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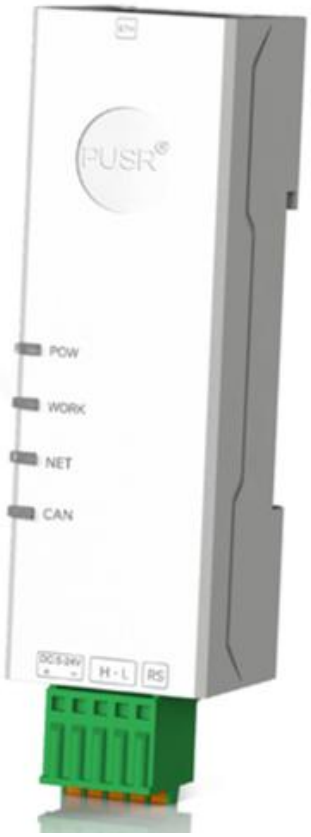
Ethernet to CAN

USR-CAN115

User Manual



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Product Feature

- CAN and Ethernet bidirectional conversion
- CAN2.0A and CAN2.0B standard protocols
- Support transparent conversion, transparent band ID conversion, standard protocol conversion
- TCP server, TCP client, UDP server, UDP client
- Support extended frame only, standard frame only, custom frame ID reception
- Support 14 groups of custom frame ID filtering to avoid data interference
- Wide baud rate range, CAN baud rate: 5K~1Mbps
- Support custom baud rate
- Heartbeat packet support: network heartbeat packet, CAN port heartbeat packet
- Support registration package: connection sending, data carrying, full registration
- Support normal, listen only, loop three working modes
- SupportPC parameter configuration
- Support network AT command configuration
- Support PC firmware upgrade, firmware update is more convenient
- High and low temperature resistance,-40℃~85℃ stable operation
- With 120 ohm termination resistor
- Support 5-24V wide voltage input, with anti-reverse connection protection
- Reliable hardware protection, electrostatic protection, surge, burst protection
- Hardware watchdog function, crash automatic restart, module more stable and reliable

Directory

1. Product Overview 5
1.1. Product Introduction 5
1.2. Technical Parameters 5
2. Hardware Parameters 7
2.1. Size Description 7
2.2. Interface Description 8
2.3. Indicator Description 9
3. Product Features 10
3.1. Description of Function Configuration 10
3.2. CAN Parameters 11
3.3. Ethernet Port Parameters 12
3.4. Transformation Function 14
3.4.1. Conversion Parameter 14
3.4.2. Filtering Function 15
3.5. Socket Function 17
3.5.1. TCP Client Mode 17
3.5.2. TCP Server Mode 19
3.5.3. UDP Client Mode 21
3.5.4. UDP Server Mode 22
3.6. Characteristic Function 23
3.6.1. Heartbeat Packet 23
3.6.2. Registration Packet 24
3.6.3. CAN Operating Mode 25
3.6.4. CAN Packaging Mechanism 26
3.6.5. Clear CAN Cache Data 27
3.6.6. No Data Restart 28
3.7. Firmware Upgrade 29
3.8. Factory Data Reset 30
4. Examples of Conversion Patterns 31
4.1. Transparent Conversion 31
4.1.1. Ethernet to CAN-transparent conversion 31
4.1.2. CAN to Ethernet--Transparent Conversion 32

4.2. Transparent Zone ID Conversion 34
4.2.1. Ethernet to CAN-Transparent Band ID Conversion 34
4.2.2. CAN to Ethernet-Transparent Band ID Conversion 35
4.3. Standard Protocol Conversion 37
5. Contact Information 39
6. Disclaimer 40
7. Update History 40

1. Product Overview

1.1. Product Introduction

USR-CAN115 is an ultra-small rail-type CAN to Ethernet device independently developed by the Internet of Things. This series of products features high speed, low latency, small size and simple use. TCP server, TCP client, UDP server and UDP client are supported. It supports three data conversion modes: transparent conversion, transparent band ID conversion and standard protocol conversion. It can easily realize the interconnection between CAN equipment and network port equipment.

This series of products adopt industrial design standard,-40℃~85℃ stable operation. Support 5~24V wide voltage terminal power supply. Wide baud rate range, CAN baud rate support 5K~1Mbps, support custom baud rate. Support AT commands and PC software configuration parameters, easy to use. The product comes with 120Ω resistor, which can be quickly connected to CAN-bus. The product comes with guide rail (C45 GB) buckle, easy and fast installation.

In order to meet the needs of more customers,the lipstick CAN converter series is mainly available in the followingthree specifications.

Table 1 Lipstick CAN Converter Specifications Selection Table

Model	Versions	Specifically described
USR-CAN115	Ethernet version	CAN to Ethernet equipment, push-type terminal wiring.
USR-CAN114	RS485 version	Serial port uses RS485 mode for communication, press-type terminal wiring.
USR-CAN112	RS232 version	Serial port uses RS232 mode for communication, press-type terminal wiring.

1.2. Technical Parameters

Table 2 Product basic parameters

Classify	Parameter	Numerical value
Basic Parameters	Working voltage	DC5~24V,recommended 12V 1A
	Size	74*24*22mm (L * W * H, excluding terminals)
	Installation method	Rail mounting

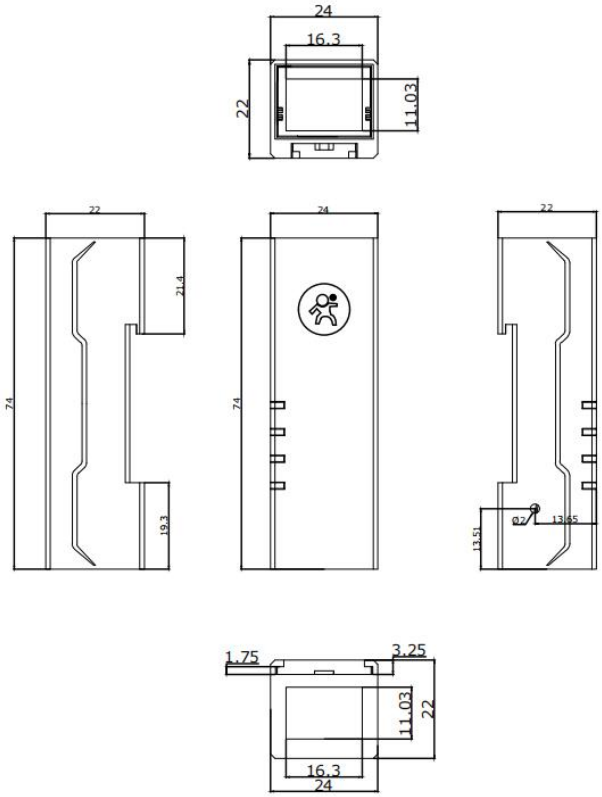
	Reload key	Press and hold to restore factory settings
	Indicator light	POWER、WORK、NET、CAN
Interface parameter	CAN port Specification	1-way CAN port, support standard CAN2.0A/B, press terminal wiring
	CAN port Baud rate	5kbps ~ 1000kbps, support custom
	Terminal Resistance	Built-in CAN bus 120Ω termination resistor
	Ethernet port Specification	RJ45, 10/100Mbps, Cross-Direct Adaptive
Work Environment	Operating temperature	-40~85℃
	Storage temperature	-40~105℃
	Operating humidity	5%~95% RH(no condensation)
	Storage humidity	5%~95% RH(no condensation)
Software Function	Networking protocol	TCP server、TCP client、UDP server、UDP client
	Conversion of mode	Transparent conversion, Transparent band ID conversion, Standard conversion
	CAN ID	Support standard frame, extended frame
	Frame ID filtering	Support standard frames only, remote frames only, custom input frame ID (up to 14 groups)
	Packet Frame	Support custom packaging frame rate ;

	Time	custom packaging time
	Switch direction	Support bi-directional conversion, only network port to CAN, only CAN to network port
	Work pattern	Normal, Loop, Hear Only
	Firmware upgrade	Support firmware upgrade on PC
	Parameter configuration	AT command, PC software configuration
	Heartbeat packet	Support network heartbeat packet, CAN port heartbeat packet
	Registration packet	Support custom, MAC registration package; optional connection sending, data carrying, full registration
Protection Parameter	Electrostatic protection	Air discharge 8kV, Contact discharge 6kV
	Electrical Fast Transient	Power supply circuit 2kV; Ethernet port/CAN port circuit 1kV
	Surge Interference test	Differential mode of power supply circuit 1kV, common mode 2kV;CAN port circuit common mode 2kV; Ethernet port circuit 1kV

2. Hardware Parameters

2.1. Size Description

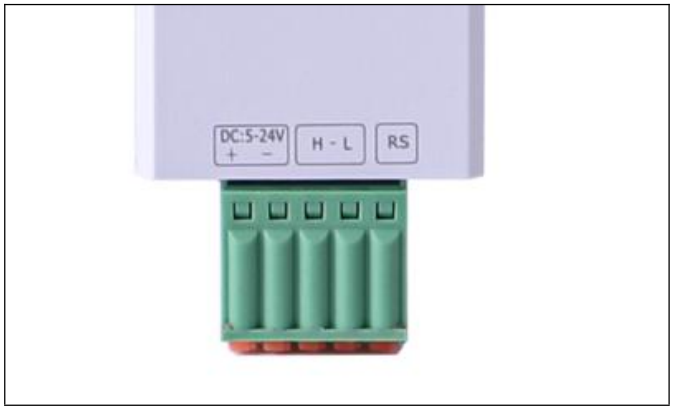
Standardsize: 74*24*22mm (L * W * H,excluding terminals)



1.USR-DR115 Standard size diagram

2.2. Interface Description

USR-CAN115 has one CAN-bus interface and one network interface. CAN-bus interface adopts push-type terminal wiring, which is convenient and fast. The connector pinsare defined as follows.



2.API description

Table 3 Terminal wiring definition

Pin	Functiondescription
DC 5-24V +	DC 5-24V power supply positive
DC 5-24V -	DC 5-24V power supply cathode
H	CAN_H signal line connection terminal

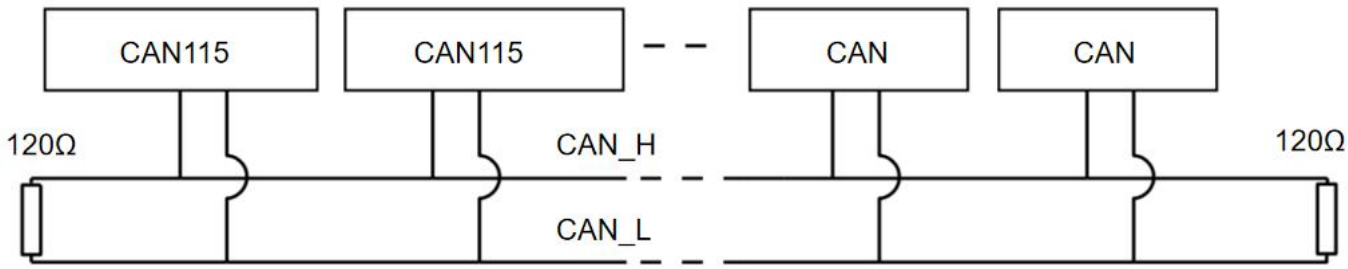
L	CAN_L signal line connection terminal
RS	CAN 120Ω termination resistor, RS and L connection, then the module internal 120Ω resistor into the CAN bus

<Description>

When USR-CAN115and CAN bus are connected, CAN_H needs to be connected to CAN_H, CAN_L needs to be connected to CAN_L.

RS is the terminal resistance selection, RS and L are connected with wires, and the 120Ω resistor inside the module is incorporated into the CAN bus; otherwise, the 120Ω resistor is not connected to the bus.

According toISO 11898 specification, in order to enhance the reliability ofCAN-buscommunication, the two terminals ofCAN-busnetwork are usually added with terminal matching resistance (120Ω), as shown in the following figure. The size of the terminal matching resistance is determined by the characteristic impedance of the transmission cable. For example, if the characteristic impedance of twisted pair is120Ω, the two terminals on the bus should also integrate120Ω terminal resistance.



3.CAN bus connection

2.3. Indicator Description

The USR-CAN115 has 4 indicators: POWER, WORK, NET, CAN. The user can easily observe the status of the equipment through the indicator lights, which aredefined as follows.

Table 4 Indicator light rule

Indicator lamp	Colour	Function description
POWER	Red	Always on when powered on, off when powered off
WORK	Green	Flashing: normal operation of equipment, frequency 1s;

		Strobe: Enter CAN bus passive error state; Constant light: CAN bus operation abnormal
NET	Green	Flashing: indicates that data is being received at the network port
CAN	Green	Flashing: indicates that CAN port has data being received

3. Product Features

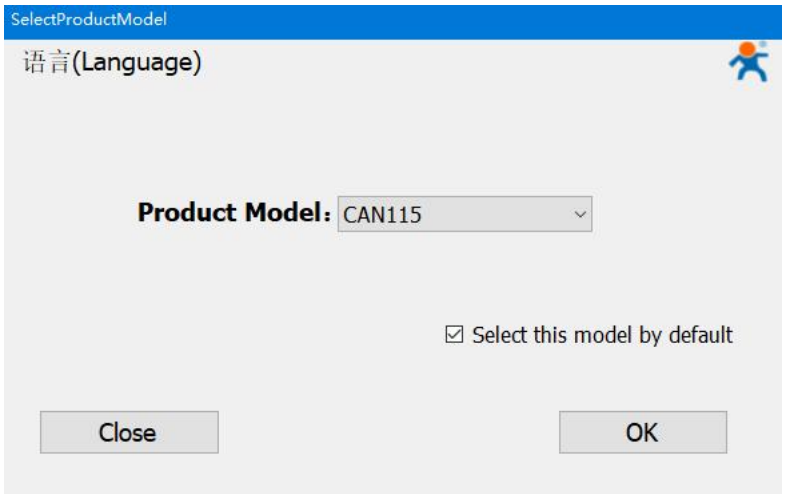
3.1. Description of Function Configuration

CAN 115 supports host computer configuration parameters and network AT command configuration.

Parameters can be configured and queried through AT commands. For specific AT commands, see Lipstick CAN Protocol Converter Standard AT Command Set CAN115.

PC configuration operation is simple, convenient and easy to use. The following describes the configuration parameters of the host computer. Please read the description in detail.

（1）Download the host computer from the official website. After opening it, first select the model, CAN115.

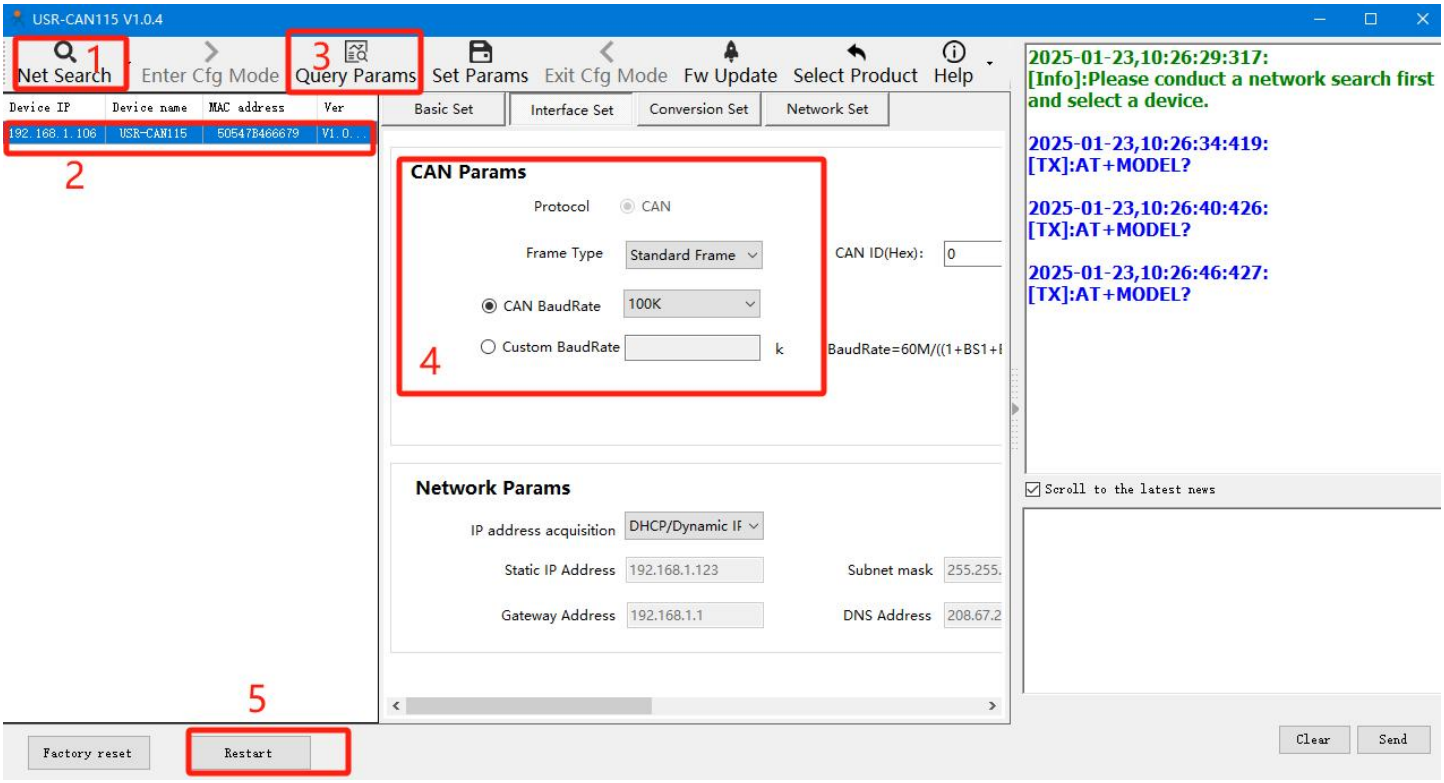


4.select the model

（2）Parameter configuration:

- Start with a web search, searching for devices.
- Select the device and click Read Parameters.
- After reading all the current parameters, configure the parameters.

