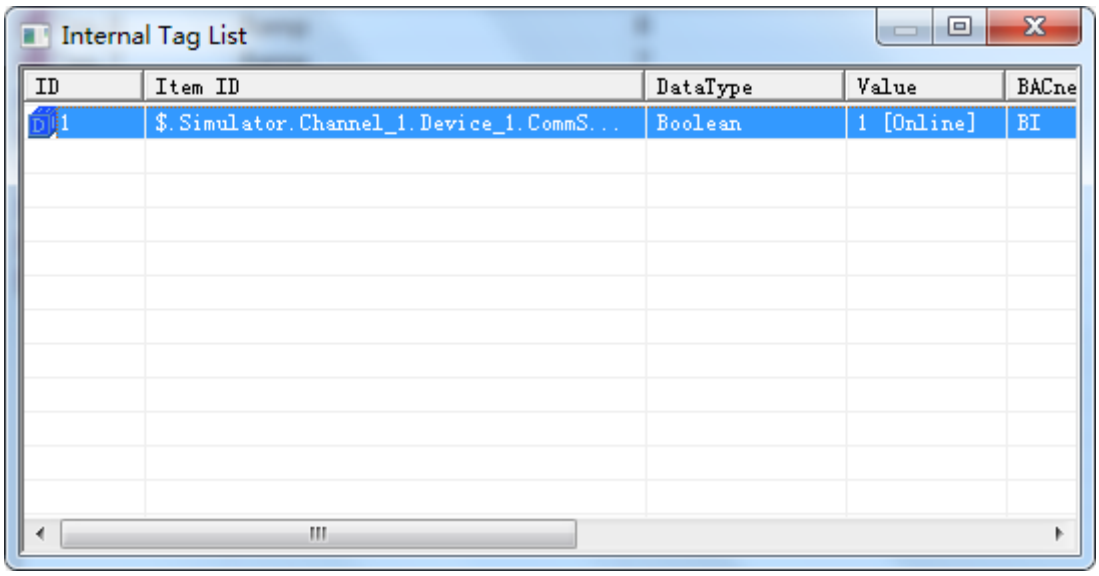


Figure 5-1-7 real-time data

3. external variables

In addition, users can also use relevant functions for logical control according to the changes in the data of external variables, such as different logical controls based on the range of numerical changes of an external variable. In the script editor, click "external variables", and double-click on a variable in the expanded variable table, as shown in figure 5-1-8.

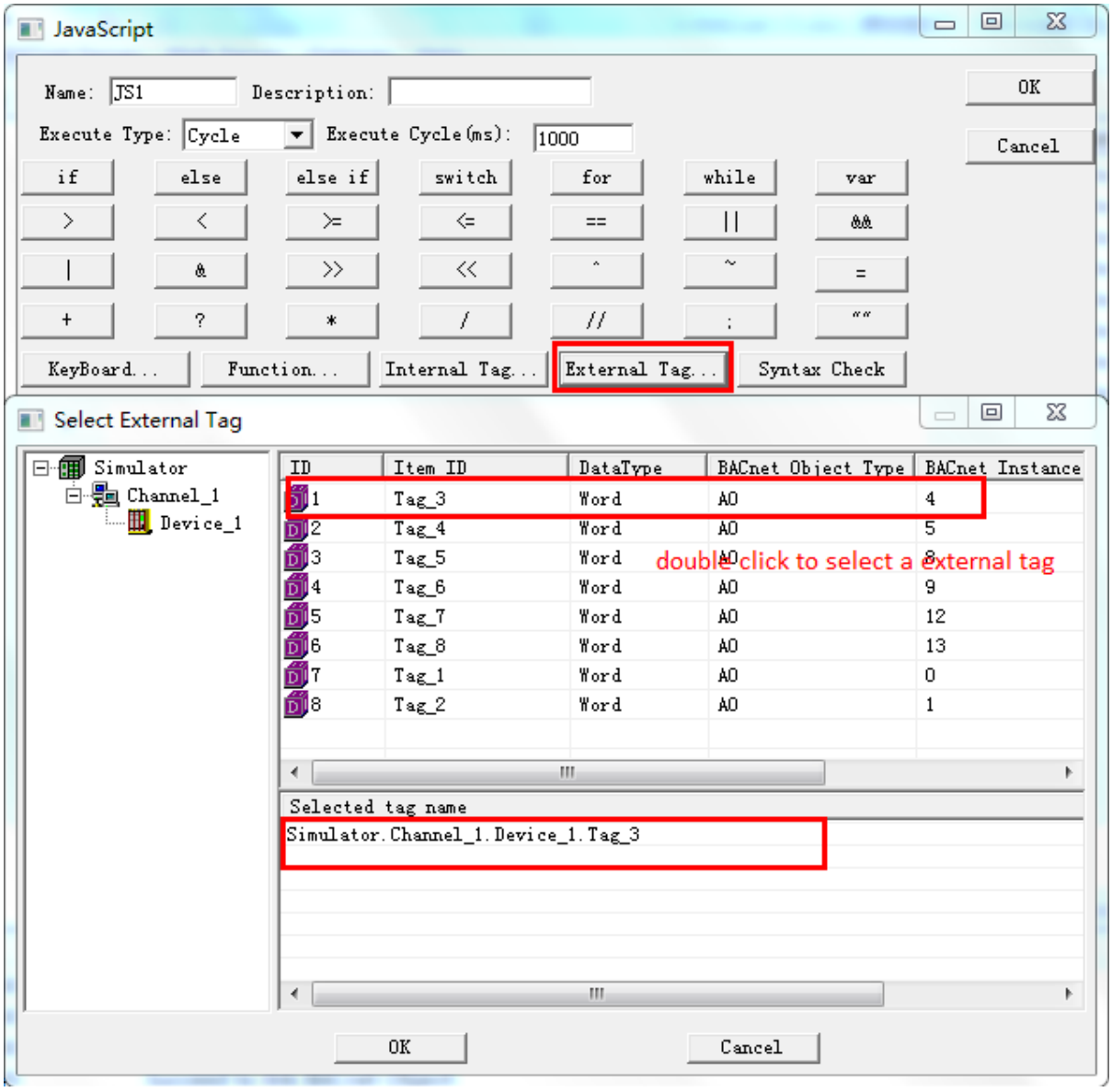


Figure 5-1-8 select the external tag

4. grammar check

After completing the programming, users can check the grammatical error with the syntax check function, and give hints if the program has problems.

5. execution mode

✧ execution mode selection cycle, cycle (MS): 1000, which represents a script execution every 1000ms.

✧ change of execution mode. Roll call needs input. The following figure 5-1-9, which assigns the value of internal variable VarName_1 to the return Tag_3 and Tag, The initial value of the internal variable VarName_1 can be assigned to batch names.

