USR-TCP232-302 User Manual

File version:V1.1

1. Quick Start

USR-TCP232-302 is used for data bidirectional transparent transmission between RS232 and Ethernet .

TCP232-302 itself complete protocol conversion, parameter can be set by built-in webpage or software. Once set, permanent preservation.

This chapter is quick start for using USR-TCP232-302 ,we advice users to read it carefully and operate personally, it can help you know about module generally.

Here is application case for inference:

http://www.usriot.com/support/application-case/usr-tcp232-series-application-case/

You can also email it to Customer Support Center:

http://h.usriot.com/

1.1. Hardware Testing Environment

To test TCP232-302 conversion function, user should connect RS232 to computer by USB to serial line, then connect its LAN port to computer LAN port by internet cable.

Here is schematic diagram for hardware link .

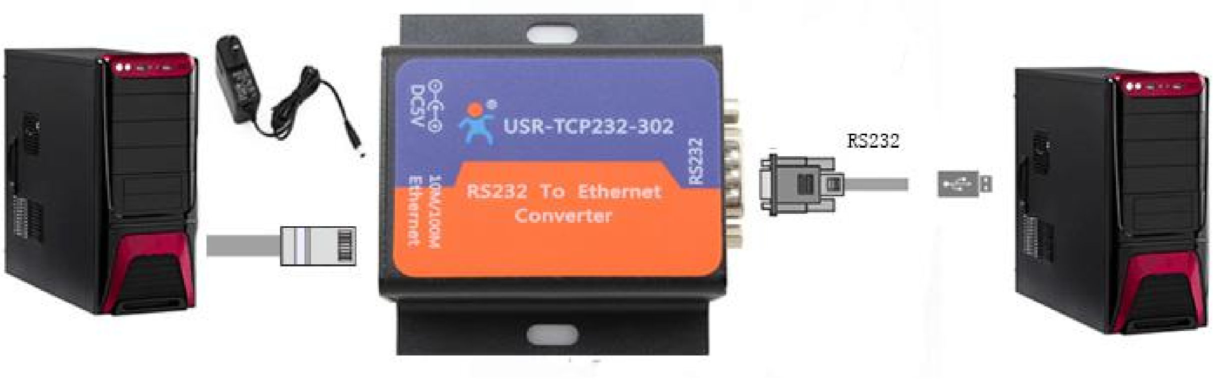
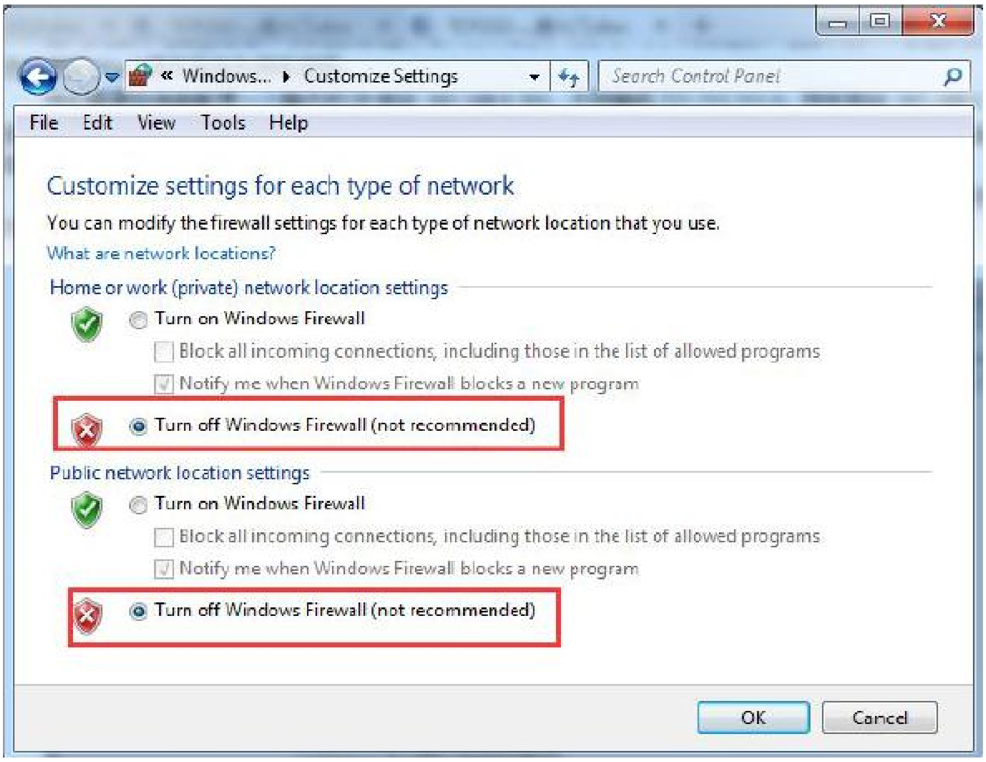


Diagram 1.1-1 Hardware Link

1.2. Connection

Computer should be set as follows:

1) Shut down firewall and anti-virus software .



Customize settings for each type of network

You can modify the firewall settings for each type of network location that you use.

What are network locations?

Home or work (private) network location settings

○ Turn on Windows Firewall

□ Block all incoming connections, including those in the list of allowed programs

☑ Notify me when Windows Firewall blocks a new program

● Turn off Windows Firewall (not recommended)

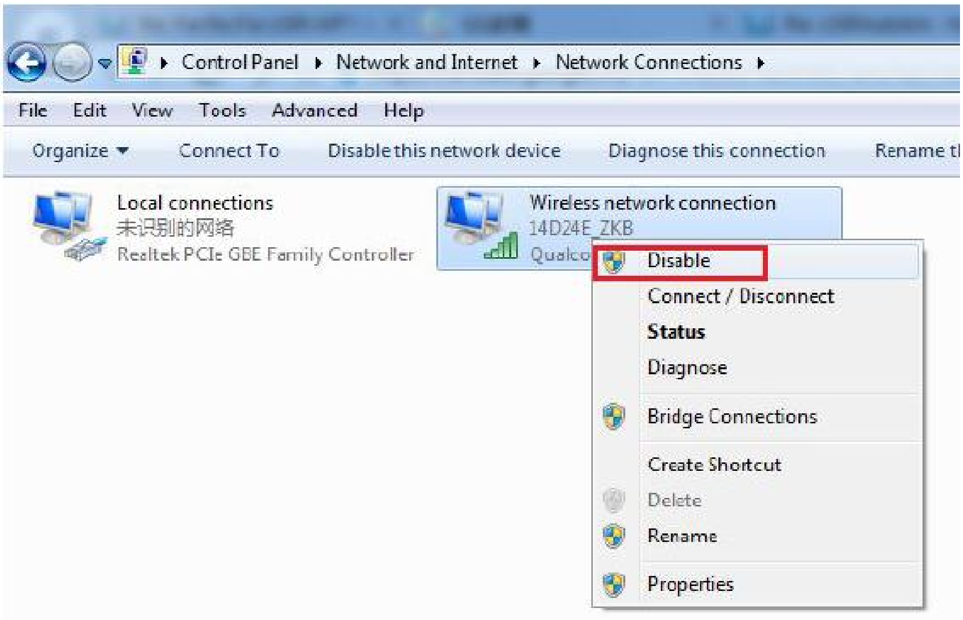
Public network location settings

○ Turn on Windows Firewall

□ Block all incoming connections, including those in the list of allowed programs

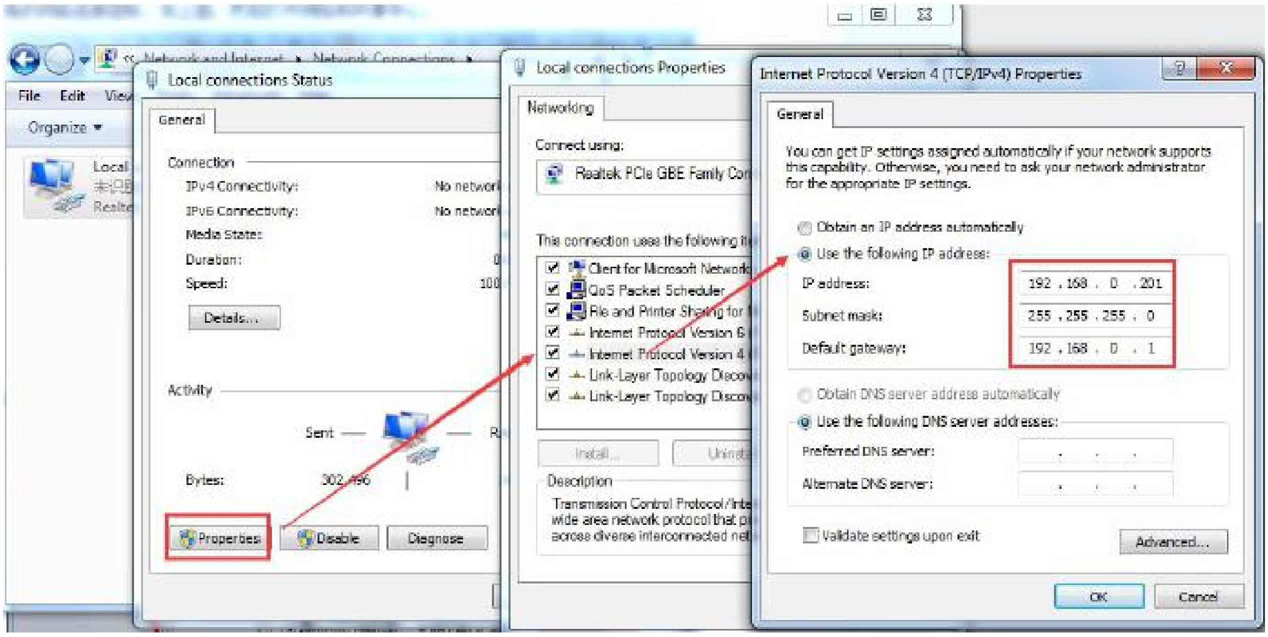
☑ Notify me when Windows Firewall blocks a new program

● Turn off Windows Firewall (not recommended)



2) Shut down unrelated network card, just use one local connection.

3) If you want connect module to PC directly, user should set static IP for computer which is in the same network segment with module.



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:

IP address: 192 . 168 . 0 . 201
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 0 . 1

○ Obtain DNS server address automatically
● Use the following DNS server addresses:

Preferred DNS server: . . .
Alternate DNS server: . . .

□ Validate settings upon exit

File
Edit
View
Organize ▾
Network and Internet ▸ Network Connections ▸
Local connections Status
General
Connection
IPv4 Connectivity:
No network
IPv6 Connectivity:
No network
Media State:
Duration:
Speed:
Details...
Activity
Sent
Bytes:
302,496
Properties
Disable
Diagnose
Local connections Properties
Networking
Connect using:
Realtek PCIe GBE Family Con
This connection uses the following it
Client for Microsoft Network
QoS Packet Scheduler
File and Printer Sharing for
Internet Protocol Version 6
Internet Protocol Version 4
Link-Layer Topology Disco
Link-Layer Topology Disco
Install...
Uninsta
Description
Transmission Control Protocol/Inte
wide area network protocol that p
across diverse interconnected net
Advanced...
OK
Cancel

1.3. Default Parameter

Item	Content
User name	admin
Password	admin
IP address	192.168.0.7
Subnet mask	255.255.255.0
Default gateway	192.168.0.1
Serial baud rate	115200
Serial parameter	None, 8 ,1
Local port	20108
Target IP	192.168.0.201
Target port	8234

Diagram 1.3-1 TCP232-302 Default Parameter

1.4. Data Transmission Testing

Steps for network communication parameters:

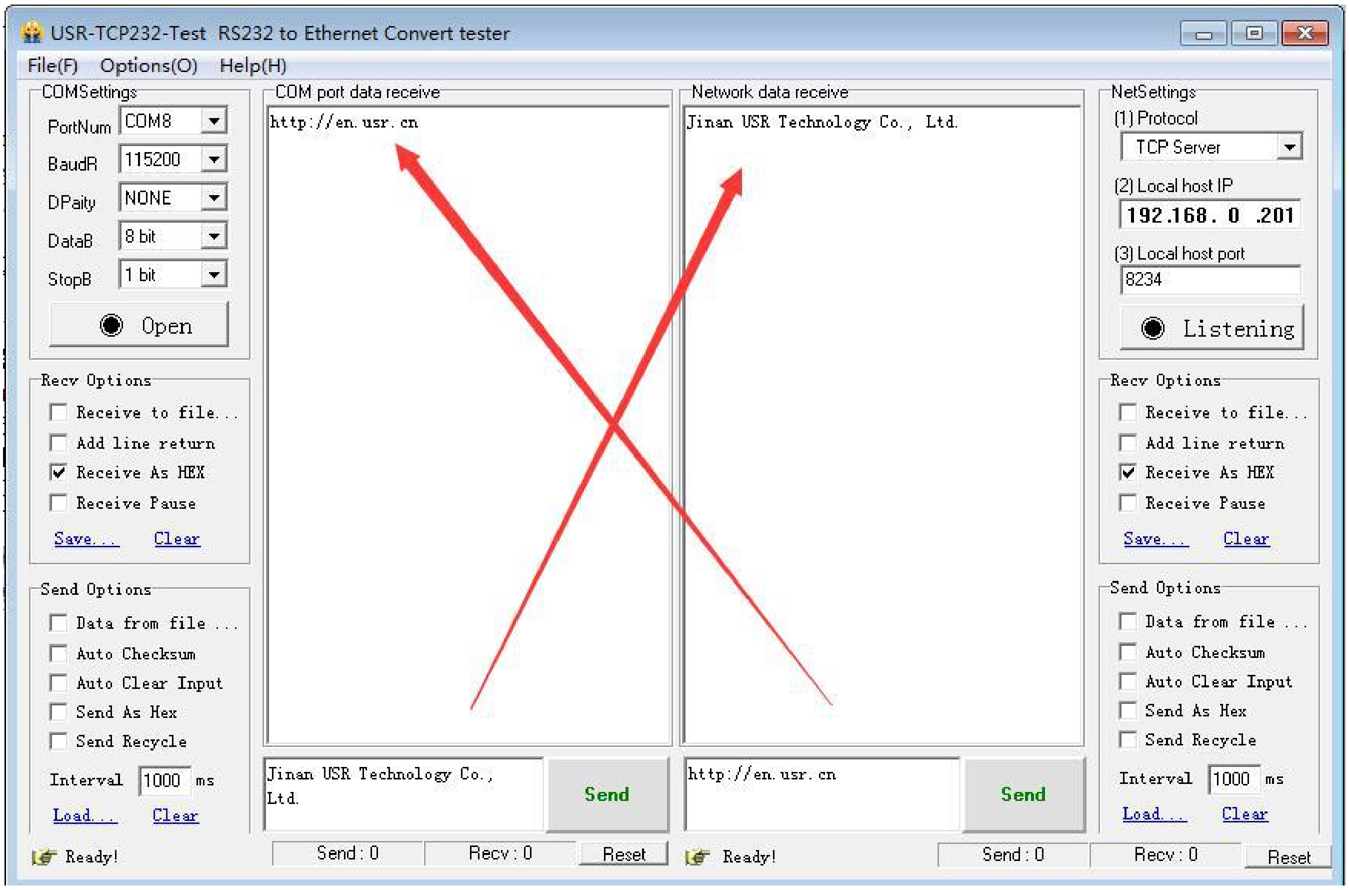
1) Install USR-TCP232-Test.exe .

2) Connect UART to PC, LAN to PC.

3) Protocol: TCP Server

Server IP: 192.168.201 (PC Static IP)

Server Port No: 8234



USR-TCP232-Test RS232 to Ethernet Convert tester

File(F) Options(O) Help(H)

COMSettings
PortNum COM8
BaudR 115200
DPaity NONE
DataB 8 bit
StopB 1 bit

COM port data receive: http://en.usr.cn

Network data receive: Jinan USR Technology Co., Ltd.

NetSettings
(1) Protocol TCP Server
(2) Local host IP 192.168. 0 .201
(3) Local host port 8234

Recv Options
□ Receive to file...
□ Add line return
☑ Receive As HEX
□ Receive Pause

Send Options
□ Data from file ...
□ Auto Checksum
□ Auto Clear Input
□ Send As Hex
□ Send Recycle
Interval 1000 ms

COM send: Jinan USR Technology Co., Ltd.

Network send: http://en.usr.cn

Ready! Send : 0 Recv : 0

Ready! Send : 0 Recv : 0

Diagram 1.4-1 Port to LAN Test

2. Overview

2.1. Brief Introduction

TCP232-302 is a new serial to Ethernet device server which realizes data bidirectional transparent transmission between RS232 and RJ45 Port. It is equipped with ARM core with characters of low power, fast speed, high stability.

It integrates internal TCP/IP Protocol, it also has some industry characteristic function.

2.2. Features

●Support DHCP (Dynamic Host Configuration Protocol), obtain an IP address automatically;
●Support DNS (Domain Name System), server address can be defined, domain name resolution;
●Web-set: Setting parameters through web;
●Upgrade firmware via network;
●Support AUTO MDI/MDIX, can use a crossover cable or parallel cable connection;
●Serial port baud rate 600 bps ~230.4 Kbps, and None, Odd, Even, Mark, Space, five check bits;
●Work mode: TCP Server, TCP Client, UDP Client, UDP Server, HTTPD Client;
●Working model related parameters can be set via a serial port or network, setting protocol is available;

user can integrate it into software;

●Support virtual serial port, self-developed USR-VCOM software;

●Heartbeat package mechanism to ensure connection is reliable, put an end to connect feign death;

●User-defined registration package mechanism, check the status of connection;

●Under TCP Server , Client number is 1-16, default value is 4, the IP connected to Client is visible;

●Support User-defined MAC address;

●Restore factory default;

●Across the gateway, switches, routers;

●Across the gateway, across switches, routers;

●Provide(socket), VB, C++, Delphi, Android, IOS;

●Download application cases;

●Support customization;

2.3. Parameters

Parameter	Parameter Value
Voltage	DC 4.75～7V
Current	150mA
Consumption	<1W
Temperature	Working temp: -25 ~ 75 °C Storage temp: -40 ~ 105 °C Storage humidity: 5% ~ 95% RH

Diagram 2.3-1 USR-TCP232-302 Parameters

2.4. Size

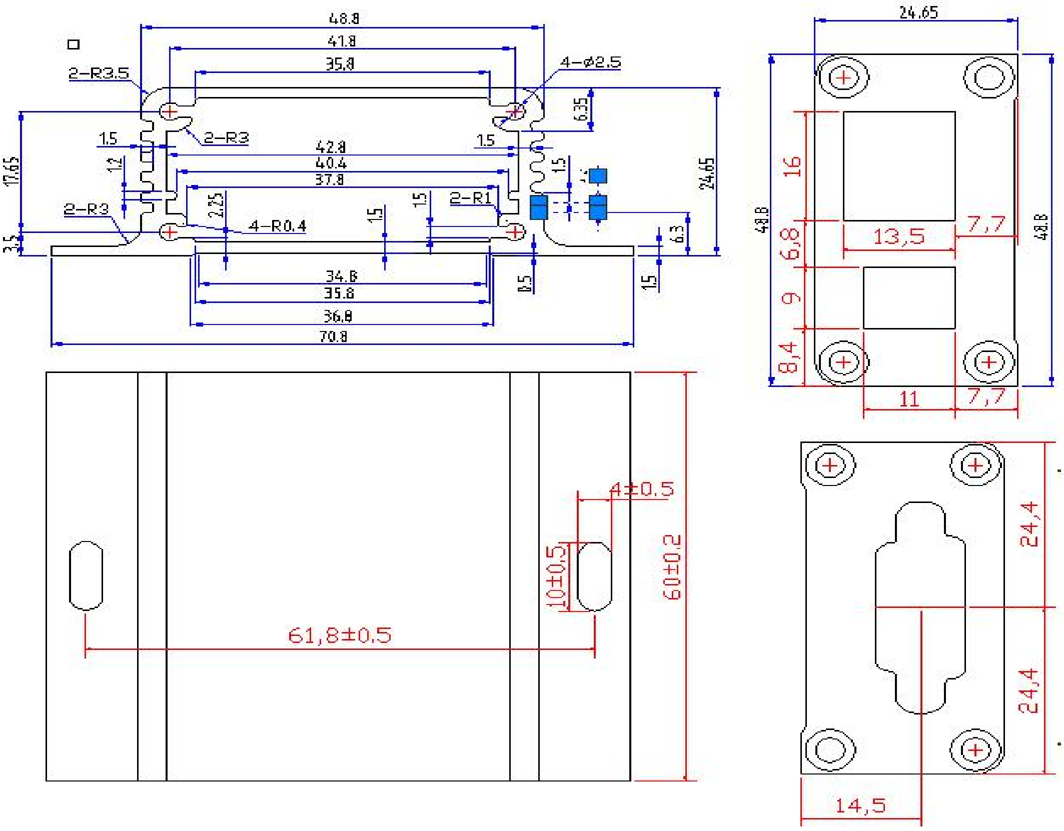


Diagram 2.4-1 USR-TCP232-302 Size

3. Module Function

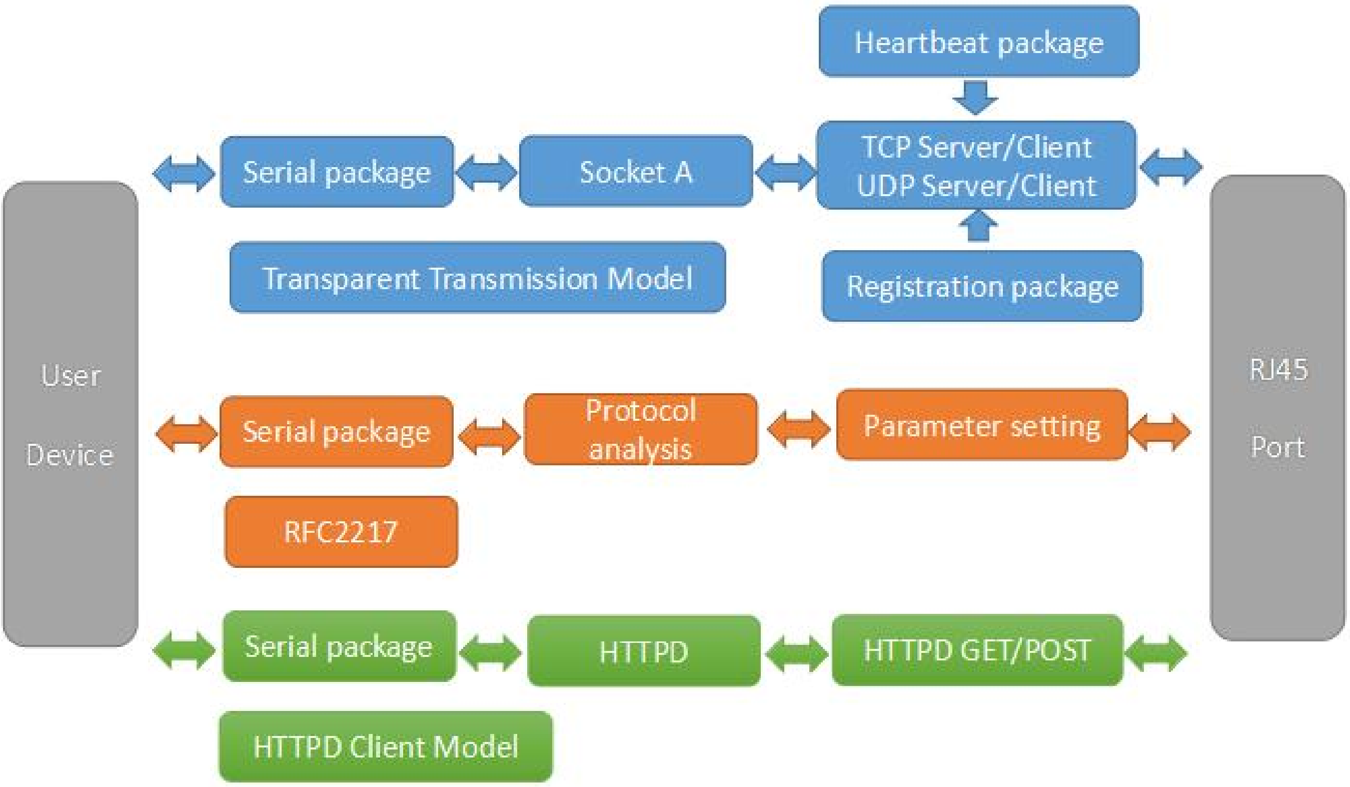


Diagram 3-1 Functional flow

3.1. Work Model

- TCP Client
- TCP Server
- UDP Client
- UDP Server
- HTTPD Client

3.1.1. TCP Client Mode

It has to be connected before transferring data.