- After configuration, click Set Parameters
- Click Restart and all parameter configurations take effect.



5.Connection Network Configuration

3.2. CAN Parameters

Frame type: The frame type of CAN message during conversion, with standard frame and extended frame optional.

CAN ID: Hex adecimal, Hex format. Range: 0~7FF(standard frame) , 0~ 1FFFFF (extended frame)

CAN Baud Rate:

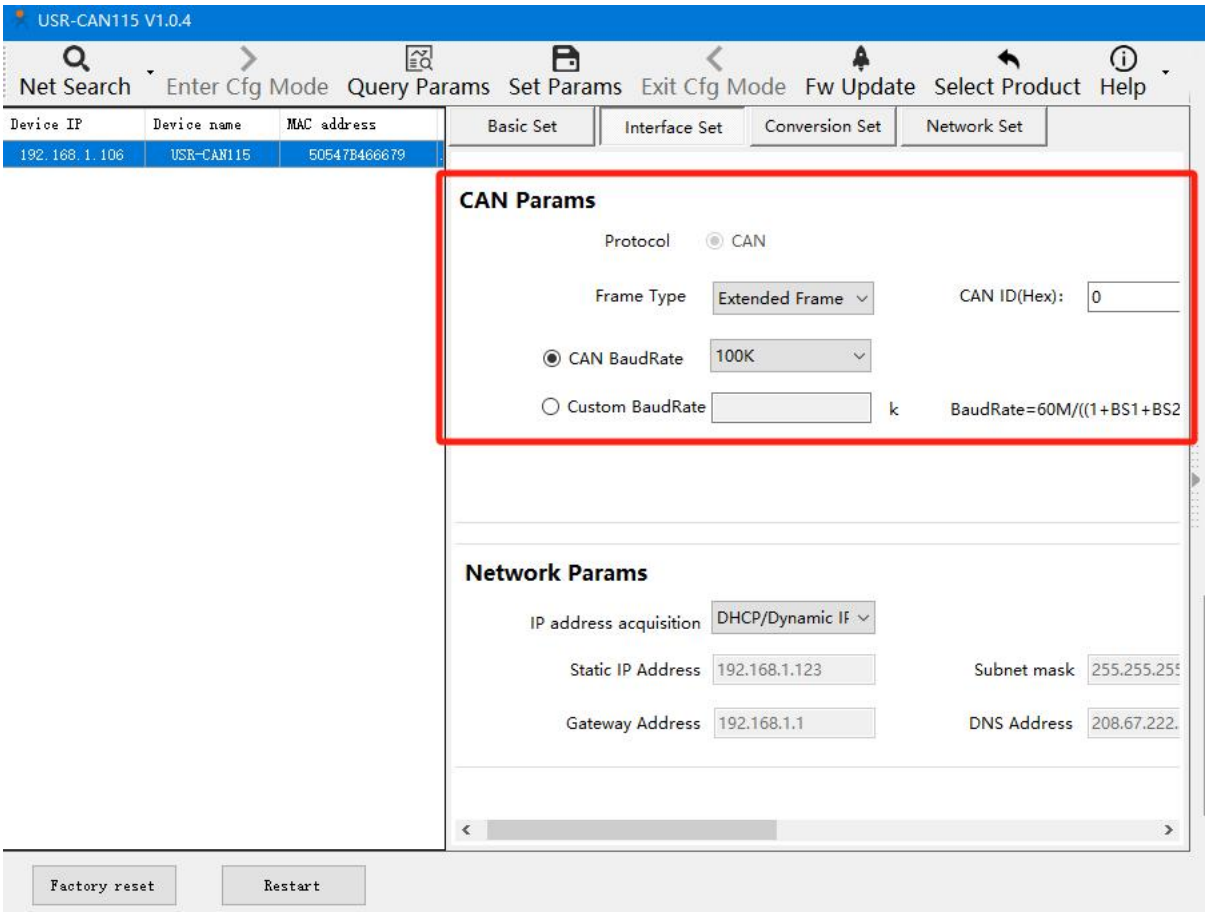
Range 5K~1000K, default 100kbps. Common baud rates can be selected directly: 5K,10K,20K,50K,100K, 120K,125K,150K,200K,250K, 400K, 500K, 600K, 750K, 1000K. Baud rate calculation method: Baud rate =60M/[(1+ BS1 + BS2)*BRP]

BS1: Phase buffer section 1, Range 1~16

BS2: Phase Buffer 2, Range 1~8

BRP: Frequency division value, Range 1~1024

BS1\BS2\BRP is configurable and the device automatically calculates the current baud rate based on these three values.



6.CAN parameter configuration

3.3. Ethernet Port Parameters

(1) **IP address acquisition**:

IP address is the identity representation of module in local area network, unique in local area network, so it cannot be duplicated with other devices in the same local area network. The IP address of CAN 115 can be obtained in two ways: static IP and DHCP.

- Static IP

Static IP is manually set by the user. Note that IP, subnet mask and gateway are written at the same time during the setting process. Static IP is suitable for scenarios where statistics on IP and devices are required and one-to-one correspondence is required.

Advantages: Access devices that cannot be assigned IP addressescan be searchedthrough thefull segment broadcast mode.

Disadvantages: Normal TCP/UDP communication cannot be performed dueto differentnetwork segments in different local area network

- DHCP

DHCP is mainly used to dynamically obtain IP address, Gateway address, DNS server address and other information from the gateway host, thus eliminating the cumbersome steps of setting IP address. It is

applicable to scenarios where there is no requirement for IP, and there is no requirement for IP to correspond to modules one by one.

Advantages: Access routers and otherdevices with DHCP Server can communicate directly,reducing the trouble ofsetting IP address, gateway addressand subnet mask;

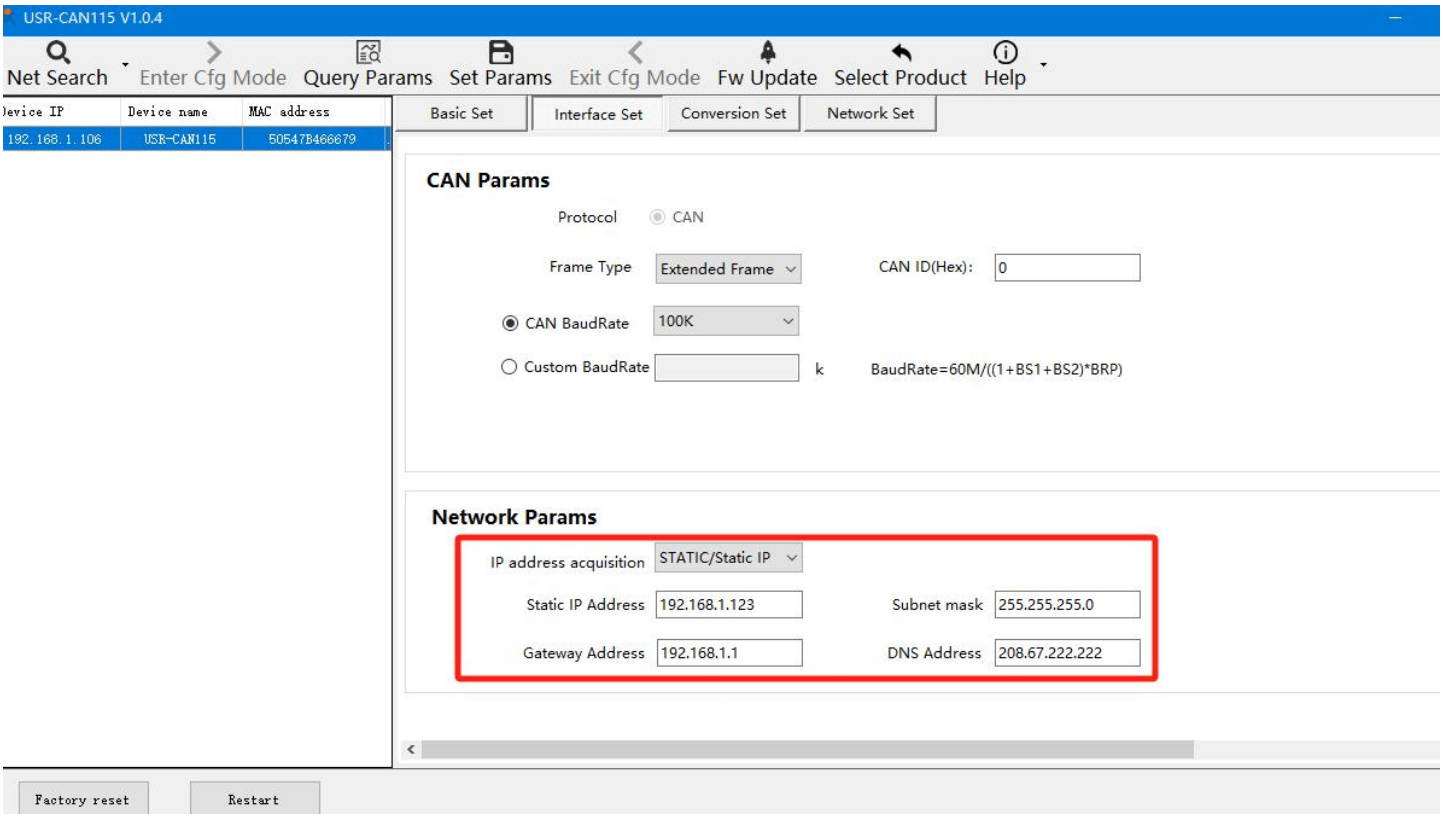
Disadvantages: Access to a networkwithout DHCP Server, such asdirect connection to a computer, CAN115will not work properly.

（2）Subnet mask:

A subnet mask is a 32-bit address that masks a portion of an IP address to distinguish network identity from host identity and to indicate whether the IP address is on a local area network or a remote network. Subnet masks cannot exist alone; they must be used in conjunction with IP addresses. Wecommonly use the C subnet mask: 255.255.255.0, the number of IP addresses in the subnet is 2 to the 8th power minus 2, that is, 256- 2 = 254, the general host address is 0 or 1 (binary) has its special role.

（3）Gateway Address:

Gateway address refers to the network number of the network where the module's current IP address is located. If the router is connected to the external network, the gateway is the IP address of the router. If the setting is wrong, the external network cannot be connected correctly. If the router is not connected to the external network, there is no need to set it. The default is OK.



7.Network port parameter configuration

3.4. Transformation Function

3.4.1. Conversion Parameter

Conversion mode: Support transparent conversion, transparent band ID conversion, standard protocol conversion. Each mode conversion rule is different, and can realize the conversion between network port data information and CAN frame information. See Chapter 4 for a detailed description of conversion patterns.

Direction of conversion: By selecting the direction of conversion, data interference on the bus side that does not require conversion can be excluded. There are three conversion directions:

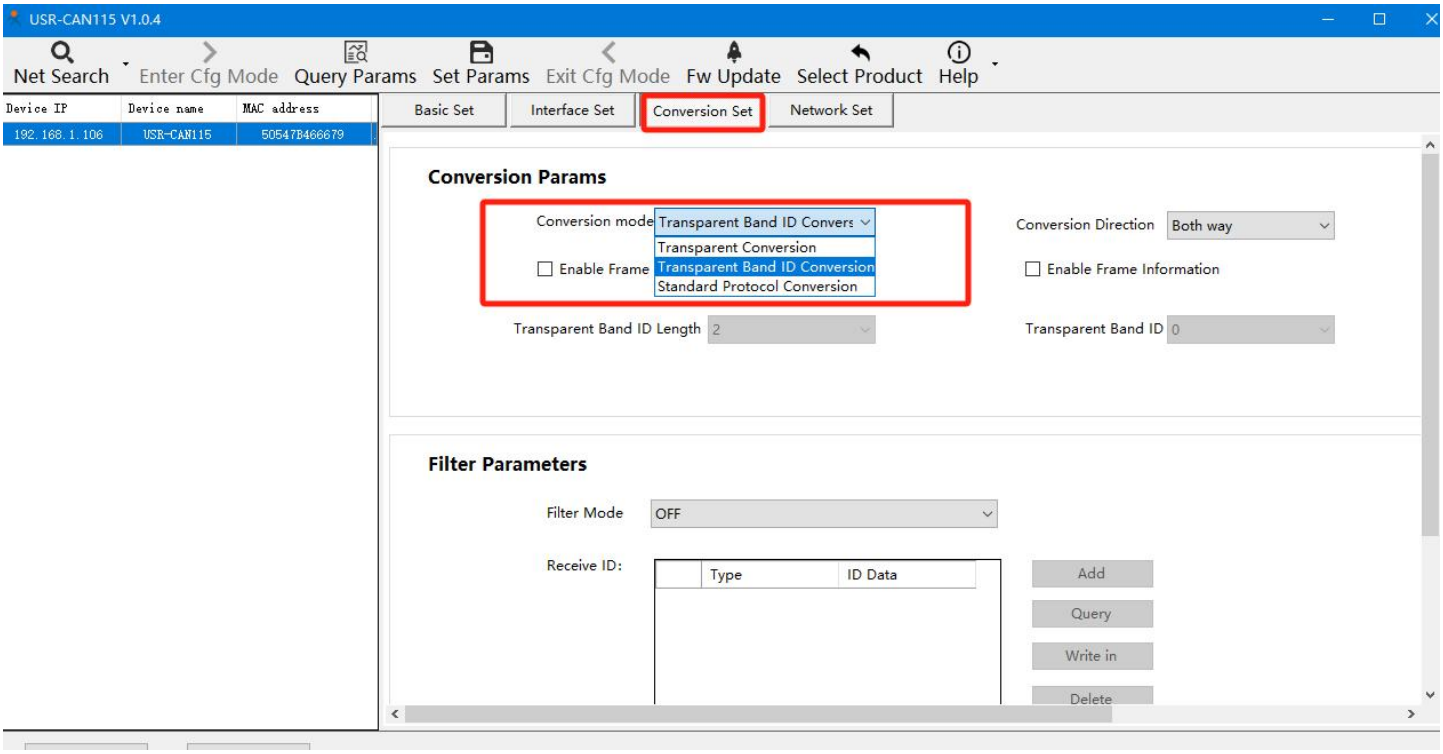
- Bidirectional: The converter converts data from the network to the CAN bus and also converts CAN bus data to the network.
- Network port to CAN only: Only data from the network is converted to the CAN bus, and data from the CAN bus is not converted to the network.
- CAN-to-network only port: Only data from the CAN bus is converted to the network, and data from the network is not converted to the CAN bus.

