TRDP-Gateway

Datasheet

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yacer 亚册
Building Blocks of Communication

Foreword

Notational Conventions

The following categorized signal words with defined meaning might appear in the manual.

Signal Words	Meaning
 DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, lower performance, or unpredictable result.
 ANTISTATIC	Indicates static sensitive equipment.
 DANGER! ELECTRIC SHOCK	Indicates High voltage danger.
 TIPS	Provides methods to help you solve a problem or save you time.
 NOTE	Provides additional information as the emphasis and supplement to the text.

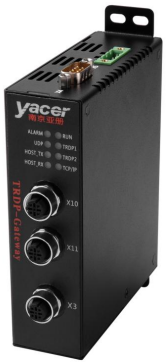
Table of Contents

1 Overview

1.1 Introduction

The Yacer TRDP-Gateway train protocol conversion gateway, provides two TRDP redundant 100M Ethernet interfaces, one TCP/IP Ethernet interface, one serial port and one CAN bus interface to implement protocol conversion between TRDP and UDP, serial port or CAN bus.

Industrial wide temperature, complete isolation and protection, compact size, suitable for train communication network.



1.2 Applications

- Protocol conversion between TRDP and UDP;
- Protocol conversion between TRDP and serial port;
- Protocol conversion between TRDP and CAN bus;
- Train Control and Management System (TCMS);
- Train Communication Network (TCN);
- Embedded development and application.

1.3 Features

- Two 100M full-duplex Ethernet interfaces, supporting TRDP protocol;
- One 100M adaptive Ethernet interface, supporting TCP/IP protocol;
- X6 extended interface: optional RS-232, RS-422 or RS-485 serial port;
- X4 extended interface: CAN bus interface;
- Supporting TRDP PD acquisition function
- Perfect isolation protection;
- Industrial wide temperature.

1.4 Order Information

TRDP-Gateway-32	3	-LV
Extended Interface X6 Definition:		
● None	0	
● Full-duplex RS-232 serial port	3	
● Full-duplex RS-422 serial port	4	
● Half-duplex RS-485 serial port	5	
Supply voltage range:		
● Nominal 24V, tolerance 9 ~ 36VDC		-LV
● Nominal 36V, 48V, tolerance 18 ~ 75VDC		-MV
● Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC		-HV

1.5 Technical Specifications

Item	Parameters	Details
TRDP Ethernet Interface	Connector	2 x M12 with D-coding
	Rate	100 Mbps Full-duplex
	Network Protocol	TRDP
	Isolation	1.5 kVrms
TCP/IP Ethernet Interface	Connector	1 x M12 with D-coding
	Rate	100 Mbps Adaptive
	Network Protocol	TCP/IP
	Isolation	1.5 kVrms
Serial Port	Connector	1 x male D-Sub 9 (X6)
	Interface type (Three-in-one)	● RS-232 full-duplex serial port ● RS-422 full-duplex isolated serial port ● RS-485 half-duplex isolated serial port
	Baud rate	≤ 921.6 kbps
	Isolation	2.5 kVrms

