EBYTE

Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual

CONTENTS

1. Product introduction

1.1. Introduction

E810 (4RS1E) is a four serial port server of RS422 & RS485 & RS232 to Ethernet, which realizes transparent data transmission between RJ45 network port and RS422, RS485, RS232. The device is equipped with M3 series 32-bit processor, which runs fast and has high efficiency, with adaptive network rate. TCP Server, TCP Client, UDP Server, UDP Client four communication mechanisms. E810 (4RS1E) is easy to operate, and users can configure the parameters of the device through the web page to easily achieve data transmission.

1.2. Features

1. Four channels of 485/232/422 and RJ45 Ethernet data transparent transmission;
2. Modbus-RTU to Modbus-TCP available;
3. AT command is configurable;
4. Web page configuration available;
5. The hardware watchdog is with high reliability;
6. The power supply has good functions such as over-current, over-voltage, and anti-reverse connection;
7. Wide voltage input 8V-28V, 12V or 24V is recommended.

1.3. Specification

No.	Specification and characteristic	Description
1	Supply voltage	8 ~ 28V DC, note: higher than 28V will cause permanent damage to the device, 12V or 24V power supply is recommended
2	Working current	180.7mA@12V(RS232)，176.8mA@12V(RS485)，173.8mA@12V(RS422)
3	Operating mode	Asynchronous half-duplex or asynchronous full-duplex
4	Interface mode	RS232:Network port type connector,The line sequence is introduced as follows RS485/RS422:1*5*3.81,Crimping method RJ45:Network port
5	Transmission medium	Network cable / twisted pair or shielded wire
6	Serial port standard	RS232:1200~115200bps RS485/RS422:1200~460800 bps
7	Network port specification	RJ45，10/100Mbps
8	Network protocol	IP、TCP/UDP、ARP、ICMP、IPV4

9	IP access method	Static IP 、 DHCP
10	DNS	Support
11	User configuration	Web page configuration，default username:admin, default password:admin
12	Simple transparent transmission method	TCP Server 、 TCP Client 、 UDP Server 、 UDP Client
13	TCP Server connection	Supports up to 4 TCP connections
14	Operating temperature	-40～+85℃，Industrial grade
15	Operating humidity	10%～90%，Relative humidity, non-condensing
16	Storage temperature	-40～+125℃，Industrial grade
17	Average weight	416g
18	Size	150*107*29