Enable Frame Info: Takes effect only in transparent transitions. When this option is selected, the converter will add the frame information of CAN message to the first byte of converted data when it works. CAN frame information is not converted when unchecked.

Enable Frame ID: Takes effect only under transparent transitions. When this option is selected, the converter will add the frame ID of the CAN message before the frame data of the converted data and after the frame information (such as enabling frame information). Frame ID of CAN is not converted when unchecked.

Transparency ID Length: Takes effect only under transparency ID conversion. When network data is converted into CAN messages, the length of the frame ID in the converted data in the start byte of the frame ID of CAN messages. The frame ID length can be filled with 1 - 2 bytes in the standard frame, corresponding to ID1 and ID2 of the CAN message respectively, and can be filled with 1 - 4 bytes in the extended frame, corresponding to ID1, ID2, ID3 and ID4 of the CAN message. The ID is 11 bits for standard frames and 29 bits for extended frames.

Transparency ID Position: Takes effect only under Transparency ID conversion. The offset position of the start byte of the frame ID of a CAN message in a serial frame when network data is converted to CAN messages.



8.Schematic diagram of conversion parameter configuration

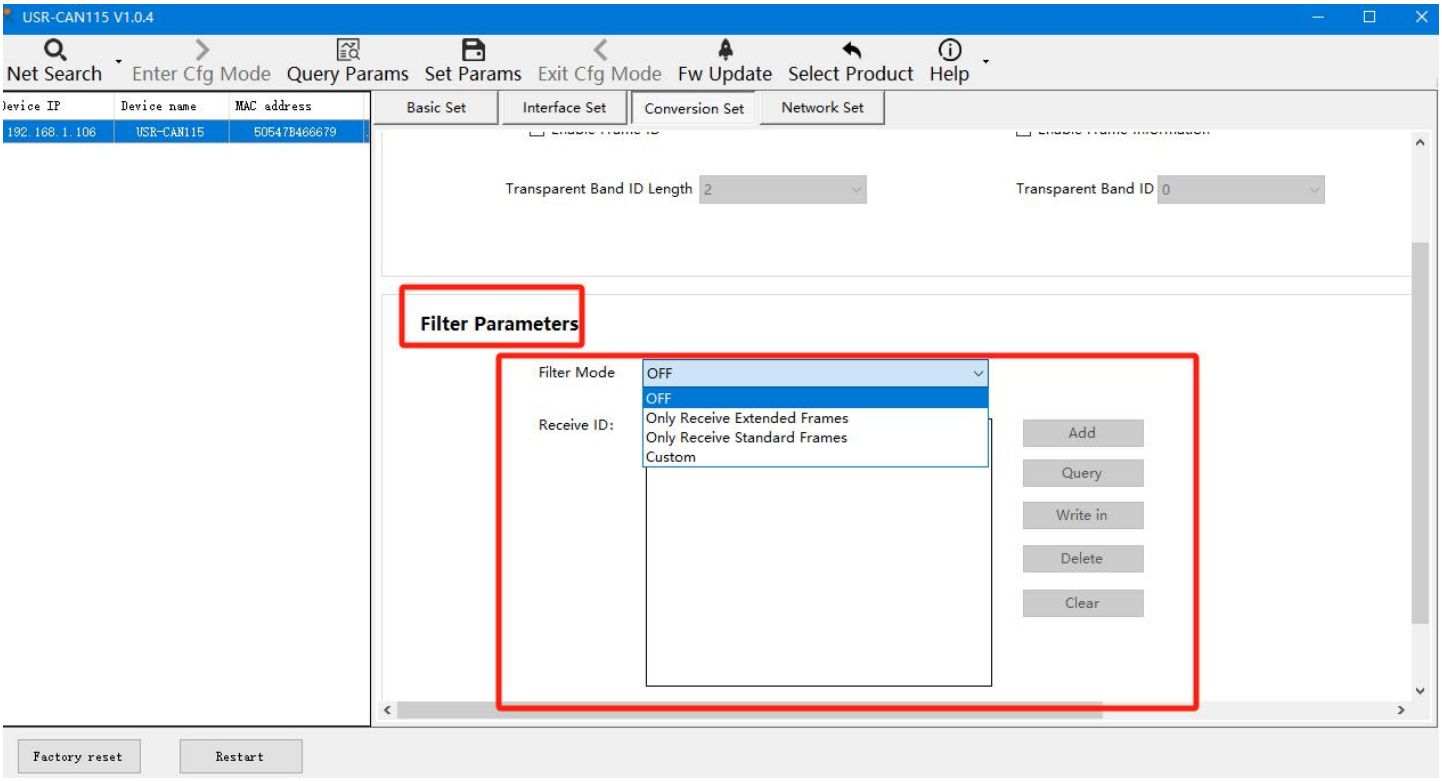
3.4.2. Filtering Function

CAN115 has the function of filtering ID, which can filter CAN bus data and selectively receive it. This minimizes network load from the network.

There are three filtering methods:

- Receive only extended frames
- Receive only standard frames
- custom

Only the extended frames and standard frames can be received, and only the configuration can be selected. The configuration mode is as follows:



9.Filtering Settings

In custom mode, users can add their own IDs to receive, and up to 14 groups can be set.

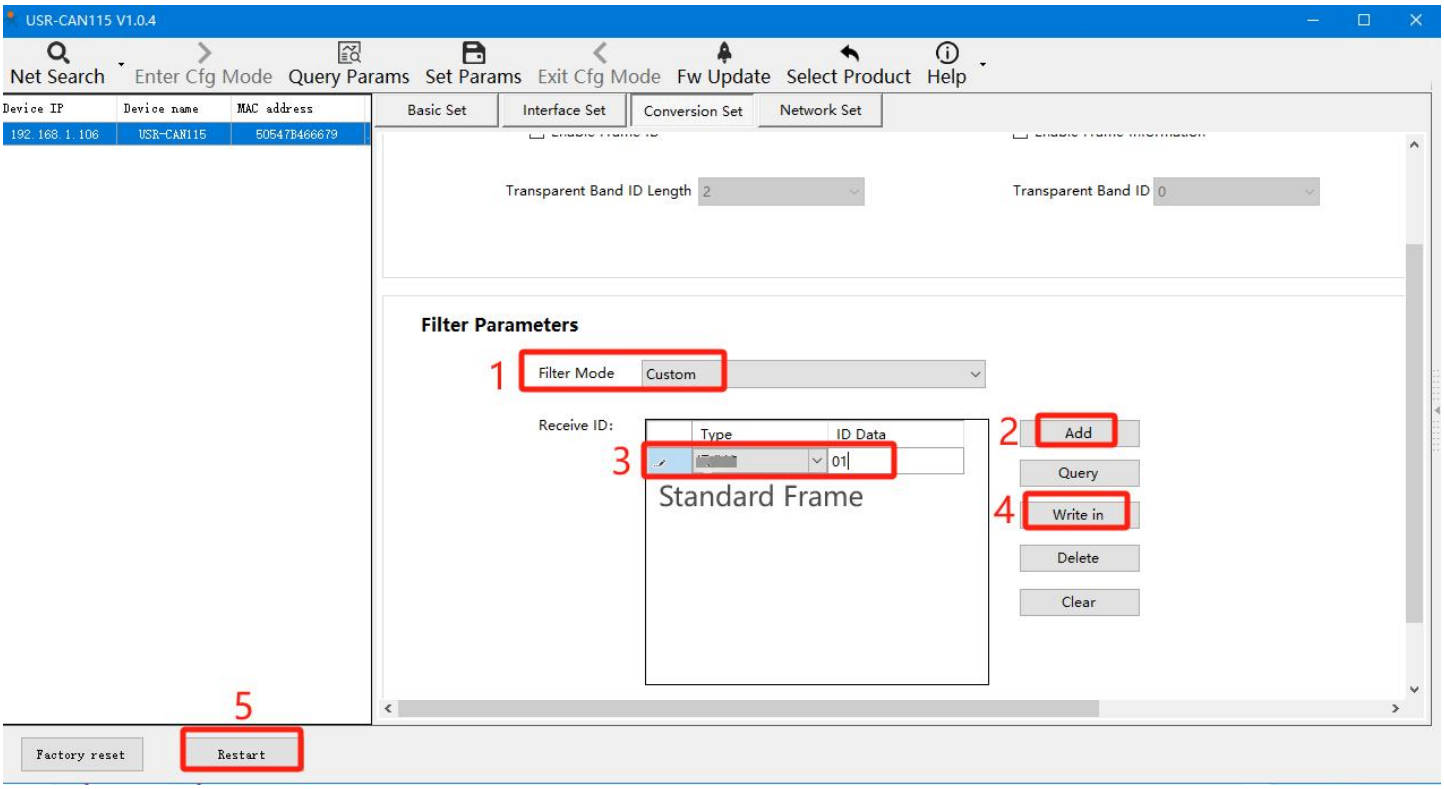
The configuration is as follows:

- Network Search Select the device that needs to be set
- Filter Mode Selection Custom
- Click Add Message and enter the ID you want to receive. Each group can select extended frames or standard frames. Standard Frame Range: 0~ 7FF, Extended Frame Range:0~ 1FFFFF
- Click Write to restart and save parameters

Click Query to query all current filter ID

Click Delete to delete the selected ID

Click Clear List to delete all current ID



10.Custom Frame ID Configuration

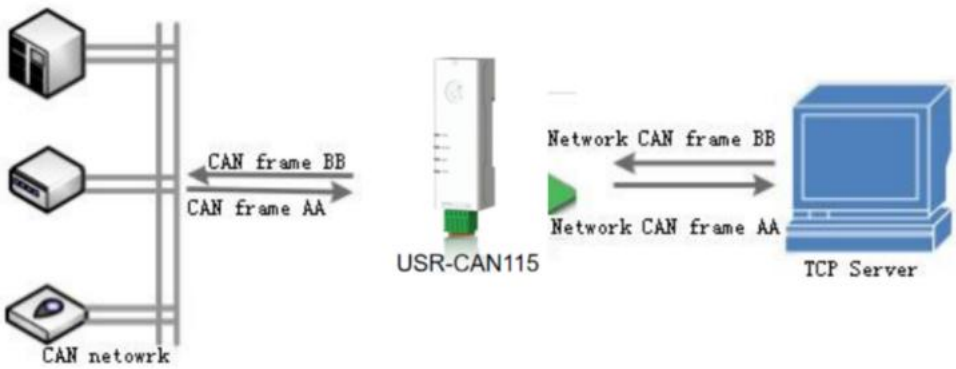
3.5. Socket Function

The socket mode of CAN115 is divided into TCP Client, TCP Server, UDP Client and UDP Server. Details are as follows:

3.5.1. TCP Client Mode

(1) Model description:

TCP Client provides client connections for TCP network services. Initiate a connection request to the server and establish a connection to realize the interaction between serial port data and server data. Usually used for data interaction between devices and servers, it is the most commonly used networking communication method.



11.TCP Client Mode Description

1) TCP Client provides client connections for TCP network services. Initiate the connection and connect to the server actively, which is used to realize the interaction between serial port data and server

data. According to the relevant provisions of TCP protocol, TCP Client has the difference between connection and disconnection, thus ensuring reliable exchange of data.

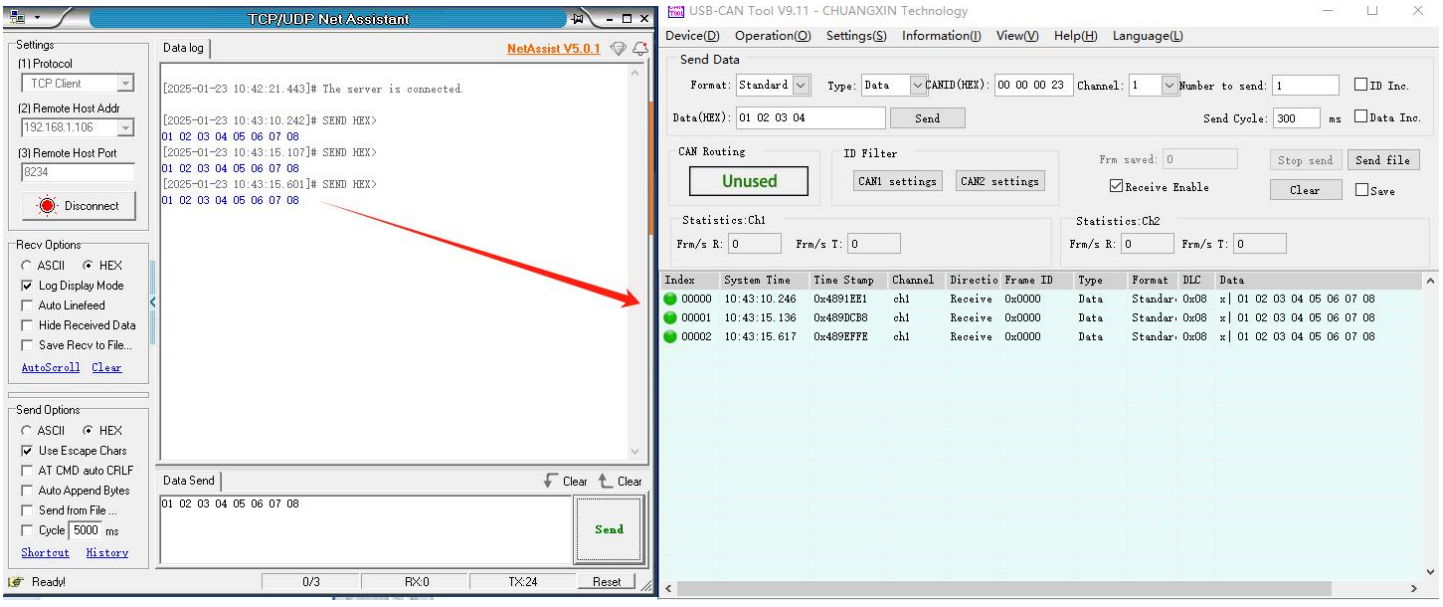
2) CAN115 is a TCP Client and requires a TCP Server connection. Parameters that need attention: target IP/domain name and target port number. The target IP can be a device on the same local local area network, or an IP address of a different local area network or an IP across public networks. If a server across public networks is connected, the server is required to have a public network IP or domain name.

3) CAN115 as TCP Client will actively connect to the target port of the target IP and will not accept other connection requests.

4) CAN115 is TCP Client. It is recommended to setthe local port number of CAN115 to 0, so thatCAN115 can access the server with random port number, which can solve the case of reconnection failure caused by the server judging that the connection state is abnormal and shieldingthe reconnection request sent by 30X.

5) This mode has the function of actively identifying abnormal connection. When the connection is established, KeepAlive probe packets will be sent at intervals of about 15s. If there is abnormal interruption of the connection, it will be detected immediately and prompt 30X to disconnect the original connection and reconnect.

6) Under the same local area network, if CAN115 is set as static IP, please keepthe IP of CAN115 and gateway in the same network segment, and set the gateway IP correctly, otherwise normal communication will not be possible.