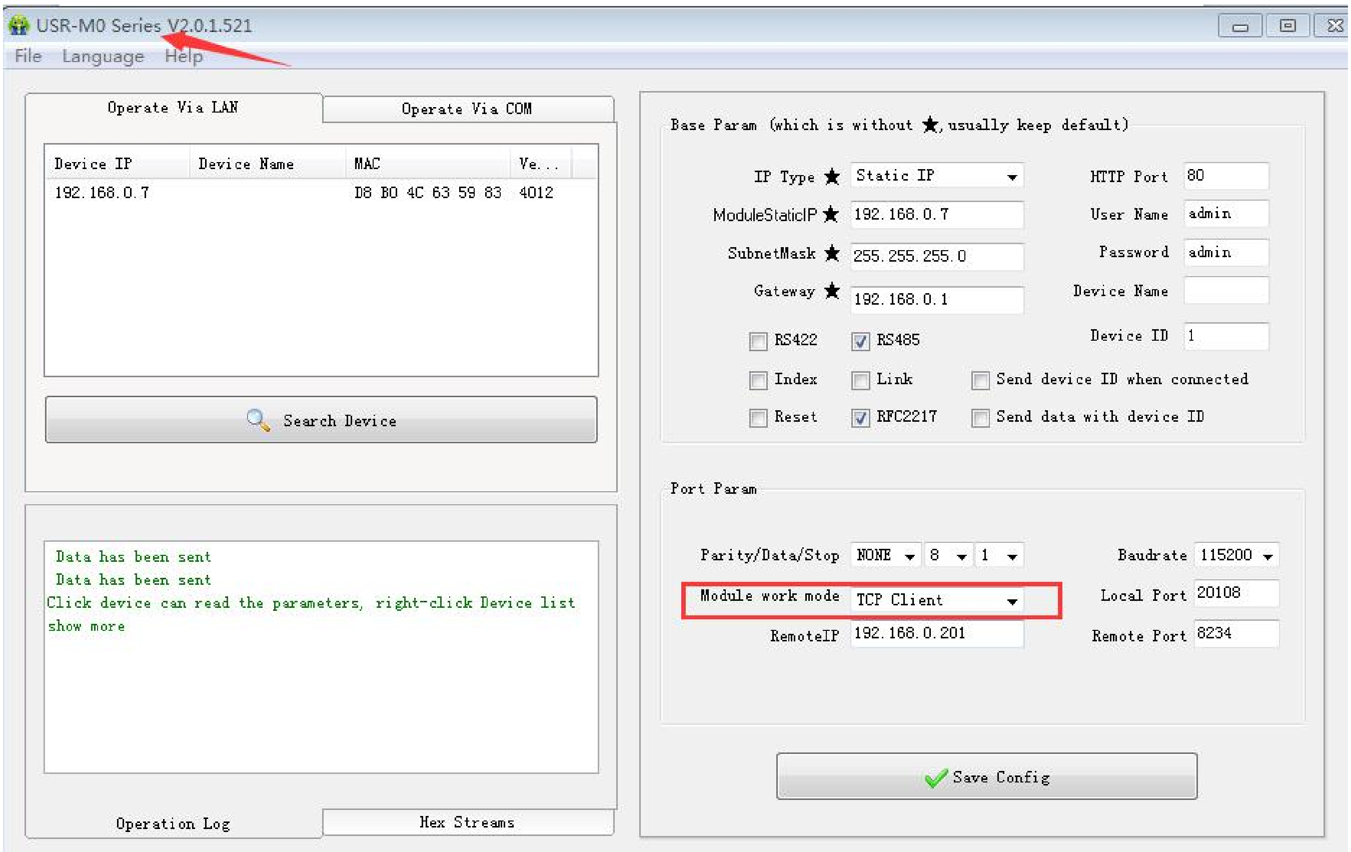
1) In TCP Client Mode,TCP232-302 connects TCP Server actively, establish a connection to transmit date

2) In TCP Client Mode, It has function of identifying disconnected link. When connected, it will send keepalive package every 15s.If unconnected ,it can be detected timely and enforceTCP232-302 to disconnect the former link to establish a new one.

3) When TCP232-302 try to connect remote server ,if the local port number is not “0" ,it will establish a connection with the same source port every time.

4) It has synchronizing function of baud rate, user should install USR VCOM Software.

5) When local port number is “0” , it means local port is random.



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

Base Param (which is without ★, usually keep default)

IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1
□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Port Param

Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode TCP Client
Local Port 20108
RemoteIP 192.168.0.201
Remote Port 8234

```
Data has been sent
Data has been sent
Click device can read the parameters, right-click Device list
show more
```

Diagram 3.1.1-1 TCP Client Setting

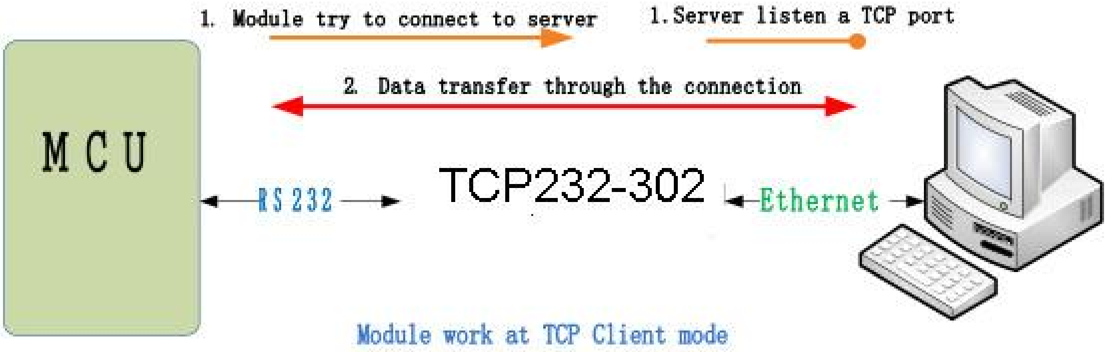

1. Module try to connect to server
1.Server listen a TCP port
2. Data transfer through the connection
MCU
RS232
TCP232-302
Ethernet
Module work at TCP Client mode

Diagram 3.1.1-2 TCP Client Mode

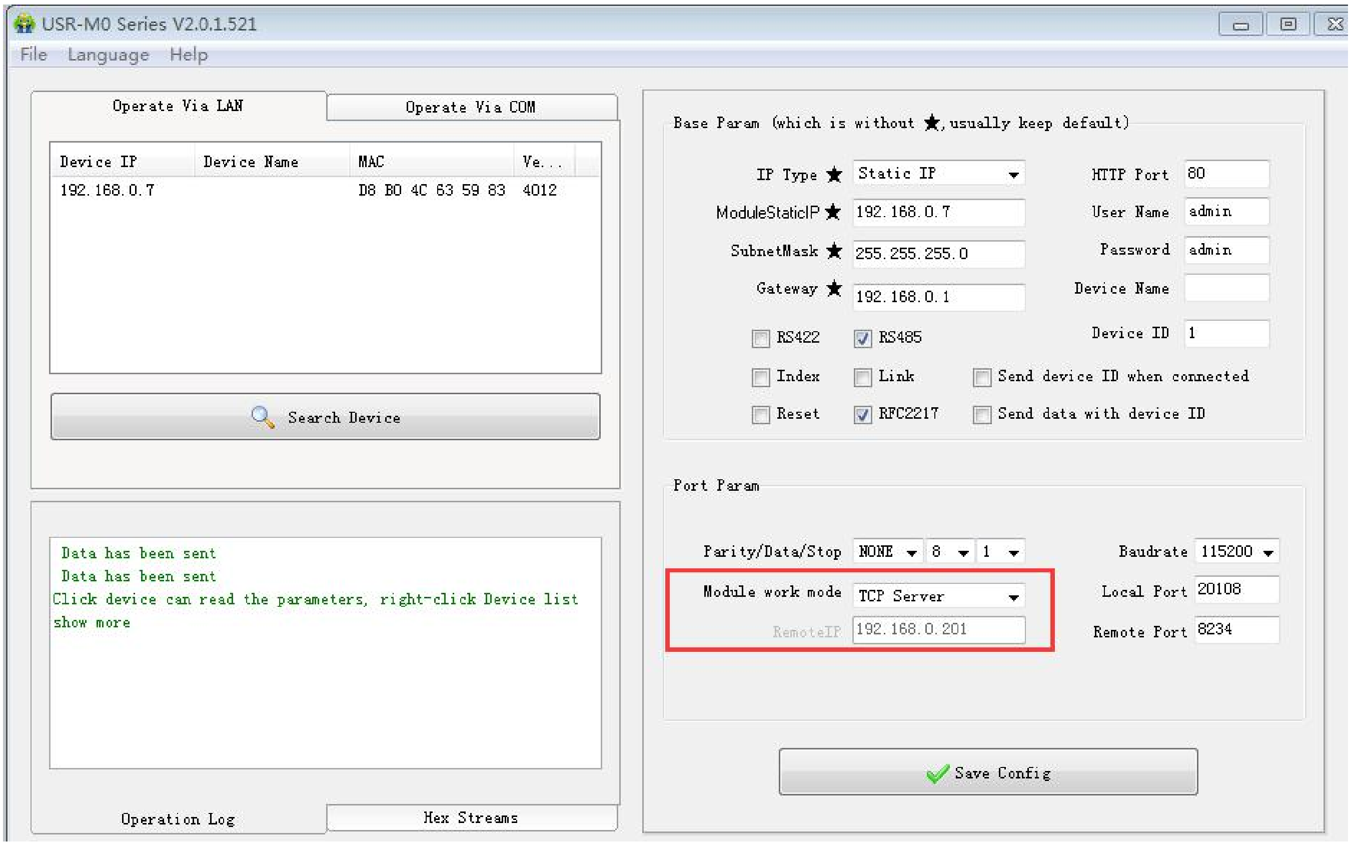
3.1.2. TCP Server Mode

1) It has to be connected before transferring data.

2) In TCP Server Mode, 302 monitors local port, it will response and establish a connection when there is a request. Up to 4 links at the same time. Once received data, 302 serial port will send data to all the devices which connect to TCP232-302.

3) It has synchronizing function of baud rate, user should install USR VCOM Software.

4) In TCP Server Mode, The maximum number can be configured by user. TCP Client number is from 1 to 16, default value 4. When the Client link is more than 16, the new link will replace the former link from Link 1



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

```
Data has been sent
Data has been sent
Click device can read the parameters, right-click Device list
show more
```

IP Type ★: Static IP
ModuleStaticIP ★: 192.168.0.7
SubnetMask ★: 255.255.255.0
Gateway ★: 192.168.0.1
HTTP Port: 80
User Name: admin
Password: admin
Device Name:
Device ID: 1

□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Parity/Data/Stop: NONE 8 1
Baudrate: 115200
Module work mode: TCP Server
RemoteIP: 192.168.0.201
Local Port: 20108
Remote Port: 8234

Diagram 3.1.2-1 TCP Server Setting

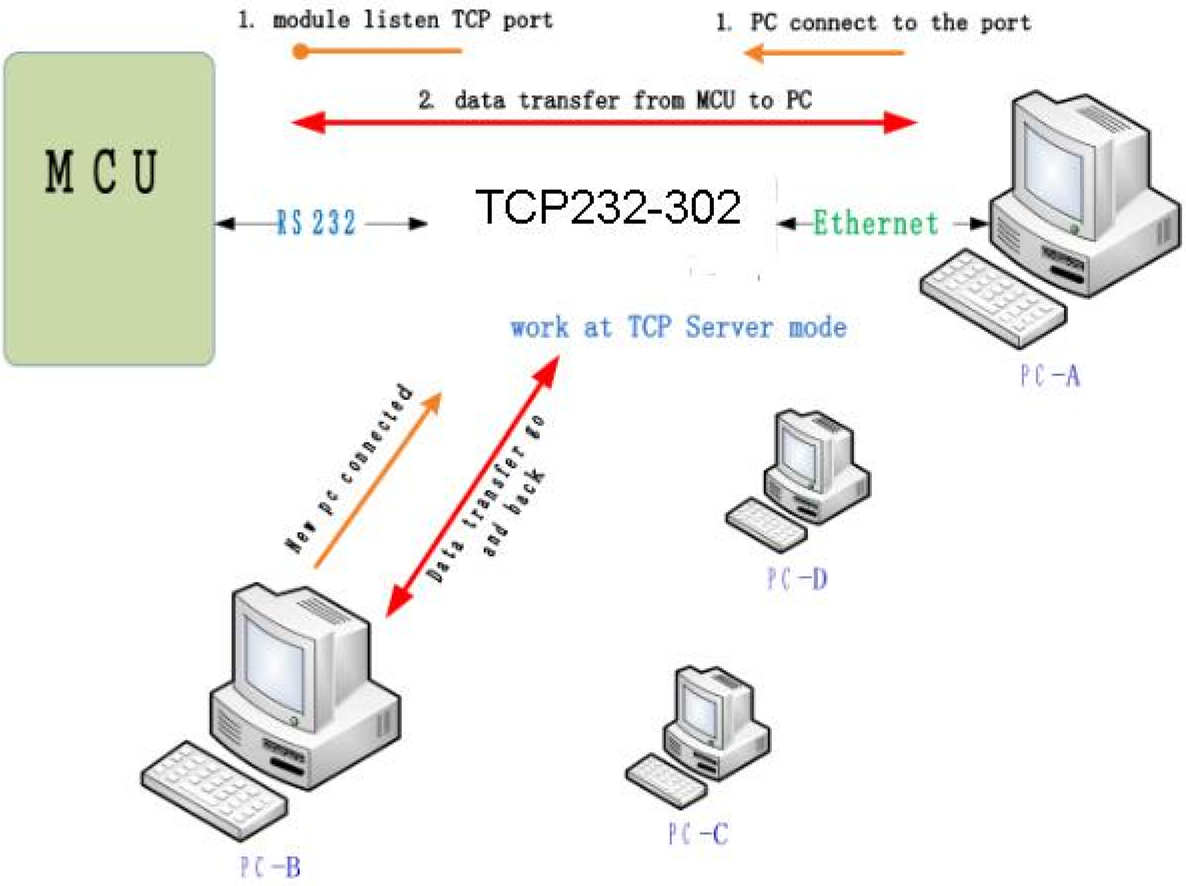

1. module listen TCP port
1. PC connect to the port
2. data transfer from MCU to PC
MCU
RS 232
TCP232-302
Ethernet
work at TCP Server mode
PC-A
New pc connected
Data transfer go and back
PC-D
PC-B
PC-C

Diagram 3.1.2-2 TCP Server Mode

3.1.3. UDP Client Mode

1) The Model belongs to UDP Protocol.

2) In UDP Client Mode, TCP232-302 won't establish the connection actively. It can only communicate with the target port whose IP has been set. When serial port receive data, it send data to target IP and port. If data doesn't come from this channel, it will not be accepted by TCP232-302.

3) In UDP Client Mode, if target IP is set as 255.255.255.255, it can realize function of entire network broadcast, also can receive broadcast data. If broadcast in network segment ,eg.192.168.0.255, it can only send data ,can't receive data.

4) Under UDP Client, maximum data length sent from MCU to TCP232-302 is 1460.

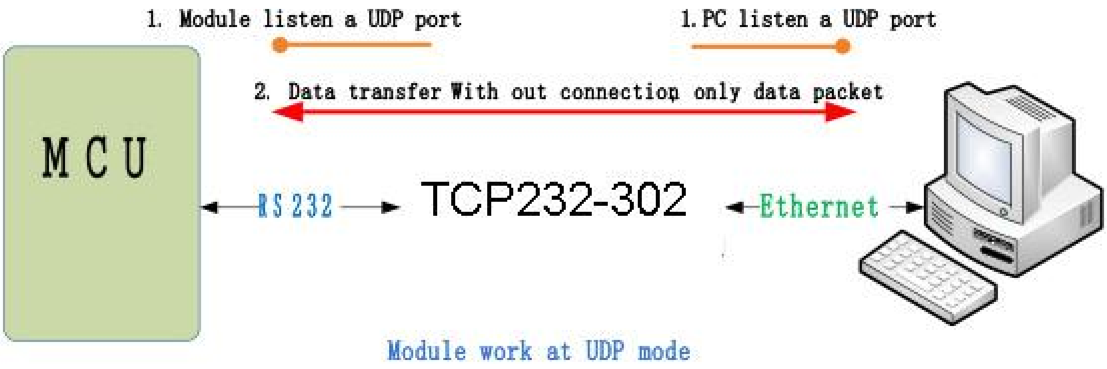
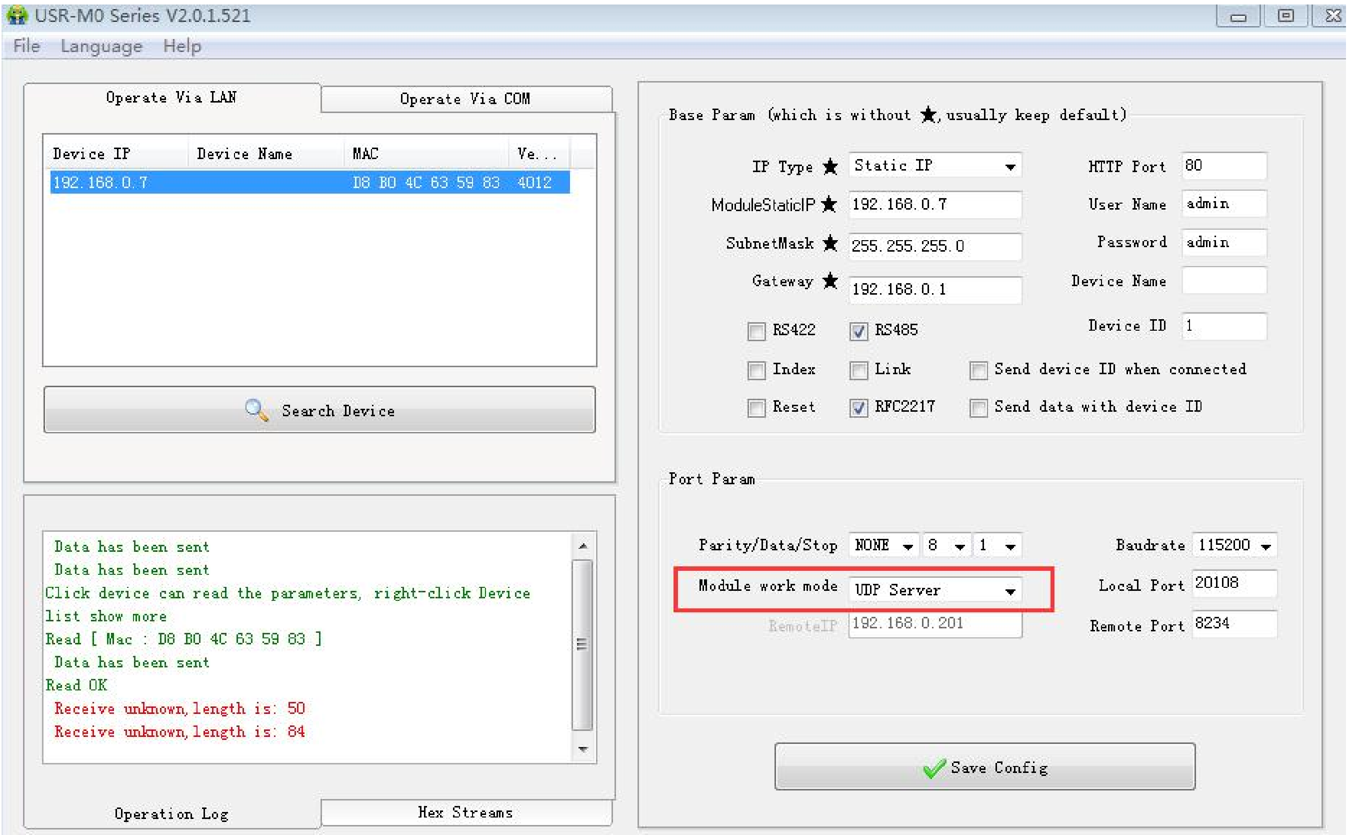

1. Module listen a UDP port
1. PC listen a UDP port
2. Data transfer With out connection only data packet
MCU
RS 232
TCP232-302
Ethernet
Module work at UDP mode

Diagram 3.1.3-1 UDP Client Mode

3.1.4. UDP Server Mode

1) UDP Server is based on normal UDP, it doesn't validate the source of IP address. Once received UDP data, it convert target IP to data source IP, similar to TCP Server.