2. Product design

2.1. Identification（Size）
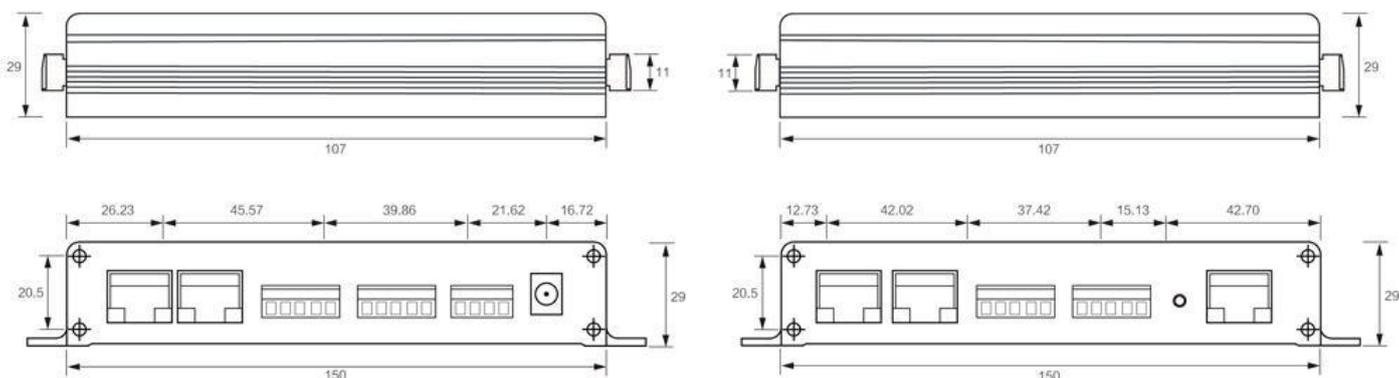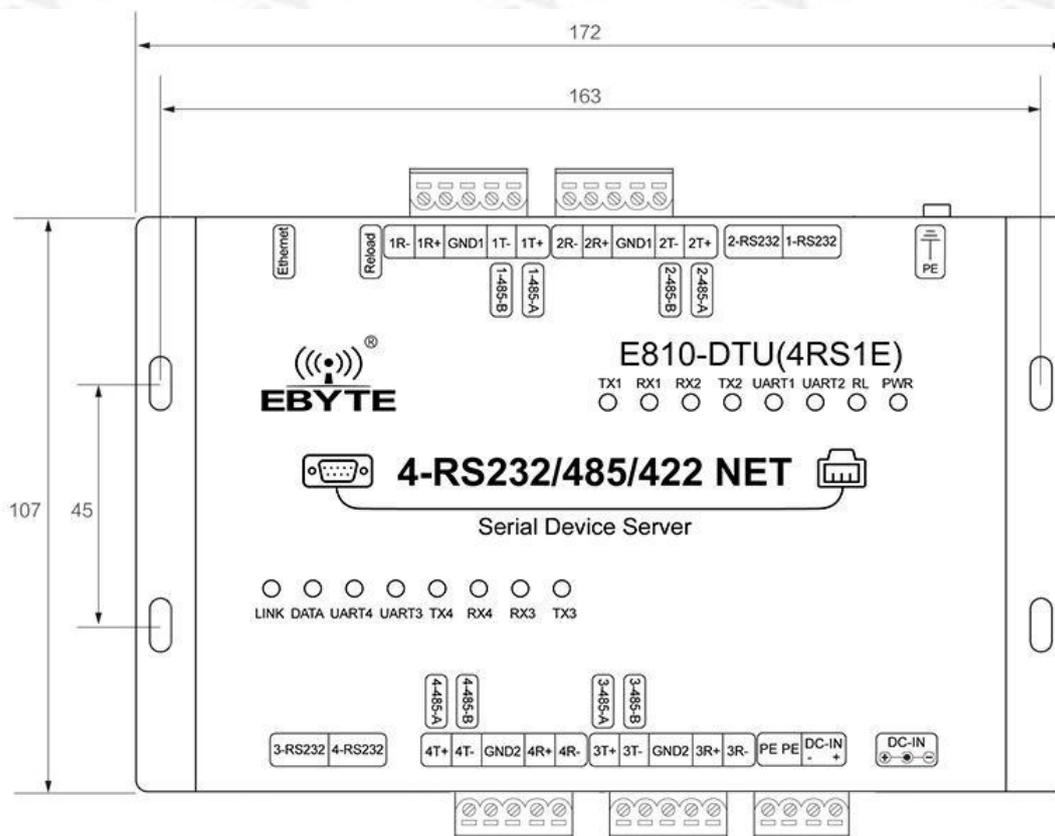
2.2. Identification（Interface and indicator）
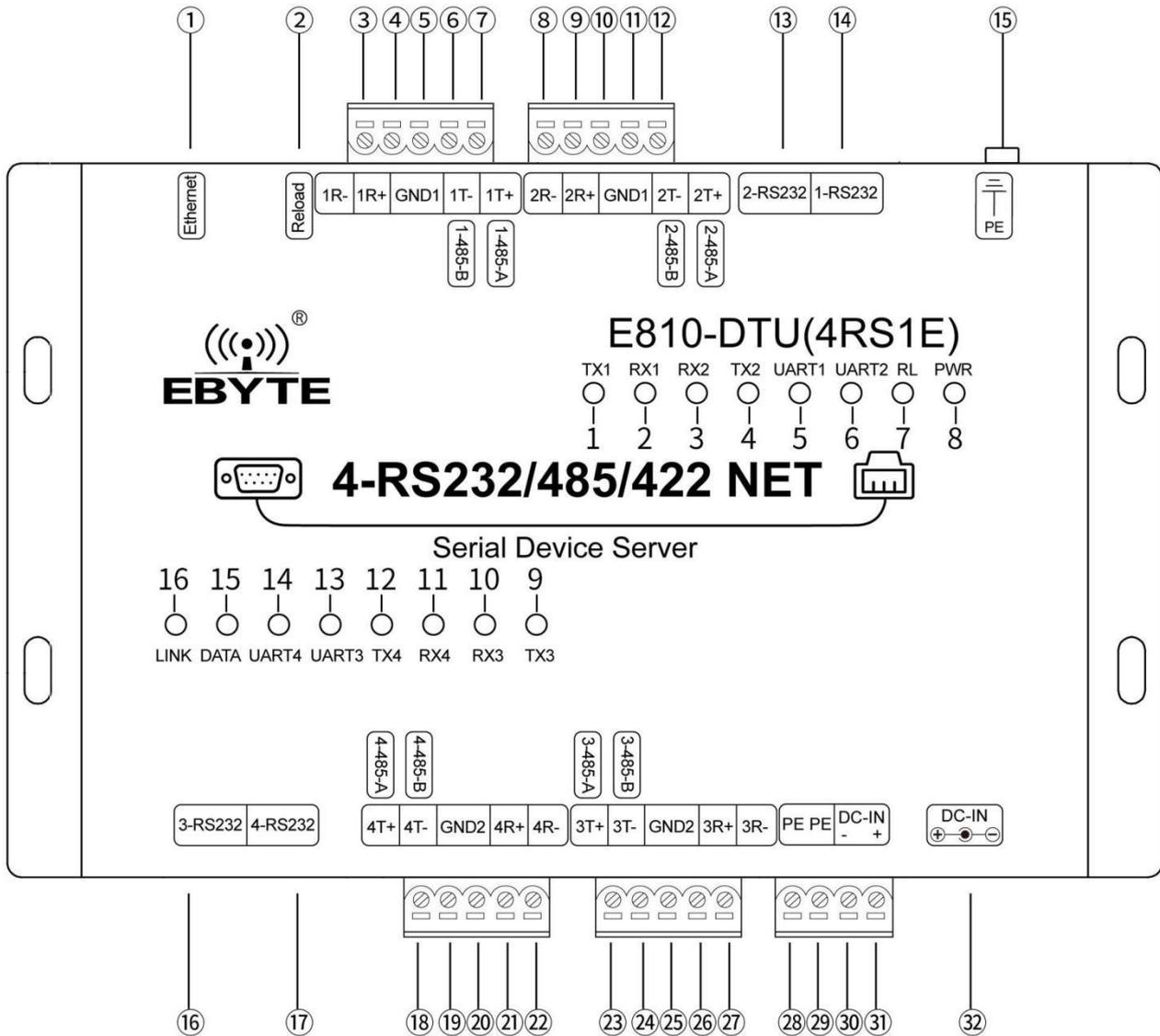
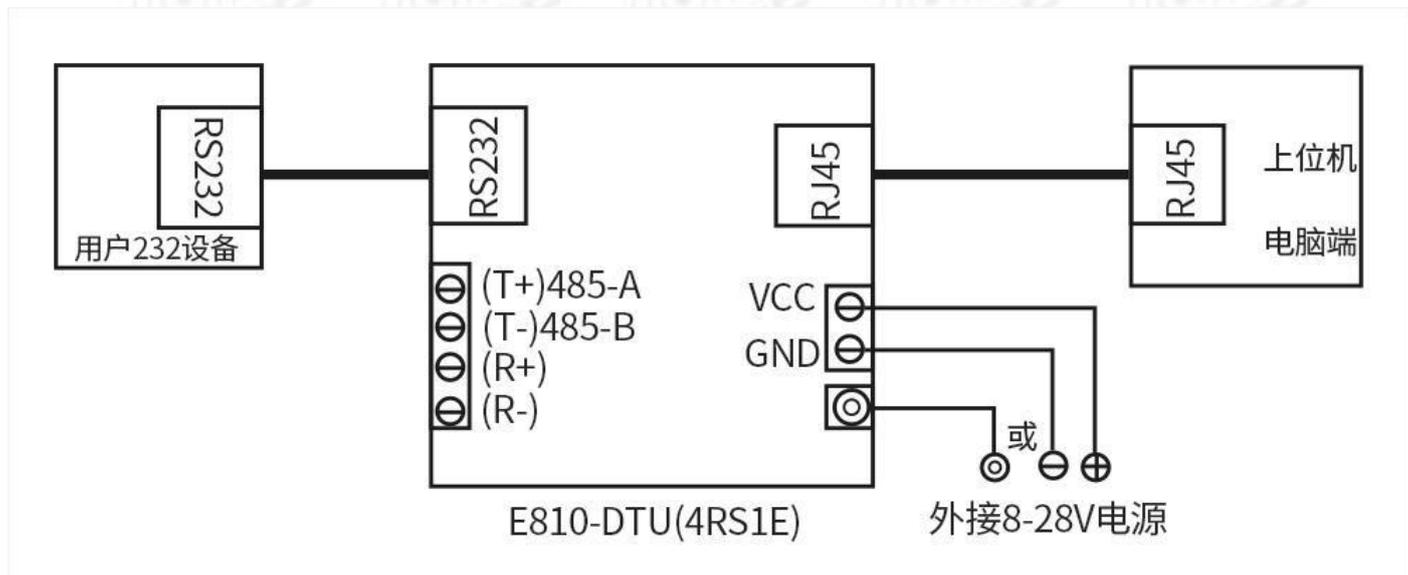| Pin No.	Name	Usage
1	Ethernet	RJ45 network interface
2	Reload	Factory reset button, long press for 5 ~ 10s is effective
3	1R-	The first serial port RS422 data receiving (B-) interface (3.81mm connecting terminal)
4	1R+	The first serial port RS422 data receiving (A +) （3.81mm connecting terminal）
5	GND1	Ground reference for the first and second signal (3.81mm connecting terminal)
6	1T-(1-485-B)	The first serial port RS485 data interface terminal B/ RS422 data transmission (B-) interface (3.81mm connecting terminal)
7	1T+(1-485-A)	The first serial port RS485 data interface terminal A/ RS422 data transmission (A +) interface (3.81mm connecting terminal)
8	2R-	The second serial port RS422 data receiving (B-) interface (3.81mm connecting terminal)
9	2R+	The second serial port RS422 data receiving (A +) (3.81mm connecting terminal)
10	GND1	Reference ground for the 1st and 2nd signal（3.81mm connecting terminal）
11	2T-(2-485-B)	The second serial port RS485 data interface terminal B/ RS422 data transmission (B-) interface (3.81mm connecting terminal)
12	2T+(2-485-A)	The second serial port RS485 data interface terminal A/ RS422 data transmission (A +) interface (3.81mm connecting terminal)
13	2-RS232	The second RS232 data interface (network port type connector)