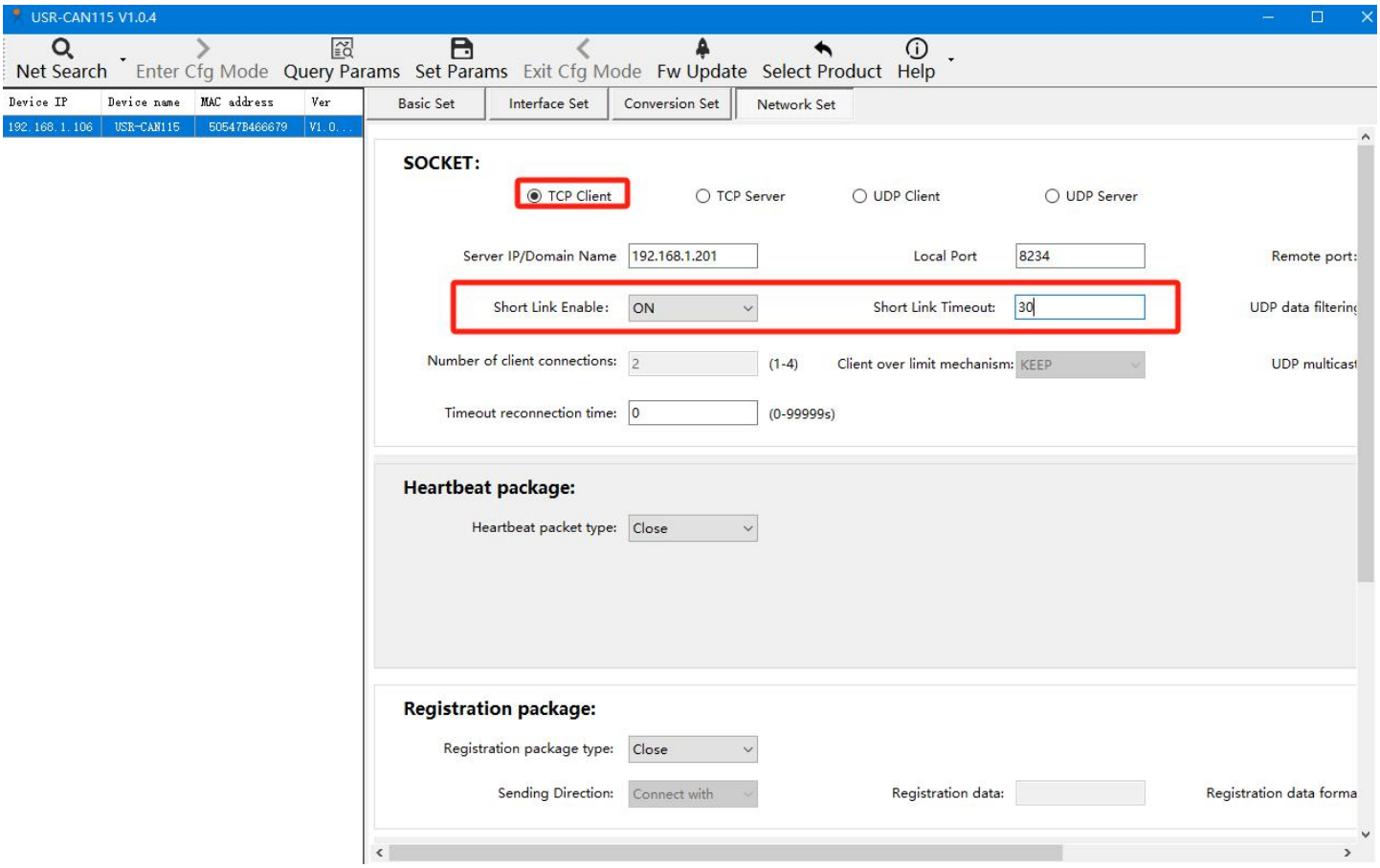


12.TCP client setup and data transfer diagram

(2) Short connections

TCP short connections are mainly used to save server resources and are generally applied to multi-point to one point scenarios. Using short connections ensures that all connections that exist are useful connections and that no additional controls are needed to filter them.

TCP short connection function is applied to TCP Client mode. After the short connection function is enabled, send a message. If there is no data received from the serial port or network port within the set time, the connection will be automatically disconnected. This function is turned off by default. The disconnection time can be set after the function is turned on. The setting range is 2~255s, and the default is 3 s. The setup diagram is as follows:

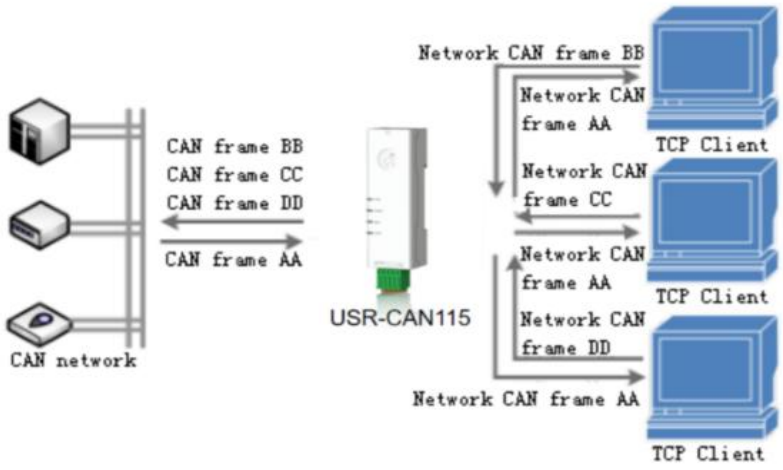


13.Short Connection Settings Illustration

3.5.2. TCP Server Mode

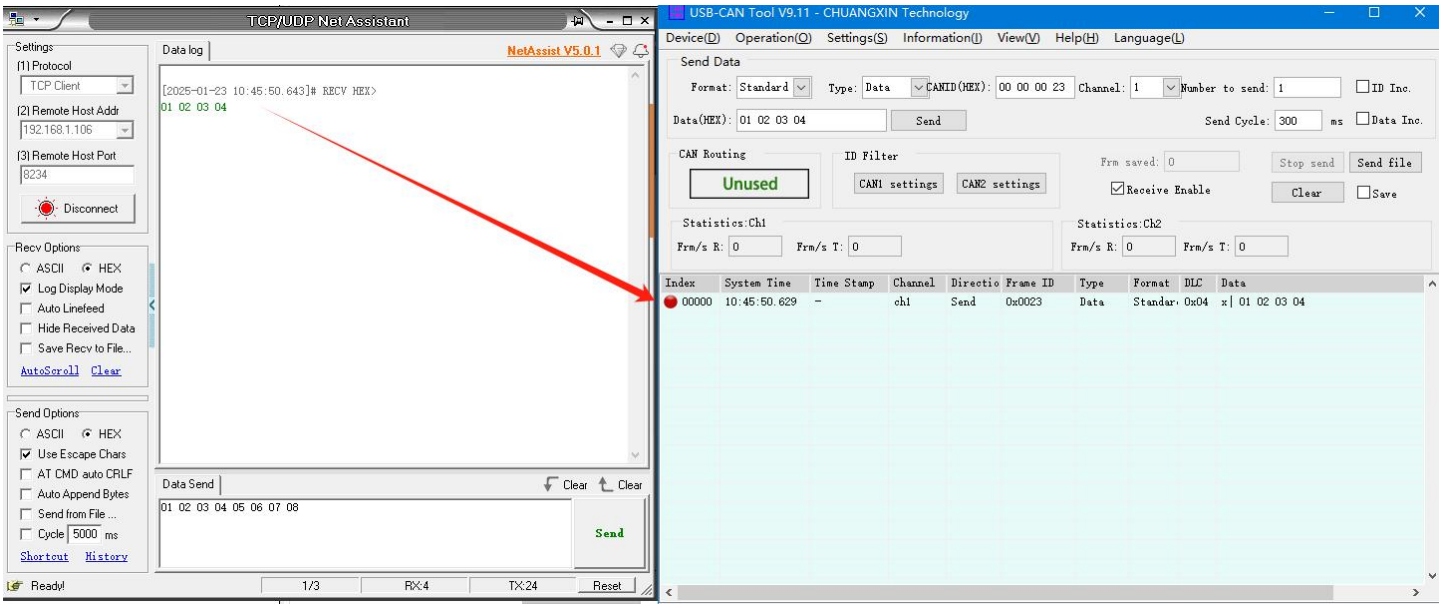
(1) Model description:

TCP Server stands for TCP Server. In TCP Server mode, CAN115 monitors the local port, accepts and establishes a connection for data communication when a connection request is sent. When CAN115 CAN port receives data, it will send data to all client devices connected to CAN115 at the same time. Similarly, TCP Server mode also has KeepAlive function for real-time monitoring of connection integrity.



14.TCP Server Mode Description

Typically used for communication with TCP clients within a local area network. Suitable for scenarios where there is no server in the local area network and multiple computers or mobile phones request data from the server. As with TCP Client, there is a difference between connection and disconnection to ensure reliable exchange of data.



15.TCP Server Settings and Data TransferIllustration

(2)Customizing the number of Client connections

When CAN115 is used as a TCP Server, the maximum number of clients that can be connected is4. The maximum value can be set according to customer needs, convenient for customers to use.

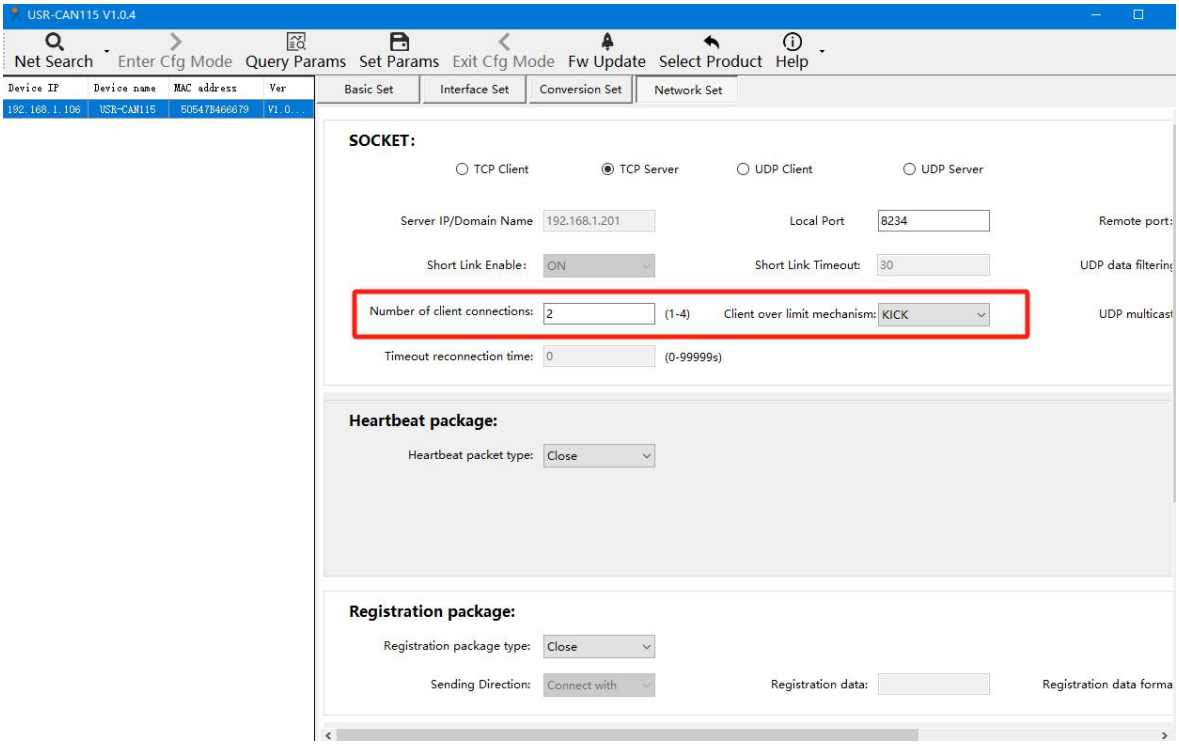
When the number of Client connections is greater than the maximum set by the user, the new connection replaces the old connection by default, or it can be set so that the new connection cannot kick the old connection.

Processing for excess connections:

KICK: Kick off old connections and plug in new ones.

KEEP: Keep existing connections and kick out new connections.

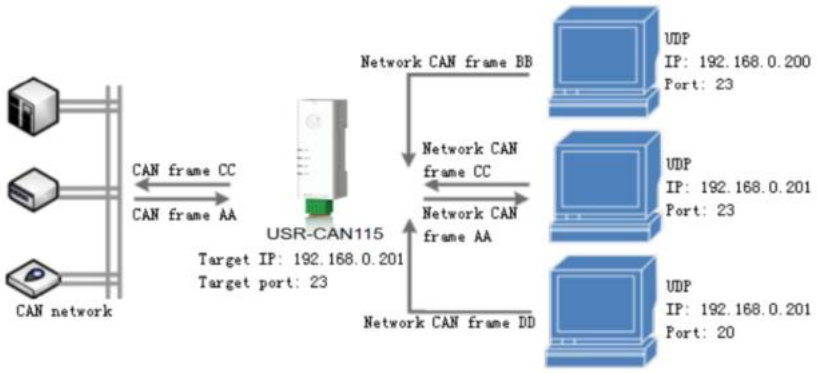
The setup diagram is as follows:



16.Setup Schematic

3.5.3. UDP Client Mode

This mode of operation is subordinate to UDP protocol. UDP Client is a connectionless transmission protocol that provides simple, unreliable, transaction-oriented messaging services. There is no connection to establish and disconnect, and only IP and ports are required to send data to each other. It is usually used in data transmission scenarios where there is no requirement for packet loss rate, data packets are small and sent frequently, and data is transmitted to a specified IP.



17.UDP Client Mode Description

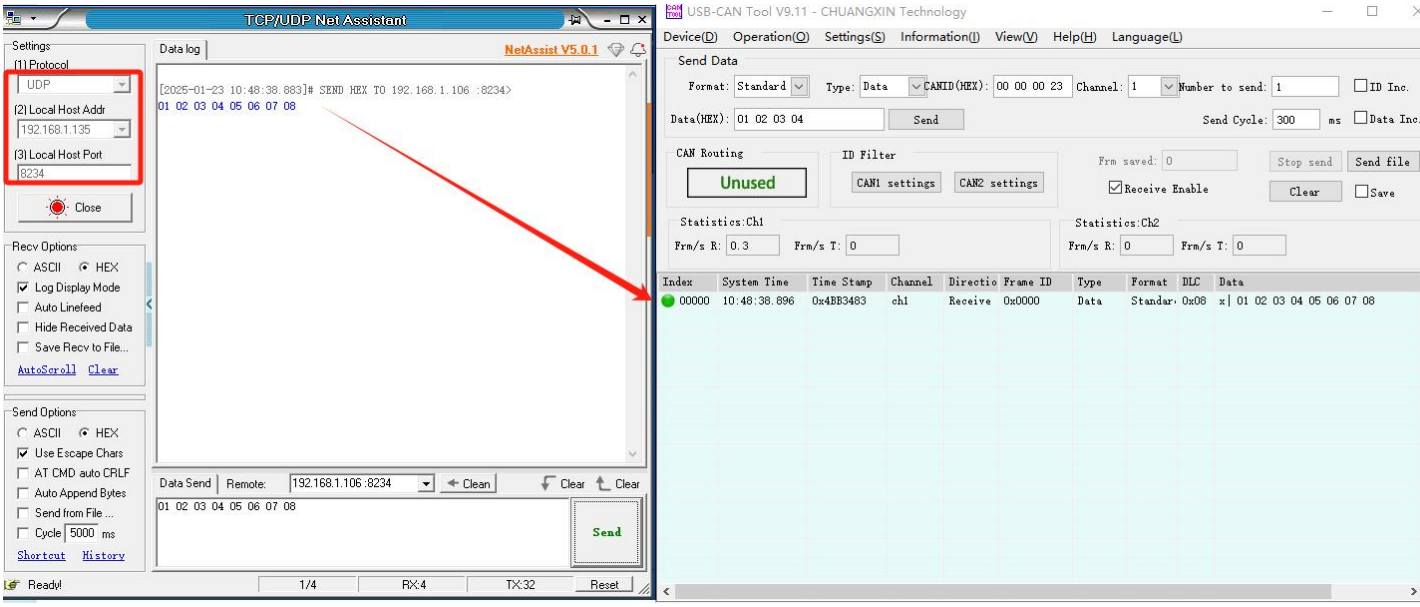
1) In UDP Client mode, the CAN port to network direction only communicates with the destination port of the destination IP.
2) In this mode, the target address is set to 255.255.255.255, which can achieve the effect of UDP full network segment broadcast; at the same time, it can also receive broadcast data; it supports

broadcast within the network segment, such as xxx.xxx.255 broadcast mode.

3) Support UDP multicast function. Multicast can realize one-to-multipoint connection mode between data sender and receiver. Many receivers join the same multicast group and share the same IP address. At the same time, the members in the multicast group are dynamic, and the joining and exiting of a member does not affect the original multicast group. The valid address range for multicast groups is 224.0.0.2 - 239.255.255.255.

4) UDP data filtering function is supported, which can be enabled by PC configuration or AT command. After being enabled, it can select to receive data transmitted transparently from all network segments(e.g.255.255.255.255),intra-segment(e.g.192.168.0.255),specified IP(e.g.192.168.0.201)according to configuration.