2) In UDP Server Mode, TCP232-302 records an IP, Once it receives data, it will send data to record IP. TCP232-302 also works as a server, can receive data from Ethernet and convert target IP to data source IP.



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

Base Param (which is without ★, usually keep default)

IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1

□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Port Param

Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode UDP Server
RemoteIP 192.168.0.201
Local Port 20108
Remote Port 8234

```
 Data has been sent
 Data has been sent
Click device can read the parameters, right-click Device
list show more
Read [ Mac : D8 B0 4C 63 59 83 ]
 Data has been sent
Read OK
 Receive unknown,length is: 50
 Receive unknown,length is: 84
```

Diagram 3.1.4-1 UDP Server Setting

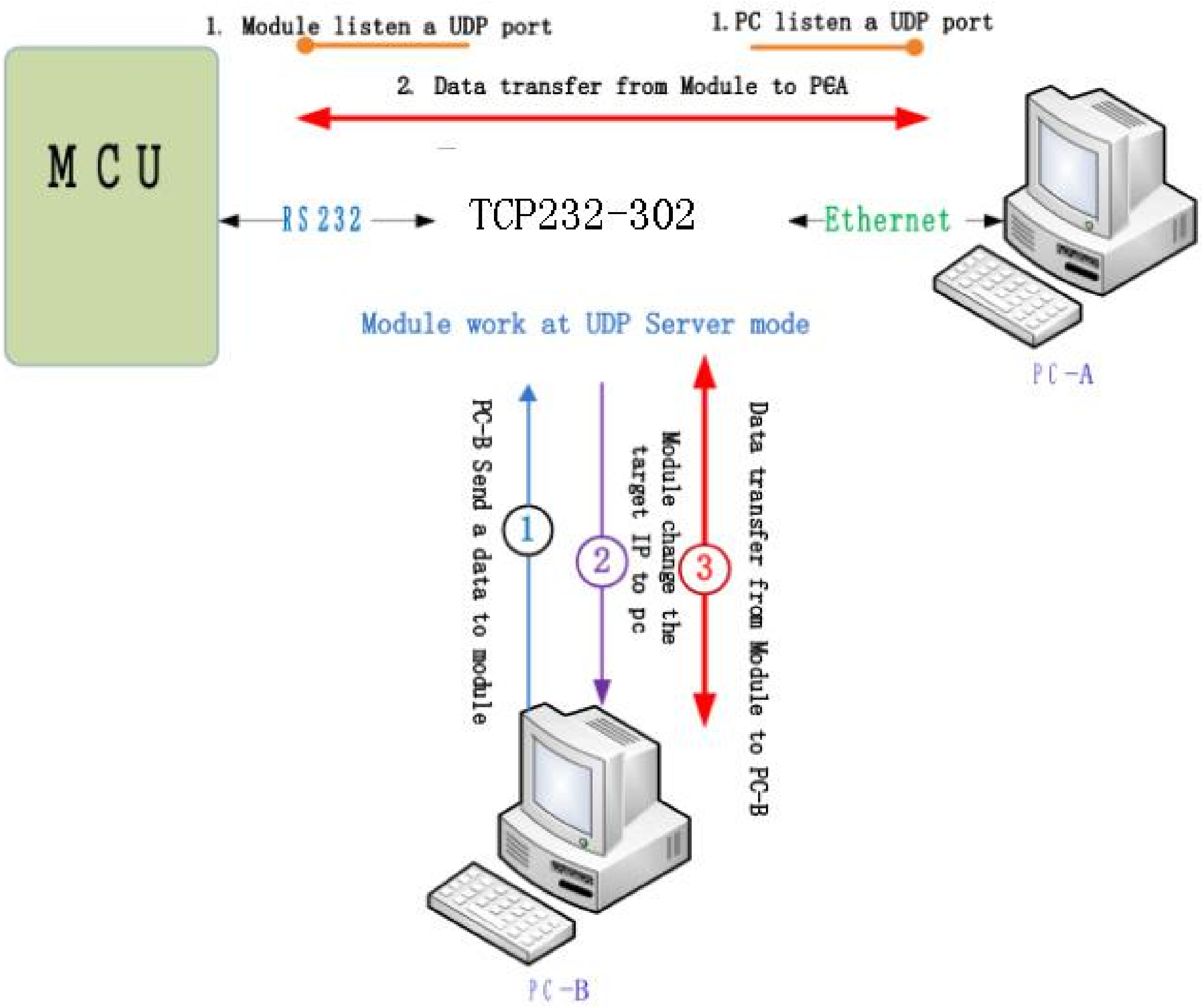

1. Module listen a UDP port
1. PC listen a UDP port
2. Data transfer from Module to PCA
MCU
RS232
TCP232-302
Ethernet
Module work at UDP Server mode
PC-A
PC-B Send a data to module
1
2
Module change the target IP to pc
3
Data transfer from Module to PC-B
PC-B

Diagram 3.1.4-2 UDP Server Mode

3.1.5. HTTPD Client Mode

1) In HTTPD Client Mode, TCP232-302 send data to HTTP Server or receive data from HTTP Server, complex HTTP protocol will be done by TCP232-302, it is convenient for user to programming.

2) TCP232-302 received data from HTTP Server will send to serial port without process.

3) According to demand, user can define HTTP content. If the request type is POST, TCP232-302 will add Connection and Content-Length.

4）In HTTPD Client Mode, it supports GET and Post Function .

3.1.6. TCP and UDP Mechanism

	TCP	UDP

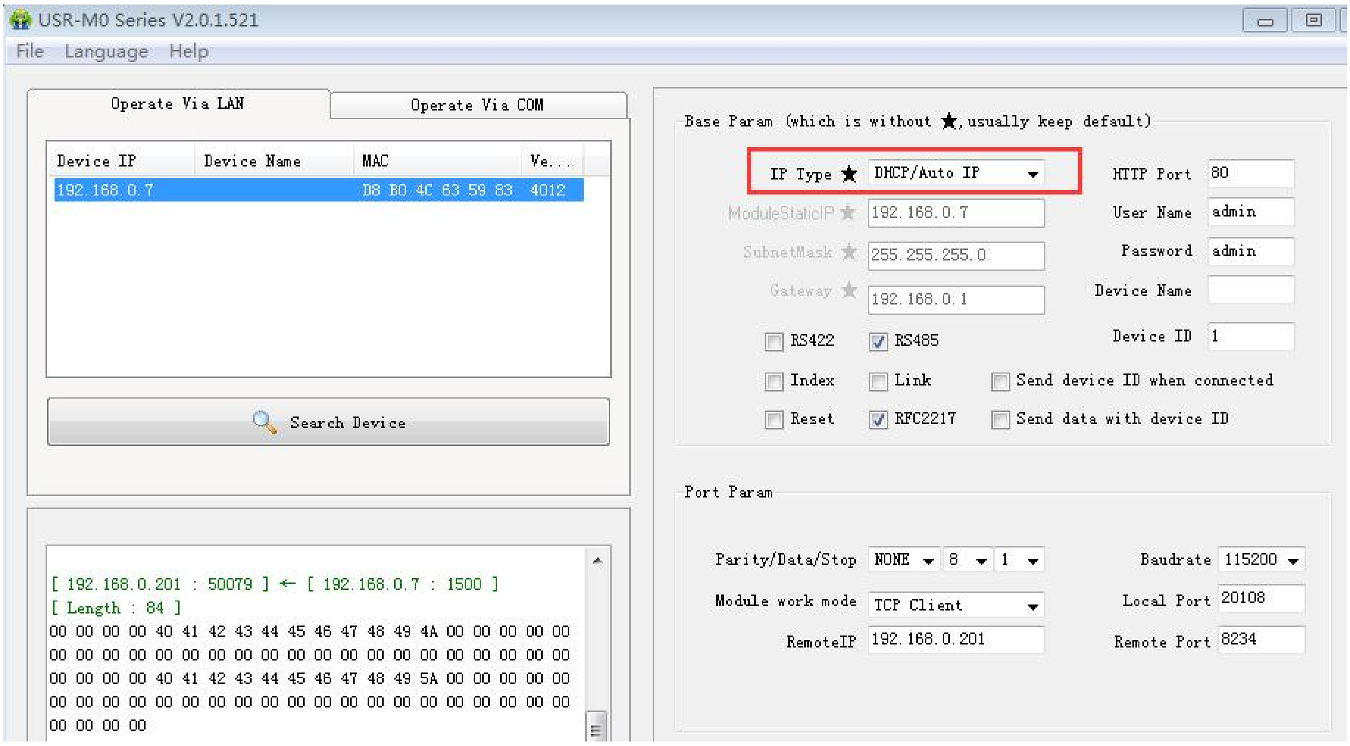
Advantages	Stable;
	Not easy to lose data package;
	Reliable connection mechanism;
		No connection mechanism;
		Easy and flexible;
		Transmission interval is accurate;

Disadvantage	Easy to block up Information; Because of check and resend mechanism, interval isn't accurate	Under bad network condition, it is high risky to losing data package

3.2. DHCP and DNS Function

DHCP: Dynamic Host Configuration Protocol

When T2 connects to remote server, it can obtain an IP address automatically which router or gateway distributed. If you don't know how to set IP address or it can't connect because of the set IP is not in the same segment, the function is helpful. IP address obtained from DHCP can be checked ,but can't be modified.



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

```
[ 192.168.0.201 : 50079 ] ← [ 192.168.0.7 : 1500 ]
[ Length : 84 ]
00 00 00 00 40 41 42 43 44 45 46 47 48 49 4A 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 40 41 42 43 44 45 46 47 48 49 5A 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
```

IP Type ★ DHCP/Auto IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1
□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

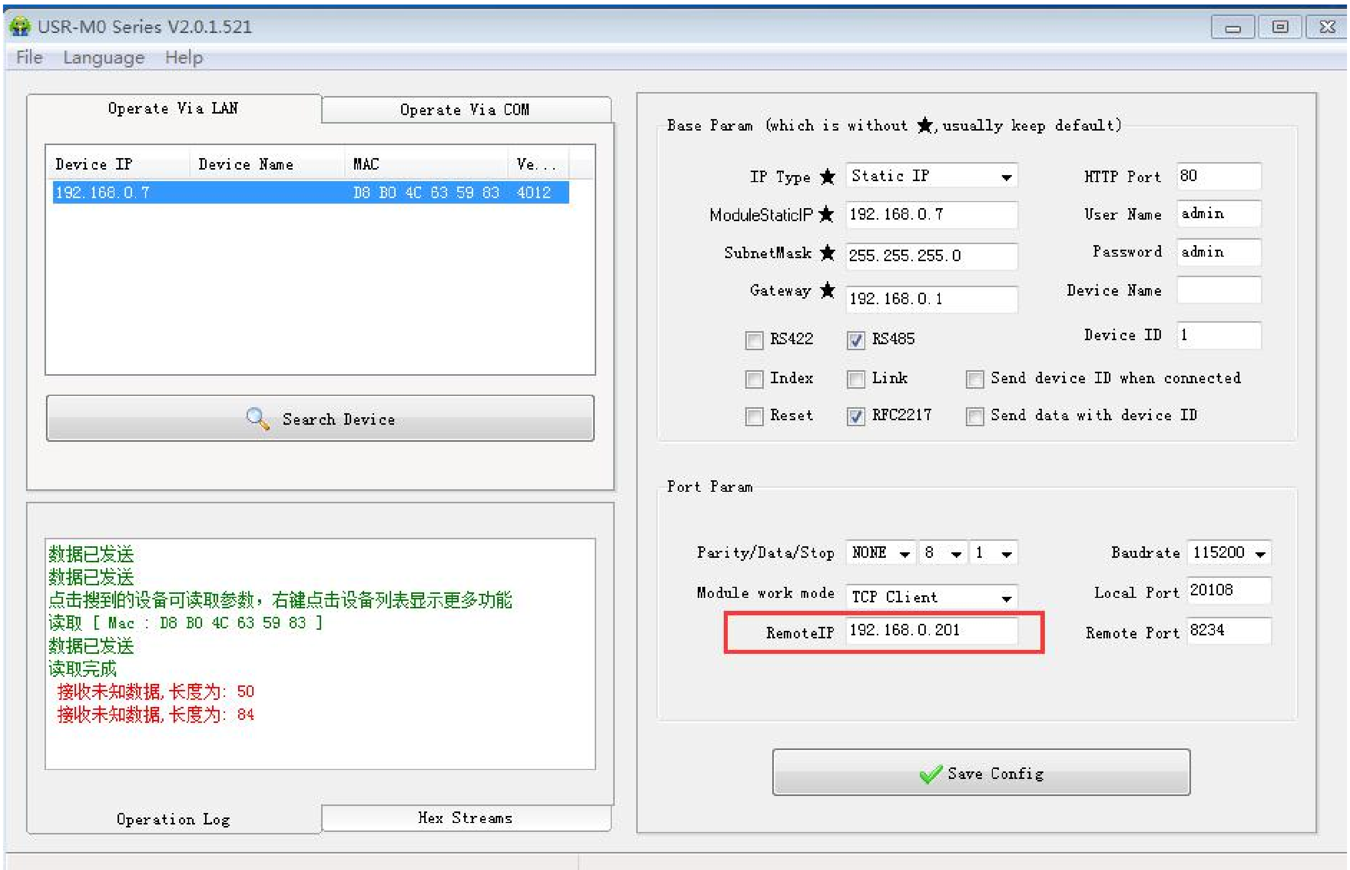
Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode TCP Client
Local Port 20108
RemoteIP 192.168.0.201
Remote Port 8234

Diagram 3.2-1 DHCP

DNS: Domain Name System

e.g. domain name sever is cloud usr.cn, when we don't know Server IP or Server IP changed, this function plays an important role, it can connect remote server by resolving server domain name

Note: when use NDS function, gateway must be same as router IP or choose DHCP function.



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

```
数据已发送
数据已发送
点击搜到的设备可读取参数，右键点击设备列表显示更多功能
读取 [ Mac : D8 B0 4C 63 59 83 ]
数据已发送
读取完成
 接收未知数据,长度为: 50
 接收未知数据,长度为: 84
```

Base Param (which is without ★, usually keep default)

IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1

□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Port Param

Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode TCP Client
Local Port 20108
RemoteIP 192.168.0.201
Remote Port 8234

Diagram 3.2-2 DNS

3.3. VCOM

USR-VCOM Download: http://www.usriot.com/usr-vcom-setup-software-v3-7-1-520/

USR-VCOM Manual: http://www.usriot.com/usr-vcom-setup-software-user-manual-v3-5-2/

If user’s upper computer and device are all connect by serial port, user can create a COM which has TCP/IP to realize remote control by USR-VCOM software.

1) Turn off firewall and anti-virus software.

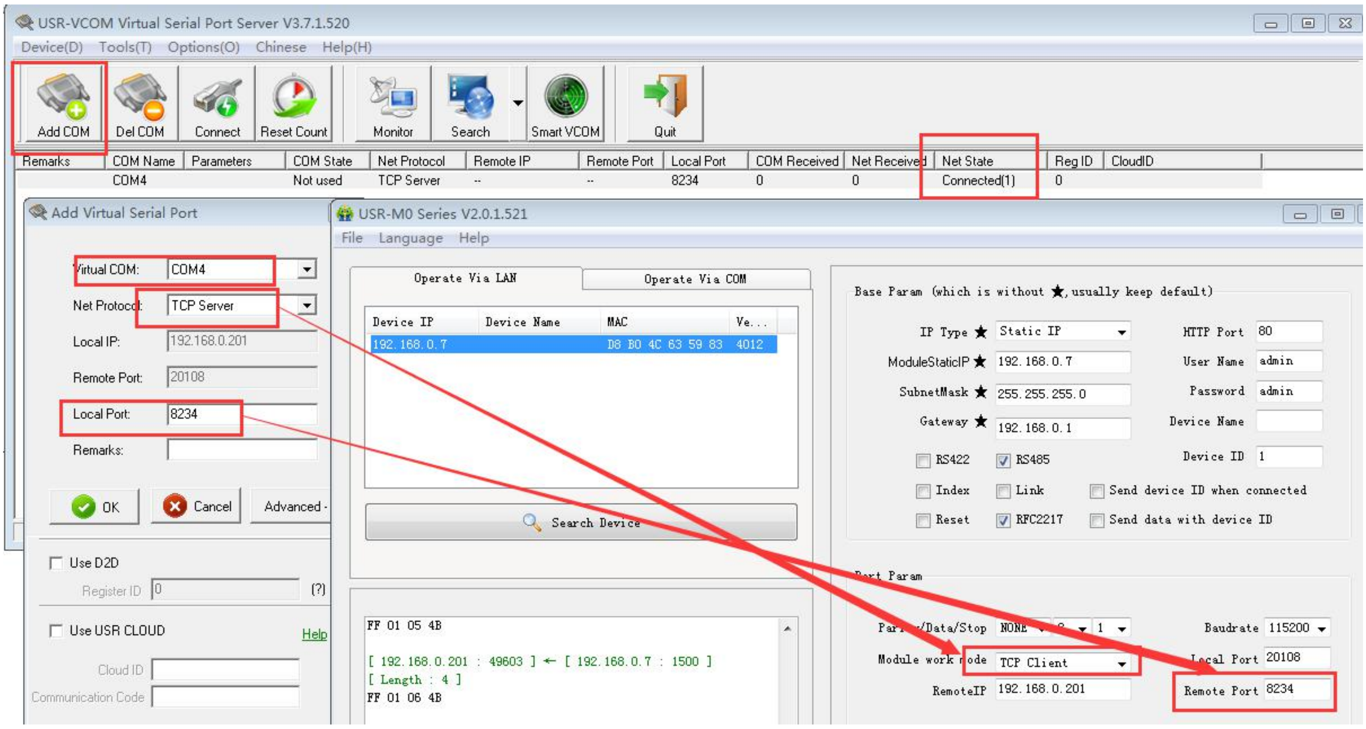
2) Install USR-VCOM.

I advise user to select “Search”or “Smart vcom” to create virtual port. **Please refer to 3.3.3**

3.3.1. TCP232-302 Works as Client

1) Set module parameters. T2 work model: TCP Client.