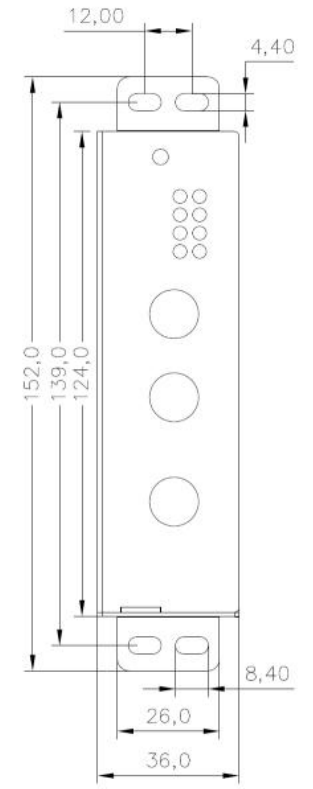
Item	Parameters	Details
CAN Interface	Connector	1 x male D-Sub 9 (X4)
	Interface type	CAN bus isolation interface (CAN 2.0A, CAN 2.0B, ISO 11898)
	Baud rate	50 Kbps ~ 1 Mbps
	Isolation	2.5 kVrms
Configuration Management	Configuration tool	yacer-DMS configuration management software
	Console interface	Ethernet Interface
Power Requirements	Power Supply	LV: Nominal 24V, tolerance 9 ~ 36VDC MV: Nominal 36V, 48V, tolerance 18 ~ 75VDC HV: Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC
	Isolation	>1.5 kVrms, Anti-reverse protection
	Power consumption	< 3 W
	Connector	3 pin connector with 5.08mm pitch
Mechanical Characteristics	Dimensions	H x W x D: 124 mm x 36 mm x 104 mm
	Weight	500g
Operating Environment	Operating temperature	-40 ~ +70℃
	Storage temperature	-40 ~ +85℃
	Operating humidity	5 ~ 95% RH (no condensation)

1.6 Mechanical Characteristics and Installation

The housing is made of stainless steel with a thickness of 1 mm.

H x W x D: 124 x 36 x 104 mm.

Fixed with 4 M4 screws, mounting hole diameter = 4.4 mm.



2 Hardware and Physical Interface

2.1 LED Indicators

Using a 2x4 indicator matrix, the front view is arranged as follows:

ALARM	RUN
UDP	TRDP1
HOST_TX	TRDP2
HOST_RX	TCP/IP

Indicator meanings are as follows:

LED	Description
ALARM	Alarm indicator, on when the device is not ready or fails, and constantly off during normal operation
UDP	TRDP Protocol UDP packet receiving and transmitting indicator
HOST_TX	CAN、Serial、TCP/IP Ethernet Transmit indicator
HOST_RX	CAN、Serial、TCP/IP Ethernet Receive indicator
RUN	Running indicator, Green light flashes during normal operation
TRDP1	Link/ACT indication of the TDRP1 port
TRDP2	Link/ACT indication of the TDRP2 port
TCP/IP	Link/ACT indication of the TCP/IP Ethernet port

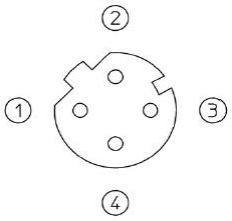
2.2 TCP/IP Interface: X3

2.2.1 Function Description

X3 is a 100M adaptive Ethernet port for TCP/IP Ethernet port with M12 (D-coded) connectors, supporting smart MDI/MDI-X.

2.2.2 Pin Definition

M12 Pin	Ethernet signal
1	TX +
2	RX +
3	TX -
4	RX -



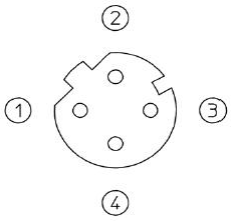
2.3 TRDP Interface: X10、X11

2.3.1 Function Description

X10 and X11 are 100M full-duplex Ethernet ports for TRDP1 and TRDP2 with M12 (D-coded) connectors, supporting smart MDI/MDI-X.

2.3.2 Pin Definition

M12 Pin	Ethernet signal
1	TX +
2	RX +
3	TX -
4	RX -



2.4 Serial Interface: X6

2.4.1 Function Description

X6 is an extended serial port, and users can choose one of the following types when ordering:

- RS-232 full-duplex
- RS-422 full-duplex with isolation
- RS-485 half-duplex with isolation

2.4.2 Pin Definition

X6 uses the male D-sub 9 connector, pin defined as follows:

Terminal Pin	RS-232 Full-duplex	RS-422 Full-duplex	RS-485 Half-duplex
1			
2	RxD		
3	TxD	ISO_GND	ISO_GND
4		TxD +	Data +
5	GND	TxD -	Data -
6			
7			
8		RxD +	Term +
9		RxD -	Term -

2.4.3 Terminator RS-485

In RS-485 mode, 8-9 short enable terminal matching with a matching resistance of 120 ohms.