- The network segment broadcast does not determine the source IP of the data, but only determines whether the source port is the same as the target port. When the source port is the same, the network data is output. When the source port is different, the network data is discarded.
- The intra-segment broadcast judges whether the data source port is the same as the target port, and judges whether the IP is an intra-segment IP, and outputs the data meeting the conditions, otherwise, the data is discarded.
- Regular UDP communication, determine the source port and IP, and output the same data as the destination port and IP, otherwise discard.

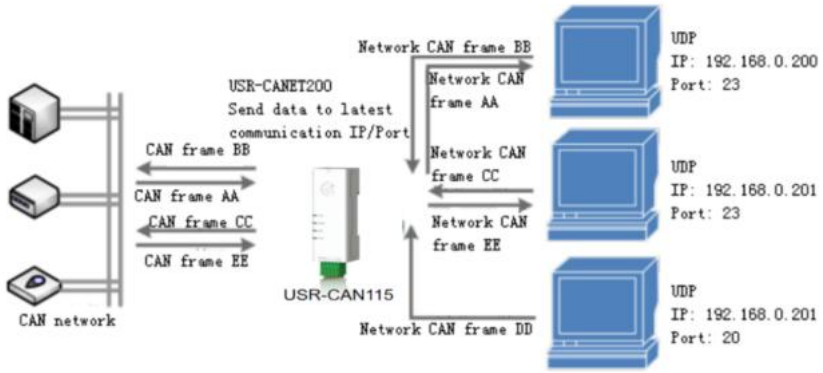


18.UDP client settings and data transferdiagrams

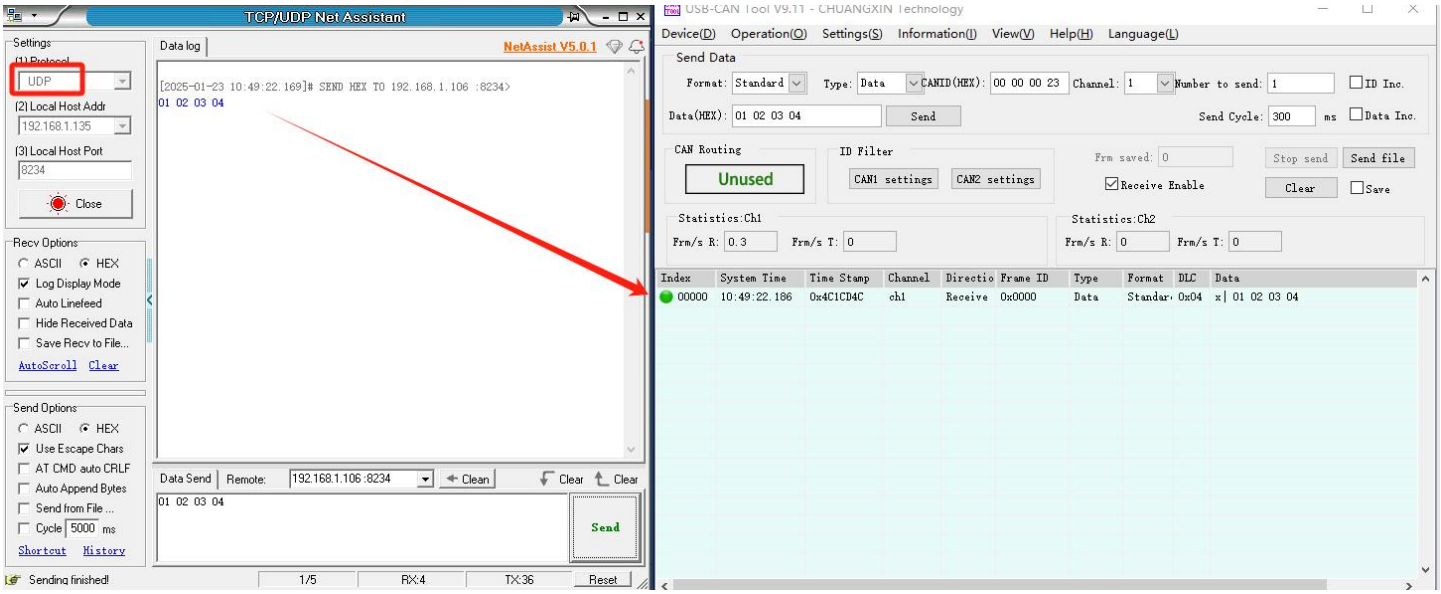
3.5.4. UDP Server Mode

UDP Server means that the source IP address is not verified on the basis of ordinary UDP. After receiving a UDP packet, the destination IP is changed to the data source IP and port number. When sending data, the

IP and port number sent to the most recent communication. This mode is usually used in data transmission scenarios where multiple network devices need to communicate with modules and do not want to use TCP due to its high speed and frequency.



19.UDP Server mode



20.UDP server setup and data transferdiagram

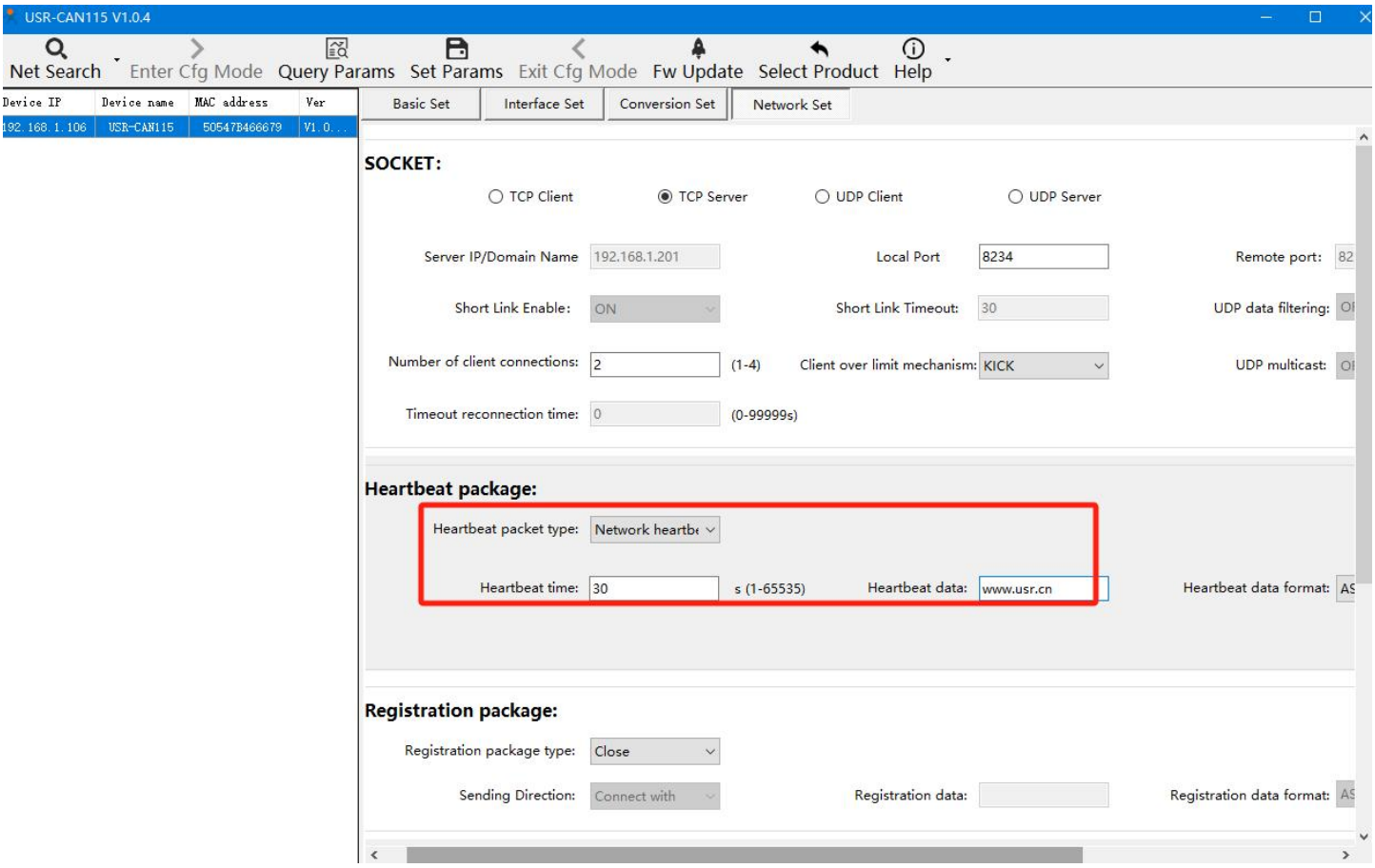
3.6. Characteristic Function

3.6.1. Heartbeat Packet

In network pass-through mode, users can choose to have CAN115 send heartbeat packets. Heartbeat packet is divided into network heartbeat packet and CAN port heartbeat packet, only one kind takes effect at the same time. It can also be sent to CAN port equipment.

Heartbeat packet:

When there is no data on the network side, it issent to the network server side regularly, mainly for the purpose of maintaining connection with the server. Works onlyin TCP Client andUDP Client mode. It supports both HEX and ASCII formats.



21.Heartbeat packet setup and data transferdiagram

CAN Port Heartbeat Package:

It can be sent to CAN as a fixed query command by heartbeat packet. Content must conform to CAN format. CAN frame format, frame type and frame ID can be configured.

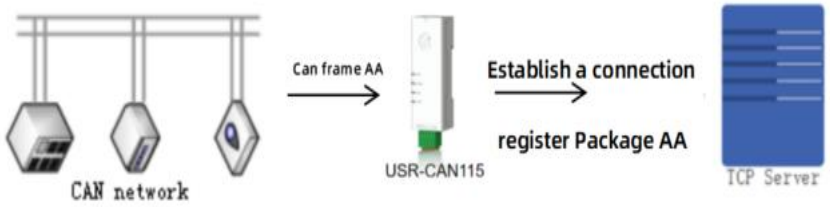
3.6.2. Registration Packet

In network pass-through mode, users can configure the registration package function. The registration package can be used as an identifier for the server to identify the data source device, or as a password to obtain authorization for server functions.

Registration package can be configured to send registration package or carry registration package, or it can take effect at the same time. Connection sending refers to sending when TCP establishes a connection or UDP is established, and carrying sending refers to splicing registration packet data into the front end of each data packet as a data packet. The data of the registration package can be MAC address or custom registration data, wherein the maximum length of the custom registration package setting content is 40 bytes.

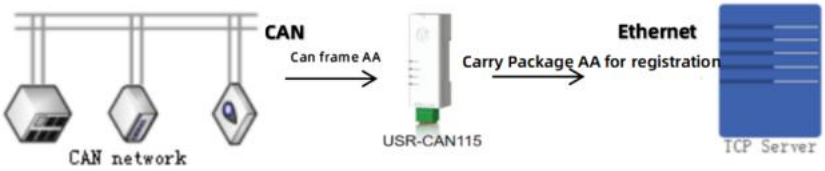
The registration packageis only available for TCP client and UDP client mode, and there is no registration package for TCP server and UDP server.

The connectionsending registration packageis mainly used to connect to the server that needs to be registered. The application diagramis as follows:

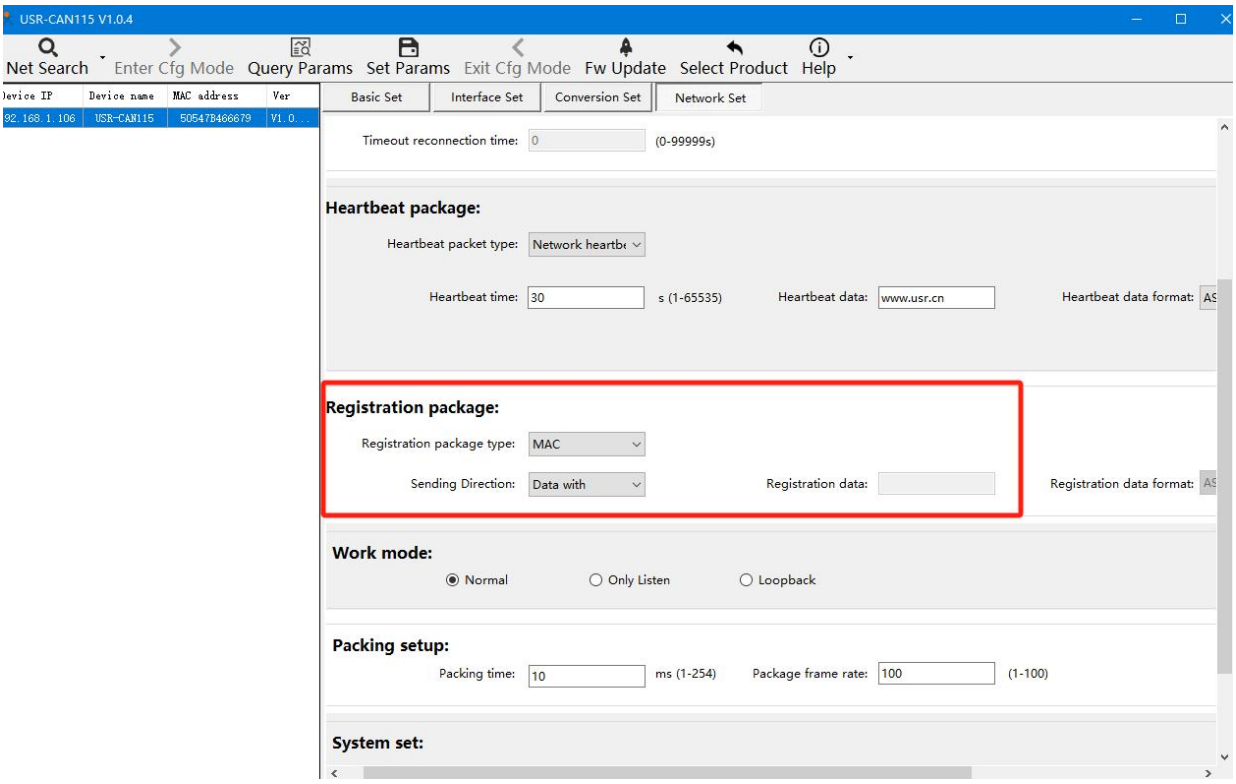


22.Schematic diagram of connecting to send registration package

Data carryingregistration packet: sending datain the front of the data access registration packet,mainly used for protocol transmission, application diagram is as follows:



23.Schematic diagram of carrying and sending registration package



24.Registration package setup and data transferdiagram

3.6.3. CAN Operating Mode

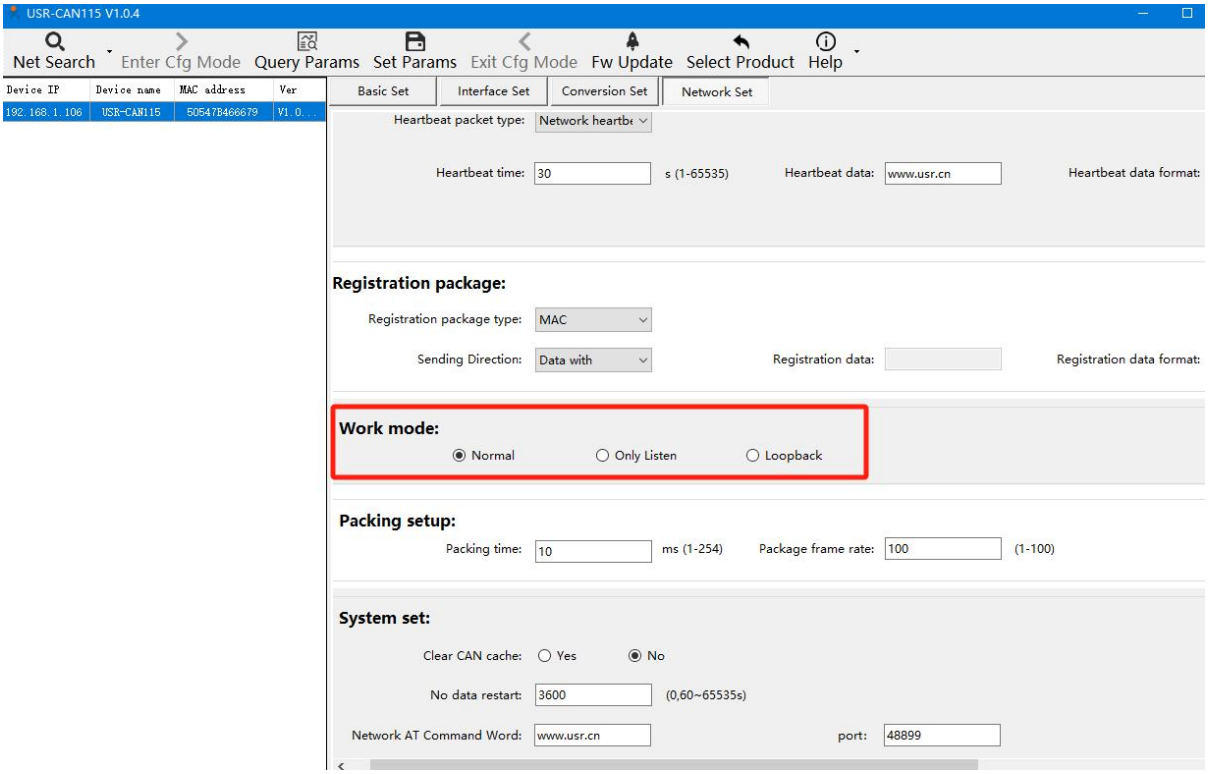
CAN supports three modes of operation: normal, listen only and loopback.