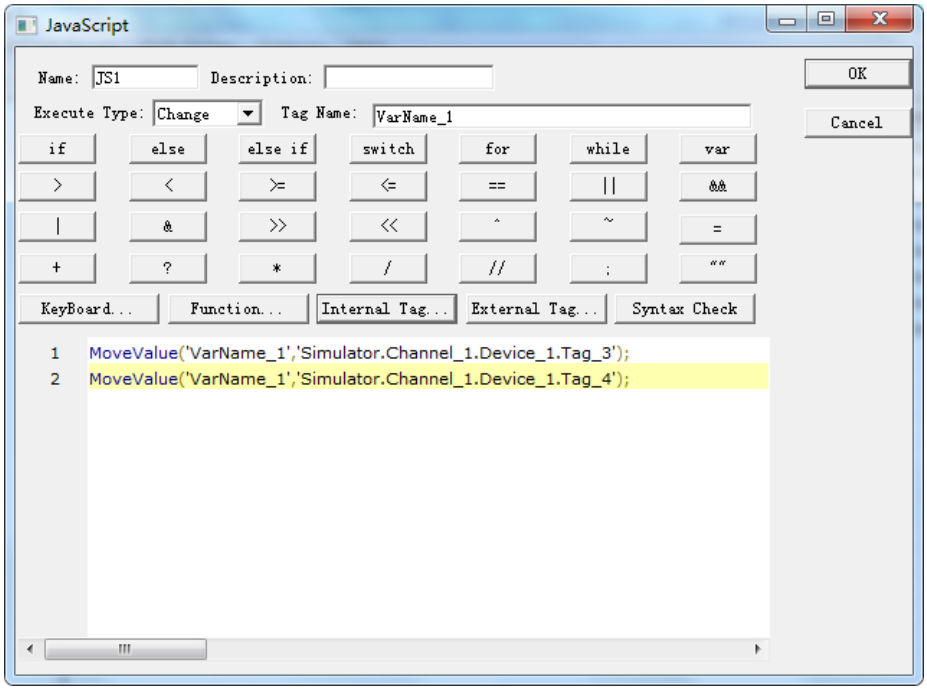


Figure 5-1-9 change script

Note:

- In order to prevent the mistake, you can point out external variables, or internal variables in the script force box, double click to select a name and then copy it from the script box to the top name box.
- Only when the value of internal variable VarName_1 changes, can script be executed to save resources.

✧ execution mode selection timing, select a time point, after the arrival of this time, the implementation of the script. It can be applied to the timing switchgear.

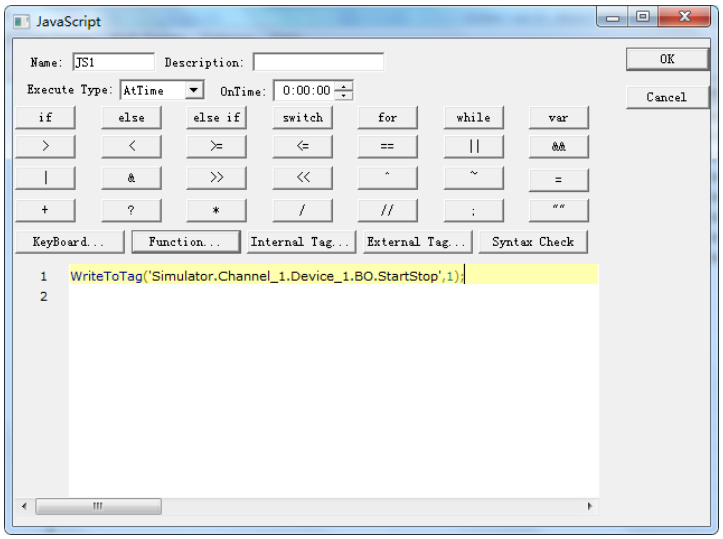


Figure 5-1-10 timing switchgear

5.2 Function description

The commonly used functions in the JS script editor are as follows:

Operating function

5.2.1 ReadFromTag

It is a value function from Tag.

Grammar:

Var szValue = ReadFromTag ("ModbusRTU.Channel_1.Device_1.tag_1");

5.2.2 WriteToTag

It is a write value to a Tag function, used to assign an external variable to a Tag, to perform a write operation on the device, or to assign a new internal variable to the user.

Grammar:

var szValue = 100;

WriteToTag('ModbusRTU.Channel_1.Device_1.tag_1',0); //write the value to the ‘tag_1’

5.2.3 GetTagQuality

It is a quality stamp from Tag.

The results returned conformed to the OPC specification. That is, Good returns 192, Bad returns 0, Uncertainn is 64, indicating that the value is not assigned and has not been updated.

Var varQuality = GetTagQuality ('szTagName'); //where 'szTagName' is selected from external variables.

5.2.4 MoveValue

It is implements the transfer of source data to destination data and data transfer between different points.

Grammar:

MoveValue ('Source Tag Name', 'Destination Tag Name'); //Source Tag Name is the name of the source data point, and Destination Tag is the destination data name. The parameters here can be either external variables or internal variables. As shown in figure 5-1-9.

MoveValue function application scenario:

(1) the gateway collection side can access and control each other (no matter what protocol can be interchanged).

Gateway acquisition gateway uses two COM ports to collect different ModbusRTU slave devices, one for collecting temperature points of air conditioning equipment, and one for collecting IO modules. According to the temperature of the air conditioner, the IO module is controlled by the output of a sound and light alarm, that is, the MoveValue function can be used for logical editing, and the data of two acquisition terminals are accessed and controlled by each other.

(2)use one internal variable point to control all external variables.

MoveValue ('internal variable', 'external variable 1' ');

MoveValue ('internal variable', 'external variable 2' ');

MoveValue ('internal variable', 'external variable 3' ');

MoveValue ('internal variable', 'external variable 4' ');

MoveValue ('internal variable', 'external variable n' ');

This is the realization that when the internal variables change, the external variable 1-N can change at the same time.

For example, if you change the temperature on the interface, the setting temperature of the N thermostat of the gateway will be changed together.

5.2.5 GetTagBCD

It is used to get the BCD code of a label.

Grammar:

Var mBCD = GetTagBCD ('szTagName');

If the single register (Word, Short) value is 4660 (0x1234), the GetTagBCDR function is used to get BCD data to be decimal number 1234.

If the double register (Dword, Long) value is 305419896 (0x12345678), the GetTagBCDR function is used to get BCD data to be decimal number 12345678.

5.2.6 GetTagBCDR

It is used to get the BCD code of a tag, but the value is BCD code with high and low inversion.