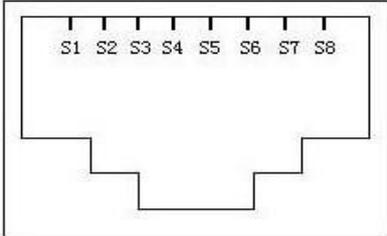| 14	1-RS232	The first RS232 data interface (network port type connector)
15	PE	Ground screw post connected to the earth
16	3-RS232	The third RS232 data interface (network port type connector)
17	4-RS232	The fourth RS232 data interface (network port type connector)
18	4T+(4-485-A)	The fourth serial port RS485 data interface terminal A/ RS422 data transmission (A +) interface (3.81mm connecting terminal)
19	4T-(4-485-B)	The fourth serial port RS485 data interface terminal B/ RS422 data transmission (B-) interface (3.81mm connecting terminal)
20	GND2	The third and fourth signal reference ground (3.81mm connecting terminal)
21	4R+	The fourth serial port RS422 data receiving (A +) (3.81mm connecting terminal)
22	4R-	The fourth serial port RS422 data receiving (B-) interface (3.81mm connecting terminal)
23	3T+(3-485-A)	The third serial port RS485 data interface terminal A/ RS422 data transmission (A +) interface (3.81mm connecting terminal)
24	3T-(3-485-B)	The third serial port RS485 data interface terminal B/ RS422 data transmission (B-) interface (3.81mm connecting terminal)
25	GND2	The the third and fourth signal reference ground (3.81mm connecting terminal)
26	3R+	The third serial port RS422 data receiving (A +) (3.81mm connecting terminal)
27	3R-	The third serial port RS422 data receiving (B-) interface (3.81mm connecting terminal)
28	PE	Connect to the earth (3.81mm connecting terminal)
29	PE	Connect to the earth (3.81mm connecting terminal)
30	DC-IN(-)	Power terminal ground (3.81mm connecting terminal)
31	DC-IN(+)	Positive terminal of power connection terminal, can not supply power with power socket at the same time (3.81mm connecting terminal)
32	DC-IN	Power socket, cannot be powered at the same time as the power terminal
LED Indicator		
1	TX1	The First serial port data sending indicator
2	RX1	The first serial port data receiving indicator
3	RX2	The second serial port data receiving indicator
4	TX2	The second serial port data sending indicator
5	UART1	The first serial port data receiving and sending indicator
6	UART2	The second serial port data receiving and sending indicator
7	RL	Factory reset indicator
8	PWR	Power Indicator
9	TX3	The third serial port data sending indicator
10	RX3	The third serial port data receiving indicator
11	RX4	The fourth serial port data receiving indicator
12	TX4	The fourth serial port data sending indicator
13	UART3	The third serial port data receiving and sending indicator
14	UART4	The fourth serial port data receiving and sending indicator
15	DATA	Network data receiving and sending indicator
16	LINK	Network connection indicator

2.3. Connection method

2.3.1. RS232 connection

Note: Network port 232 interface wiring sequence
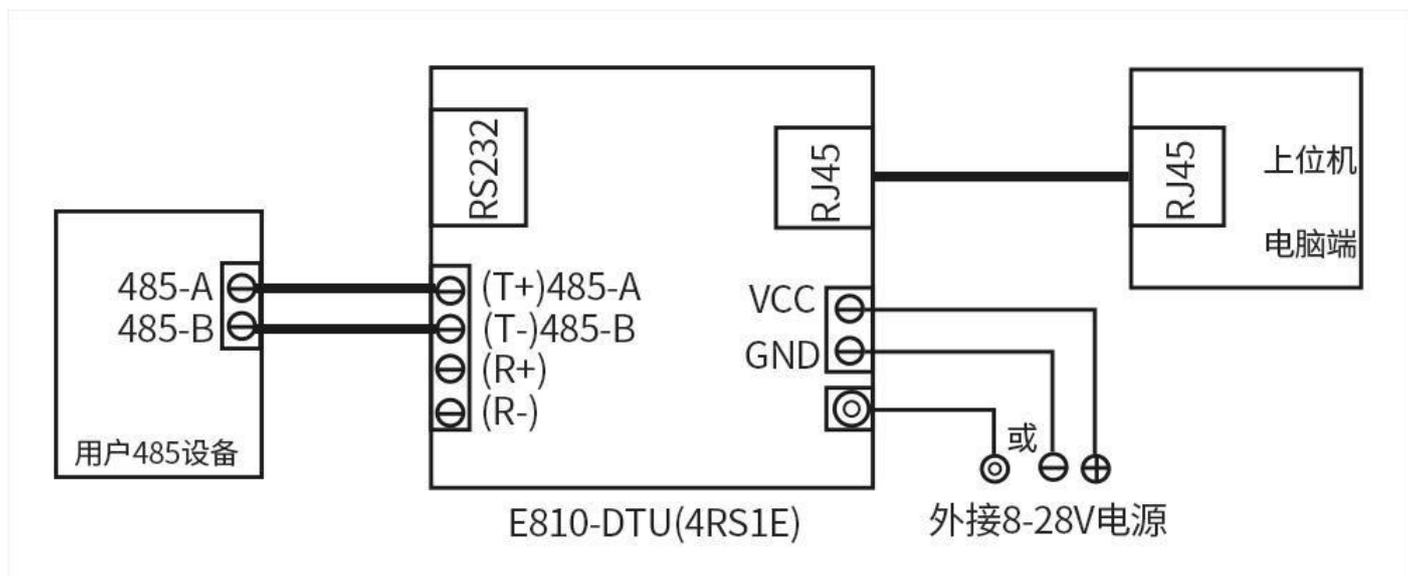
RJ45 水晶头线序说明：