2) Open USR-VCOM, set virtual port as follows :



Remarks	COM Name	Parameters	COM State	Net Protocol	Remote IP	Remote Port	Local Port	COM Received	Net Received	Net State	Reg ID	CloudID
	COM4		Not used	TCP Server	--	--	8234	0	0	Connected(1)	0	

Virtual COM: COM4
Net Protocol: TCP Server
Local IP: 192.168.0.201
Remote Port: 20108
Local Port: 8234
Remarks:
□ Use D2D
Register ID 0 (?)
□ Use USR CLOUD
Cloud ID
Communication Code

Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

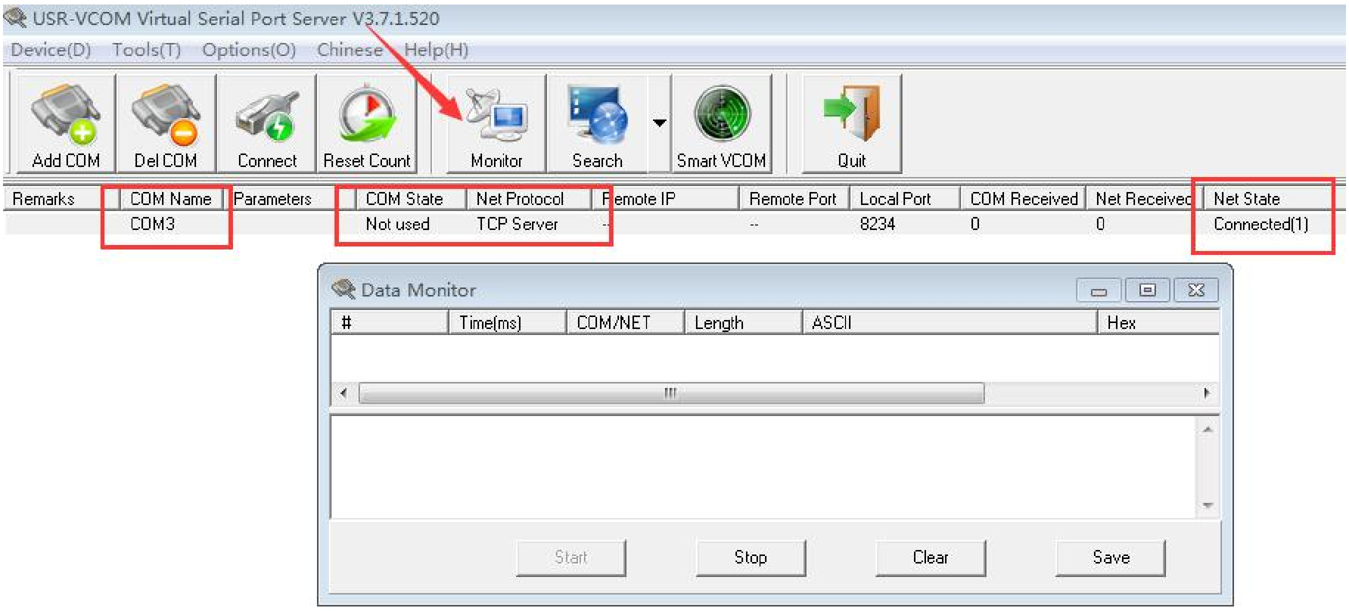
```
FF 01 05 4B
[ 192.168.0.201 : 49603 ] ← [ 192.168.0.7 : 1500 ]
[ Length : 4 ]
FF 01 06 4B
```

Base Param (which is without ★, usually keep default)
IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1
□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Port Param
Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode TCP Client
Local Port 20108
RemoteIP 192.168.0.201
Remote Port 8234

Diagram 3.3.1-1 Create Server Virtual Port

3) If the work mode and parameter is correct , TCP232-302 will connect automatically. If user want to monitor sent data, please click “Monitor”. It is used to check whether the data is correct .


USR-VCOM Virtual Serial Port Server V3.7.1.520
Device(D) Tools(T) Options(O) Chinese Help(H)
Add COM
Del COM
Connect
Reset Count
Monitor
Search
Smart VCOM
Quit
Data Monitor
Start
Stop
Clear
Save

Remarks	COM Name	Parameters	COM State	Net Protocol	Remote IP	Remote Port	Local Port	COM Received	Net Received	Net State
	COM3		Not used	TCP Server	--	--	8234	0	0	Connected(1)

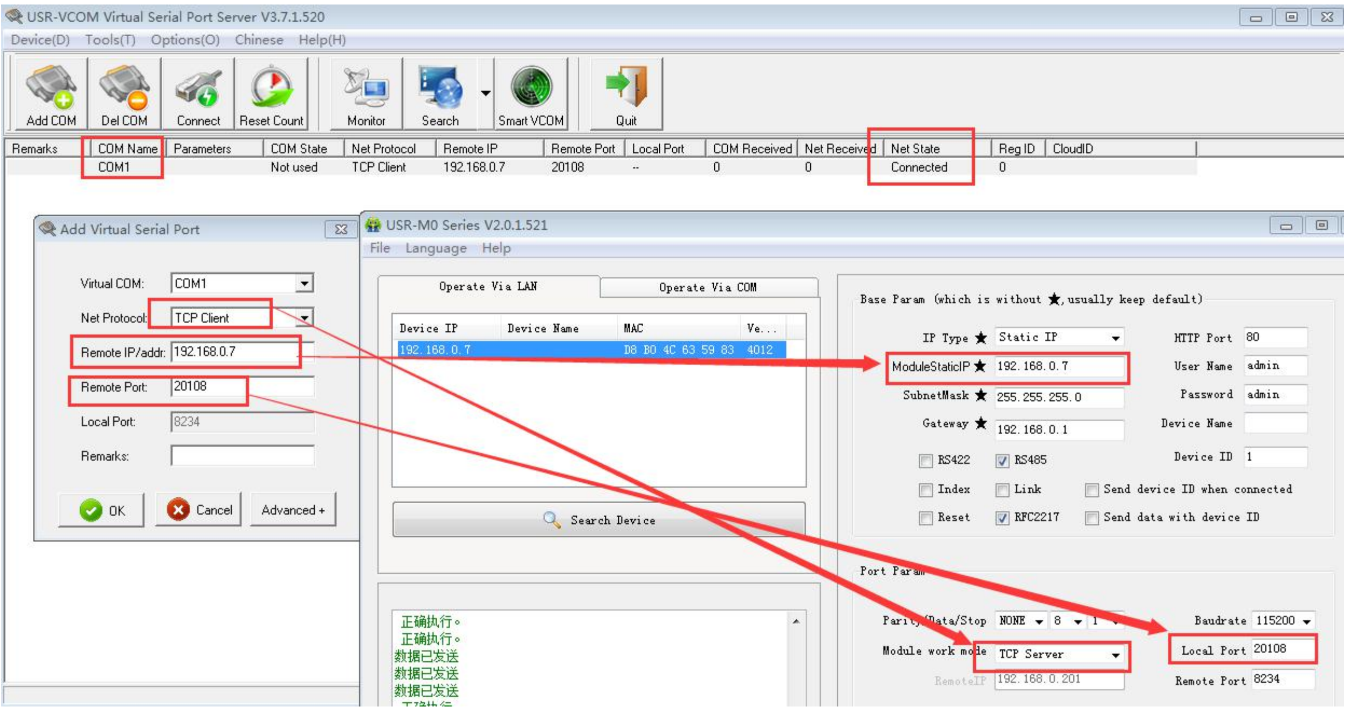
#	Time(ms)	COM/NET	Length	ASCII	Hex

Diagram 3.3.1-2 Monitor Date

3.3.2. TCP232-302 Works as Server

1) Set TCP232-302 work mode: TCP Server.

2) Set virtual port as follows:



Remarks	COM Name	Parameters	COM State	Net Protocol	Remote IP	Remote Port	Local Port	COM Received	Net Received	Net State	Reg ID	CloudID
	COM1		Not used	TCP Client	192.168.0.7	20108	--	0	0	Connected	0	

Virtual COM: COM1
Net Protocol: TCP Client
Remote IP/addr: 192.168.0.7
Remote Port: 20108
Local Port: 8234
Remarks:

Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

正确执行。
正确执行。
数据已发送
数据已发送
数据已发送

Base Param (which is without ★, usually keep default)

IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1

□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

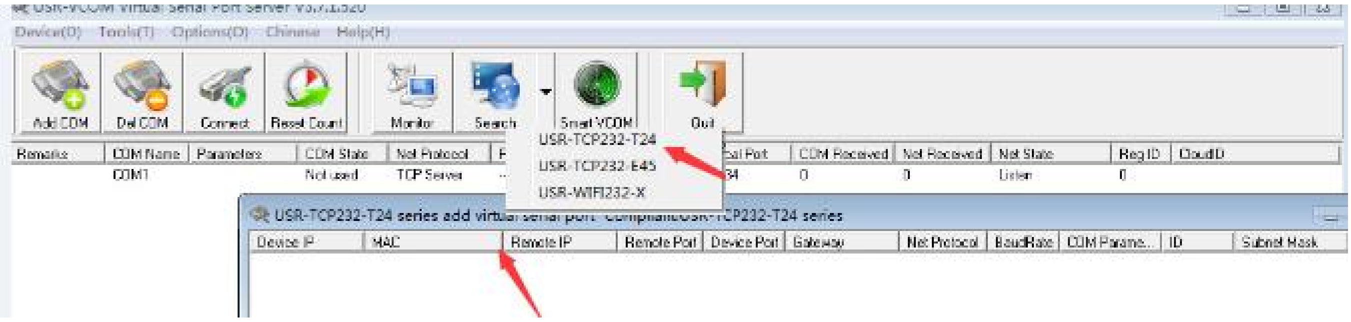
Port Param

Parity/Data/Stop NONE 8 1
Module work mode TCP Server
RemoteIP 192.168.0.201
Baudrate 115200
Local Port 20108
Remote Port 8234

Diagram 3.3.2-1 Create Client Virtual Port

3.3.3. Other Ways to Create VCOM

1) Create VCOM by “search” button.

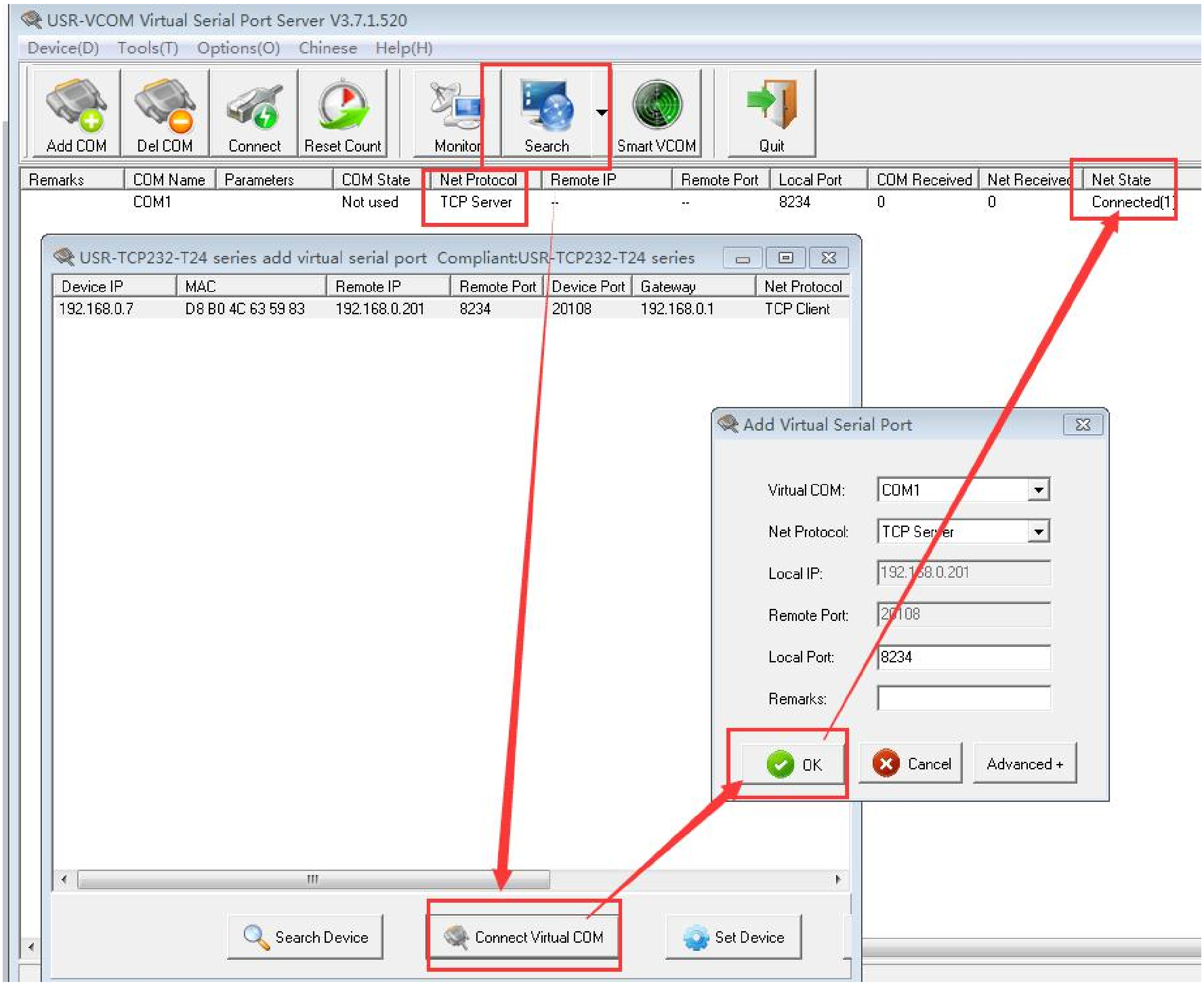


Remarks	COM Name	Parameters	COM State	Net Protocol	F...	...cal Port	COM Received	Net Received	Net State	Reg ID	CloudID
	COM1		Not used	TCP Server	...	34	0	0	Listen	0	

USR-TCP232-T24 series add virtual serial port Compliant USR-TCP232-T24 series

Device IP	MAC	Remote IP	Remote Port	Device Port	Gateway	Net Protocol	BaudRate	COM Parame...	ID	Subnet Mask

Diagram 3.3.3-1 Search Function


USR-VCOM Virtual Serial Port Server V3.7.1.520
Device(D) Tools(T) Options(O) Chinese Help(H)
Add COM
Del COM
Connect
Reset Count
Monitor
Search
Smart VCOM
Quit
USR-TCP232-T24 series add virtual serial port Compliant:USR-TCP232-T24 series
Add Virtual Serial Port
OK
Cancel
Advanced +
Search Device
Connect Virtual COM
Set Device

Remarks	COM Name	Parameters	COM State	Net Protocol	Remote IP	Remote Port	Local Port	COM Received	Net Received	Net State
	COM1		Not used	TCP Server	--	--	8234	0	0	Connected(1)

Device IP	MAC	Remote IP	Remote Port	Device Port	Gateway	Net Protocol
192.168.0.7	D8 B0 4C 63 59 83	192.168.0.201	8234	20108	192.168.0.1	TCP Client

Virtual COM: COM1

Net Protocol: TCP Server

Local IP: 192.168.0.201

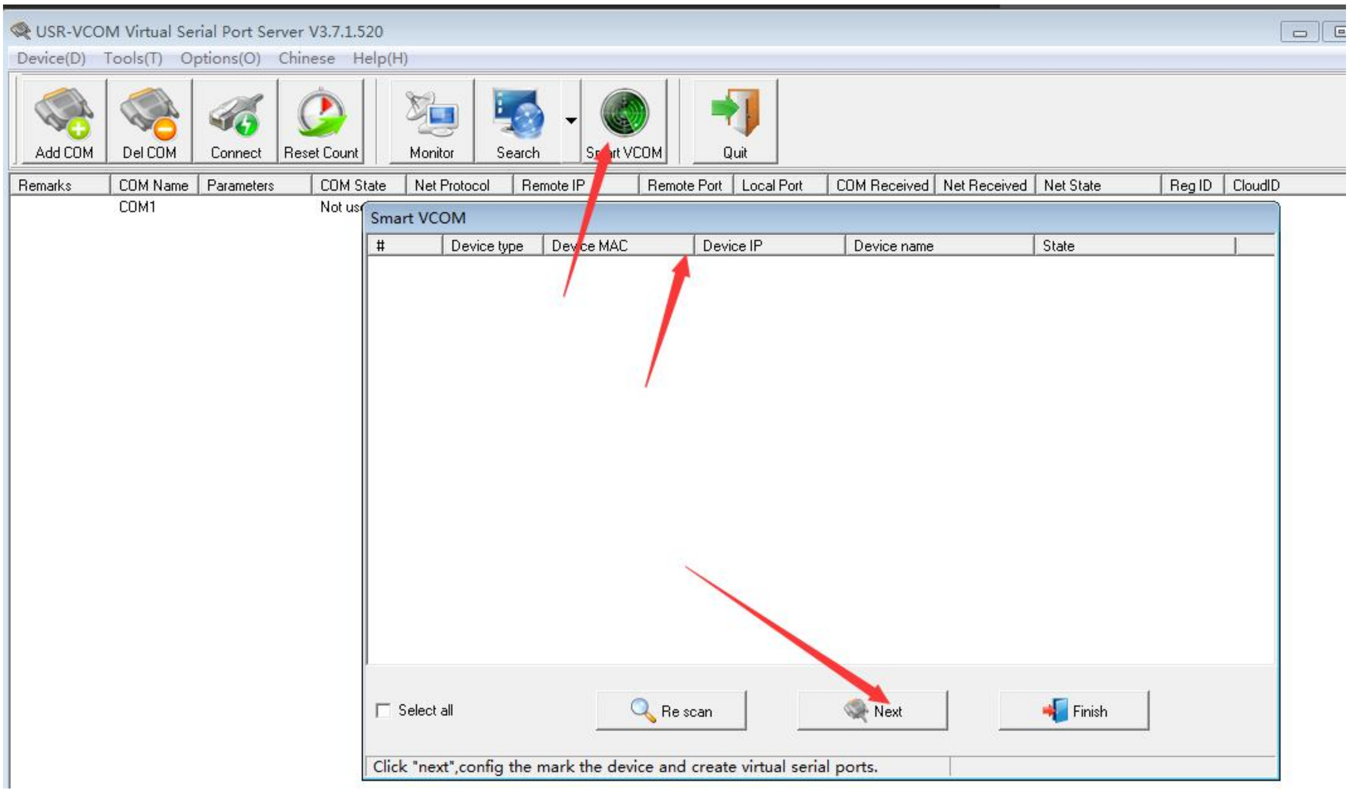
Remote Port: 20108

Local Port: 8234

Remarks:

Diagram 3.3.3-2 Search Function

2) Automatically Create



Click "next",config the mark the device and create virtual serial ports.

Diagram 3.3.3-1 Smart VCOM

3.4. Special Function

3.4.1. Factory Reset

1) Hardware: pull “ Reload “ down to 0 V level for 5 seconds then pull CFG(Reload) up to 3.3 V or don’t connect it, resetting is finished.

2) Software: finish it by set-up software.

3.4.2. Link Function

Link pin can be used as indication pin for TCP connection status.

When connected, it output low level; When unconnected, high level.

When TCP232-302 is in TCP mode,after connection, Link pin will pull down automatically. Otherwise, Link pin will pull up.

When TCP232-302 is in DUP model, Link pin will always pull down.

Note: Reserved Link pin of TCP232-302 can be used as Link indication.

As Link pin doesn’t stretch out of shell , to realize the function ,user can only use TCP232-302-PCBA

3.4.3. Reset Function

When TCP232-302 works as TCP Client, it connects to TCP Server actively. When start Reset function, TCP232-302 try to connect TCP Server for 30 times, if failed, TCP232-302 will restart automatically.

By default, this function is not checked.

3.4.4. ID Function

When TCP232-302 works as TCP Client, it can send ID when establish a connection or carry ID when sending data.TCP232-302 ID is decimal .1-65535

(ID function and transparent transmission can't work at same time)

3.4.5. Index Function

When TCP232-302 works as TCP Server, it can establish 16 links simultaneously at most. Default is 4 .

Take 4 link as example, Server send data to 4 Client simultaneously or Server can't distinguish the data source, Index can realize the choice of data source of sending or receiving.

Index function can be set by software or web-page.

3.4.6. RFC2217 Function

By this function , TCP232-302 port parameter can be modified when working . E.g. change baud rate from 115200bps to 9600bps. The function can be set by software or webpage. By default , it is checked.

When RFC2217 function of TCP232-302 is checked, RFC2217 function of USR-VCOM software is also checked, the baud rate of software on PC will automatically matched with the baud rate of TCP232-302.

3.5. Additional Function

3.5.1. Display IP and Data

On the webpage of TCP232-302, it can display the IP of device and sent/received data byte, and the total data byte of TCP232-302.

In TCP Mode, it can display the TOP 5 device IP and sent/received data byte. In UDP Mode, it only display sent/received data byte.

3.5.2. Serial Port Parameter Setting

For TCP232-302 parameter setting, it doesn't need CFG（Reload）pin and specific baud rate.

3.5.3. Set Client Number in TCP Server Mode

In TCP Server Mode, The maximum number can be configured by user. TCP Client number is from 1 to 16, default value 4. When the Client link is more than 16, the new link will replace the former link from Link 1

When the Client link is more than 4, send and receive data at same time , the data flow should be within 2.5 KB/s

3.5.4. Defined MAC Address

Mac address can be modified. Factory Mac address is exclusive.

3.5.5. Defined DNS Server IP

To resolve server domain name, user should send data by gateway or router, then gateway or router Distributes IP address, it can show IP in the webpage. User can set specific domain name resolution IP, to specific gateway or router to resolve domain name.