Grammar:

Var mBCDR = GetTagBCDR ('szTagName');

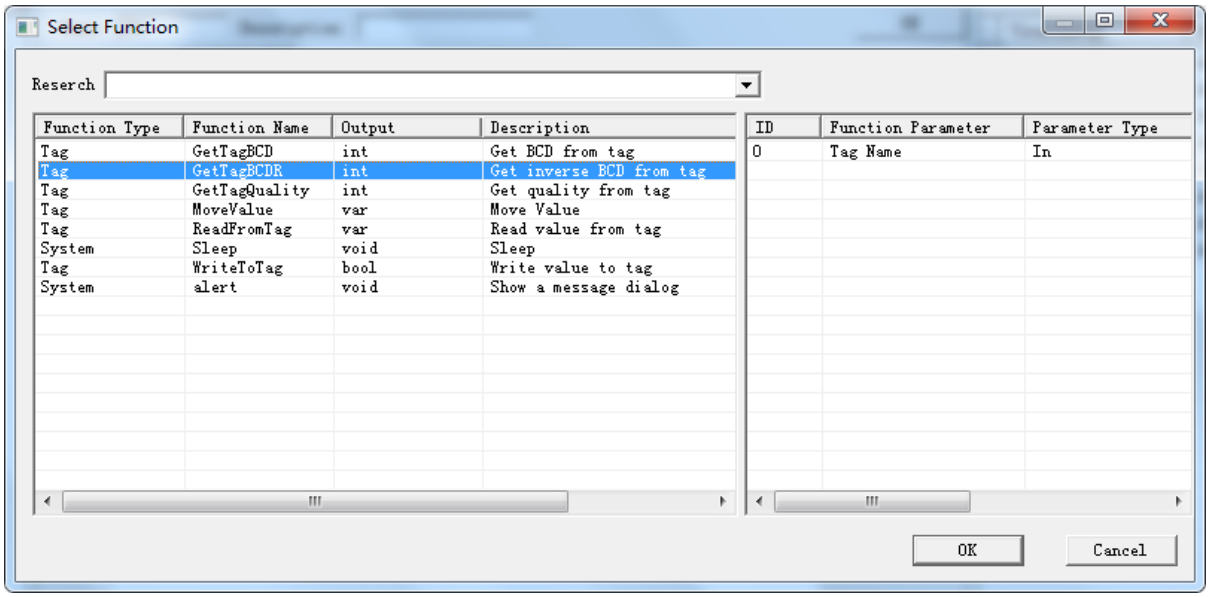


figure 5-2-6-1 Get BCDR

If the single register (Word, Short) value is 4660 (0x1234), the GetTagBCDR function is used to get BCD data to be decimal number **3412**.

If the double register (Dword, Long) value is 305419896 (0x12345678), the GetTagBCDR function is used to get BCD data to be decimal number **56781234**.

For an example:

If you need to get the BCD code of'Simulator.Channel_1.Device_1.Tag_1', assign it to T1. Get the'Simulator.Channel_1.Device_1.Tag_2'inverse BCD code and assign it to T2. The code is shown as shown in figure 5-2-6-2.

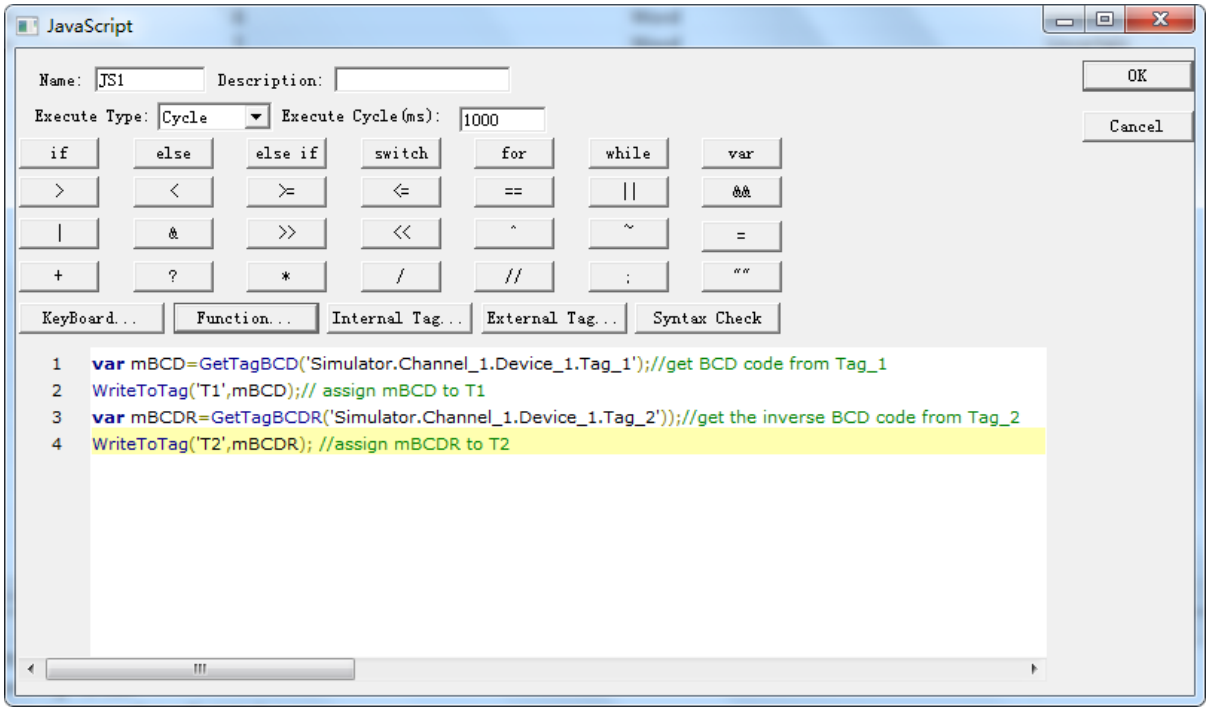


figure 5-2-6-2 Get BCD

Start monitor later, in the Internal tag list value display is as the figure 5-2-6-3.