端口号	线序说明
接以太网口 S1 S2 S3 S4 S5 S6 S7 S8 12345678 RJ-45接头	S1：橙白
	S2：橙
	S3：绿白
	S4：蓝
	S5：蓝白
	S6：绿
	S7：棕白
	S8：棕

RJ45→RS232 接口：（RS232 水晶头线序）

RJ45 引脚	1	2	3	4	5	6	7	8
232 引脚	空	空	GND	TXD	RXD	空	空	空

2.3.2. RS485 Connection

2.3.3. RS422 Connection
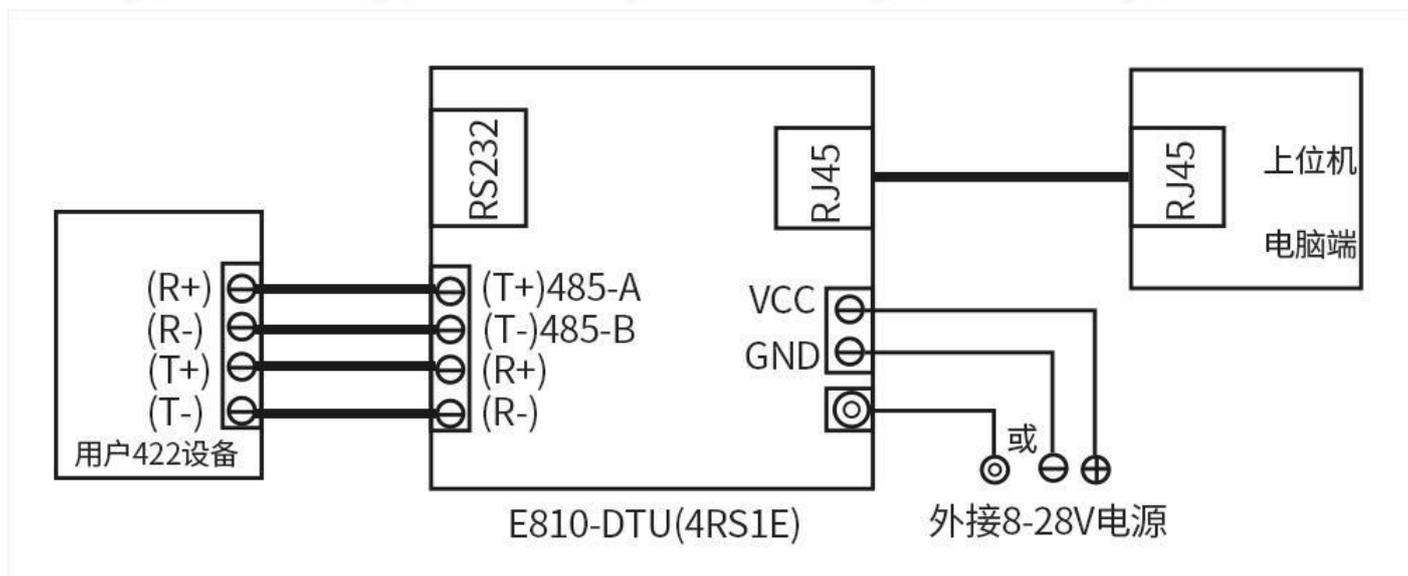
Note: When using full-duplex (RS422) or half-duplex (RS485) wiring, in order to prevent signal reflection and interference, a matching resistor (parameter 120 1 / 4W) must be connected to the line terminal!

3. Introduction to basic network functions

3.1 IP Address/Subnet mask/Gateway

1. IP address is the identity of DTU in LAN. It is unique in LAN and thus cannot be duplicated with other devices in the same LAN.

IP address of E810 (4RS1E) can be obtained by static IP or DHCP.

（1） Static IP

Static IP needs to be manually set by users. During the setting process, pay attention to write the IP, subnet mask, and gateway at the same time. It is applicable for scenarios where IP and equipment need to be counted and corresponded.

Advantages: Access to devices that cannot automatically assign IP addresses can be searched through the full network segment broadcast mode;

Disadvantages: Different IP network segments in different LANs will cause normal TCP / UDP communication not possible.

（2） DHCP

The main function of DHCP is to dynamically obtain the IP address, Gateway address, DNS server address and other information from the gateway host, thereby eliminating the tedious steps of setting IP address. It is applicable to scenarios where there is no requirement on IP and it is not mandatory to have correspondence between IP and DTU.

Advantages: Devices such as access routers that have a DHCP server can communicate directly, reducing the trouble of setting the IP address gateway and subnet mask;

Disadvantages: E810 (4RS1E) will not work properly when connected to a network without DHCP Serve, such as directly connected to a computer.

2. Subnet mask is mainly used to determine the network number and host number of the IP address, indicate the number of subnets, and determine whether the DTU is in the subnet. Subnet mask must be set, the commonly used class C subnet mask: 255.255.255.0, the network number is the first 24 digits, the host number is the last 8 digits, the number of subnets is 255, and DTUIP is in the range of 255, it is considered to be in this subnet.

3.Gateway refers to the network number of the network where the current IP address of DTU is located. The gateway is the router's IP address if connected to a device such as a router when connecting to the external network. External network cannot be accessed correctly if the setting is incorrect. No setting is required(Default) if a device such as a router is not connected.

3.2 DNS Server address

DNS server is mainly used to translate domain names into network-recognizable IP addresses. DNS server address can be set to enable domain name resolution if the local domain name server is incomplete. Users can also set a specific DNS server address according to their needs. E810 (4RS1E) will submit a resolution request to the set DNS server when domain name resolution is required, which is more flexible and reliable to use.

In the static IP mode, the default DNS server address is 61.139.2.69, and the standby DNS server address is 192.168.4.1. In the DHCP mode, the DNS server address is obtained automatically. DTU supports that domain name server address can be set.

4. Socket Functional characteristics

E810 (4RS1E) has four socket operating modes: TCP Client, TCP Server, UDP Client, UDP Server, which can be configured through the web interface.