2.5 CAN Interface: X4

2.5.1 Function Description

X4 is the CAN bus interface.

2.5.2 Pin Definition

PIN	CAN
1	Term +
2	CAN_L

PIN	CAN
3	
4	
5	
6	Term -
7	CAN_H
8	
9	

2.5.3 Terminator CAN bus

In CAN interface mode, 1-6 short enable terminal matching with a matching resistance of 120 ohms.

2.6 Power Interface: X5

2.6.1 Function Description

TRDP-Gateway is powered by DC power supply, supports isolation protection and surge protection, and provides anti-inverse protection.

Depending on the factory configuration, the power input range is as follows:

Model	Nominal Value	Minimum	Maximum
LV	24V	9V	36V
MV	36V、48V	18V	75V
HV	72V、96V、110V	40V	160V

2.6.2 Pin Definition

The X5 uses a 3-pos 5.08mm terminal connector (Phoenix Contact MSTB 2,5 / 3-GF compatible).

Pin	Signal Name	Description
1	V +	Voltage +
2	FG	Protection Groud
3	V -	Voltage -

3 Working State and Initialization

3.1 Working State

The TRDP-Gateway has two working states:

- Initialization state: When the module is powered up, it enters the initialization state first, receives or loads the configuration, and performs the system initialization operation.
- Running state: After the module is initialized, it enters the running state and works according to the configuration.

3.2 Module Initialization Mode

The TRDP-Gateway has two initialization methods:

- Host initialization: After the module is powered on, it obtains configuration data from the host through messages and initializes the system. The default initialization mode is Host.
- Local initialization: After the module is powered on, it loads the configuration data from the module's onboard FLASH for initialization.

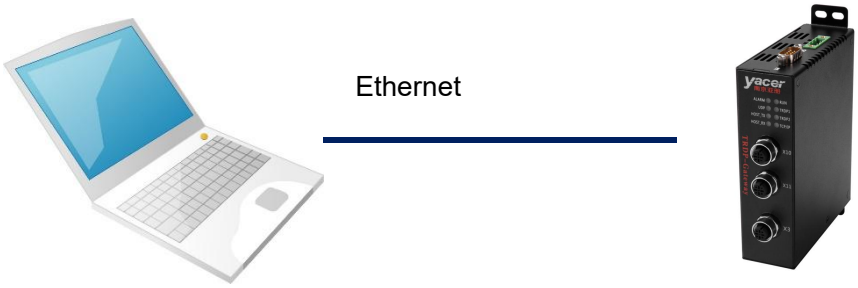
3.3 Host initialization programming interface

Reference document “THCP Protocol Programming Manual”.

4 yacer-DMS Configuration Management

4.1 Connect Configuration Computer to TRDP-Gateway

Connect the management computer with TCP/IP Ethernet interface (X3) of TRDP-Gateway through network cable, and run yacer-DMS configuration management software on the computer to configure the parameters and monitor running status of TRDP-Gateway.



4.2 Get Configuration Management software yacer-DMS

Users can obtain the compressed package yacer-DMS.zip of configuration management software through the following ways:

- “Softwares” directory of TRDP-Gateway accompanied U-Disk;
- Official website of Yacer (http://www.yacer.com.cn) Software channel.