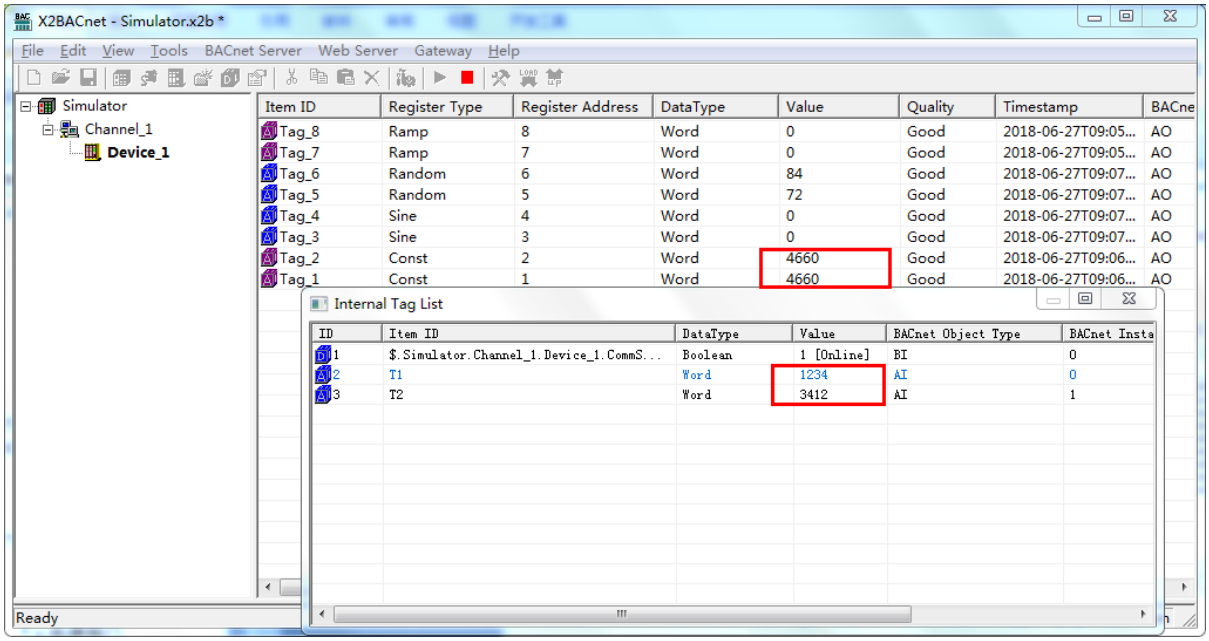


figure 5-2-6-3 check BCD value

System function

The output string of alert () function is mainly used for debugging. The results returned are displayed on the log of Runtime.exe. It can also be displayed on the state of the web communication.

Grammar:

For example, the return value of the output quality stamp

Alert (varQuality.toString ());

The Sleep (1000) function is used for latency, indicating a delay of 1 seconds. Unit milliseconds.

5.3 Example

Open the script editor to reduce the current value of Tag " Simulator.Channel_1.Device_1.Tag_1" by 20 times and map it to the internal variable T1.

```
var szValue=ReadFromTag('Simulator.Channel_1.Device_1.Tag_1');

var newValue=Number(szValue);//String strongly transformed integer

newValue=newValue*0.5;

WriteToTag("T3",newValue.toString());
```

The script editor supports all mathematical calculations, such as taking random numbers between 0-255.

Examples are as follows:

```
Var Rand = Math.round (Math.random () * 255);

Alert (rand.toString ());
```

Note: Excute Type represents how long the execution of a script!

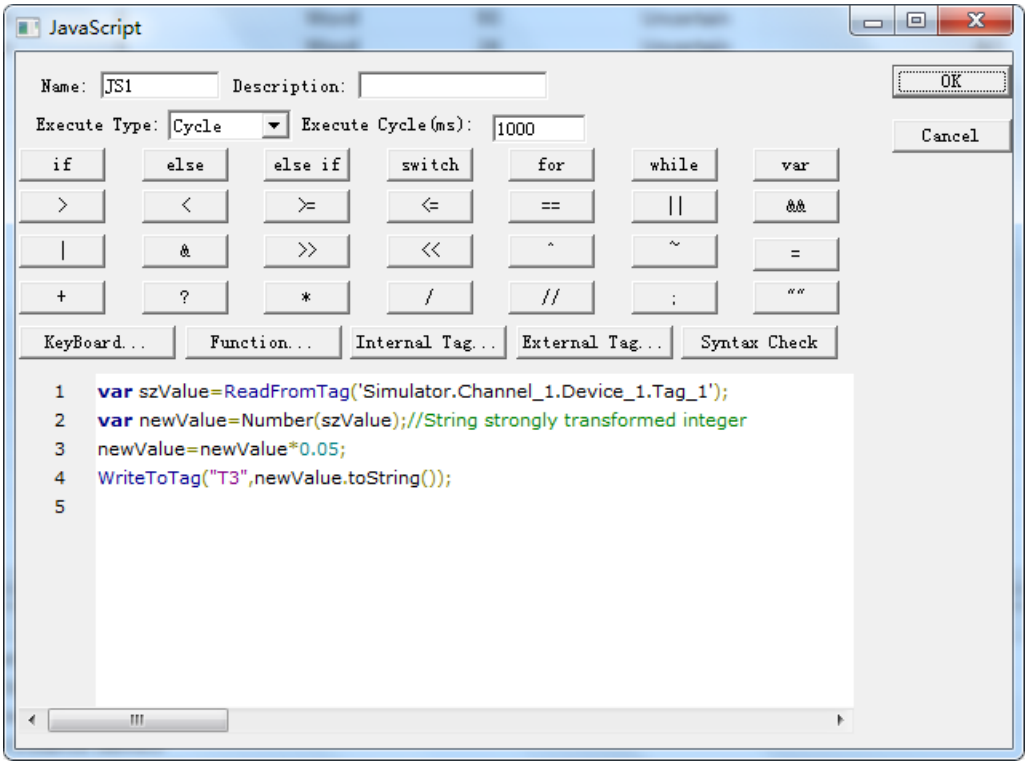


Figure 5-3-1 script example

View the T1 real-time data under the internal variables in the View menu bar. As shown in figure 5-3-2.