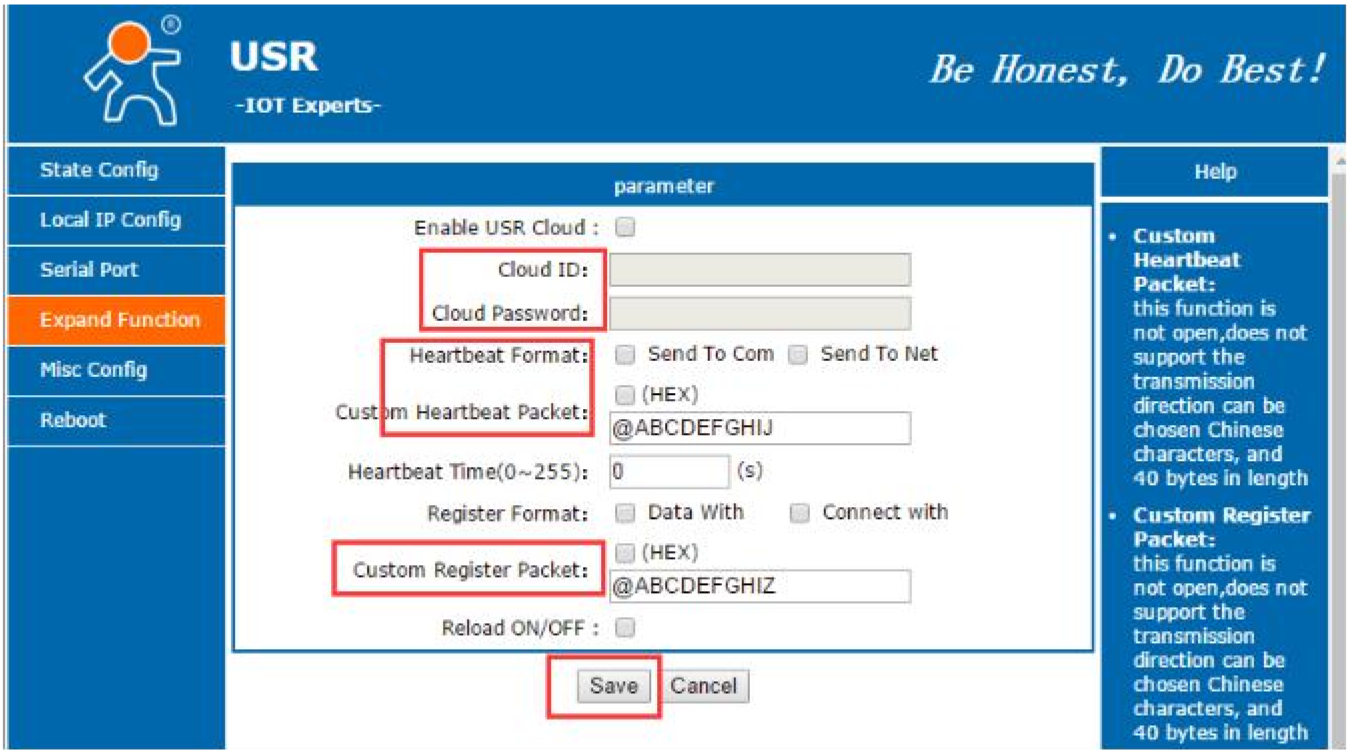
3.5.6. Defined Registration Package

The content of registration package can be defined, 40 bytes at most.

It includes sending registration package when connecting and carrying registration package when sending data. It can be used singly or together. It support TCP Client.

It is set by webpage, support decimal input and hexadecimal input, doesn’t support character input.

By default, heartbeat package turns off. User can turn on it as follows:



Enable USR Cloud : □

Cloud ID:

Cloud Password:

Heartbeat Format: □ Send To Com □ Send To Net

Custom Heartbeat Packet: □ (HEX) @ABCDEFGHIJ

Heartbeat Time(0~255): 0 (s)

Register Format: □ Data With □ Connect with

Custom Register Packet: □ (HEX) @ABCDEFGHIZ

Reload ON/OFF : □

- **Custom Heartbeat Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length
- **Custom Register Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length

3.5.7. Defined Heartbeat Package

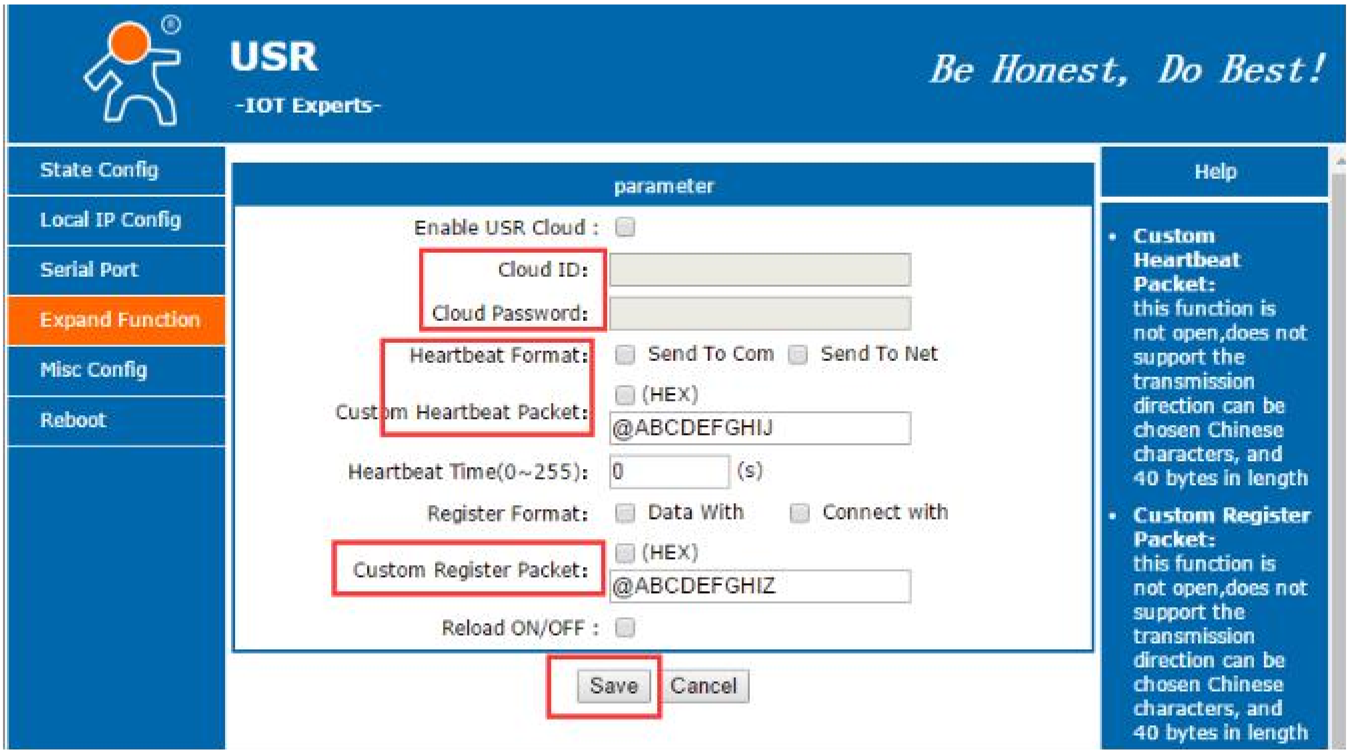
The content of heartbeat package can be defined, 40 bytes at most. Time set from 0s to 65535s.

When 0s or data transmission, heartbeat package stop working.

It can ensure connection is reliable, put an end to connect feign death; It can send to LAN Port or Serial Port singly or at same time. If don’t choose direction, heartbeat package stop working.

User can set the parameter in webpage, it can work in TCP Client and TCP Server .It support decimal input and sixteen input , doesn’t support character input.

By default, heartbeat package turns off. User can turn on it as follows:



Enable USR Cloud : □

Cloud ID:

Cloud Password:

Heartbeat Format: □ Send To Com □ Send To Net

Custom Heartbeat Packet: □ (HEX) @ABCDEFGHIJ

Heartbeat Time(0~255): 0 (s)

Register Format: □ Data With □ Connect with

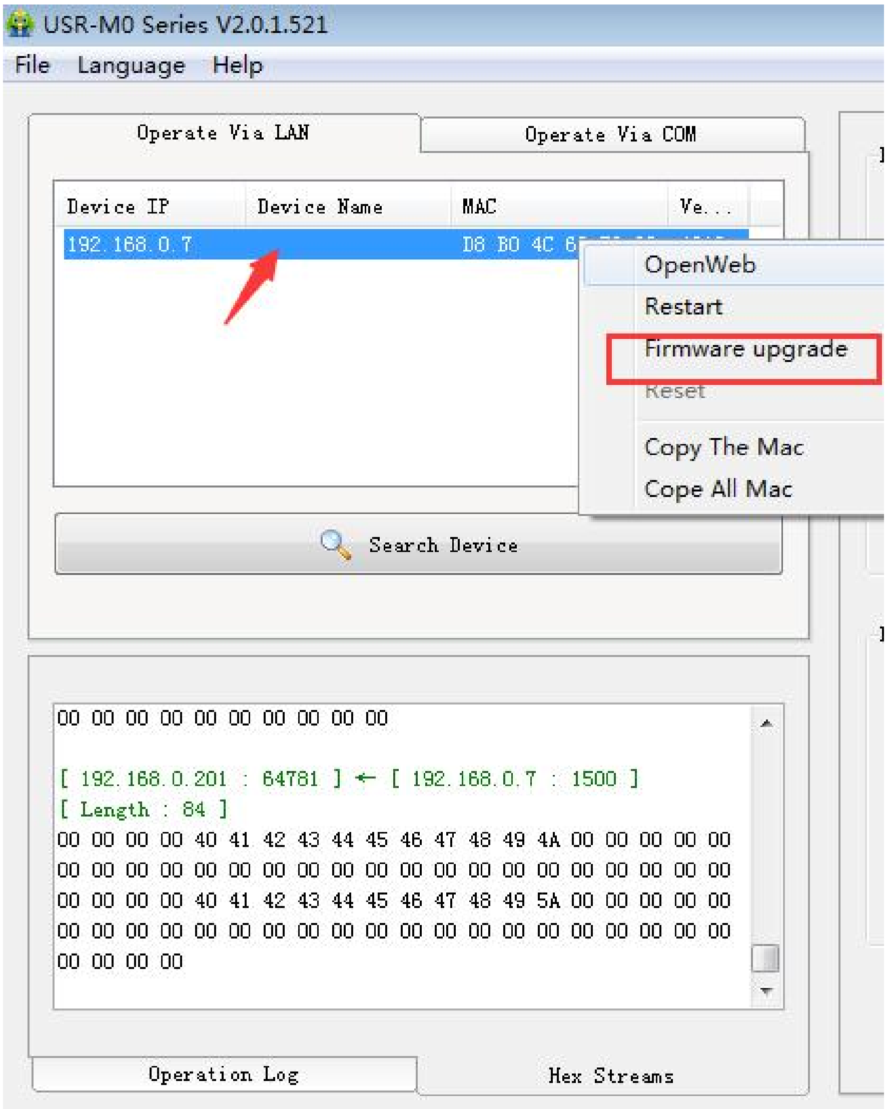
Custom Register Packet: □ (HEX) @ABCDEFGHIZ

Reload ON/OFF : □

- **Custom Heartbeat Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length
- **Custom Register Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length

3.6. Firmware Upgrade

When Module T2 IP and PC IP is in the same segment , click here, then click “firmware upgrade”



```
00 00 00 00 00 00 00 00 00 00

[ 192.168.0.201 : 64781 ] ← [ 192.168.0.7 : 1500 ]
[ Length : 84 ]
00 00 00 00 40 41 42 43 44 45 46 47 48 49 4A 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 40 41 42 43 44 45 46 47 48 49 5A 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00
```

Diagram 3.6-1 Firmware Update

3.7. Configuration Protocol

Configuration flow: to configure protocol cross segment ,all communication protocol is set by UDP Broadcast, Little-endian .In UDP communication,target port number should be 1500. Local port number is random. All communication protocol is UDP broadcast.

3.7.1. Network setting protocol command

Chart 3.7-1 - Query command

Function	Head of data package	Length (command-1 bite)	Command	MAC address (6 bite)	User name and (12 bite)	Parameter	Check bit (sum)
Search	FF	01	01	-	-	-	02
Restart	FF	xx	02	[MAC]	[usrname]	-	xx

					[password]		
Read configuration	FF	xx	03	[MAC]	[usrname] [password]	-	xx
Basic setting	FF	xx	05	[MAC]	[usrname] [password]	Basic parameter	xx
Port 0 setting	FF	xx	06	[MAC]	[usrname] [password]	Port parameter	xx
Factory Default	FF	xx	0b	[MAC]	[usrname] [password]	-	xx
Cloud setting	FF	xx	0c	[MAC]	[usrname] [password]	Port parameter	xx
Heartbeat package Setting	FF	xx	21	[MAC]	[usrname] [password]	Port parameter	xx
Extension setting	-	-	-	-	-	-	-

To confirm command accuracy ,we set algorithm of sending data and check method: sum check . From length byte (include length) to check bit (not include check) ,the sum is check value, only keep lower byte.

Search command : Fixed command FF 01 01 02, sum check 02=01+01

Restart command : send (22 byte) FF 13 02 00 71 77 7C 42 2F 61 64 6D 69 6E 00 61 64 6D 69 6E 00 FC,

sum check: FC=13+02......6E+00,

From 4th to 9th is TCP232-302 MAC address. The last 12 byte before check bit is user name and password, both is 6 byte, if not, write 0 (the last byte of user name and password should be 0 , the following name and password is the same rule)

Read Configuration command :send (22 byte) FF 13 03 00 71 77 7C 42 2F 61 64 6D 69 6E 00 61 64 6D 69 6E 00 FD,

FD= 13 + 03 + 00 + ... + 6E + 00

From 4th to 9th is TCP232-302 MAC address. The last 12 byte before check bit is user name and password, both is 6 byte, if not, write 0.

Basic setting command: it includes 67 basic parameter.

E.g : send FF 56 05 00 71 77 7c 42 2F 61 64 6d 69 6e 00 61 64 6d 69 6e 00 95 63 03 00 00 00 50 00 00 07 00 a8 c0 c9 00 a8 c0 00 FF FF FF 55 6c 6c 2d 66 32 00 00 00 00 00 00 00 00 00 00 61 64 6d 69 6e 00 61 64 6d 69 6e 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04, check byte uses sum check method 04 = 56 + 05 + 00+ ... + 01;

From 4th to 9th is TCP232-302 MAC address,10th to 22th is user name and password .The following byte is basic setting parameter,the last byte is sum check byte.

Chart 3.7 -2 - basic setting command

Name	Byte	Example	Instruction
ucSequenceNum	1	00	Reserve package head

ucCRC	1	00	Reserve package head
ucVersion	1	00	Reserve package head
ucFlags	1	80	8th 0:DHCP； 1:Static IP 7 th 0:Turn off factory default function 1:Turn on factory default function
usLocationURLPort	2	00 00	Not enabled, reserved protocol
usHTTPServerPort	2	50 00	HTTP service port
ucUserFlag	1	00	Not enabled, reserved protocol
ulStaticIP	4	07 00 A8 C0	Static IP
ulGatewayIP	4	C9 00 A8 C0	Gateway
ulSubnetMask	4	00 FF FF FF	Subnet mask
ucModName	14	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00	Module name
Protocol reserved	2	00 00	Must be 0
username	6	61 64 6D 69 6E 00	User name
password	6	61 64 6D 69 6E 00	Password
ucNetSendTime	1	00	Not enabled, reserved protocol
uiId	2	01 00	Device ID

ucIdType	1	A4	bit0(1): send ID when connecting ;
			bit1(2): send ID when sending data;
			bit2(4): RS485;
			bit4(16): Reset;
			bit5(32):Link-state;
			bit6(64): index function;
			bit7(128):Similar RFC2217 function,

mac_addrs	6	00 00 00 00 00 00	Device Mac address（only support query）
DNSGatewayIP	4	01 00 A8 C0	DNS address（only support query）
ucReserved	4	00 00 00 00	Unused

Port configuration: The parameter which is used to configure Lan port and Serial port is 63 byte .

E.g.: send (63 byte) FF 52 06 00 71 77 7C 42 2F 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 C2 01 00 08 01 01 01 00 00 00 00 8C 4E 2A 20 31 39 32 2E 31 36 38 2E 30 2E 32 30 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 c9 00 A8C0 00 01 00 00 00 00 00 00 00 05 00 00 00 00 F0,

Check byte method : F0=52 + 06 + ... + 00 ;

From 4th to 9th is TCP232-302 MAC address,10th to 22th is user name and password.the following is port parameter +1 byte and check bit .

Chart 3.7-3 - Port setting command

Name	Byte	Example	Instruction
ulBaudRate	4	00 C2 01 00	Serial port baud rate
ucDataSize	1	08	Serial port data bite (0X05/0x06/0x07/0x08)
ucParity	1	01	Serial port check bite

			1:no, 2:odd, 3:even, 4:mark, 5:space
ucStopBits	1	01	Serial port stop bite (0x01/0x02)
ucFlowControl	1	00	Not enabled, reserved protocol
ulTelnetTimeout	4	00 00 00 00	Not enabled, reserved protocol
usTelnetLocalPort	2	8C 4E	Local port
usTelnetRemotePort	2	2a 20	Remote port
uiTelnetURL	30	31 39 32 2E 31 36 38 2E 30 2E 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	IP address or domain name send by ASCII E.g.: 192.168.0.1
ulTelnetIPAddr	4	00 00 00 00	Not enabled,
ucFlags	1	00	Cloud function: For 5th , 0: turn off cloud 1: turn on cloud
ucWorkMode	1	01	Work mode : 0: UDP, 1:TCP Client, 2: UDP Server, 3: TCP Server 4: HTTPD Client
HTPucFlags	1	00	0：HTTPD GET; 1:HTTPD POST
tc_number	1	04	Client number that TCP Server can connect
uiPackLen	2	00 00	Not enabled, reserved protocol
ucPackTime	1	0A	Serial port packing time
ucTimeCount	1	91	Write the read data as it is .
ucReserved	5	00 00 00 00 00	Write 00 00 00 00 00. For extension use

Factory default : send FF 13 0B 00 71 77 7C 42 2F 61 64 6D 69 6E 00 61 64 6D 69 6E 00 07;

Sum check: 07 = 13 + 0B+ ... + 6E + 00

From 4th to 9th is TCP232-302 MAC address,10th to 21th is user name and password , both is 6 byte ,if not , write 0.

Cloud function command : send FF 13 0c 00 71 77 7c 42 2F 61 64 6d 69 6e 00 61 64 6d 69 6e 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 08;

Sum check：07 = 13 + 0c + ... + 6E + 00+...+00;

From 4th to 9th is TCP232-302 MAC address,10th to 21th is user name and password , both is 6 byte ,if not , write 0. The following is Cloud ID and password, the last one is check bit.

Heartbeat package function: send FF 13 21 00 71 77 7c 42 2F 61 64 6d 69 6e 00 61 64 6d 69 6e 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 1d;

Sum check: 1d = 13 + 21 + ... + 6E + 00+...+00;

From 4th to 9th is TCP232-302 MAC address,10th to 21th is user name and password, both is 6 byte ,if not , write 0. The following is heartbeat and registration Sending direction,heartbeat time, heartbeat package length,registration package length,heartbeat package,registration package,heartbeat package and registration package are both 40 byte, if not,write 0, the last one is check bit.

Chart 3.7-4 - Heartbeat&registration package command

Name	Byte	Example	Instruction
H_R_ucFlags	1	00	1th is 1 : heartbeat package to Lan port. 2th is 1: heartbeat package to Serial port. 3th is 1: send registration package. 4th is 1: data carry registration package. 5th is 1: httpd remove package head. 6th is 1: turn on serial port setting parameter function. 7th is 1: input heartbeat package 16 binary system. 8th is : input registration package 16 binary system.
heart_times	1	3c	heartbeat time
heart_len	1	00	heartbeat package length
register_len	1	00	registration package length
heartbeat	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	heartbeat package content
register_s	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	registration package content

3.7.2. Network echo command.

Search command return result : (36 byte) FF 24 01 00 00 c0 a8 00 07 00 71 77 7c 42 2F 01 0c 00 00 55 53 52 2d 4b 32 00 00 00 00 00 00 00 00 00 00 F2
Initial value is 0X00, subtract each byte in sequence.
F2= 00 - FF - 24 - 01 - 00 - 4B - ... - 31 - 00 – 00.

Chart 3.7-5 - Search instruction reply command

Name	Byte	Example	Instruction
TAG_STATUS	0	FF	Fixed number

Packet_length	1	24	Fixed number
CMD_DISCOVER_TARGET	2	01	Fixed number
Board_type	3	00	Fixed number
Board_ID	4	00	Fixed number
Client_IP_address	5~8	C0 A8 00 07	Device IP（big-endian）
MAC_address	9~14	AC CF 23 20 FE 3D	Device MAC（big-endian）
Firemware_version	15~18	01 00 00	Firmware version
Application_title	19~34	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00 00 00	Device name
checksum	35	F0	Initial value is 0x00, subtract TAG_STATUS byte in sequence u until the last byte. Result is checksum

Return result of restart command: (4 byte)
FF 01 02 4B ,if user name and password is correct 4B = 'K'
FF 01 02 50 ,user name and password is wrong 50 ＝'P'
Return result of read command: return result is all parameters of TCP232-302 ,264 byte
Not include check and protocol ,return parameter directly. Refer to Chart 2-4. Return result
In 3 package. 130 byte, 50 byte, 84 byte.

```
e.g.:   95 63 03 00 00 00 50 00 00 07 00 A8 C0 01 00 A8 C0 00 FF FF FF 55 53 52 2D 54 43 50 32 33 32
2D 33 31 30 00 00 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 01 00 A4 AC CF 23 20 FE 10 00 00 00 00 00
00 00 00 80 25 00 00 08 01 01 01 00 00 00 00 8C 4E 2A 20 31 39 32 2E 31 36 38 2E 31 2E 31 33 33 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 85 01 A8 C0 00 01 00 00 00 00 00 00 00 00 00 00 00;
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
        00 30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00;
```

If password is wrong ,it returns FF 01 03 50.