In normal mode, it canreceive and send data normally;

In listen only mode, CAN port works in monitor mode and does not respond;

In loopback mode,the data sent will be received by itself and transmitted to the CAN bus, but the data

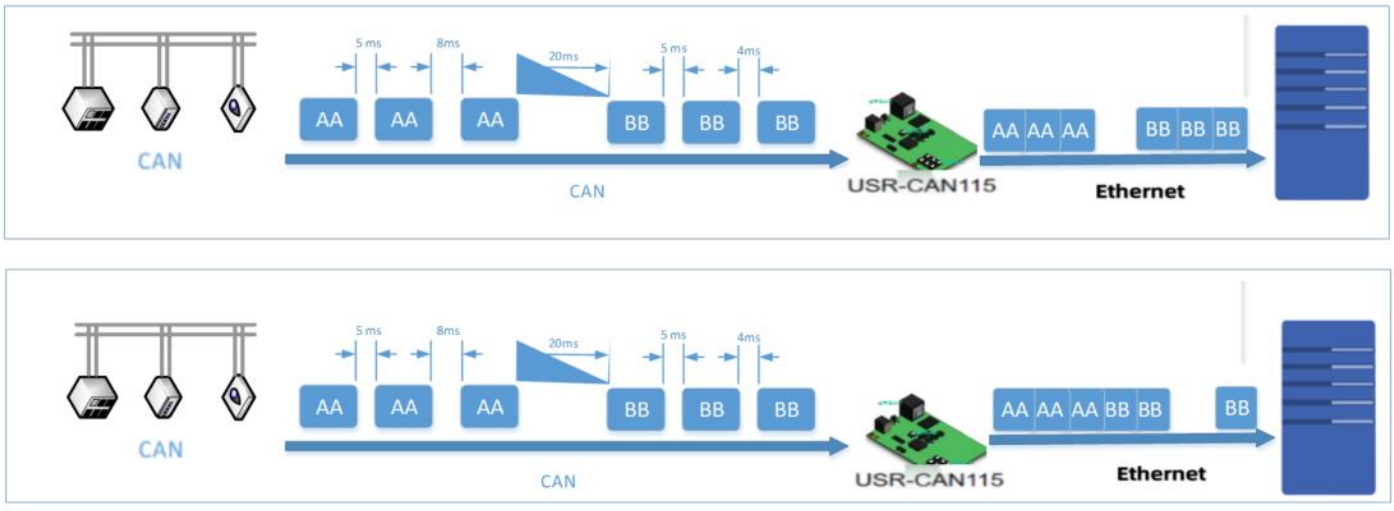
cannot be sent to the module. This mode is mainly used for testing.



25.Operation mode settingdiagram

3.6.4. CAN Packaging Mechanism

Since the data on the network side is transmitted in data frames, it is necessary to send CAN data to the network side in frames, which can transmit data more efficiently and quickly. CAN115 can pack data received by CAN according to packing time and packing frame number.

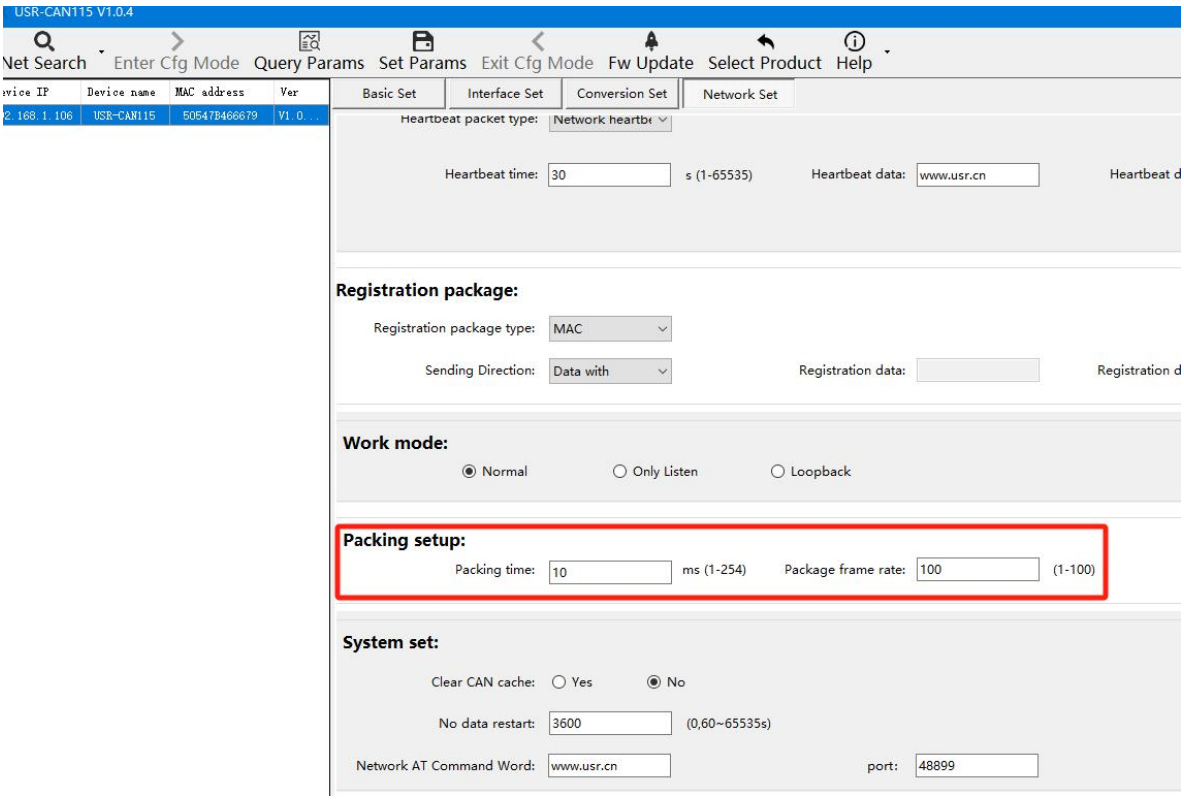


26.CAN package description

CAN packaging mechanism is based on packaging time and packaging length, and when either of them meets, it is packaged and sent.

Packing time: default 10ms, settable,range: 1~254.

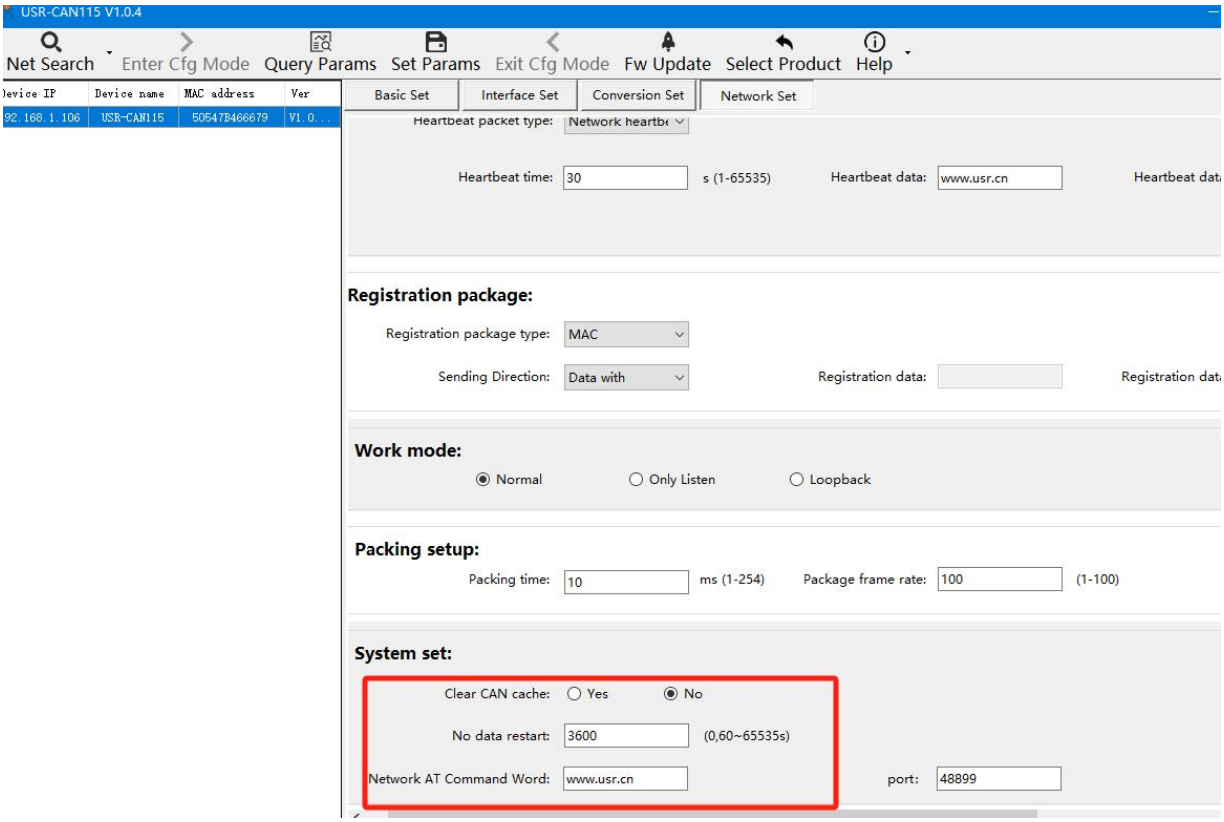
Packing length: default is 100frames, can be set, range: 1~10 0.



27.Diagram of subcontracting time setting

3.6.5. Clear CAN Cache Data

When the TCP connection is not established, the data received by the CAN port will be placed in the buffer area, and the CAN port will receive abufferof up to 200 frames. When TCP connection is established,CAN portcache data can be setaccording to customer requirements. This function defaults to no cleanup. When the short connection function is enabled in TCP C lient mode, the function of clearing cache data fails. The setup diagramis as follows:

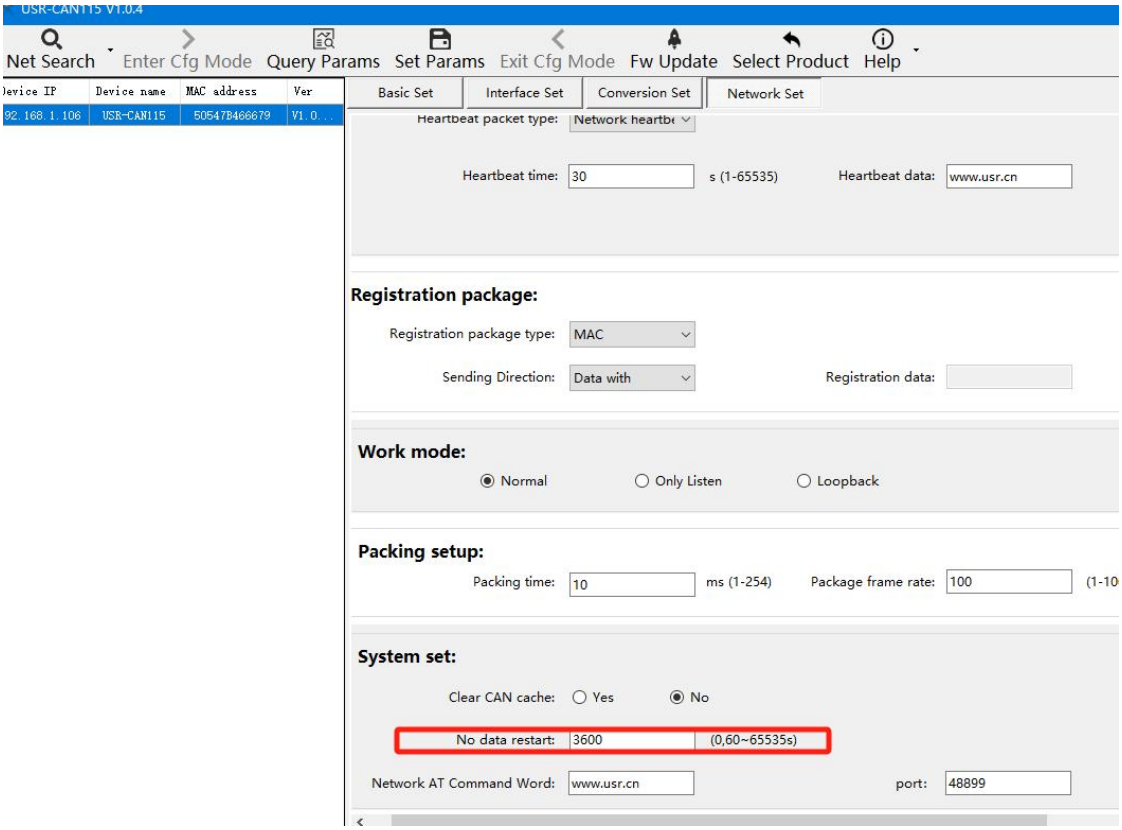


28.Clear Cache Data Settings Illustration

3.6.6. No Data Restart

The function of no data restart (timeout restart) is mainly used to ensure the long-term stable operation of CAN115. When the network port does not receive data for a long time, or the network does not receive data for a long time, CAN115 will restart after exceeding theset time, so as to avoid abnormal conditions affecting communication. Thenormal working time of this function is set to60~65535s, and the default value is3600s. When the settingtime is less than60s, it is set to zero by default,that is, the function is turned off.

The setupdiagram is as follows:



29.No data restart function

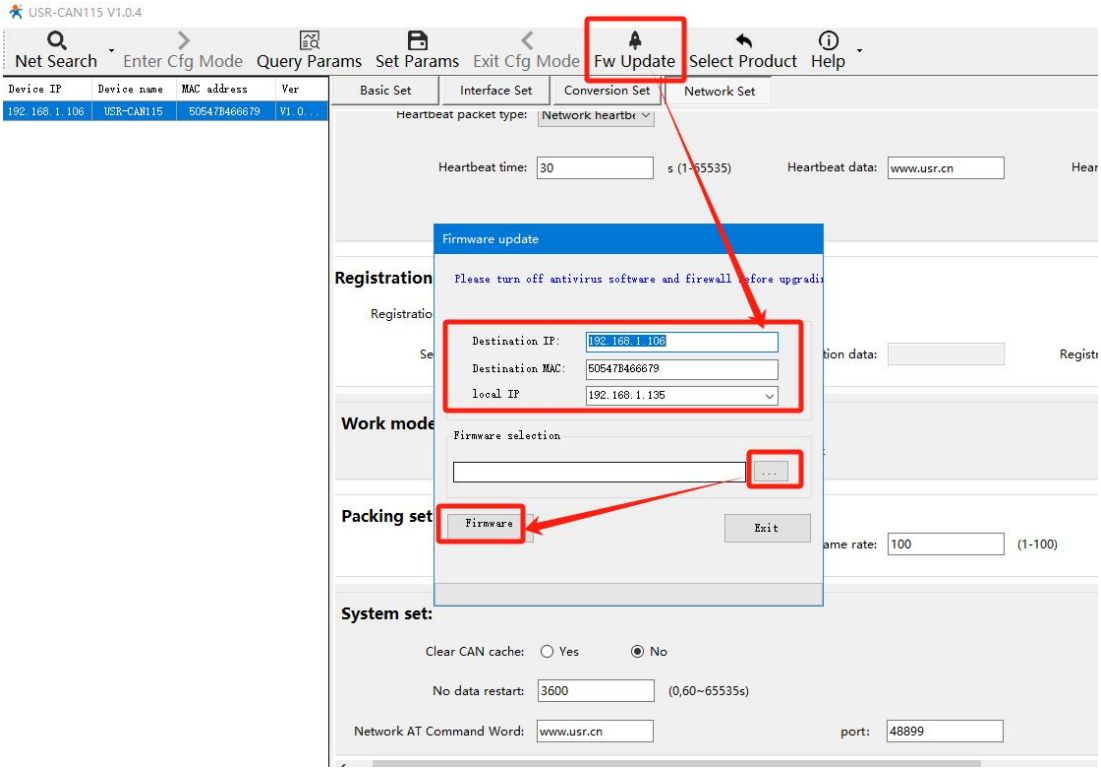
3.7. Firmware Upgrade

Support easy firmware upgrade of equipment through host computer. The specific operation methods are as follows:

Click Firmware Upgrade--> Device automatically fills in target IP address, target MAC address, local IP address--> Click "..." in the Firmware Selection Bar, Select the firmware to be upgraded--> Click Firmware Upgrade--> The device enters the upgrade status, wait for the progress bar to reach 100%, and prompt that the firmware transmission is successful and the firmware upgrade is complete.