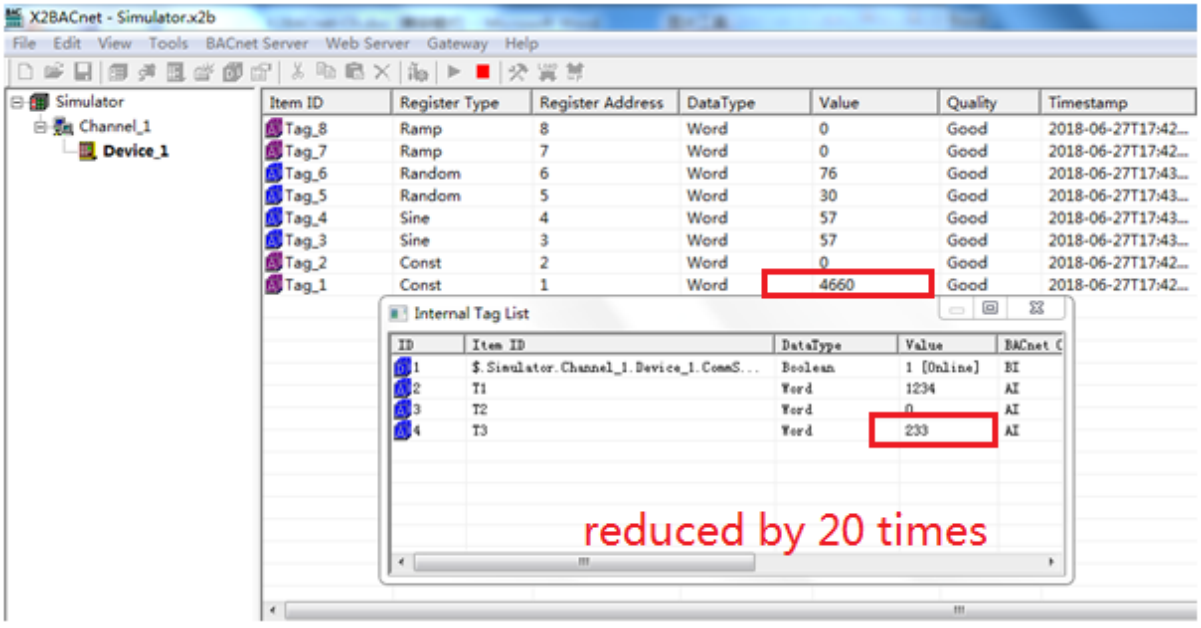


Figure 5-3-1 reduced by 20 times

6 BAC2004-LITE Hardware Parameter

BAC2004-LITE The hardware parameters of the gateway are as follows:

6.1 Hardware Performance table

The hardware performance is shown in table 6-1-1.

CPU	32 Bit 400MHz RISC ARM926EJ
Memory	64M DDR2
storage	256M Flash
Operating System	WIN CE
Ethernet	2 High-performance 100M/10M adaptive Industrial Network Card, support AUTO
Power supply socket	Standard 5.08mm spacing 3PIN connector
RTC Clock	Internal integrated real-time clock, on-board 1 CR2032 batteries (can be used for 3 years)
buzzer	board carries 1 buzzer, which can be used for alarm or prompting sound
Serial communication port	4 fully isolated RS485 interface (support transceiver indicator)

Table 6-1-1 hardware performance table

6.2 Electrical specifications and working environment table

Electrical specifications and working environment are shown in table 6-2-1.

Rated power	7 W
Rated voltage	AC and DC rated voltage 24V, working range 12V to 24V.
Power Protection	adopts isolated power module, with lightning surge protection
Allowable loss of power	< 5 ms

CE & ROHS	conforms to EN61000-6-2:2005, EN61000-6-4:2007 standard, and meets ROHS Lightning surge + 4KV, group pulse + 4KV, electrostatic contact 4K, air discharge 8K
Working Temperature	-20～70℃
Storage temperature	-40～85℃
relative humidity in working	20%～90% non condensation
relative humidity in storage and	15%～95% non condensation
Aseismic	10 ～ 25 Hz (X、Y、Z direction 2G/30 minutes)
Cooling mode	natural air cooling
Protection grade	The front panel is in line with IP65 (fitted with flat panel cabinets) and the rear body of the fuselage is IP20.
Mechanical	Use of aluminum alloy shell, surface coating
Whole machine size	160mmx93mmx 37mm
Whole machine weight	500g

Table 6-2 electrical specifications and working environment table

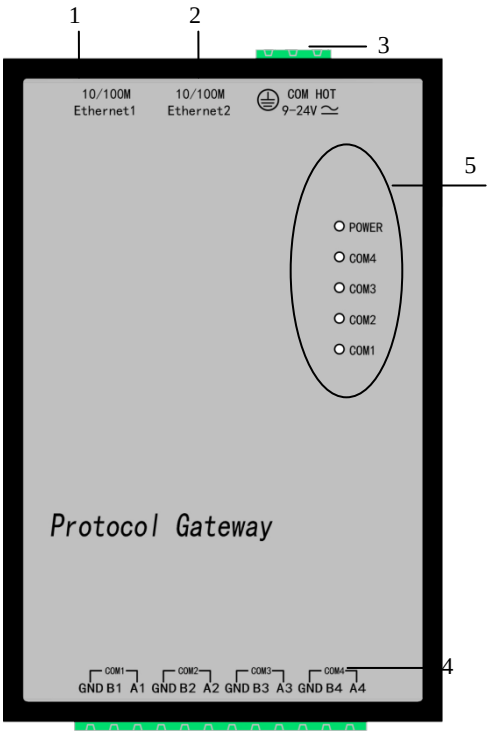
6.3 Network Interface

Label 1 and 2 in the physical map are Ethernet 1 and 2 respectively. Standard RJ45 interface, 10M/100M adaptive, support AUTO MDI/MDIX.

Ethernet 1: default IP address is 172.24.13.88,

Ethernet 2: default IP address is 192.168.1.88. Its IP can make changes, easy to connect communication. Long press the Reset key , restore the Ethernet 2 to the factory default IP.

The concrete interface of the gateway is illustrated as shown in Figure 6-3-1.



1. Ethernet 1
2. Ethernet 2
3. AC/DC 12V~24V
4. full electrical isolation 4 RS485 port
5. LED Communication indicator

Figure 6-3-1 schematic diagram of Gateway Interface

6.4 Power interface

The label 3 in the above figure is the mainboard power input interface. The standard 3PIN 5.08mm spacing connector is used in the interface, and the input pin definition is shown in table 6-4-1.

PIN foot No	Port	Illustrate	Remarks
1	⏚	Shell ground wire	Connect the earth
2	COM	Power ground wire of this machine	Power input negative pole
3	HOT	Power input positive pole	Power input positive pole

Table 6-4-1 power interface parameters

Power input supports AC / DC 12V to 24V wide voltage input, supports

overcurrent and lightning protection, and supports reverse connection protection.

6.5 RS485 interface parameters

The label 4 in the above figure is RS485 interface, and the standard 12PIN 5.08mm spacing connector is used in the interface. The definition of the foot table is shown in table 6-5-3.

PIN foot No	Port	Illustrate	Remarks
1	A1	RS485 (COM1)	All electrical isolation RS485 interface, the maximum isolation voltage is 2000V
2	B1		
3	RS485_GND		
4	A2	RS485 (COM2)	All electrical isolation RS485 interface, the maximum isolation voltage is 2000V
5	B2		
6	RS485_GND		
7	A3	RS485 (COM3)	All electrical isolation RS485 interface, the maximum isolation voltage is 2000V
8	B3		
9	RS485_GND		
10	A4	RS485 (COM4)	All electrical isolation RS485 interface, the maximum isolation voltage is 2000V
11	B4		
12	RS485_GND		

Table 6-5-3 RS485 interface parameters

7 BAC1002-LITE Hardware Parameter

BAC1002-LITE The hardware parameters of the gateway are as follows:

7.1 Hardware Performance table

The hardware performance is shown in table 7-1-1.