Return result of basic parameter setting :

If correct ,it return FF 01 05 4B. If password is correct 4B = 'K'
FF 01 05 50 If password is wrong 50 ＝'P'

Return result of serial port parameter setting :

If correct, it return FF 01 06 4B If password is correct 4B = 'K'

FF 01 06 50 If password is wrong 50 ＝'P'

Return result of cloud parameter setting :

If correct, it return FF 01 06 4B If password is correct 4B = 'K'
FF 01 06 50 If password is wrong 50 ＝'P'

Return result of heartbeat registration parameter setting :

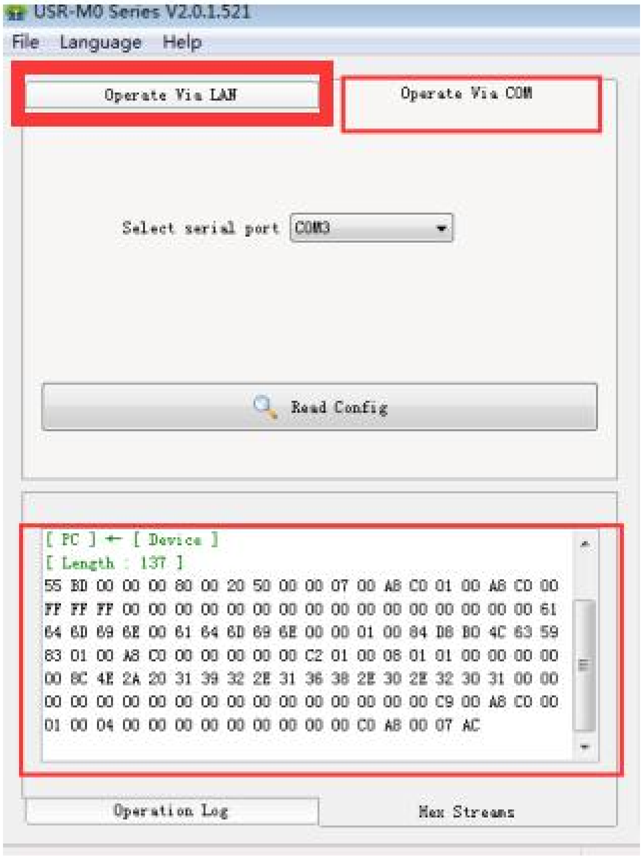
If correct, it return FF 01 06 4B If password is correct 4B = 'K'
FF 01 06 50 If password is wrong 50 ＝'P'

Other return result:

If check sum is wrong , it return ”E” + right check sum.
Right operation: FF 01 CMD ’K ‘
If user name and password is wrong , it return FF 01 CMD ’P’
Other is wrong ,it returns FF 01 CMD’E’

3.7.3. Monitor function

If user want to monitor message, please do as follows with USR-M0 software.



```
[ PC ] ← [ Device ]
[ Length : 137 ]
55 BD 00 00 00 80 00 20 50 00 00 07 00 A8 C0 01 00 A8 C0 00
FF FF FF 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 61
64 6D 69 6E 00 61 64 6D 69 6E 00 00 01 00 84 D8 B0 4C 63 59
83 01 00 A8 C0 00 00 00 00 00 C2 01 00 08 01 01 00 00 00 00
00 8C 4E 2A 20 31 39 32 2E 31 36 38 2E 30 2E 32 30 31 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 C9 00 A8 C0 00
01 00 04 00 00 00 00 00 00 00 00 00 C0 A8 00 07 AC
```

3.7.4. Serial port setting protocol

In order to enter serial port setting mode, user must set command according to Protocol .TCP232-302 setting commands are as follows. User can also use set up Software , there is no limit for baud rate of sending data, 9600 and 115200 is high recommend. Package head is as follows:

55 BD read M0 series parameter configuration.

55 BE configure basic parameter configuration
55 BF configure serial port 0 parameter configuration
55 BB configure extend parameter configuration
55 B1 5A restart command

Basic configuration : It includes some serial port parameter configuration. Total 67 byte, check bit xx= 00 + 00 +00+80 ... + 00. Send 55 BE+basic parameter+check bit, If configuration is right ,it returns BE 4B, otherwise ,it returns BE 45.

Chart 3.7-6 - Port setting command

Name	Byte	Example	Instruction
ucSequenceNum	1	00	Reserve package head
ucCRC	1	00	Reserve package head
ucVersion	1	00	Reserve package head
ucFlags	1	80	8th 0:DHCP； 1:Static IP 7 th 0:Turn off factory default function 1:Turn on factory default function
usLocationURLPort	2	00 00	Not enabled, reserved protocol
usHTTPServerPort	2	50 00	HTTP service port
ucUserFlag	1	00	Not enabled, reserved protocol
ulStaticIP	4	07 00 A8 C0	Static IP
ulGatewayIP	4	C9 00 A8 C0	Gateway
ulSubnetMask	4	00 FF FF FF	Subnet mask
ucModName	14	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00	Module make
Protocol reserved	2	00 00	Must be 0
username	6	61 64 6D 69 6E 00	User name
password	6	61 64 6D 69 6E 00	Password
ucNetSendTime	1	00	Not enabled, reserved protocol
uiId	2	01 00	Device ID

ucIdType	1	A4	bit0(1): send ID when connecting ;
			bit1(2): send ID when sending data;
			bit2(4): RS485;
			bit4(16): Reset;
			bit5(32):Link-state;
			bit6(64): index function;
			bit7(128):Similar RFC2217 function,

mac_addrs	6	00 00 00 00 00 00	Device Mac address（only support query）
DNSGatewayIP	4	01 00 A8 C0	DNS address（only support query）
ucReserved	4	00 00 00 00	Unused

Port setting command: it include 65 byte, sum check method . Send 55 BF+basic parameter + check bit. If correct ,it returns BE 4B. Otherwise, it returns BE 45.

Chart 3.7-7 - Port setting command

Name	Byte	Example	Instruction
ulBaudRate	4	00 C2 01 00	Serial port baud rate
ucDataSize	1	08	Serial port data bite (0X05/0x06/0x07/0x08)
ucParity	1	01	Serial port check bite 1:no, 2:odd, 3:even, 4:mark, 5:space
ucStopBits	1	01	Serial port stop bite (0x01/0x02)
ucFlowControl	1	00	Not enabled, reserved protocol
ulTelnetTimeout	4	00 00 00 00	Not enabled, reserved protocol
usTelnetLocalPort	2	8C 4E	Local port
usTelnetRemotePort	2	2a 20	Remote port
uiTelnetURL	30	31 39 32 2E 31 36 38 2E 30 2E 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	IP address or domain name send by ASCII E.g.: 192.168.0.1
ulTelnetIPAddr	4	00 00 00 00	Invalid byte , arbitrary configuration
ucFlags	1	00	Cloud function: For 5th , 0: turn off cloud 1: turn on cloud
ucWorkMode	1	01	Work mode : 0: UDP, 1:TCP Client, 2: UDP Server, 3: TCP Server 4: HTTPD Client
HTPucFlags	1	00	0：HTTPD GET; 1:HTTPD POST
tc_number	1	04	Client number that TCP Server can connect
uiPackLen	2	00 00	Not enabled, reserved protocol
ucPackTime	1	0A	Serial port packing time
ucTimeCount	1	91	Write the read data as it is .
ucReserved	5	00 00 00 00 00	Write 00 00 00 00 00. For extension use

Read configuration command : TCP232-302 send 55 BD, return value is 137 byte, there is no check bit. TCP232-302 return parameter is as follows.

Chart 3.7- 8 - Read configuration command

Name	Byte	Example	Instruction
ucSequenceNum	2	55 bd	Reserve package head
ucCRC	1	00	Reserve package head
ucVersion	1	00	Reserve package head
ucFlags	1	80	8th 0:DHCP； 1:Static IP 7th 0:Turn off factory default function 1:Turn on factory default function
usLocationURLPort	2	00 00	Not enabled, reserved protocol

usHTTPServerPort	2	50 00	HTTP service port
ucUserFlag	1	00	Not enabled, reserved protocol
ulStaticIP	4	07 00 A8 C0	Static IP
ulGatewayIP	4	C9 00 A8 C0	Gateway
ulSubnetMask	4	00 FF FF FF	Subnet mask
ucModName	14	55 53 52 2D 4B 32 00 00 00 00 00 00 00 00	Module name
Protocol reserved	2	00 00	Must be 0
username	6	61 64 6D 69 6E 00	User name
password	6	61 64 6D 69 6E 00	Password
ucNetSendTime	1	00	Not enabled, reserved protocol
uiId	2	01 00	Device ID

ucIdType	1	A4	bit0(1): send ID when connecting ;
			bit1(2): send ID when sending data;
			bit2(4): RS485;
			bit4(16): Reset;
			bit5(32):Link-state;
			bit6(64): index function;
			bit7(128):Similar RFC2217 function,

mac_addrs	6	00 00 00 00 00 00	Device Mac address（only support query）
DNS Gateway IP	4	01 00 A8 C0	DNS address（only support query）
ucReserved	4	arbitrary value	Unused
ulBaudRate	4	00 C2 01 00	Serial port baud rate
ucDataSize	1	08	Serial port data bite (0X05/0x06/0x07/0x08)
ucParity	1	01	Serial port check bite 1:no, 2:odd, 3:even, 4:mark, 5:space
ucStopBits	1	01	Serial port stop bite (0x01/0x02)
ucFlowControl	1	00	Not enabled, reserved protocol
ulTelnetTimeout	4	00 00 00 00	Not enabled, reserved protocol
usTelnetLocalPort	2	8C 4E	Local port
usTelnetRemotePort	2	2a 20	Remote port
uiTelnetURL	30	31 39 32 2E 31 36 38 2E 30 2E 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	IP address or domain name send by ASCII E.g.: 192.168.0.1
ulTelnetIPAddr	4	00 00 00 00	Not enabled,
ucFlags	1	00	Cloud function: For 5th , 0: turn off cloud 1: turn on cloud
ucWorkMode	1	01	Work mode : 0: UDP, 1:TCP Client, 2: UDP Server, 3: TCP Server 4: HTTPD Client

HTPucFlags	1	00	0：HTTPD GET; 1:HTTPD POST
tc_number	1	04	Client number that TCP Server can connect
uiPackLen	2	00 00	Not enabled, reserved protocol
ucPackTime	1	0A	Serial port packing time
ucTimeCount	1	91	Write the read data as it is .
ucReserved	5	00 00 00 00 00	Write 00 00 00 00 00. For extension use
Current IP	4	07 00 A8 C0	Current module IP address
Version	1	01	Version number

Serial port configuration extended function parameter: extended function 112 character, send 55 BB + special function character + check bit. If correct , it returns BB 4B. Otherwise It returns BB 45.

Chart 3.7-9 - Serial port setting extended function parameter command

Name	Byte	Example	Instruction
Device ID	20	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Module Cloud ID
CLOUD_password	8	00 00 00 00 00 00 00 00	Module Cloud password
H_R_ucFlags	1	00	1th is 1 : heartbeat package to Lan port. 2th is 1: heartbeat package to Serial port. 3th is 1: send registration package. 4th is 1: data carry registration package. 5th is 1: httpd remove package head. 6th is 1: turn on serial port setting parameter function. 7th is 1: input heartbeat package 16 binary system. 8th is : input registration package 16 binary system.
heart_times	1	3c	heartbeat time
heart_len	1	00	heartbeat package length
register_len	1	00	registration package length
heartbeat	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	heartbeat package content
register_s	40	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	registration package content

3.7.5. Reset command

Send 55 B1 5A, if correct , it returns BA 4B, then module restart. If wrong, it won't return.

3.7.6. Similar T24 series setting protocol

Network command : Fixed format 40 byte data package, please refer to the following format and data , TCP232-302 will return 35 bytes data package. 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39 30 31 32 33 34 35 36 37 38 39. When setting parameter ,it send 40 bytes, returns 35 bytes.

Chart 3.7-10 -Network command

Name	Byte	Example	Instruction
MAC	6	00 CE 83 25 4D 60	Module MAC that need to be set
Old password	6	31 31 30 34 31 35	Password for network module，110415 is initial password.
Target IP	4	C9 00 A8 C0	Target IP
Target Port	2	2A 20	Target Port
Module IP	4	07 00 A8 C0	Module IP
Module Port	2	8C 4E	Module Port
Gateway	4	C9 00 A8 C0	Gateway IP
Work mode	1	01	0:UDP Client, 1:TCP Client 2:UDP Server, 3:TCP Server
Baud rate	3	00 C2 01	Port baud rate
Port parameter bit	1	03	Data bit, stop bit, check bit
Independent ID	3	00 00 00	ID-H,ID-L,ID-type, if don't need, write 0（ID type has addition meaning ,refer to appendix Ⅰ）
Subnet mask	4	00 FF FF FF	Subnet mask,Little Endian

Chart 3.7- 11- Network return parameter

Name	Byte	Example	Instruction
MAC	6	00 CE 83 25 4D 60	Module MAC that need to be set
Version	1	42	Version
Target IP	4	C9 00 A8 C0	Target IP
Target Port	2	2A 20	Target Port
Module IP	4	07 00 A8 C0	Module IP
Module Port	2	8C 4E	Module Port
Gateway	4	C9 00 A8 C0	Gateway IP

Work mode	1	01	0:UDP Client, 1:TCP Client 2:UDP Server, 3:TCP Server
Baud rate	3	00 C2 01	Port baud rate
Port parameter bit	1	03	Data bit, stop bit, check bit
Independent ID	3	00 00 00	ID-H,ID-L,ID-type, if don’t need, write 0 （ID type has addition meaning ,refer to appendixⅠ）
Subnet mask	4	00 FF FF FF	Subnet mask,Little Endian

Port parameter set : Port parameter set of similar T24 set protocol.

Read parameter command: send 55BC to TCP232, return message and set

Parameter command as follows:

Chart 3.7-12 -Read parameter return command

Name	Byte	Example	Instruction
Head of data package	2	55 BC	Head of data package
Target IP	4	C9 00 A8 C0	Target IP
Target Port	2	2A 20	Target Port
Module IP	4	07 00 A8 C0	Module IP
Module Port	2	8C 4E	Module Port
Gateway	4	C9 00 A8 C0	Gateway IP
Work mode	1	01	0:UDP Client, 1:TCP Client 2:UDP Server, 3:TCP Server
Baud rate	3	00 C2 01	Port baud rate
Port parameter bit	1	03	Data bit, stop bit, check bit
Independent ID	3	00 00 00	ID-H,ID-L,ID-type, if don’t need, write 0 （ID type has addition meaning ,refer to appendixⅠ）
Subnet mask	4	00 FF FF FF	Subnet mask,Little Endian
Firmware version	1	58	Firmware version lowest byte
Sum Check	1	B9	Sum check, from target IP to sum check　(result keep low byte)

Chart 3.7- 13 - Set parameter command

Name	Byte	Example	Instruction
Head of data package	2	55 BA	Head of data package
Target IP	4	C9 00 A8 C0	Target IP
Target Port	2	2A 20	Target Port

Module IP	4	07 00 A8 C0	Module IP
Module Port	2	8C 4E	Module Port
Gateway	4	C9 00 A8 C0	Gateway IP
Work mode	1	01	0:UDP Client, 1:TCP Client 2:UDP Server, 3:TCP Server
Baud rate	3	00 C2 01	Port baud rate
Port parameter bit	1	03	Data bit, stop bit, check bit
Independent ID	3	00 00 00	ID-H,ID-L,ID-type, if don’t need, write 0 （ID type has addition meaning ,refer to appendix Ⅰ）
Subnet mask	4	00 FF FF FF	Subnet mask,Little Endian
Sum Check	1	61	Sum check, from target IP to sum check (result keep low byte)

3.8. UART Framing mechanism

3.8.1. packing method

TCP232-302 accepts time packing method.

1) packing time standard: more than 4 byte packing time.
2) Calculation method :

√ TCP232-302 Port parameter :data bit 8 byte, stop bit 1 byte, start bit 1byte.

√ Length of one data : 8+1+1=10

√ Packing time of four byte:

$$T = \frac{1}{\text{波特率}} * 10 * 4$$

√ Port packing length : 400 byte.

√ When baud rate is 115200, default packing time 0.4ms.

3.8.2. Flow calculation

When TCP232-302 work in Cloud mode ,it receives network data, then it sends to Port. Because port speed is limited, sometimes data will overflow.

E.g network data will send m byte data every n seconds. To check whether data can Overflow : (support notwork is in good station ,network data transmission time is negligible) If data won’t overflow , m byte data can be finished in n seconds.

M byte data transmission time :

$$T = \frac{1}{\text{波特率}} * 10 * \mathrm{m}$$

If n> 2T ,data won’t overflow, TCP232-302 work well.

4. Parameter Setting

Parameter setting can be done by webpage and software.

1)TCP232-302 connects PC by LAN （TCP232-302 IP and PC IP should in the same network segment）

2)TCP232-302 connects PC by Router. Under this situation ,one PC can connect several TCP232-302 or one TCP232-302 can connect several devices.

4.1. Webpage Setting

Parameters need to be set:

1) Work Mode

◆TCP Client/ TCP Server/ UDP Client/ UDP Server

2) TCP/UDP parameter:

◆Connection Type : Server/ Client / HTTPD Client

◆Remote Port and IP

◆Local Port

3) Serial Parameter

◆Baud rate/Data bit/ Check bit/ Stop bit

◆RS485

4) IP and Server setting

Note : After setting parameter, please save and restart.

4.2. Log in

Open a browser, type 192.168.07 , Name and password：admin

User can also log in by software.

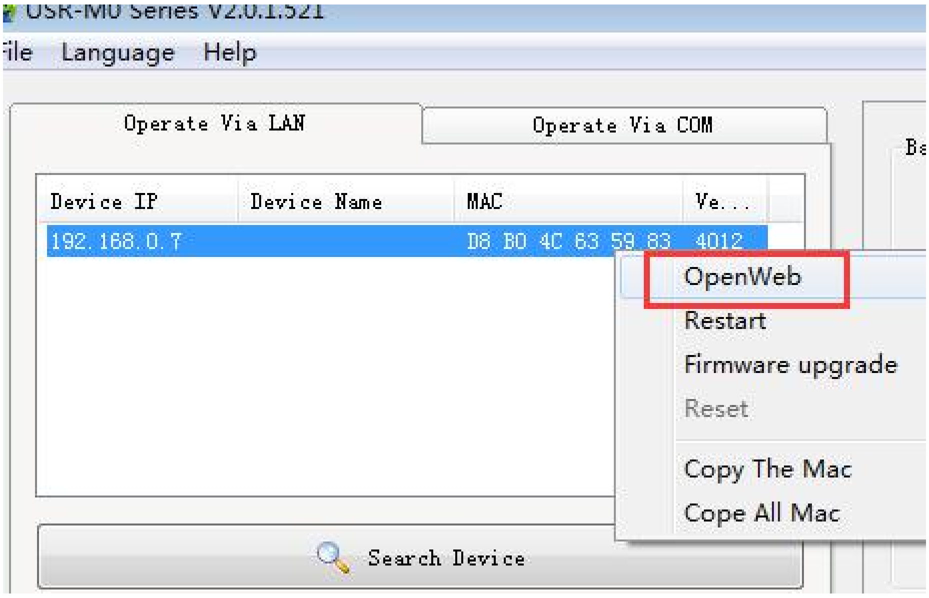
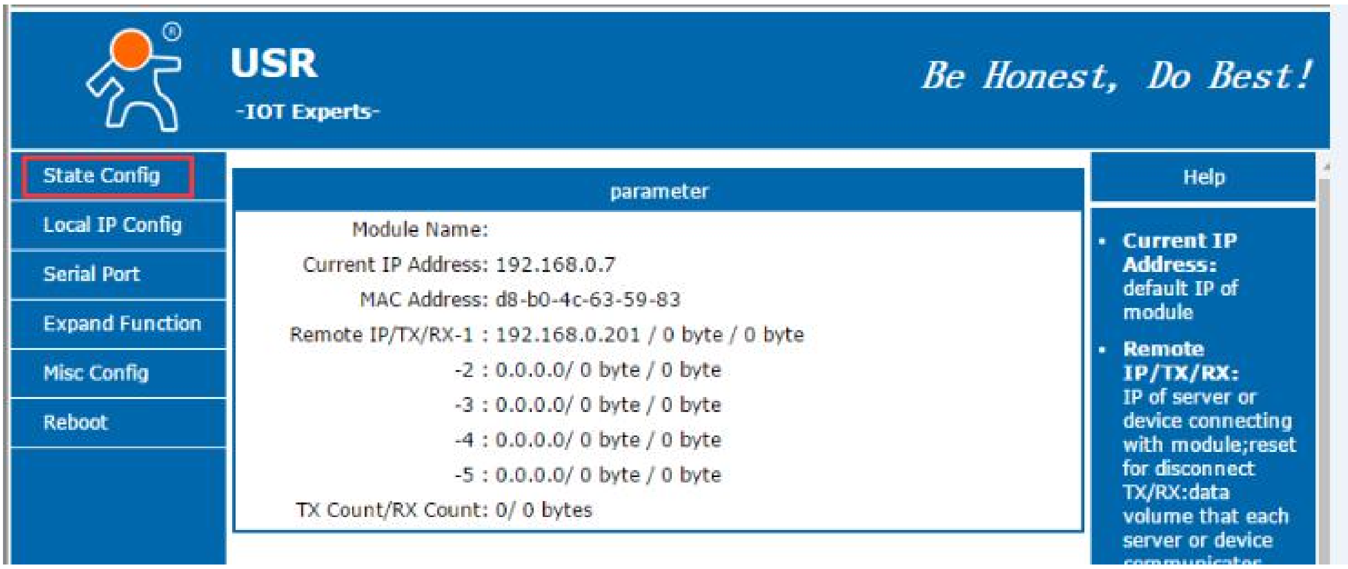