Note:

- When upgrading with configuration software, it is recommended to turn off the firewall and antivirus software of the computer (usually in the control panel)



30.Firmware Upgrade Diagram

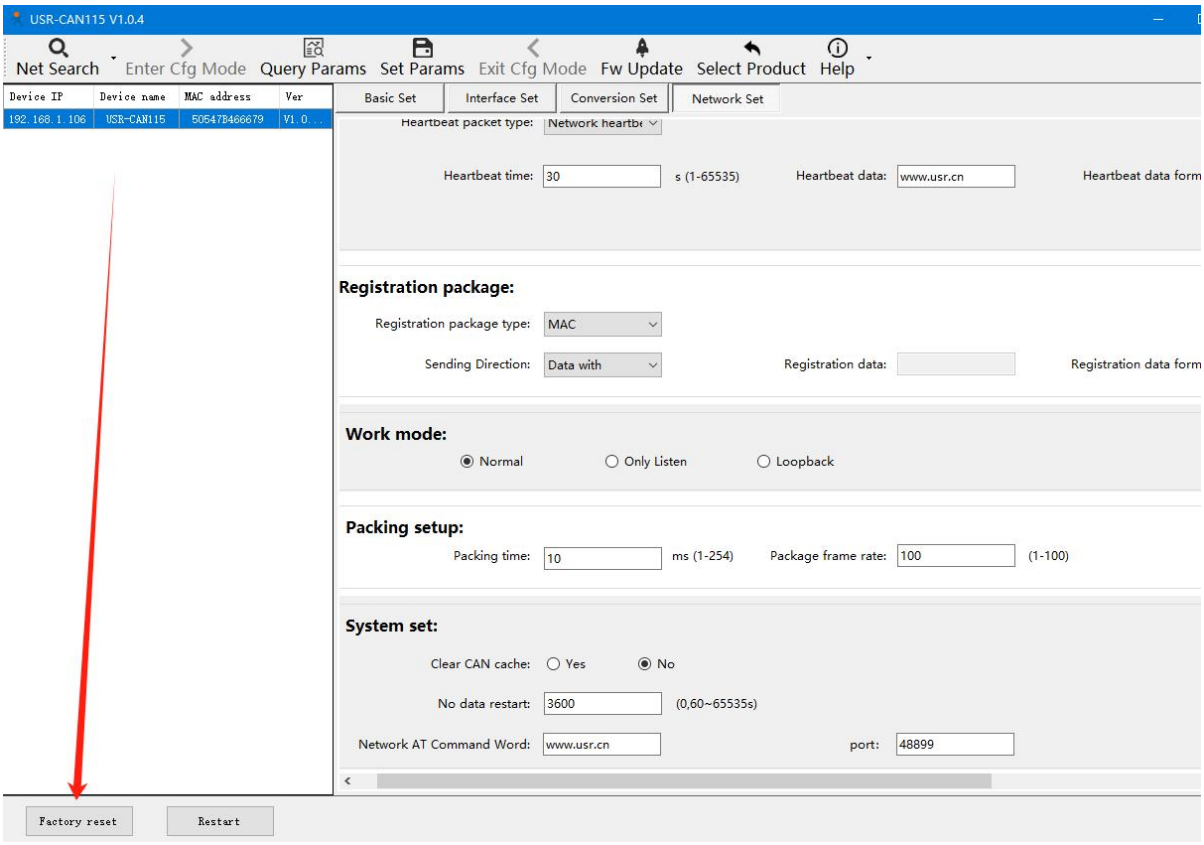
3.8. Factory Data Reset

Hardware factory reset: The module can restore the factory settings through hardware. After power-on, press the Reload button, keep the Reload pressed and release it after 3-15s. The hardware factory settings can be restored.

Software factory reset: By setting software, you can restore software factory settings.

AT command to restore factory settings: AT command mode, send command AT+CLEAR, plus Enter, receive correct reply+OK, that is, restore factory settings.

Set software settings:



31.Setup Software Schematic

4. Examples of Conversion Patterns

The device supports three conversion modes: transparent conversion, transparent band ID conversion and standard protocol conversion. TCP server, TCP client, UDP server, UDP client protocol under the three modes are applicable, data conversion is more flexible. The following are detailed examples of three conversion modes.

4.1. Transparent Conversion

In the transparent conversion mode, CAN115 receives data from one bus and immediately converts it to the other bus side without adding data or modifying the data. This enables the exchange of data formats without changing the data content, and the converter is transparent to both ends of the bus.

CAN message frame information (frame type part) and frame ID come from user configuration in advance, and frame type and frame ID remain unchanged during conversion. The user can choose whether to convert the frame information and frame ID.

In this way, the communication burden of users will not be increased, but the data can be converted in real time, and the transmission of large traffic data can be undertaken.

4.1.1. Ethernet to CAN-transparent conversion

Network data to CAN message: all data from the network end are sequentially filled into the data field of CAN message frame. The frame information (frame type part) and frame ID are configured in advance.

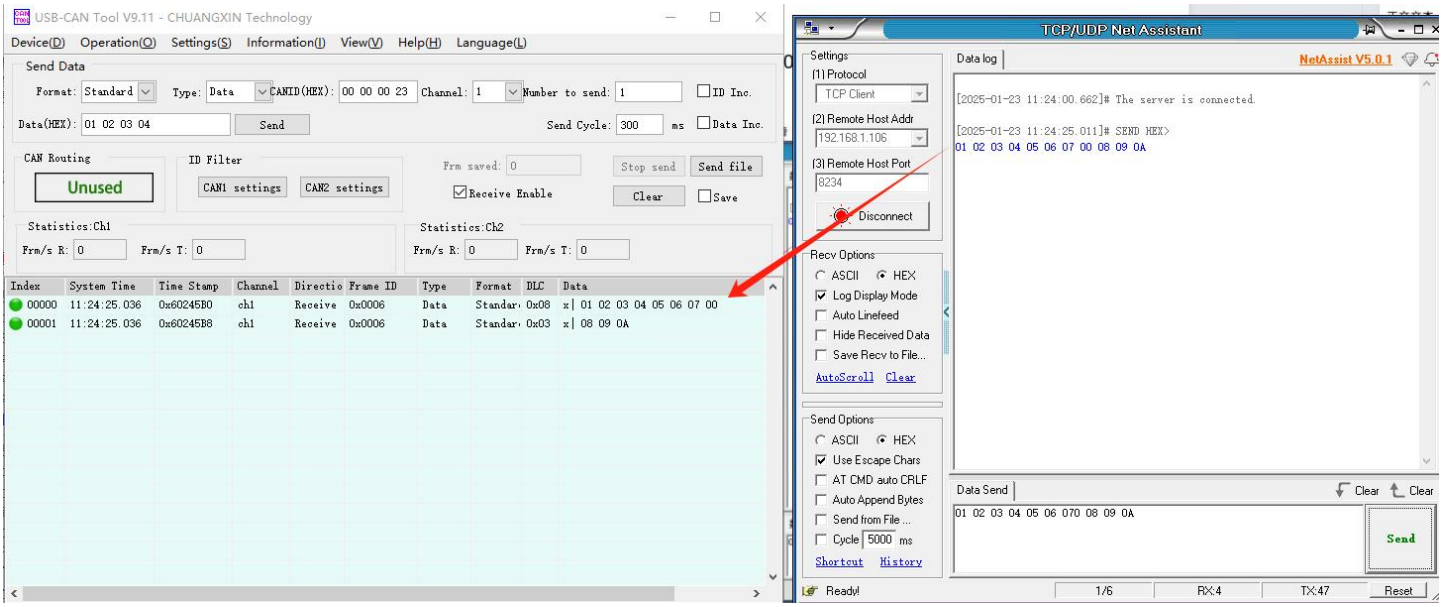
Network Side
Data1
Data2
Data3
Data4
Data5
Data6
Data7
Data8
Data9
Data10

CAN Information		
Frame Information	Frame Information	Frame Information
FrameID	User Configuration	User Configuration
	User Configuration	User Configuration
Data Field	Data1	Data9
	Data2	Data10
	Data3	
	Data4	
	Data5	
	Data6	
	Data7	
	Data8	

32.Transparent transmission-Ethernet data to CAN

Examples:

Under TCP server protocol, the frame ID is configured as standard frame, CAN ID is "0006", and the conversion example is as follows:



33.Transparent Transmission--Ethernet Data to CAN Transmission Example

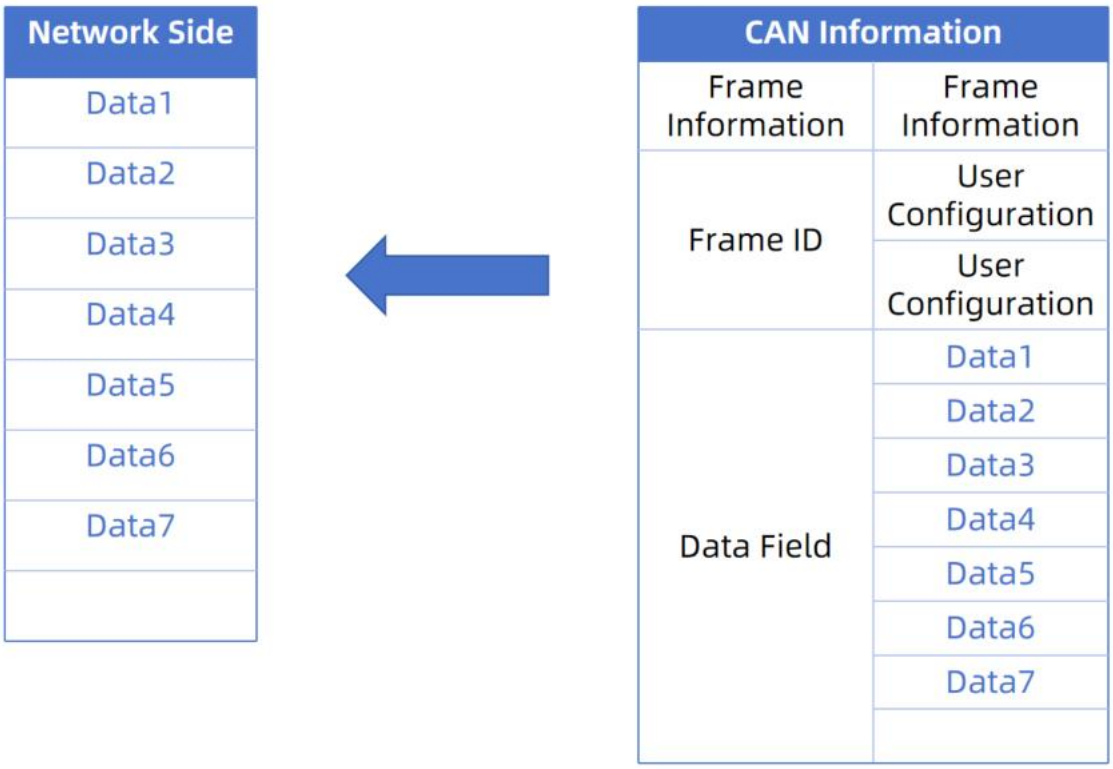
4.1.2. CAN to Ethernet--Transparent Conversion

For CAN bus messages, receive a frame of CAN messages immediately forward a frameto the network.

If the configuration enables frame information, the converter operates by adding frame information of

CAN messages to the first byte of the network data frame. CAN frame information is not converted when unchecked.

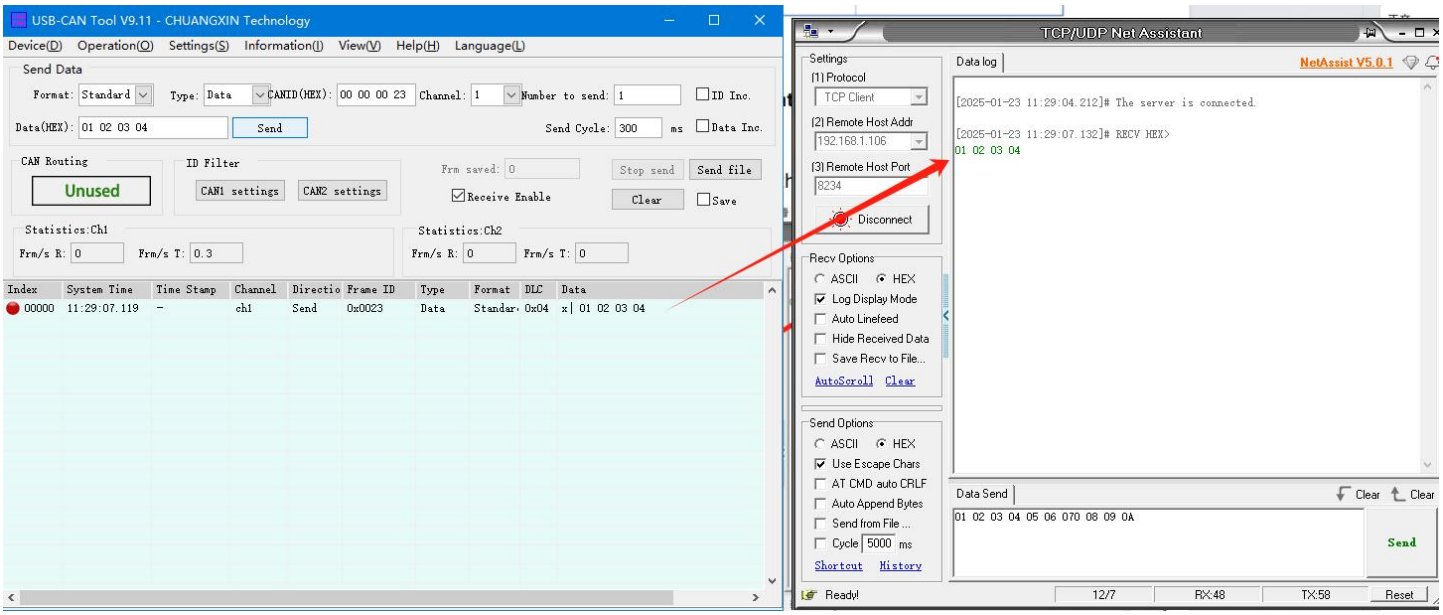
If the enable frame ID is enabled, the converter will add the frame ID of the CAN message before the frame data of the network data frame and after the frame information (e.g. enable frame information).



34.Transparent transmission--CAN to Ethernet data

Examples:

In TCP server mode, and the conversion is as follows:



35.Transparent Transmission--CAN to Ethernet Data Transmission Example

4.2. Transparent Zone ID Conversion

Transparent band identification transformation is a special use of transparent transformation and has no protocol attached. This method can convert the "address" inEthernet datainto the identification field of CAN message, where the starting position and length of frame ID inEthernet datacan be configured. The converter will extract this frame ID during conversion and fill it in the frame ID field of the CAN message as the ID of the CAN message whenthe Ethernet data isforwarded. Similarly, when CAN messages are converted toEthernet data, the ID of CAN messages is also converted to the corresponding position ofEthernet data.