CPU	32 Bit 400MHz RISC ARM926EJ
Memory	32M DDR2
storage	128M Flash
Operating System	Linux
Ethernet	1 High-performance 100M/10M adaptive Industrial Network Card, support AUTO
Power supply socket	Standard 5.08mm spacing 3PIN connector
RTC Clock	Internal integrated real-time clock, on-board 1 CR2032 batteries (can be used for 3 years)
buzzer	board carries 1 buzzer, which can be used for alarm or prompting sound
Serial communication port	2 fully isolated RS485 interface (support transceiver indicator)

Table 7-1-1 hardware performance table

7.2 Electrical specifications and working environment table

Electrical specifications and working environment are shown in table 7-2-1.

Rated power	5 W
Rated voltage	AC and DC rated voltage 24V, working range 12V to 24V.
Power Protection	adopts isolated power module, with lightning surge protection
Allowable loss of power	< 5 ms

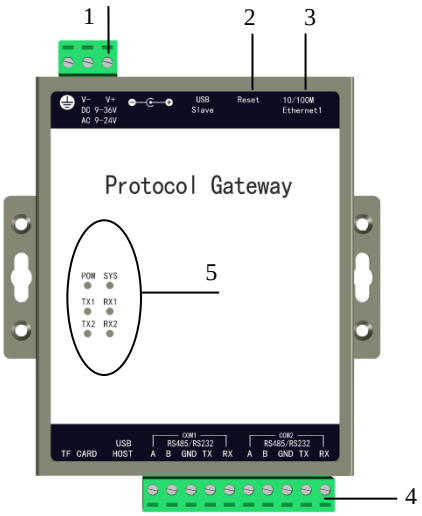
CE & ROHS	conforms to EN61000-6-2:2005, EN61000-6-4:2007 standard, and meets ROHS Lightning surge + 4KV, group pulse + 4KV, electrostatic contact 4K, air discharge 8K
Working Temperature	-20～70℃
Storage temperature	-40～85℃
relative humidity in working	20%～90% non condensation
relative humidity in storage and	15%～95% non condensation
Aseismic	10 ～ 25 Hz (X、Y、Z direction 2G/30 minutes)
Cooling mode	natural air cooling
Protection grade	The front panel is in line with IP65 (fitted with flat panel cabinets) and the rear body of the fuselage is IP20.
Mechanical	Use of aluminum alloy shell, surface coating
Whole machine size	129mmx86mmx 34mm
Whole machine weight	200g

Table 7-2 electrical specifications and working environment table

7.3 Network Interface

Label 3 in the physical map are Ethernet interface. The default IP address is 192.168.1.88. Its IP can make changes, easy to connect communication. Long press the Reset key(Label 2 in the physical map) , restore the Ethernet to the factory default IP.

The concrete interface of the gateway is illustrated as shown in Figure 6-3-1.



1. DC/AC 24V
2. Reset
3. 10/100M Ethernet
4. full electrical isolation 2 Road 485/232 (reuse)
5. LED communication indicator

Figure 7-3-1 schematic diagram of Gateway Interface

7.4 Power interface

The label 3 in the above figure is the mainboard power input interface. The standard 3PIN 5.08mm spacing connector is used in the interface, and the input pin definition is shown in table 5-4-1.

PIN foot No	Port	Illustrate	Remarks
1	⏚	Shell ground wire	Connect the earth
2	V-	Power ground wire of this machine	Power input negative pole
3	V+	Power input positive pole	Power input positive pole

Table 7-4-1 power interface parameters

Power input supports AC / DC 12V to 24V wide voltage input, supports overcurrent and lightning protection, and supports reverse connection protection.

7.5 RS485 interface parameters

The label 4 in the above figure is the RS485 and the RS232 multiplexing interface, and the standard 12PIN 5.08mm spacing connector is used in the interface. The definition of the foot table is shown in table 7-5-3.

PIN foot No	Port	Illustrate	Remark
1	A	RS485 or RS232 (COM1)	All electric isolation RS485 and RS232 interface, isolation voltage is 2000V
2	B		
3	GND		
4	RX		
5	TX		
6	A	RS485 or RS232 (COM2)	
7	B		
8	GND		
9	RX		
10	TX		

Table 7-5-3 Serial port parameters

8 BACnet client (master station) access

BACnetScan was developed by Shanghai Sunfull Automation Co., LTD, It is a BACnet client scan software,easy to operate and quick scan speed from machine.

- Support BACnet Ethernet, BACnet IP and BACnet MSTP.
- Support read and write present value property, export EXCEL etc.
- Supoort Chinese and English Language.

With BACnetscan scans the current local area network (LAN) all BACnetIP equipment .

Right click BACnet IP and select “Search Device…” or click button. As the Figure 5-1。