Diagram 4.2-1 Open Web

4.3. State Configuration

Current IP ,Mac, Remote IP/ TX/RX, TX Count/RX Count



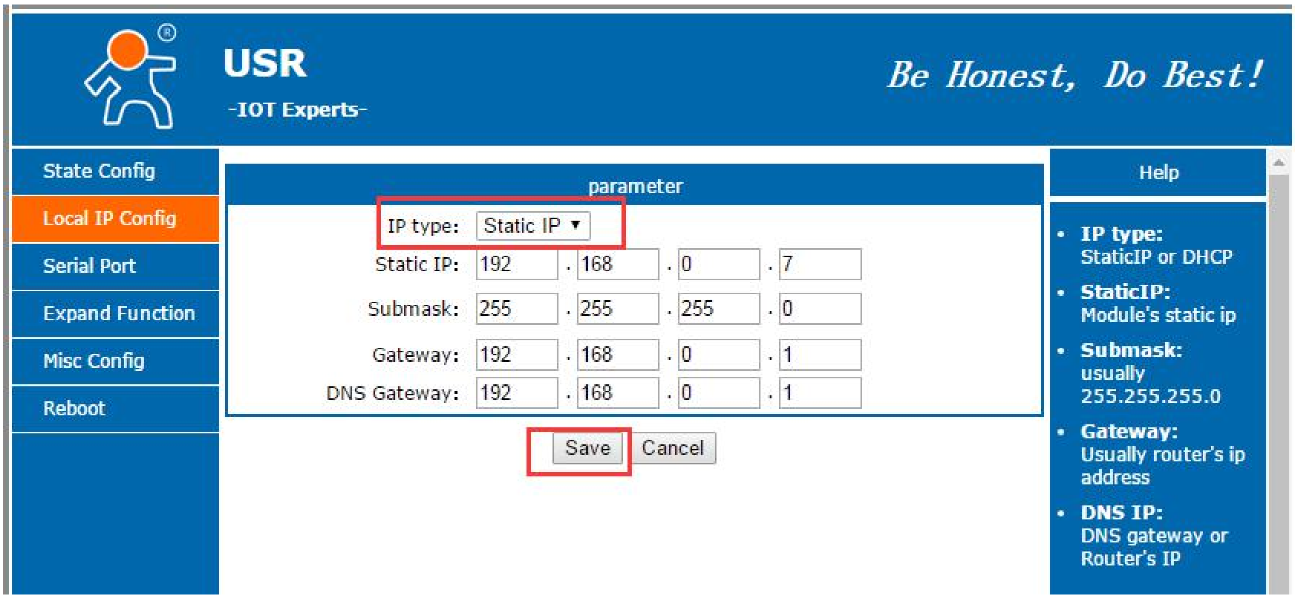
Module Name:
Current IP Address: 192.168.0.7
MAC Address: d8-b0-4c-63-59-83
Remote IP/TX/RX-1 : 192.168.0.201 / 0 byte / 0 byte
-2 : 0.0.0.0/ 0 byte / 0 byte
-3 : 0.0.0.0/ 0 byte / 0 byte
-4 : 0.0.0.0/ 0 byte / 0 byte
-5 : 0.0.0.0/ 0 byte / 0 byte
TX Count/RX Count: 0/ 0 bytes

- **Current IP Address:** default IP of module
- **Remote IP/TX/RX:** IP of server or device connecting with module;reset for disconnect TX/RX:data volume that each server or device communicates

Diagram 4.3-1 State Configuration

4.4. Local IP

IP type: Static IP (TCP232-302 Fixed IP)and DHCP（obtain an IP address automatically）
Static IP: don’t set it the same as local network IP
Submask: aims to distinguish network segment, default is 255.255.255.0
Gateway: Router IP
DNS Gateway: default IP is module gateway when gateway or router is resolving domain name



IP type: Static IP

Static IP: 192 . 168 . 0 . 7

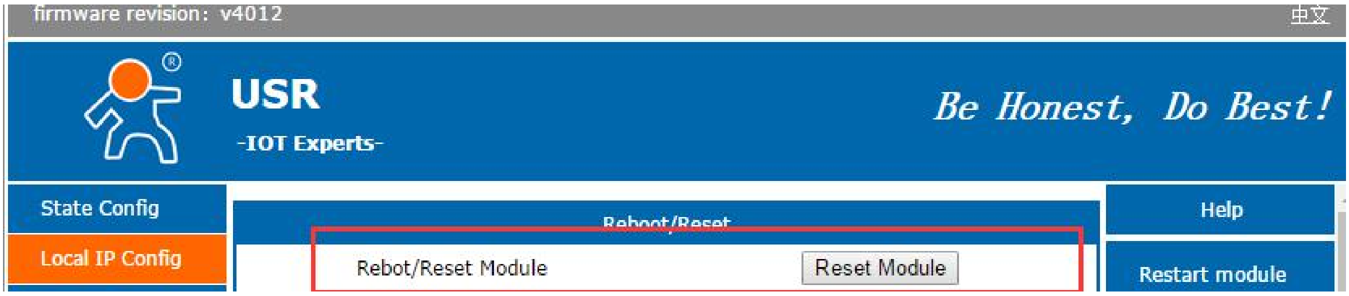
Submask: 255 . 255 . 255 . 0

Gateway: 192 . 168 . 0 . 1

DNS Gateway: 192 . 168 . 0 . 1

- **IP type:** StaticIP or DHCP
- **StaticIP:** Module's static ip
- **Submask:** usually 255.255.255.0
- **Gateway:** Usually router's ip address
- **DNS IP:** DNS gateway or Router's IP

Diagram 4.4-1 Local IP



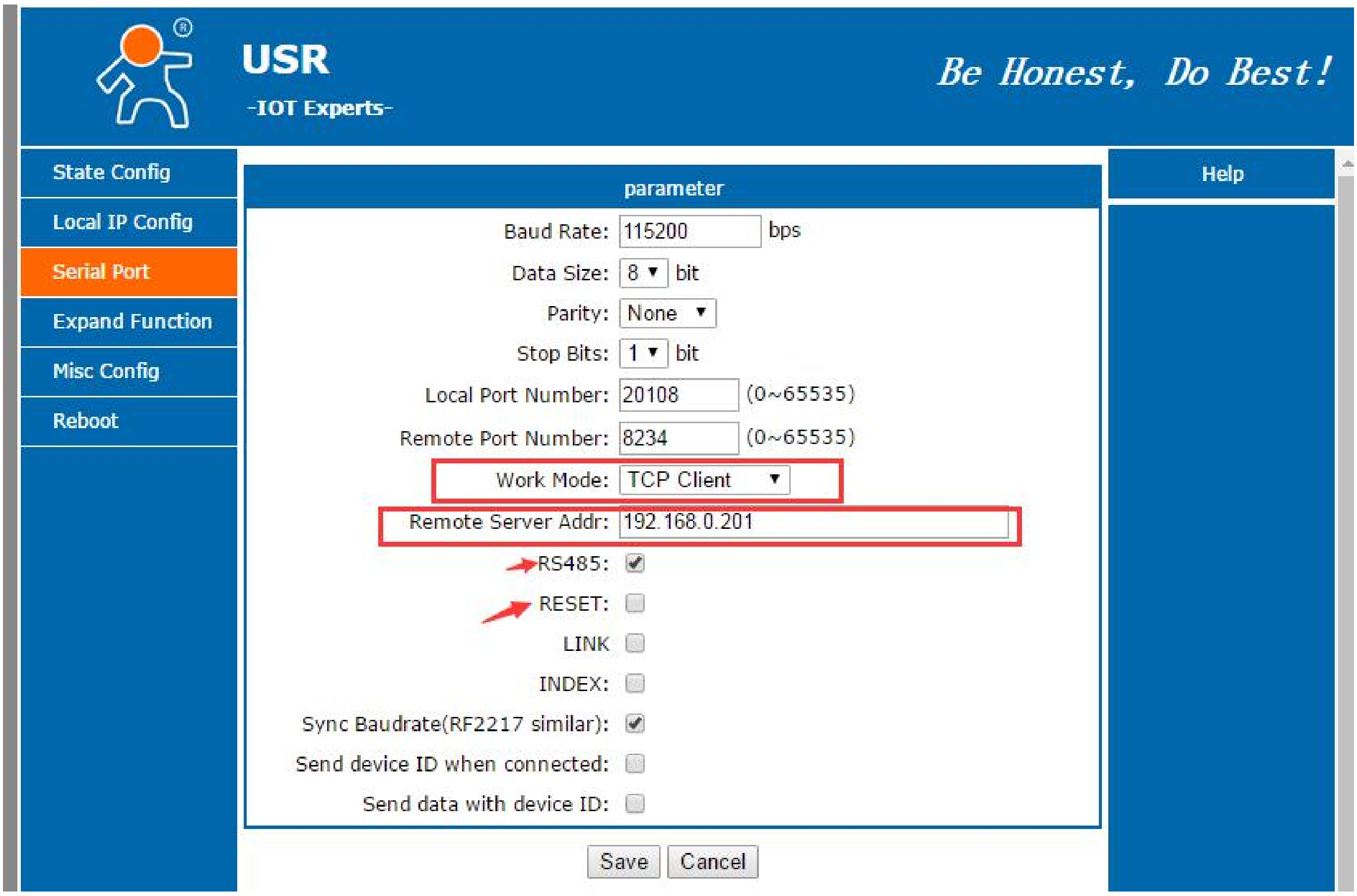
Rebot/Reset Module

Restart module

Diagram 4.4-2 Local IP

4.5. Serial Port

1) Baud rate: 600bps～230.4Kbps
2) Stop bit :1, 2
3) Data bit :5, 6, 7, 8
4) Check bit : NONE, ODD, EVEN, MARK, SPACE
5) Local Port Number : Fixed port number by default, It can be set “0” when router is connecting Extranet
6) Remote Port number
7）Work Mode: TCP Client/ TCP Server/ UDP Client/ UDP Server/ HTTPD Client
8）Remote Server Address: IP address or Domain name.
9）HTTPD: HTTPD Get or HTTPD Post



Baud Rate: 115200 bps

Data Size: 8 bit

Parity: None

Stop Bits: 1 bit

Local Port Number: 20108 (0~65535)

Remote Port Number: 8234 (0~65535)

Work Mode: TCP Client

Remote Server Addr: 192.168.0.201

RS485: ☑

RESET: □

LINK □

INDEX: □

Sync Baudrate(RF2217 similar): ☑

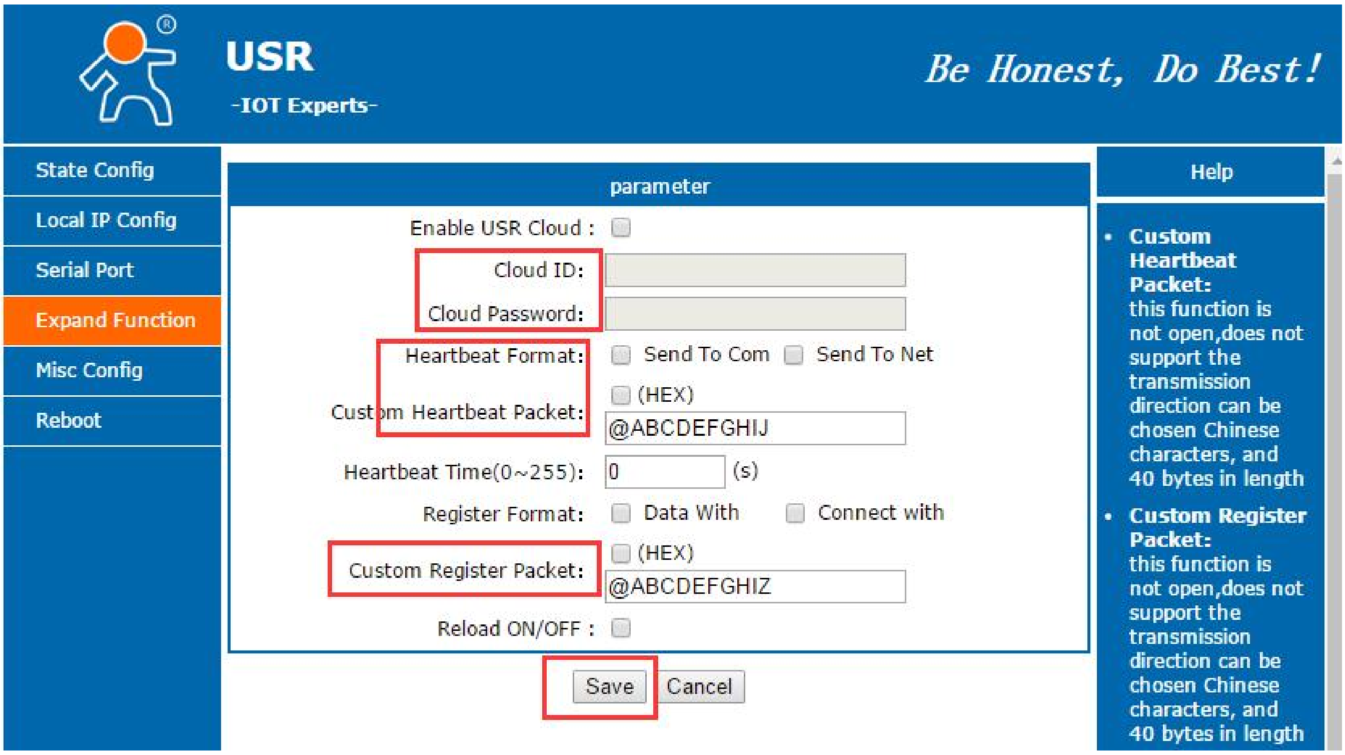
Send device ID when connected: □

Send data with device ID: □

Diagram 4.5-1 Serial Port

4.6. Expand Function

Defined registration package and Defined registration package



USR -IOT Experts- Be Honest, Do Best!

State Config
Local IP Config
Serial Port
Expand Function
Misc Config
Reboot

parameter

Enable USR Cloud : ☐
Cloud ID:
Cloud Password:
Heartbeat Format: ☐ Send To Com ☐ Send To Net
Custom Heartbeat Packet: ☐ (HEX) @ABCDEFGHIJ
Heartbeat Time(0~255): 0 (s)
Register Format: ☐ Data With ☐ Connect with
Custom Register Packet: ☐ (HEX) @ABCDEFGHIZ
Reload ON/OFF : ☐

Save Cancel

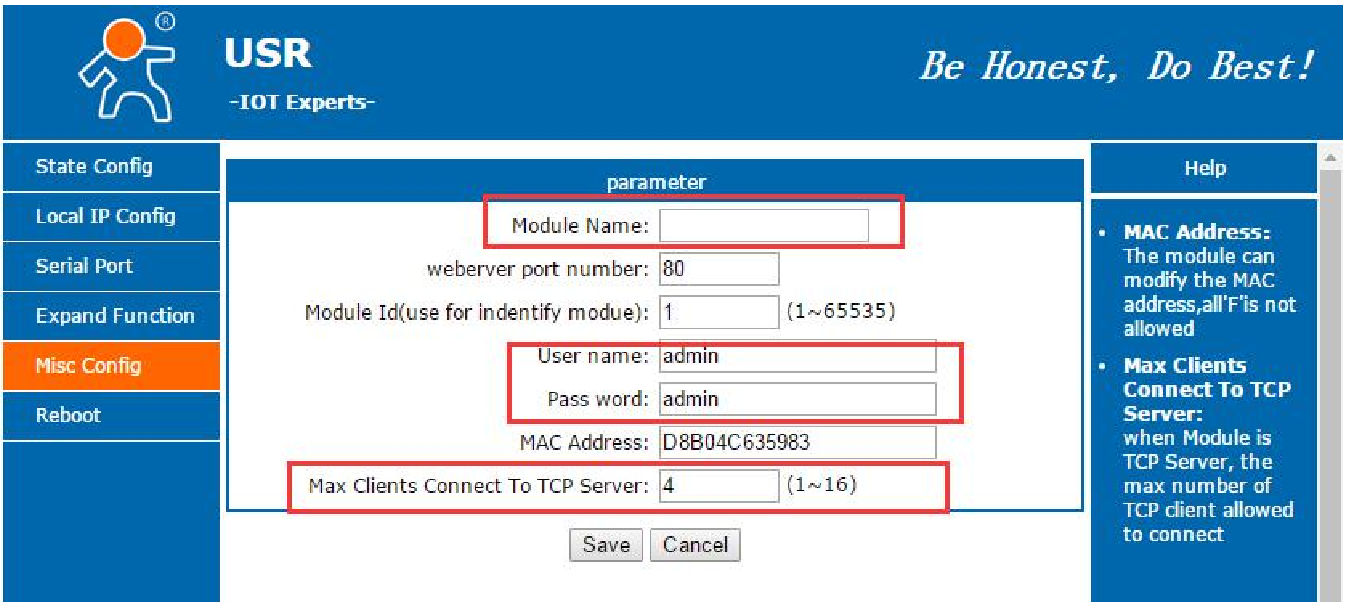
Help

- **Custom Heartbeat Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length
- **Custom Register Packet:** this function is not open,does not support the transmission direction can be chosen Chinese characters, and 40 bytes in length

Diagram 4.6-1 Expand Function

4.7. Misc Configuration

Set module name, user name, pass word, MAC.



USR -IOT Experts- Be Honest, Do Best!

State Config
Local IP Config
Serial Port
Expand Function
Misc Config
Reboot

parameter

Module Name:
weberver port number: 80
Module Id(use for indentify modue): 1 (1~65535)
User name: admin
Pass word: admin
MAC Address: D8B04C635983
Max Clients Connect To TCP Server: 4 (1~16)

Save Cancel

Help

- **MAC Address:** The module can modify the MAC address,all'F'is not allowed
- **Max Clients Connect To TCP Server:** when Module is TCP Server, the max number of TCP client allowed to connect

Diagram 4.7-1 Misc Setting

4.8. Reboot

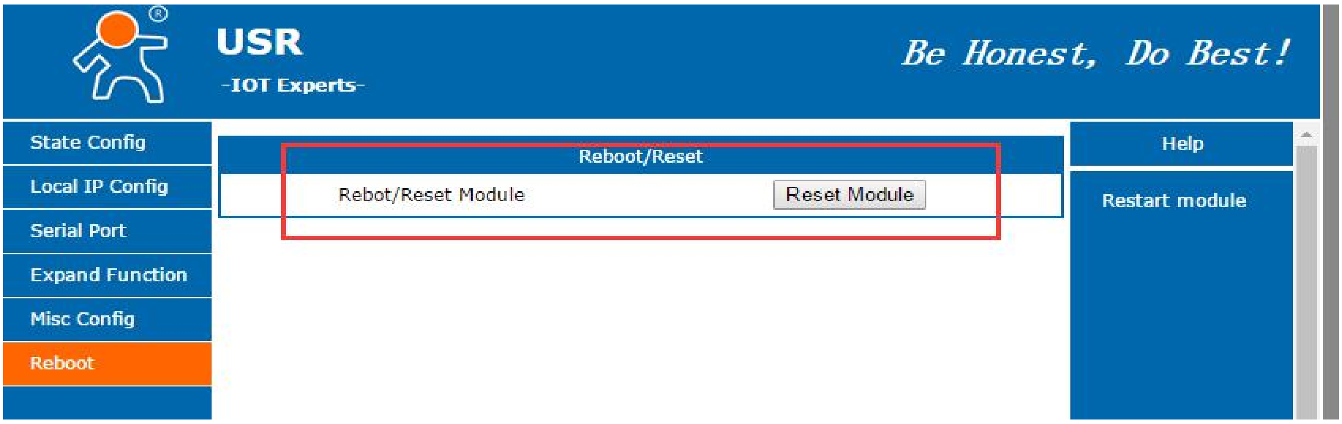
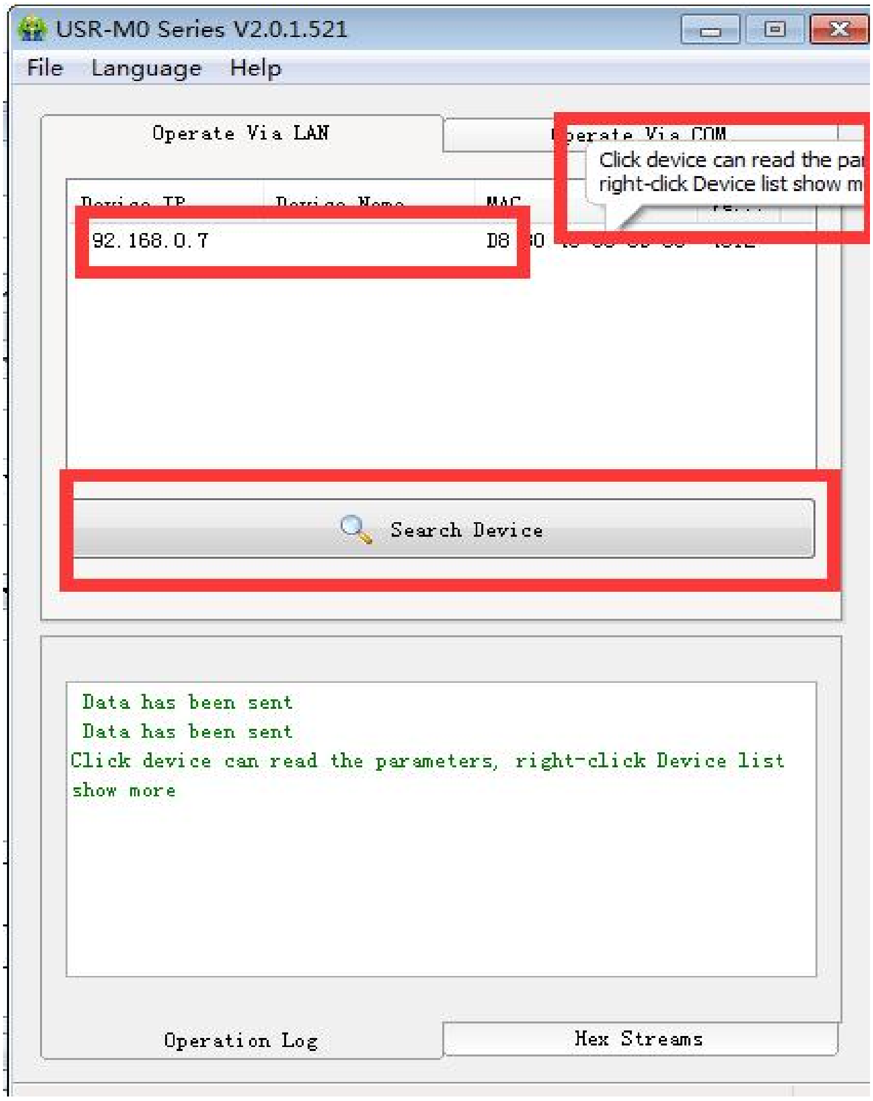