4.1.　TCP Server Mode characteristic

Diagram 4-2 TCP Server

(1) TCP Server is TCP server. In TCP Server mode, E810 (4RS1E) monitors the local port. It accepts and establishes a connection for data communication when there is a connection request. When E810 (4RS1E) serial port receives data, it will send the data to all client device that have established the connection with it.

(2) It is usually used for communication with TCP clients in LAN. It is applicable for the scenario where there is no server in LAN and there are multiple computers or mobile phones requesting data from the server. Like TCP Client, there are differences between connection and disconnection to ensure reliable exchange of data.

(3) When E810 (4RS1E) is used as TCP Server, there are maximum of 4 serial ports and each one allows one client connection only. The local port number is a fixed value and cannot be set to 0.
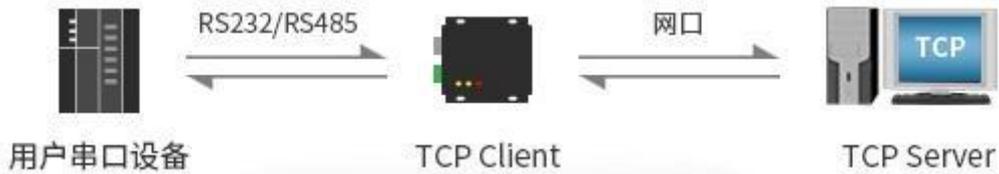
4.2.　**TCP Client** Mode characteristic

Diagram 4-3 TCP Client

(1) TCP Client provides client connection for TCP network services, actively initiate a connection request to the server and establish a connection, which is used to implement serial port data and server data interaction. According to the relevant provisions of TCP protocol, TCP Client is distinguished from connected and disconnected, thereby ensuring reliable exchange of data. It is usually used for data interaction between the device and the server and the most commonly used network communication method.

(2) When E810 (4RS1E) attempts to connect to the server in TCP Client mode and the local port is 0, the connection is initiated through a random port each time.

(3) This mode supports short connection function.

(4) Under the same LAN, if E810 (4RS1E) is set to static IP, please keep the IP of E810 (4RS1E) and the gateway on the same network segment, and set the gateway IP correctly, otherwise communication will not be normal.
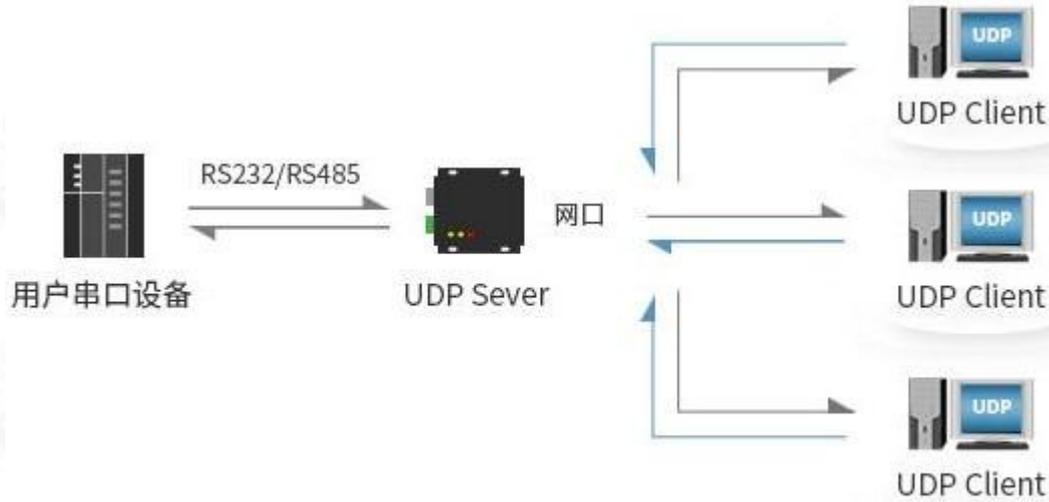
4.3. UDP Server Mode characteristic

Diagram 4-4 UDP Server

(1) UDP Server means that the source IP address is not verified on the basis of ordinary UDP. After receiving a UDP data packet each time, the destination IP is changed to the data source IP and port number. When sending data, send to the IP and port number of the most recent communication.

(2) This mode is usually used for data transmission scenarios where multiple network devices need to communicate with DTU and do not want to use TCP due to the fast frequency.

4.4. UDP Client Mode characteristic

Diagram 4-5 UDP Client

(1) UDP Client is a connectionless transmission protocol that provides transaction-oriented simple and unreliable information transmission services. There is no connection and disconnection establishment. IP and port needed to be specified can send data to the other party. Usually used for data transmission scenarios where there is no requirement for packet loss rate, data packets are small and transmission frequency is fast, and data is to be transmitted to the specified IP.

(2) In UDP Client mode, E810 (4RS1E) will only communicate with the target port of the target IP. If the data is not from this channel, the data will not be received by E810 (4RS1E).

(3) In UDP Client mode, if the destination address is set to 255.255.255.255, the effect of UDP full network segment broadcast can be achieved, and broadcast data can be received at the same time. E810 (4RS1E) DTU supports broadcast within network segment, for example, xxx. the broadcast mode of xxx.xxx.255.

5. Special functions

5.1. Short connection

The use of TCP short connections is mainly to save server resources and is generally applied in multi-point-to-point scenarios. The use of short connections can ensure that all existing connections are useful connections and do not require additional control means for filtering.

TCP short connection function is applied in the TCP Client mode. After the short connection function is enabled, the information is sent. If there is no data received by the serial port or network port within the set time, the connection will be automatically disconnected. The short connection function is turned off by default. The disconnection time can be set after the function is turned on. The setting range is $2 \sim 255S$.

5.2. Registration packet mechanism

In the network transparent transmission mode, users can choose to let DTU send a registration packet to the server. The registration packet is to enable the server to identify the data source device or as a password to obtain server function authorization.

E810 (4RS1E) has 4 registration packet mechanisms:

● Send MAC on connection: DTU will send the MAC address of DTU itself to the device once the connection is established.

● Send custom data on connection:DTU will send user-defined data to the device once the connection is established

● Send MAC per packet data: dd DTU MAC address before each frame of data sent by DTU

● Send custom data for each packet of data:User-defined data is added before each frame of data sent by DTU

Establishing a connection and sending a registration packet are mainly applied to connect to a server that needs to be registered. The data carrying registration packet refers to the access to the registration packet at the forefront of the data when sending data, is mainly used for protocol transmission. The user-defined data packet defaults to hexadecimal data (ASCII code is optional), and the maximum packet length is 40 bytes.

5.3. Heartbeat packet mechanism

In the network transparent transmission mode, users can choose to let E810 (4RS1E) send heartbeat packets. The heartbeat packet can be sent to the network server side or the serial port device side, and cannot be run simultaneously.