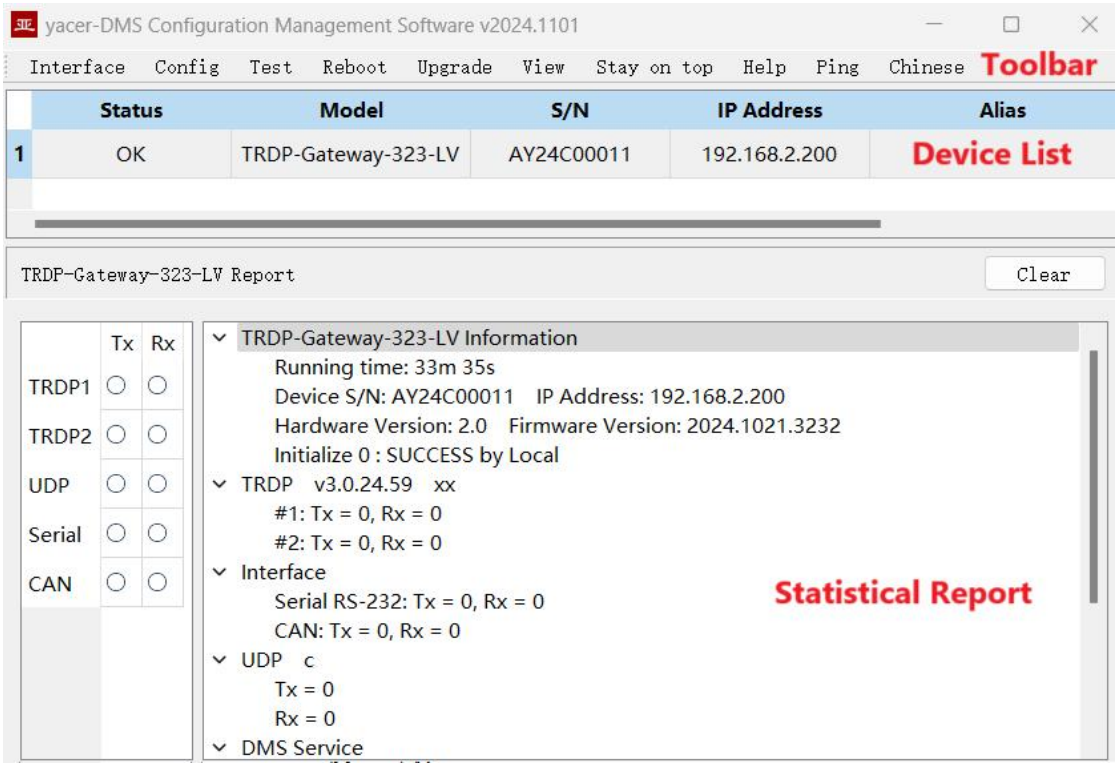
4.3 Run yacer-DMS Software

The yacer-DMS is an installation free application software, unzip yacer-DMS.zip, enter the working directory and double click the file yacer-DMS.exe to run.

4.4 Main Window of yacer-DMS

The following figure is the main interface of the configuration management software, which can be divided into three parts:

- Toolbar: Functional operation buttons;
- Device List: Displaying the basic information and operation status of online devices;
- Statistical Report: Displaying the receive/transmit indication & statistics, and device details.



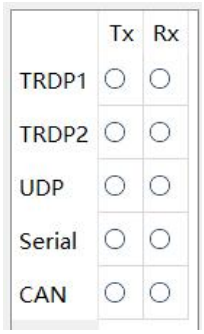
4.5 Statistical Report

The statistical report has three panels: control panel, receive/transmit indication panel and information panel.