Diagram 4.8-1 Reboot Setting

4.9. Software Setting

1) Search device



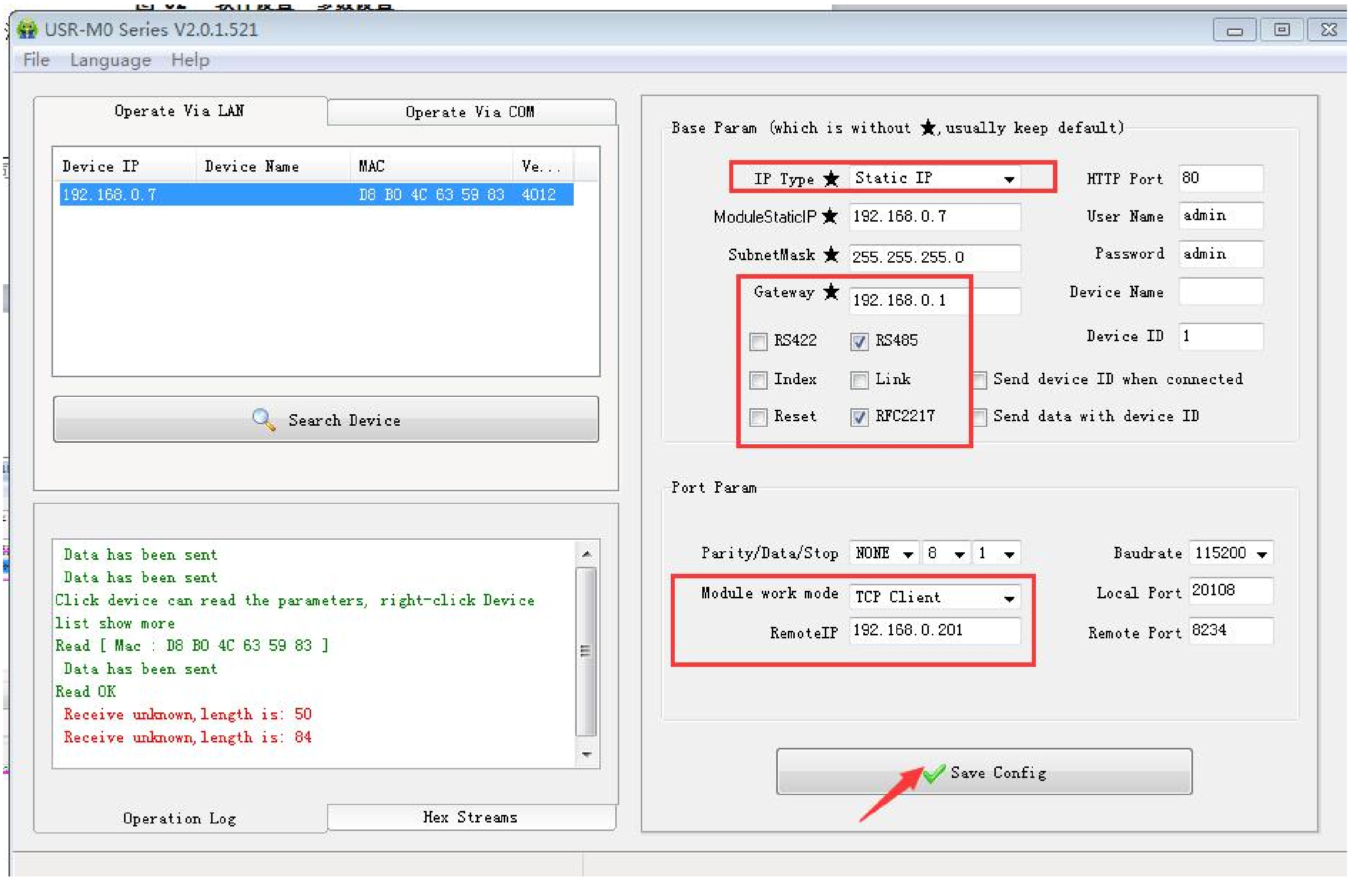
Click device can read the pa
right-click Device list show m

92.168.0.7 D8 0

```
 Data has been sent
 Data has been sent
Click device can read the parameters, right-click Device list
show more
```

Diagram 4.9-1 Search

2) Set parameters



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

```
 Data has been sent
 Data has been sent
Click device can read the parameters, right-click Device
list show more
Read [ Mac : D8 B0 4C 63 59 83 ]
 Data has been sent
Read OK
 Receive unknown,length is: 50
 Receive unknown,length is: 84
```

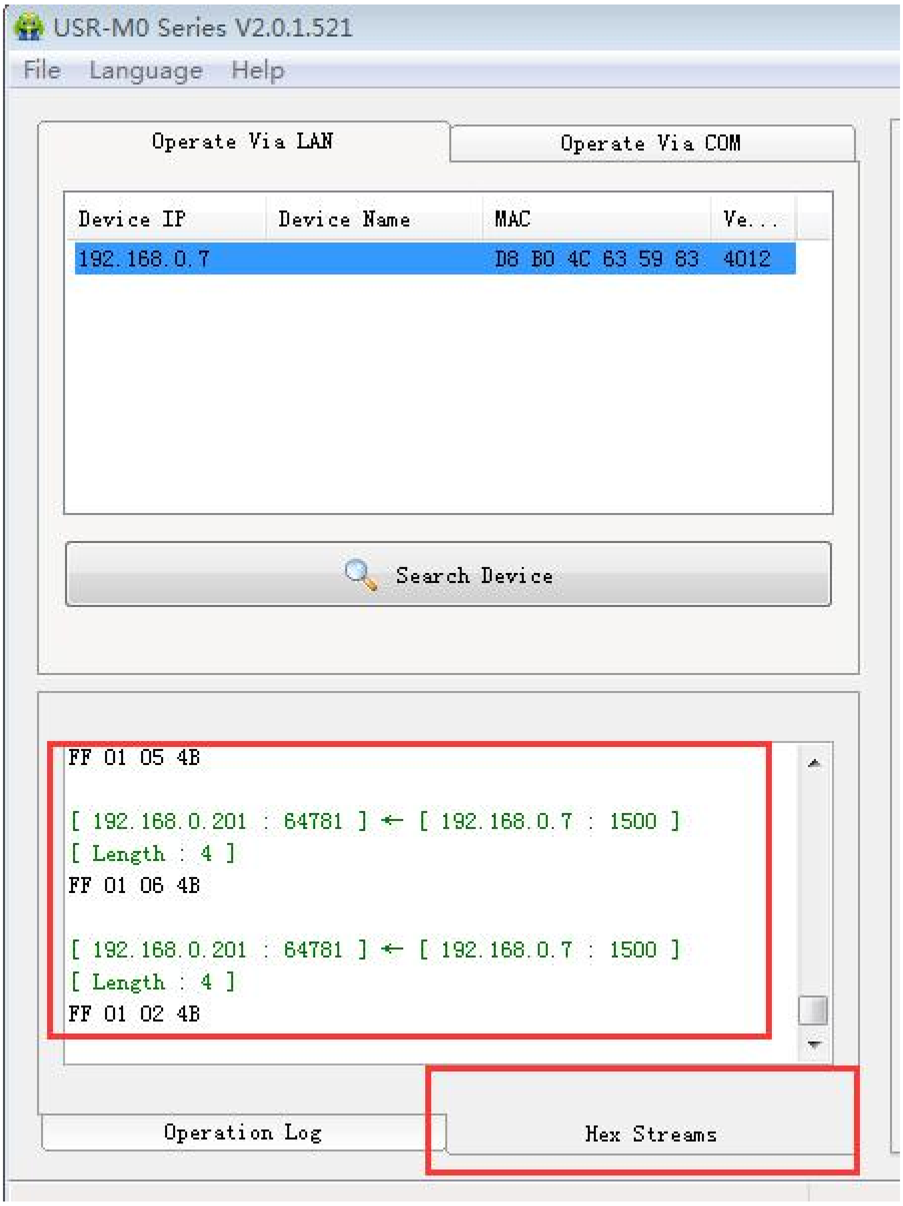
IP Type ★ Static IP
ModuleStaticIP ★ 192.168.0.7
SubnetMask ★ 255.255.255.0
Gateway ★ 192.168.0.1
HTTP Port 80
User Name admin
Password admin
Device Name
Device ID 1
□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Parity/Data/Stop NONE 8 1
Baudrate 115200
Module work mode TCP Client
Local Port 20108
RemoteIP 192.168.0.201
Remote Port 8234

Diagram 4.9-2 Parameter setting

3) Check data

Click “Hex Stream” , it’s helpful to understand the protocol and check data by observing data.



Device IP	Device Name	MAC	Ve...
192.168.0.7		D8 B0 4C 63 59 83	4012

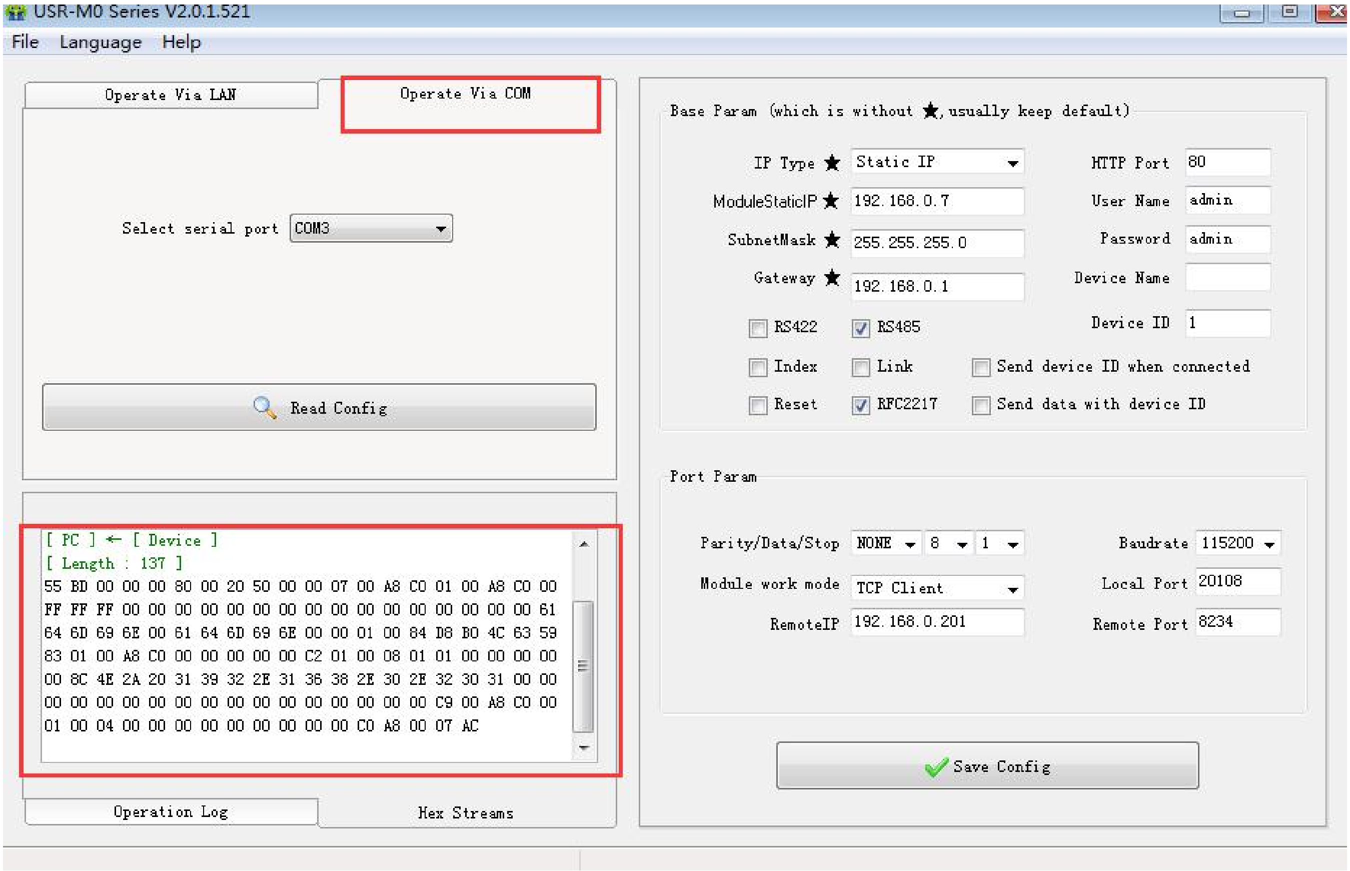
```
FF 01 05 4B

[ 192.168.0.201 : 64781 ] ← [ 192.168.0.7 : 1500 ]
[ Length : 4 ]
FF 01 06 4B

[ 192.168.0.201 : 64781 ] ← [ 192.168.0.7 : 1500 ]
[ Length : 4 ]
FF 01 02 4B
```

Diagram 4.9-3 Check Streams

4) Press CFG (Reload) and click “operate via COM” → select serial port→ Read Configuration, user can also set parameters by this way.



Select serial port: COM3

```
[ PC ] ← [ Device ]
[ Length : 137 ]
55 BD 00 00 00 80 00 20 50 00 00 07 00 A8 C0 01 00 A8 C0 00
FF FF FF 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 61
64 6D 69 6E 00 61 64 6D 69 6E 00 00 01 00 84 D8 B0 4C 63 59
83 01 00 A8 C0 00 00 00 00 00 C2 01 00 08 01 01 00 00 00 00
00 8C 4E 2A 20 31 39 32 2E 31 36 38 2E 30 2E 32 30 31 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 C9 00 A8 C0 00
01 00 04 00 00 00 00 00 00 00 00 00 C0 A8 00 07 AC
```

Base Param (which is without ★, usually keep default)

IP Type ★: Static IP
ModuleStaticIP ★: 192.168.0.7
SubnetMask ★: 255.255.255.0
Gateway ★: 192.168.0.1
HTTP Port: 80
User Name: admin
Password: admin
Device Name:
Device ID: 1

□ RS422 ☑ RS485
□ Index □ Link □ Send device ID when connected
□ Reset ☑ RFC2217 □ Send data with device ID

Port Param

Parity/Data/Stop: NONE 8 1
Baudrate: 115200
Module work mode: TCP Client
Local Port: 20108
RemoteIP: 192.168.0.201
Remote Port: 8234

Diagram 4.9-4 Port Setting

5. Appendix

AppendixⅠ:Meaning of Port parameter bit

Bit number	Instruction	Value	Description
1:0	Data bit choice	00	5 bit data bit
		01	6 bit data bit
		10	7 bit data bit
		11	8 bit data bit
2	Stop bit	00	1 bit stop bit
		01	2 bit stop bit
3	Check bit enable	00	Unable check bit
		01	Enable check bit
5:4	Check bit type	00	ODD check
		01	EVEN check
		10	Set 1
		11	Zero Clearing
8:6	Undefined	000	Write 0

AppendixⅡ:ID type of Independent ID

This byte is the last byte of 3 bytes, additional meaning is as follows:
bit0(1) send ID when connecting;
bit1(2)send ID when send data;
bit2(4) RS485;
bit3(8) NC;
bit4(16) Reset;
bit5(32) Link-state;
bit6(64) tcp server index;
bit7(128) baud rate synchronization, similar RFC2217.
When each bit is 1, it means related function is invalid. Otherwise, it is valid, default is RS485 and similar RFC2217 set 1 .(turn on function, value is 0x84)

Appendix Ⅲ:Upper computer Socket programming example

Server Socket code:

```
#include <stdio.h>
#include <string.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <stdlib.h>
#include <syslog.h>
#include <errno.h>
#define MAX_LISTEN_NUM 5
#define SEND_BUF_SIZE 100
#define RECV_BUF_SIZE 100
#define LISTEN_PORT 1010
int main()
{
  int listen_sock = 0;
  int app_sock = 0;
  struct sockaddr_in hostaddr;
  struct sockaddr_in clientaddr;
  int socklen = sizeof(clientaddr);
  char sendbuf[SEND_BUF_SIZE] = {0};
  char recvbuf[RECV_BUF_SIZE] = {0};
  int sendlen = 0;
  int recvlen = 0;
  int retlen = 0;
  int leftlen = 0;
  char *ptr = NULL;
  memset((void *)&hostaddr, 0, sizeof(hostaddr));
  memset((void *)&clientaddr, 0, sizeof(clientaddr));
  hostaddr.sin_family = AF_INET;
  hostaddr.sin_port = htons(LISTEN_PORT);
  hostaddr.sin_addr.s_addr = htonl(INADDR_ANY);
  listen_sock = socket(AF_INET, SOCK_STREAM, 0);
  if(listen_sock < 0)
  {
      syslog(LOG_ERR, "%s:%d, create socket failed", __FILE__, __LINE__);
      exit(1);
  }
  if(bind(listen_sock, (struct sockaddr *)&hostaddr, sizeof(hostaddr)) < 0)
  {
      syslog(LOG_ERR, "%s:%d, bind socket failed", __FILE__, __LINE__);
      exit(1);
  }
  if(listen(listen_sock, MAX_LISTEN_NUM) < 0)
  {
      syslog(LOG_ERR, "%s:%d, listen failed", __FILE__, __LINE__);
      exit(1);
  }
  while(1)
  {
      app_sock = accept(listen_sock, (struct sockaddr *)&clientaddr, &socklen);
      if(app_sock < 0)
     {
        syslog(LOG_ERR, "%s:%d, accept failed", __FILE__, __LINE__);
        exit(1);
     }
     sprintf(sendbuf, "welcome %s:%d here!/n", inet_ntoa(clientaddr.sin_addr.s_addr), clientaddr.sin_port);
     //send data
     sendlen = strlen(sendbuf) +1;
     retlen = 0;
     leftlen = sendlen;
     ptr = sendbuf;
     //while(leftlen)
     {
         retlen = send(app_sock, ptr, sendlen, 0);
      if(retlen < 0)
      {
          if(errno == EINTR)
            retlen = 0;
        else
            exit(1);
      }
      leftlen -= retlen;
```

```
      ptr += retlen;
     }
     //receive data
     recvlen = 0;
     retlen = 0;
     ptr = recvbuf;
     leftlen = RECV_BUF_SIZE -1;
     //do
     {
         retlen = recv(app_sock, ptr, leftlen, 0) ;
      if(retlen < 0)
      {
          if(errno == EINTR)
            retlen = 0;
        else
            exit(1);
      }
      recvlen += retlen;
      leftlen -= retlen;
      ptr += retlen;
     }
     //while(recvlen && leftlen);
     printf("receive data is : %s", recvbuf);
    close(app_sock);
  }
  close(listen_sock);

  return 0;
   }
```

Client Socket code:

```
#include <stdio.h>
#include <string.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <syslog.h>
#include <errno.h>
#include <stdlib.h>
#define MAX_LISTEN_NUM 5
#define SEND_BUF_SIZE 100
#define RECV_BUF_SIZE 100
#define SERVER_PORT 1010
int main()
{   int sock_fd = 0;
```

```
    char recvbuf[RECV_BUF_SIZE] = {0};
    char sendbuf[SEND_BUF_SIZE] = {0};
    int recvlen = 0;
    int retlen = 0;
    int sendlen = 0;
    int leftlen = 0;
    char *ptr = NULL;
    struct sockaddr_in ser_addr;
    memset(&ser_addr, 0, sizeof(ser_addr));
    ser_addr.sin_family = AF_INET;
    inet_aton("127.0.0.1", (struct in_addr *)&ser_addr.sin_addr);
    ser_addr.sin_port = htons(SERVER_PORT);
    sock_fd = socket(AF_INET, SOCK_STREAM, 0);
    if(sock_fd < 0)
    {
        syslog(LOG_ERR, "%s:%d, create socket failed", __FILE__, __LINE__);
        exit(1);
    }
    if(connect(sock_fd, (struct sockaddr *)&ser_addr, sizeof(ser_addr)) < 0)
    {
        syslog(LOG_ERR, "%s:%d, connect socket failed", __FILE__, __LINE__);
        exit(1);
    }
     //receive data
     recvlen = 0;
     retlen = 0;
     ptr = recvbuf;
     leftlen = RECV_BUF_SIZE -1;
     //do
     {
         retlen = recv(sock_fd, ptr, leftlen, 0) ;
      if(retlen < 0)
      {
          if(errno == EINTR)
            retlen = 0;
        else
            exit(1);
      }
      recvlen += retlen;
      leftlen -= retlen;
      ptr += retlen;
     }
     //while(recvlen && leftlen);
     printf("receive data is : %s", recvbuf);
     sprintf(sendbuf, "hello server/n");
     //send data
     sendlen = strlen(sendbuf) +1;
     retlen = 0;
     leftlen = sendlen;
     ptr = sendbuf;
    // while(leftlen)
     {
         retlen = send(sock_fd, ptr, sendlen, 0);
      if(retlen < 0)
      {
          if(errno == EINTR)
            retlen = 0;
        else
            exit(1);
      }
      leftlen -= retlen;
      ptr += retlen;
     }
     close(sock_fd);
}
```

6. Contact Information

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7. Disclaimer

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8. Undated History

V 1.0 2016-5-13 First Version

V 1.1 2016-6-27 update