In this way, the converter adapts to the user's custom protocol to the maximum extent possible.

Note: In this conversion mode, the CAN ID of the CAN parameter setting item of the configuration software is invalid, because the identifier (frame ID) sent is filled with data in the Ethernet data described above.

4.2.1. Ethernet to CAN-Transparent Band ID Conversion

Configure the CAN frame type and the start address and length of the "Frame ID" of the CAN message carried in the Ethernet data. The range of start address is 0~7; the length range is standard frame: 1~2, extended frame: 1~4.

During conversion, CAN message "frame ID" in Ethernet data is converted into CAN frame ID field according to prior configuration. If the configured transparent tape ID length is less than the frameID length of the frame type ofthe CANmessage,0 is added to the high byte of the frameIDinthe CANmessage.

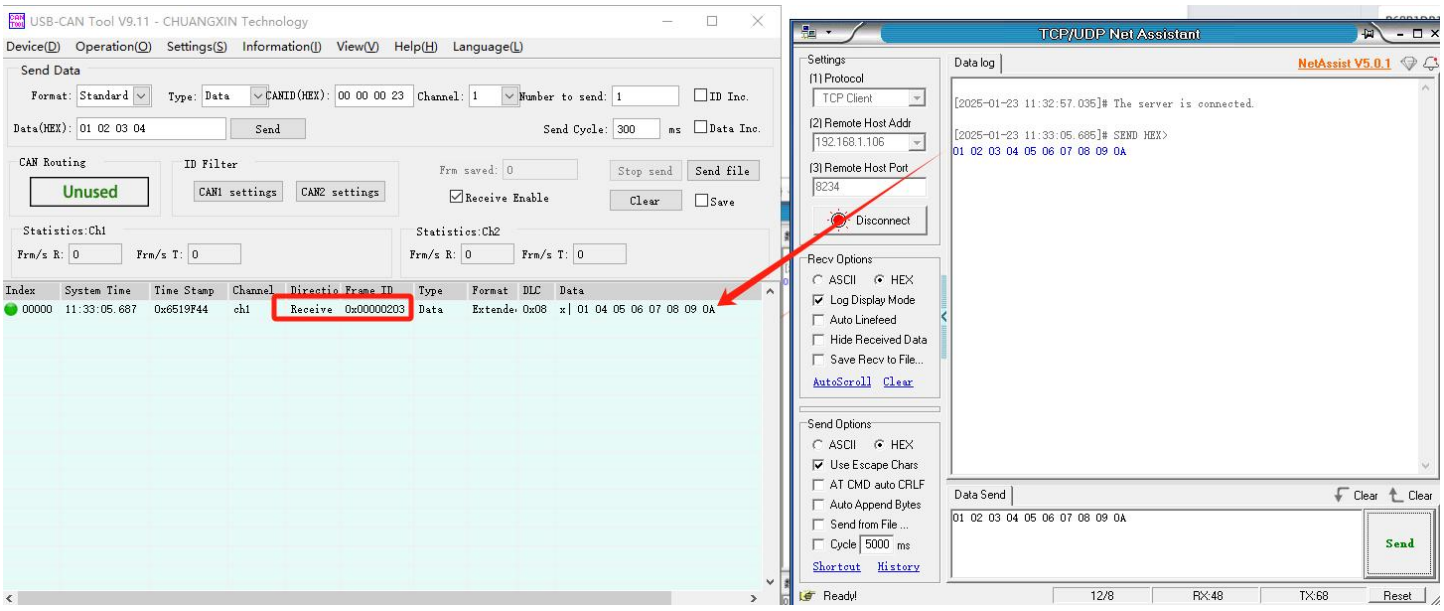
Address	Ethernet Data
0	Data1
1	Data2 (ID1)
2	Data3 (ID2)
3	Data4
4	Data5
5	Data6
6	Data7
7	Data8
...	...
N-2	Data N-1
N-1	Data N

CAN Information		
Frame Information	Frame Information	Frame Information
Frame ID	ID1 (0x00)	ID1 (0x00)
	ID2 (0x00)	ID2 (0x00)
	Data2 (ID3)	Data2 (ID3)
	Data3 (ID4)	Data3 (ID4)
Data Field	Data1	Data...
	Data4	Data N-1
	Data5	Data N
	Data6	
	Data7	
	Data8	
	Data9	
	Data10	

36.Transparent tape ID transmission-serial frame to CAN

Examples:

In TCP server mode, the configuration frame type is extended frame, the starting address is 1, the length is 2, and the serial frame is converted to CAN as follows:



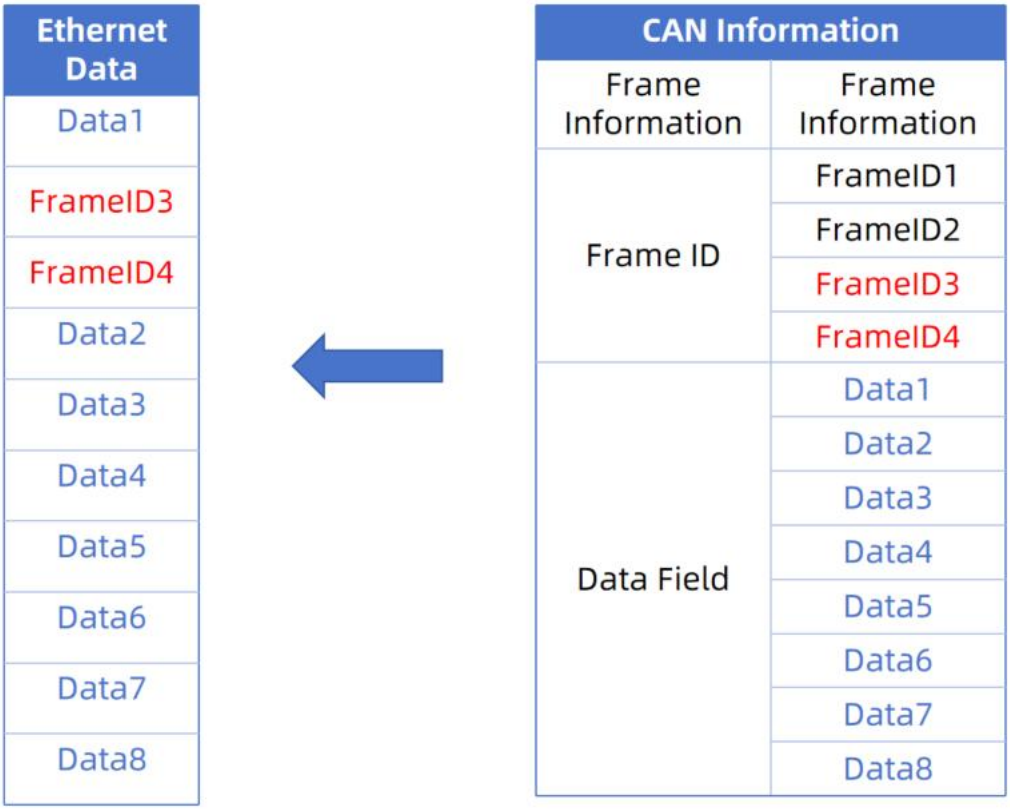
37.Transparent tape ID transmission--Network data to CAN example

4.2.2. CAN to Ethernet-Transparent Band ID Conversion

For CAN messages, a frame is immediately forwarded upon receipt of the frame, and the ID in the

received CAN message is converted accordingly according to the position and length of the CAN frame ID configured in advance in Ethernet data during each forwarding. Other data are forwarded sequentially.

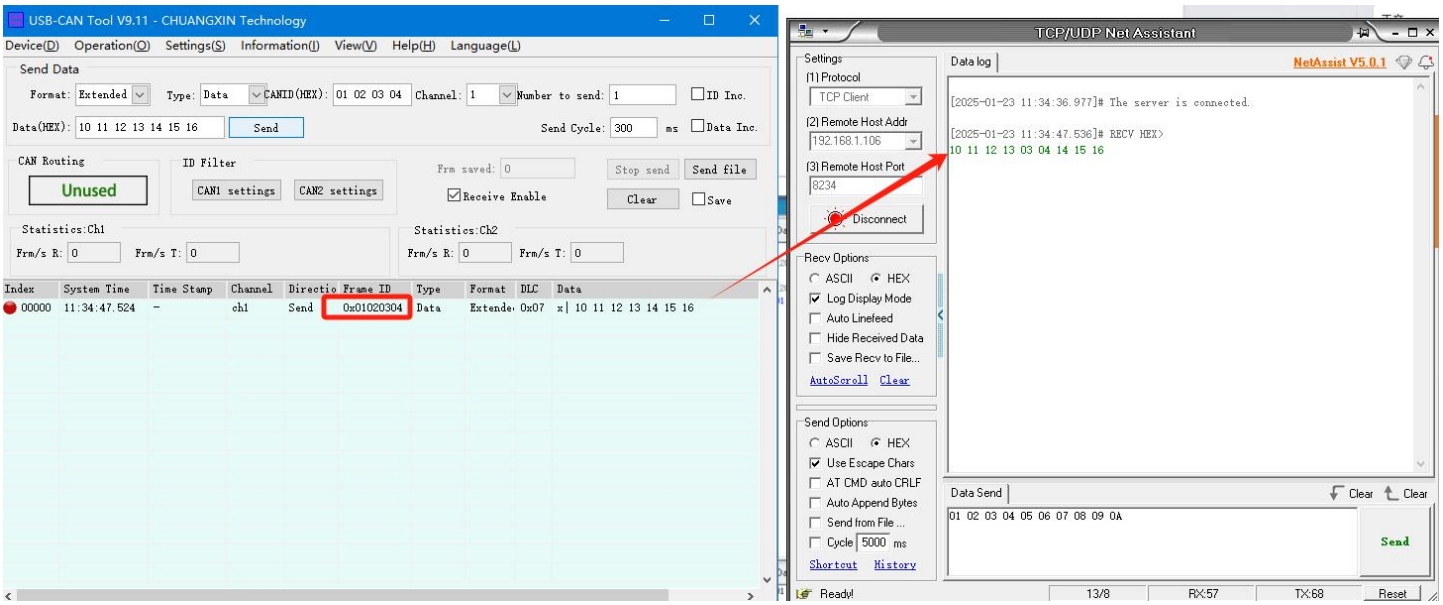
Note: If the CAN frame ID length is greater than the set transparent tape ID length, only the lower byte is converted to the corresponding position of the serial frame. For example: CAN frame ID is 01020304, the set transparent band ID length is 2, then only 0304 will be converted to the corresponding position in the serial frame.



38.Transparent tape ID transmission--CAN to serial frame

Examples:

Configuration frame type is extended frame, starting address is 4, length is 2, CAN frame transfer serial is as follows:



39.Transparent tape ID transmission--CAN to serial frame example

4.3. Standard Protocol Conversion

Standard CAN frame format, each CAN frame contains 13 bytes, 13 bytes of content includes CAN frame information + frame ID + data frame.

By configuring the frame information correctly (the first byte of data), you can flexibly send out standard frames, extended frames, and even remote frames. The details of standard frames, extended frames and even remote frames can be obtained by correctly parsing the 13-byte frame data.

Note:

（1）In this conversion mode, the CAN parameter items "CAN ID" and "Frame Type" of the configuration software are invalid, because the frame ID sent at this time is filled with the frame ID data in the 13-byte serial frame described above, and the frame type is determined by the frame information in the 13-byte serial frame.

（2）In this mode, the conversion must be performed in strict accordance with the 13-byte serial data format. First of all, we must ensure that the frame information is correct, the reserved bit must be zero, and the data length cannot be greater than 8, otherwise it will not be converted. Each frame is fixed to be 13 bytes, if insufficient must be filled with 0. Serial data satisfying the format of 13 bytes in the same serial data frame corresponds to a CAN message, and serial data frames less than 13 bytes are not converted.

（3）The converted serial data frames are aligned with 13 bytes.

The standard CAN frame format is as follows:

CAN Fixed Format (1 CAN frame contains 13 bytes)		
Frame Information	Frame ID	Frame data
1Byte	4Byte	8Byte

Frame information: length 1 byte, used to identify frame information: frame type, frame length.

Bit7							Bit0
FF	RTR	retain	retain	B3	B2	B1	B0

FF: Identification bit of standard frame and extension frame, 1 is extension frame, 0 is standard frame

RTR: identification bit of remote frame and data frame, 1 is remote frame, 0 is data frame

Reserved: reserved bit must be filled in 0, not 1.

B3-B0: data length bits, identifying the data length of the CAN frame.

Frame ID: Length 4 bytes; high order first, low order last. The standard frame significance bit is 11 bits and the extended frame significance bit is 29 bits.

12h	34h	56h	78h

Extended Frame ID: 0x12345678

00h	00h	01h	23h

This ID can represent either an extended frame ID or a standard frame ID.

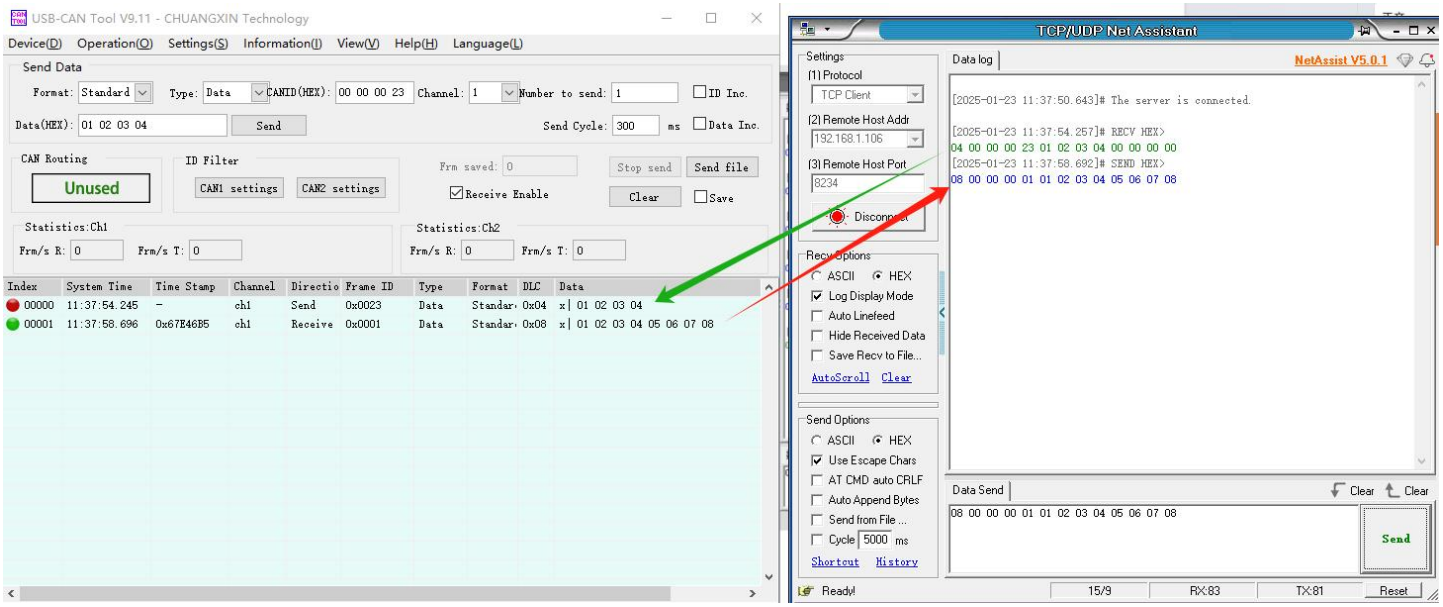
Extended Frame ID: 0x0000123

Standard Frame ID: 0x0123

Extended frames and standard frame IDs are distinguished by frame information

Frame data:length 8 bytes, insufficient must be filled with 00.

Examples:



40.Standard Protocol Transmission Examples

5. Contact Information

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Technical Support：h.usriot.com

Inquiry Email： inquiry@usriot.com

Skype & WhatsApp： +86 13405313834

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