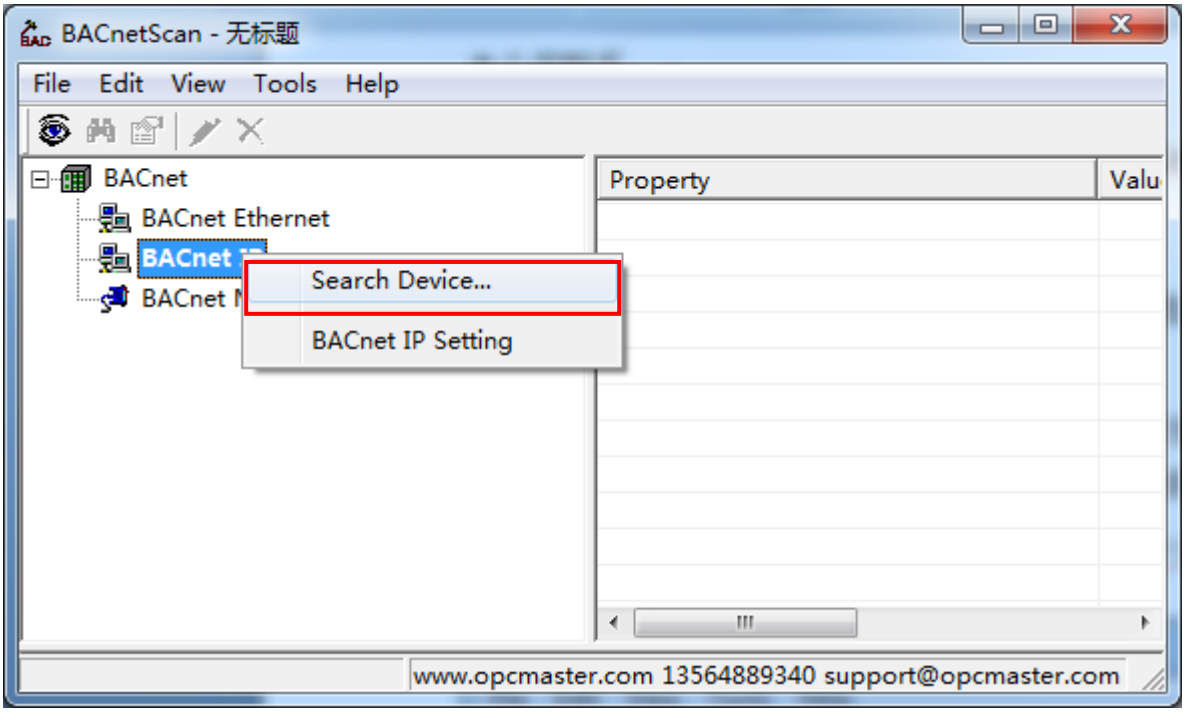


Figure 8-1 Search Device

Searched BACnet Device 10 in same Network segment as below Figuer 8-2.

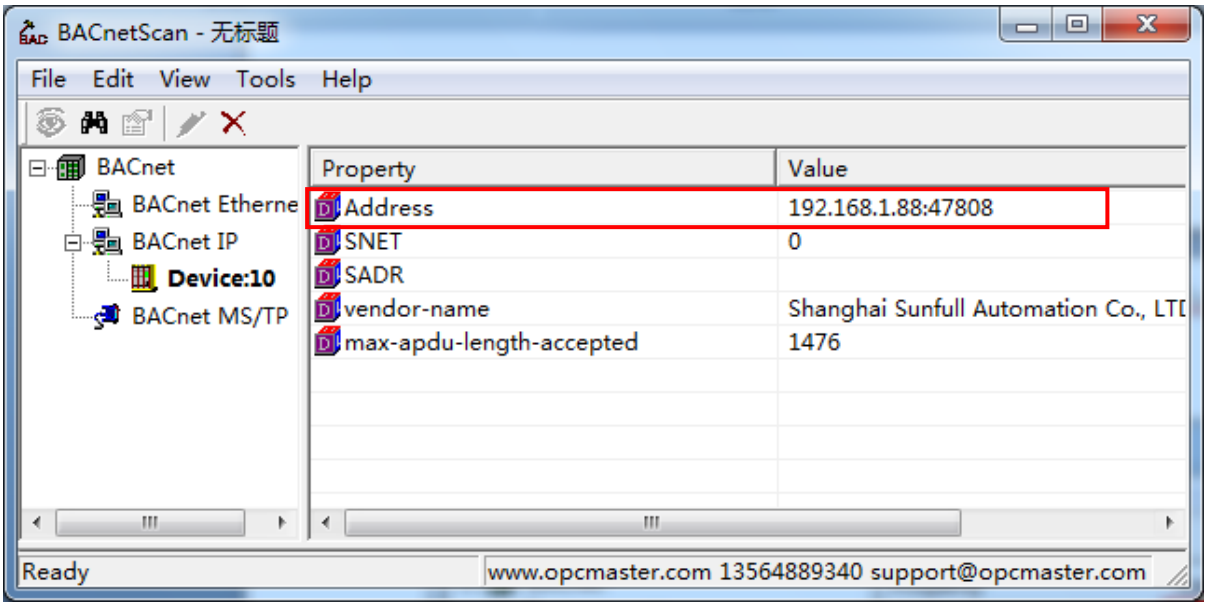


Figure 8-2 Searched Device 10

Click Device ,property and valve on the right, right click Search Object or click button ,As the following figure 8-3。

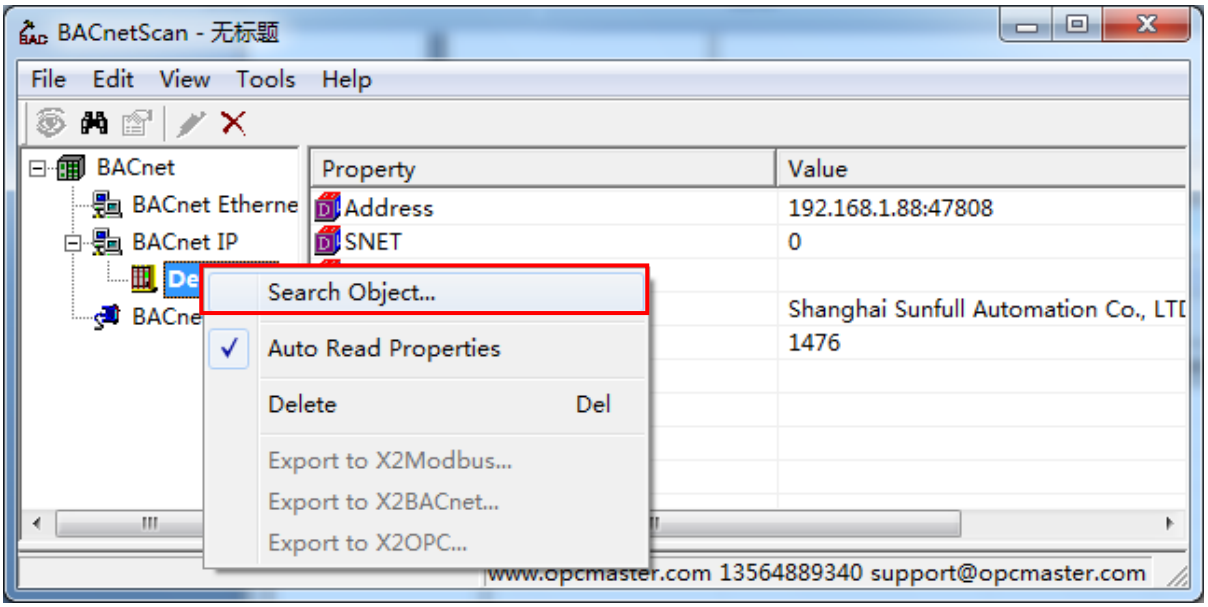


Figure 8-3 Search Object

Pay attention to check the " Auto Read properties" said at the time of scanning point, automatically read all attributes of the point also.

Can see from figure 5-4 gateway configured within all points have been scan to, choose one of the points, right-click to choose "read object properties", you can see the current object attribute values.