4.5.1 Control Panel

Control Widget	Function
Clear	Clear the statistical report

4.5.2 Receive/Transmit Indication Panel

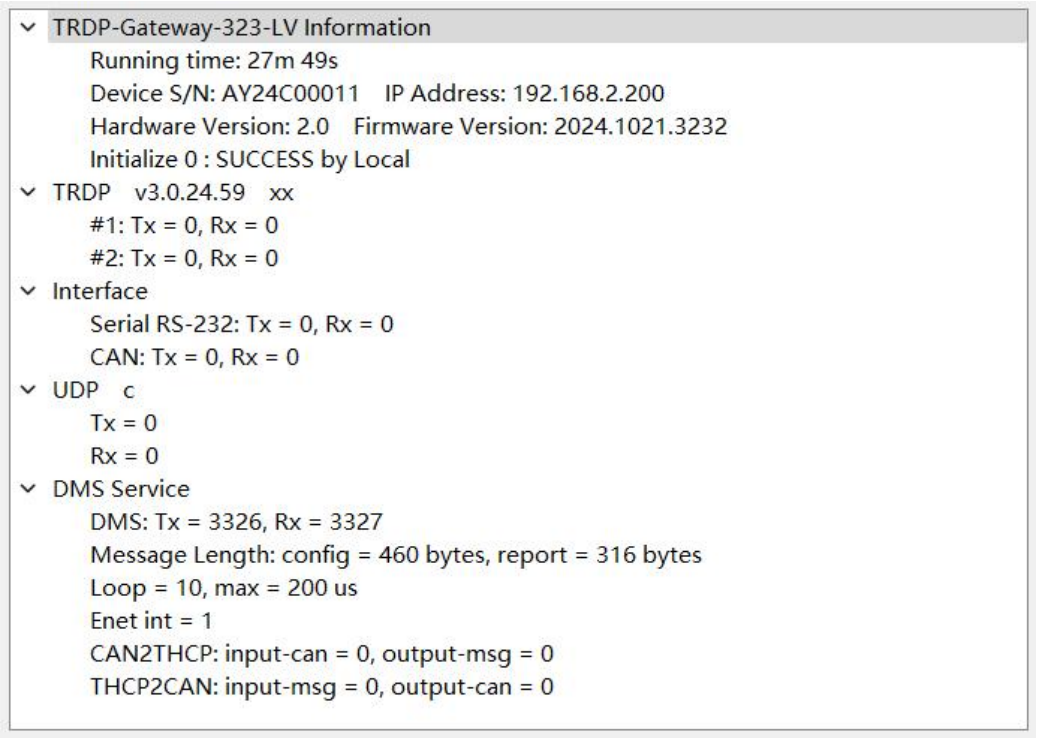


- Tx: The interface sends a frame of data, corresponding Tx indicator blinks once;
- Rx: The interface receives a frame of data, corresponding Rx indicator blinks once.

4.5.3 Information Panel

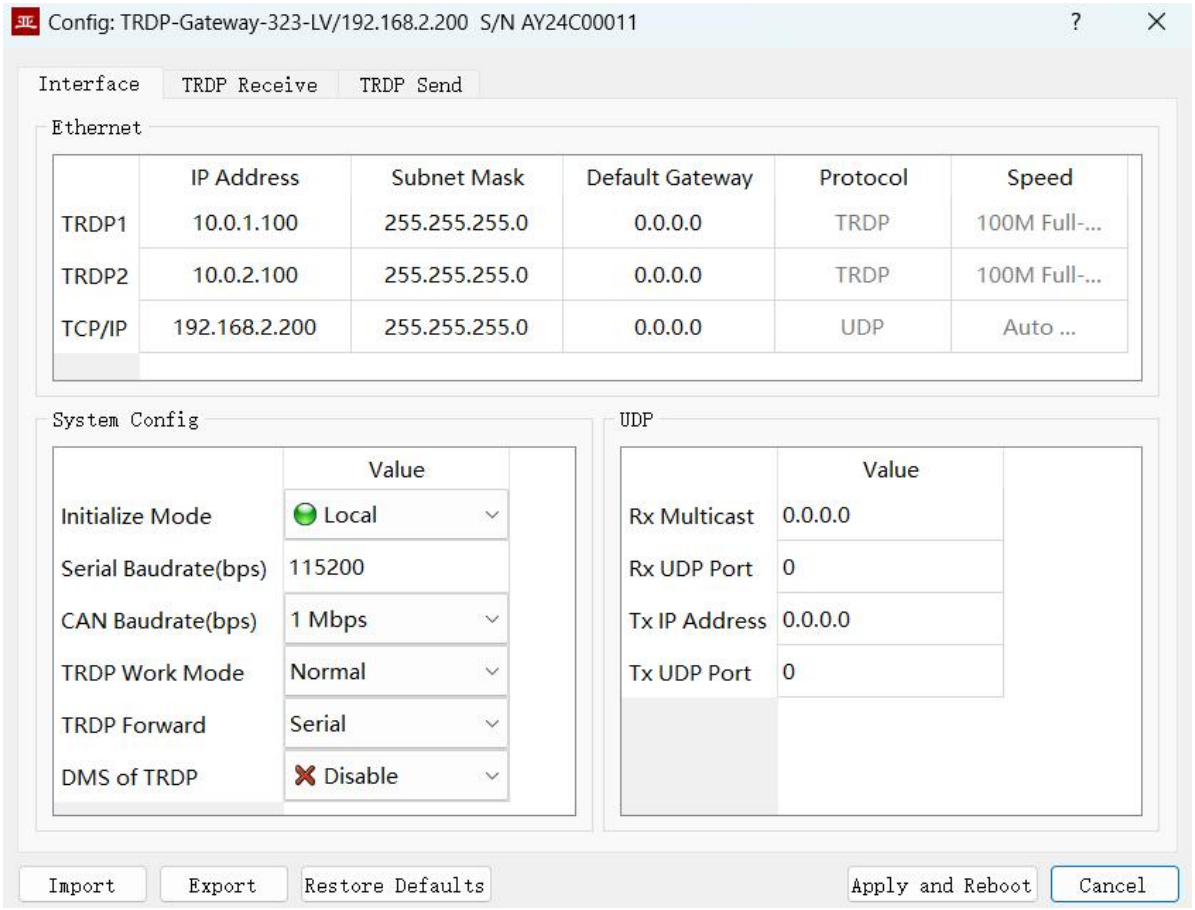
Display the following contents:

- Device information: Running time, S/N, IP address and Version number;
- TRDP: TRDP protocol transceiver statistics;
- Interface: Serial port and CAN interface receive/transmit statistics;
- UDP: UDP transceiver statistics;
- DMS Service: DMS message receive/transmit statistics.



4.6 Configure Device

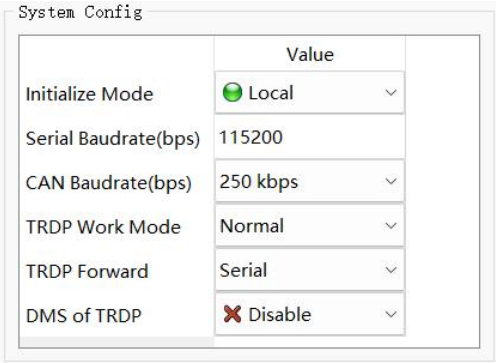
Click the ‘Config’ button on the toolbar or double-click the selected device in the device list, yacer-DMS pops up the configuration dialog. According to the interface and function, the dialog divides the configuration items into several configuration pages.



The bottom of the dialog box includes the following operation buttons:

Button	Function
Import	Open the configuration file, read the configuration parameters refresh the configuration dialog
Export	Export configuration parameters from the configuration dialog to a file for saving
Restore Defaults	Refresh the configuration dialog with the factory paramters
Apply and Reboot	Write the configuration parameters in the dialog to the deivce, and restart the device to make the configuration take effect
Cancel	Cancel current configuration operation

4.7 System Configuration



4.7.1 Initialization Mode

Configure the initialization mode for TRDP-Gateway , and the factory default value is Host.

4.7.2 Serial Configuration

Configure the baud rate for serial port. Other serial port parameters are: 8-bit data bit, 1-bit stop bit, and no parity.

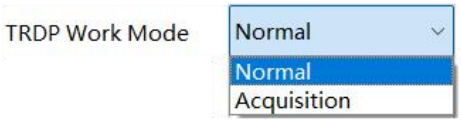
4.7.3 CAN Baudrate

Configure the baud rate for CAN interface.

4.7.4 TRDP Work Mode

Configure TRDP working mode，it can be configured in Local initialization mode. By default, the TRDP working mode is normal.