Network heartbeat packet: Send heartbeat packets to the network. DTU sends heartbeat packet data to the network server to maintain the connection with the network server under the set heartbeat sending period. It only takes effect in TCP Client and UDP Client modes.

Serial port data packet: DTU sends heartbeat packet data to the serial port in the set heartbeat sending period. After receiving the heartbeat data from the serial port, users can do the corresponding processing.

In applications where the server sends fixed query commands to the device, in order to reduce communication traffic, users can choose to send a heartbeat packet (query command) to the serial port device instead of sending the query command from the server.

User-defined data packets default to hexadecimal data (ASCII code is optional). E810 (4RS1E) DTU supports user-defined heartbeat packets with a maximum length of 40 bytes.

5.4.   Timeout restart

Timeout restart (no data restart) function is mainly used to ensure the long-term stable operation of E810 (4RS1E). When the network port cannot receive data or the network has not received data for a long time, E810 (4RS1E) will restart after exceeding the set time to avoid abnormal conditions affecting communication. The normal working time of this function is set to 60 ~ 65535S, and the default value is 300S. When the setting time is less than 60S, it is set to zero by default, that is, the function is turned off.

5.5.   TCP Multi-connection function

TCP multi-connection function is mainly to solve the problem that in TCP Sever mode, users have multiple clients connected to E810 (4RS1E) and send and receive data at the same time. When E810 (4RS1E) is used as TCP Server, it can establish up to 6 connections at the same time. TCP Server will send data to multiple (no more than 6) TCP Clients on the connection at the same time. When the number of established connections exceeds 6, the old connection established at the beginning will be actively disconnected, that is, the old connection is kicked off.

5.6.   Clear cache data

When TCP connection is not established, the data received by the serial port will be placed in the cache area. E810 (4RS1E) serial port receiving cache is 400 bytes. After the TCP connection is established, the serial port cache data can be set to be cleared according to customer needs.

5.7.   Link and data transmission command

Link indicates the network connection status of DTU. In TCP mode, the link is off when network is not connected. When the connection is established, the link is always on. The Link indicator is always on in UDP mode.

The other one is a data transmission command, which shows the data transmission status of the serial port on DTU. When there is no data transmission on the serial port, the data transmission indicator turns off. When there is data transmission on the serial port, the flashing indicates that its period is 60ms and the indicator is on for 10ms. As shown below. (补充图片)

5.8.   KeepAlive Function

Keep-Alive is a mechanism for detecting dead connections in TCP connections. When users do not send any data, TCP link will periodically send "Keep-Alive" information to maintain the idle link and avoid dead connections consuming unnecessary system resources. This setting is valid under TCP. Users can customize the Keep-Alive switch and other parameters.

Keepalive parameters:

time： Start probe message after how many seconds the TCP link has no data message transmitted；

intv：   Time interval between the previous probe message and the next probe message;

probes：   Maximum number of probe failures. When the number of sniffing failures reaches this number, TCP connection will be disconnected.

5.9.　Modbus TCP to TU function

The device supports conversion between Modbus RTU and Modbus TCP. After the function is enabled, the device receives the data and checks whether the data meets the requirements of Modbus RTU (Modbus TCP) protocol. After the verification is successful, Modbus RTU data is converted to Modbus TCP, and Modbus TCP data is converted to Modbus RTU data.

5.10.　Restore factory setting

There are two methods for DTU restore factory setting: software restore factory setting and hardware restore factory setting: 1 In hardware restore factory setting mode, press Restore button for 5s ~ 15s; 2 conduct restore factory setting through the web interface.

6.　Quick instructions

6.1.　Parameter setting instruction

DTU is configured by using web interface. Enter 192.168.4.101 in the browser to configure the interface.(default username：admin,default password：admin）

6.2.　Socket Instruction

Preparations：
1. Set the IP address of the PC (computer) to the same network segment as E810 (4RS1E) DTU and the same subnet mask. For example, the PC IP is 192.168.4.100 and the DTUIP is 192.168.4.101.

PC configuration：

Figure 6-1

DTU configuration：

Figure 6-2

6.2.1. TCP Server Instruction

(1) We take a single serial port and serial port 1 as TCP server as an example.(Each serial port allows one client connection only) Connect E810 (4RS1E) to the PC with a network cable, open the network configuration interface, set the parameters according to the figure below, and save.

Figure 6-3 Parameter setting

(2) Open the serial debugging assistant and the network debugging assistant, set the parameters of the serial assistant to the parameters set by DTU just now, open the serial port, set the protocol type of the network debugging assistant to TCP Client, and set the server IP address of the network debugging assistant to DTU IP address, the server port of the network debugging assistant is set to the local port of DTU, and click Connect.

(3) Enter a string of data in the sending area of the serial port debugging assistant and click Send. Users can see that the network assistant received the same data in the sending area of the serial port debugging assistant. Enter a string of data in the sending area of the network debugging assistant, the serial port assistant also receives the same data in the network transmission area and realizes two-way transparent transmission.

Figure 6-4 Data transparent transmission

6.2.2. TCP Client Instruction

(1) Similarly, we take a single serial port and serial port 1 as TCP Client as an example. Connect E810 (4RS1E) to the PC with a network cable, open the network configuration interface, set the parameters according to the figure below, and save.

Figure 6-5 Parameter setting

(2) Open the serial port debugging assistant and the network debugging assistant, set the parameters of the serial port assistant to the parameters set by DTU just now, open the serial port, set the protocol type of the network debugging assistant to TCP Server, and set the local IP address of the network debugging assistant to DTU, the local port of the network debugging assistant is set to the destination port of the DTU, and click Connect.