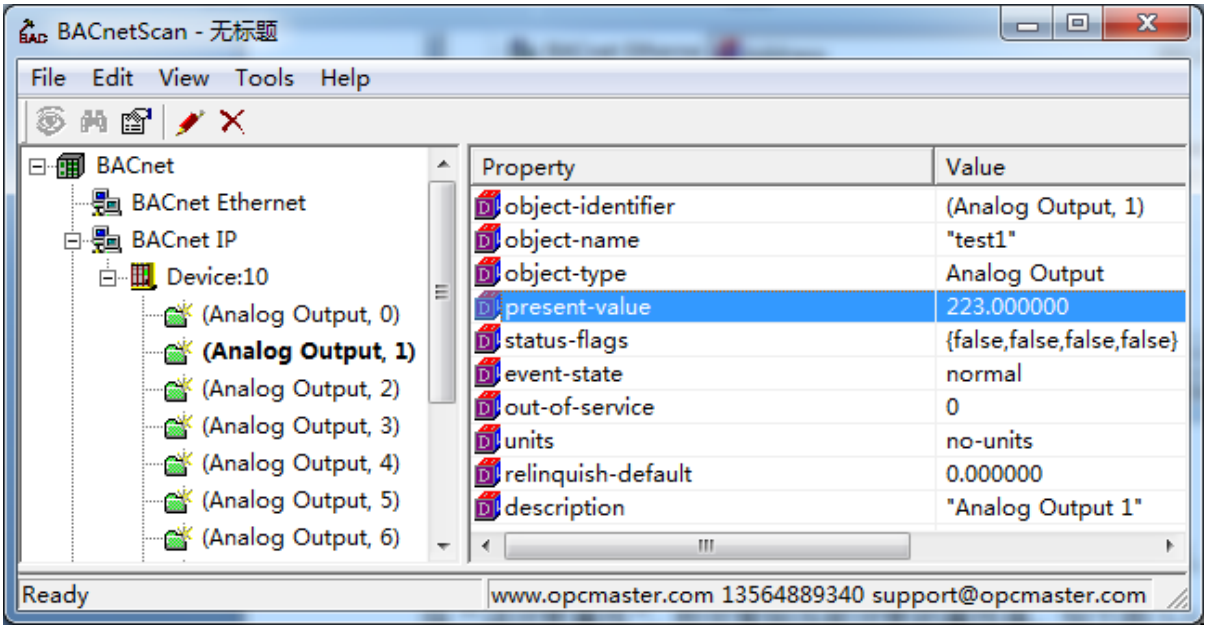


Figure 8-4 Read object properties

9 Common Problems

9.1 Hint ” Failed to call ‘http://192.168.1.88/soap’ WEB server!”

When starting monitor in the Local PC monitor mode, the error message is constantly prompted in the print message bar ” Failed to call ‘http://192.168.1.88/soap’ WEB server!”. There are three main reasons for this situation:

- The first possibility is that the current monitoring mode is gateway mode, which needs to be adjusted to Local PC monitor mode.
- The second possibility is that the port number of the current WEB server is occupied by other applications on the local computer.
- The third possibility is that the X2BACnetRuntime program is closed, and only needs to restart the monitor.

9.2 Pay attention to the difference of “Upload” and “Download”

It is particularly reminded that after the completion of the project configuration on PC, the project will be uploaded to the gateway through the button "Upload project". When you look at the project in the gateway, you download the project inside the gateway to the configuration software through the button "download project" .

9.3 Gateway to realize ModbusRTU to BACnet common problems

Q1: There are a lot of Modbus drivers in Sunfull gateway. If we need to collect datas from a watt hour meter with standard ModbusRTU protocol, which driver should I choose?

A1: For devices that support standard ModbusRTU protocol, you need to select the driver whose name is ModbusRTUClient.

Q2: How many buses can the Sunfull gateway take at most? Can each bus be mixed with different devices (for example, a bus is connected to the water meter and meter simultaneously)? How many devices can be supported in series by each bus?

A2:

1) Sunfull gateway can support 4 RS485 access at most (e.g.BAC2004 supports 4 road 485, BAC1002 supports 2 485/232).

2) for the sake of communication stability, it is recommended that customers connect the same equipment to each bus, such as configuring the COM1 connection meter and COM2 receiving the water meter.

3) no more than 32 buses are recommended for each bus, and one bus must be connected with multiple devices in series. It is necessary to ensure the unique device ID between devices.

Q3: for example, I have 20 same types of electric meters on a bus, and a X2BACnet software is completed to configure one of the meters. How to quickly complete the other 19 units In the software?

A3: in order to save time for users, Sunfull gateway has made copy paste and batch modification in many places. For example, the copy and paste of the same device point information, the copy and paste between the channels, the point bit information (register type, register address, data type, etc.) are modified in batch.

When the user completes a point configuration of an electric meter, the other 19 units can quickly complete the configuration by copying and pasting the current device, and the user pays attention to the equipment station number corresponding to the site equipment.

Q4: I use the BAC2004 gateway to collect the ModbusRTU data provided. Why does the reading of the single precision floating-point format correspond to the actual value of the field?

A4: for collecting ModbusRTU data, Sunfull gateway opens the single precision floating point sequence in the device properties. Users need to switch the regular 4321 byte format to 2143. After saving, the project can be uploaded to the gateway again.

Note: for such read - up data and field data, users can consider switching byte order (gateways open 2 byte integer order, 4 byte integer order, and single precision floating order).

Q5: when building a project with X2BACnet configuration software, the server-side BACnet address is very messy, can it be configured quickly through a single key arrangement?

A5: In X2BACnet configuration software, "BACnet server" menu bar, the design of "Sort Object Instance Numer", users only need to click, can quickly arrange the BACnet address from 0 in order.

Q6: the upper computer system is BA System. When we integrate the BACnet gateway, can we scan the roll call to display in Chinese??

A6: In the X2BACnet configuration software, under the "BACnet server" menu bar, the "BACnet Character Encoding" option is added, and the user only needs to switch to the "Unicode" character set to support Chinese.

Q7: When the network controller integrate the BACnet gateway quickly through

the BACnetIP protocol, why can't we find the Sunfull gateway?

A7:

1) Users need to ensure that the Sunfull gateway is in the same network segment as the network controller, and the subnet mask and the default gateway must also be guaranteed to be consistent with the scene.

2) Ensure that Sunfull BACnet server device ID is unique and cannot be duplicated with other devices on the same network.

3) Do not check the menu bar "BACnet server" under " BACnetMSTP Settings", if open MSTP, it means convert to BACnetMSTP server, it is not able to search the BACnetIP.

4) the user can also be tested by the BACnetScan scanning tool developed by Sunfull. If BACnetScan can find the fast Sunfull BACnet gateway, it is no problem to scan the BACnetIP. It is necessary to confirm whether the communication parameters of the Network controller and gateway are set correctly.