(3) Enter a string of data in the sending area of the serial debugging assistant and click Send. Users can see that the network assistant received the same data in the sending area of the serial port debugging assistant. Enter a string of data in the sending area of the network debugging assistant, the serial assistant also receives the same data in the network transmission area and realizes two-way transparent transmission.
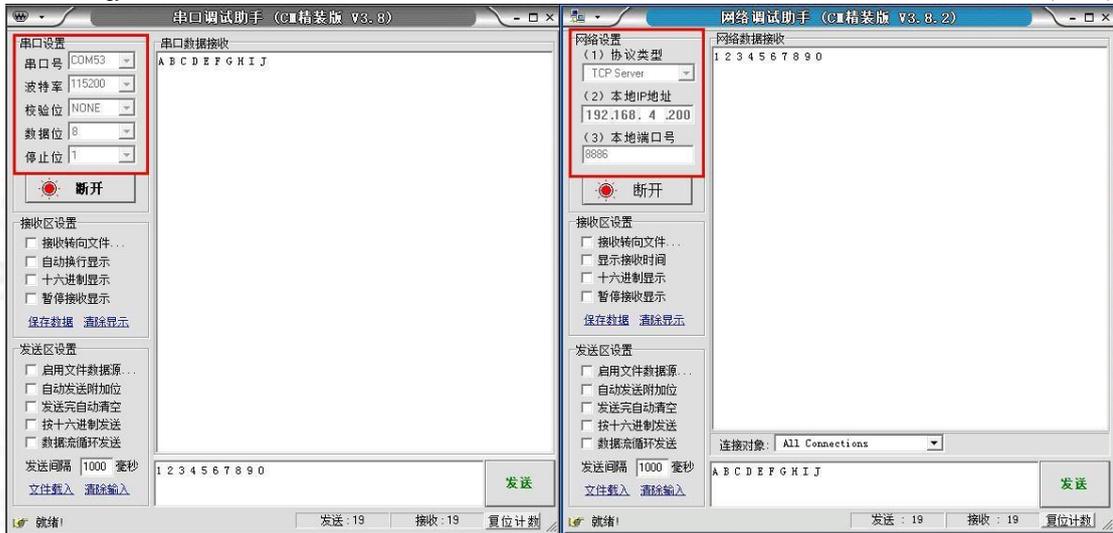
Figure 6-6 Data transparent transmission

6.2.3. UDP Server Instruction

(1) Similarly, we take a single serial port and serial port 1 as UDP server as an example. Connect E810 (4RS1E) to the PC with a network cable, open the network configuration interface, set the parameters according to the figure below, and save.

Figure 6-7 Parameter setting

(2) Open the serial port debugging assistant and the network debugging assistant, set the parameters of the serial port assistant to the parameters set by DTU just now, open the serial port, set the protocol type of the network debugging assistant to UDP, the local IP address of the network debugging assistant is set to the local IP address of the PC. The local port of the network debugging assistant is set to 8700. Click Connect.

(3) Enter a string of data in the sending area of the serial debugging assistant and click Send. Users can see that the network assistant received the same data in the sending area of the serial port debugging assistant. Enter a string of data in the sending area of the network debugging assistant, the serial assistant also receives the same data in the network transmission area and realizes two-way transparent transmission.
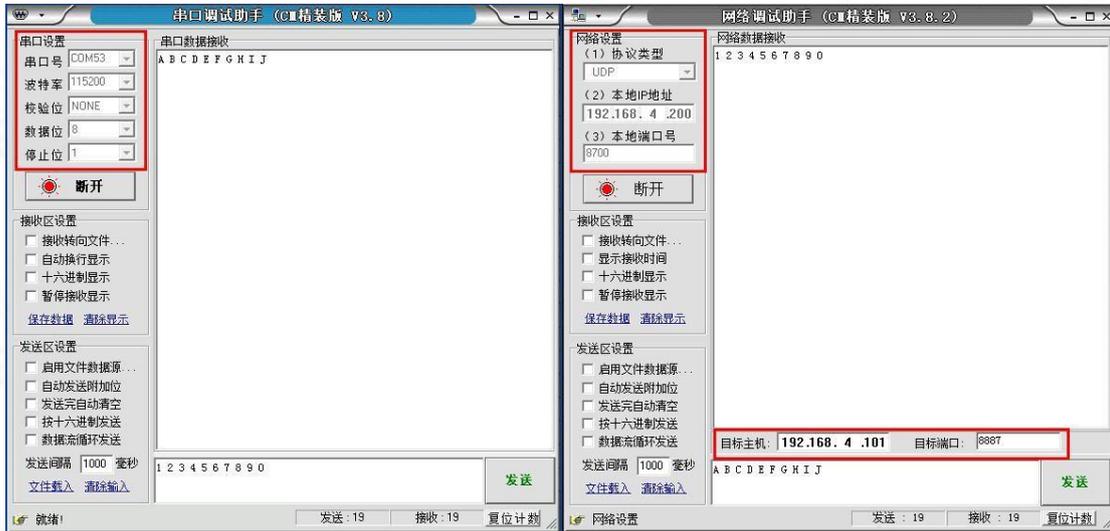
Diagram 6-10 Data transparent transmission

6.2.4. UDP Client Instruction

(1) Similarly, we take a single serial port and serial port 1 as the UDP server as an example. Connect E810 (4RS1E) to the PC with a network cable, open the network configuration interface, set the parameters according to the figure below, and save.
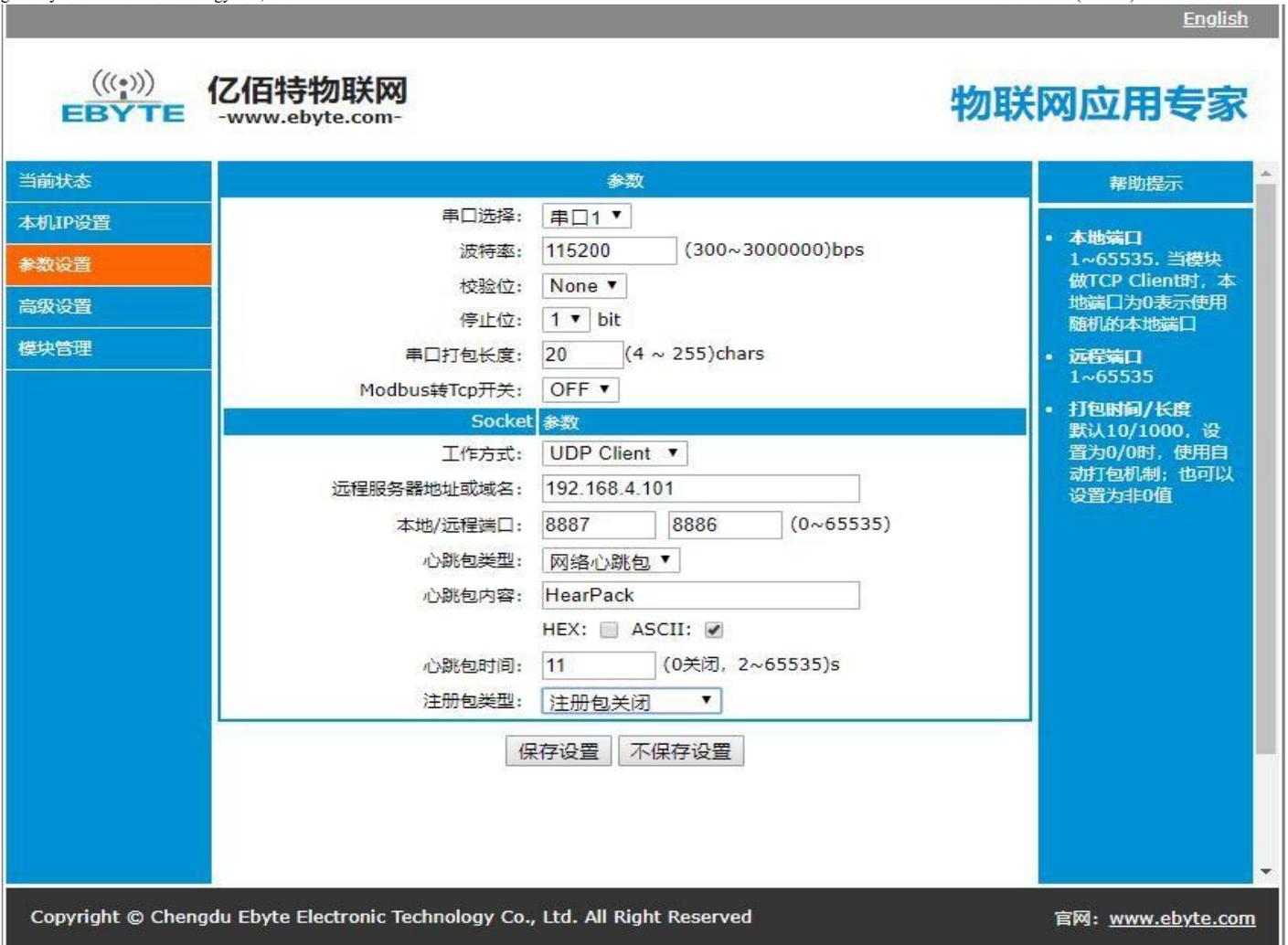
Figure 6-11 Parameter setting

(2) Open the serial port debugging assistant and the network debugging assistant, set the parameters of the serial port assistant to the parameters set by DTU just now, open the serial port, set the protocol type of the network debugging assistant to TCP UDP, and set the local IP address of the network debugging assistant to DTU. The destination IP address, and the local port of the network debugging assistant is set to the destination port of DTU, the local port of the network debugging assistant is set to the destination port of the DTU, and click Connect.

(3) Enter a string of data in the sending area of the serial debugging assistant and click Send. Users can see that the network assistant received the same data in the sending area of the serial port debugging assistant. Enter a string of data in the sending area of the network debugging assistant, the serial assistant also receives the same data in the network transmission area and realizes two-way transparent transmission.
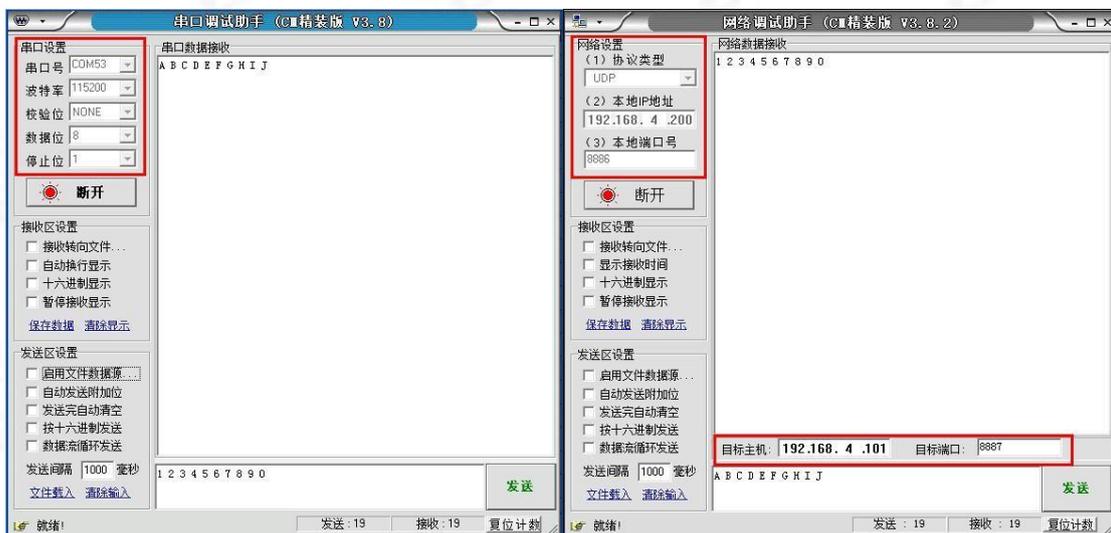

图 6-13 数据透传

6.3. Special function instructions

6.3.1. Short connection

TCP short connection function is applied in the TCP Client mode. After the short connection function is enabled, if no data is received by the serial port or network port within the set time, the connection will be automatically disconnected. The short connection function is turned off by default. The disconnection time can be set after the function is turned on. The setting range is 2 ~ 255s, which can be entered directly.

6.3.2. Registration packet

E810 (4RS1E) has four registration packet mechanisms: sending MAC on connection, sending custom data on connection, sending MAC for each packet, and sending custom data for each packet. Custom data defaults to hexadecimal data (ascii Optional),The registration packet is off by default. When users need to use it, they can open the network configuration software to configure it, and custom data can b entered directly.

6.3.3. Heartbeat packet

Heartbeat packet is used to ensure the reliability of the connection. E810 (4RS1E) supports two types of heartbeat packets: network heartbeat packet and serial port heartbeat packet. After setting the heartbeat packet type, set the heartbeat period and customize the heartbeat packet data are also required.

6.3.4. Timeout restart

Timeout restart is when the network port does not receive data for a long time, DTU will automatically restarts after exceeding the set time to avoid communication abnormality. The restart time can be set to 60 ~ 65535S. Timeout restart default 300s.

6.3.5. Clear cache

When TCP is not established, the data received by the serial port is stored in the cache area. Users can set the clear cache according to their needs. The clear cache is off by default.

7.Important statement

- Ebyte reserves the right of final interpretation and modification of all contents in this manual.
- As the hardware and software of the product are continuously improved, this manual may be changed without further notice. The latest version of the manual shall prevail.
- Users who use this product need to pay attention to product dynamics on the official website so that users can get the latest information of this product in time.

8. Revision version

Version	Date	Description	Issued by
1.00	2018-02-26	Initial version	huaa
2.00	2018-05-27	Version modification	Blue

About us

Technical support: support@cdebyte.com
Documents and RF Setting download link: www.ebyte.com
Thank you for using Ebyte products! Please contact us with any questions or suggestions: info@cdebyte.com
----
Official hotline:028-61399028
Web: www.cdebyte.com
Address: , Building B5, Mould Industrial Park, 199# Xiqu Ave, High-tech Zone, Chengdu, 611731, Sichuan, China

Chengdu Ebyte Electronic Technology Co.,Ltd.