In the acquisition mode, the TRDP-Gateway will collect all the TRDP PD data whose destination IP address is multicast or broadcast on the network in real time and forward it to the host.

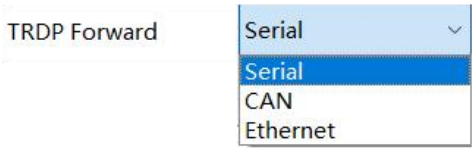


Note: The acquisition mode requires the cooperation of upstream switches to forward multicast or broadcast packets to the TRDP-Gateway.

4.7.5 TRDP Forward Interface

In Local initialization mode, this configuration is valid.

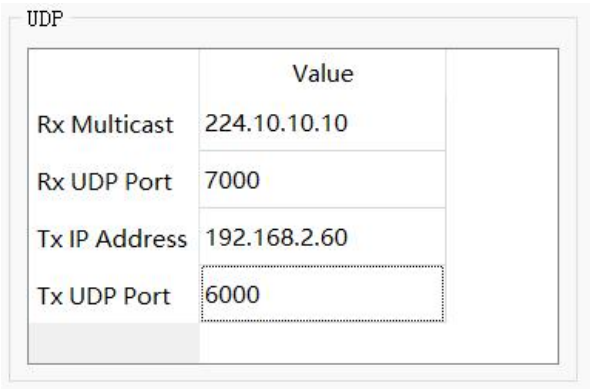
In Host mode, it indicates the current working interface between host and TRDP-Gateway, and can't be changed by configuration.



4.7.6 DMS of TRDP Ethernet Interface

Configure TRDP Ethernet interface to enable DMS function, and TRDP interface doesn't enable DMS function by default.

4.8 UDP configuration



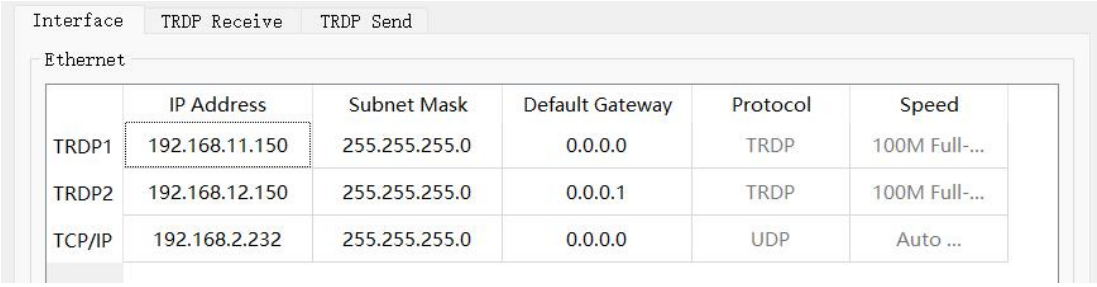
Configure the IP and UDP ports for communication between the host computer and TRDP-Gateway, including the following:

- Receive multicast address: When the host sends messages to TRDP-Gateway, use this multicast address as the destination IP.
- Receive UDP port: When the host sends messages to TRDP-Gateway, use this port as the UDP destination port.
- Destination IP address: When TRDP-Gateway sends messages to the host, use this IP address as the destination IP.
- Destination UDP Port: When TRDP-Gateway sends messages to the host, use this port as the UDP destination port.

4.9 Ethernet Interface

TRDP1 and TRDP2 are redundant TRDP network ports, which are forced to work in 100M full-duplex mode.

The TCP/IP network port works in adaptive mode and uses UDP to communicate with the host computer.



	IP Address	Subnet Mask	Default Gateway	Protocol	Speed
TRDP1	192.168.11.150	255.255.255.0	0.0.0.0	TRDP	100M Full-...
TRDP2	192.168.12.150	255.255.255.0	0.0.0.1	TRDP	100M Full-...
TCP/IP	192.168.2.232	255.255.255.0	0.0.0.0	UDP	Auto ...

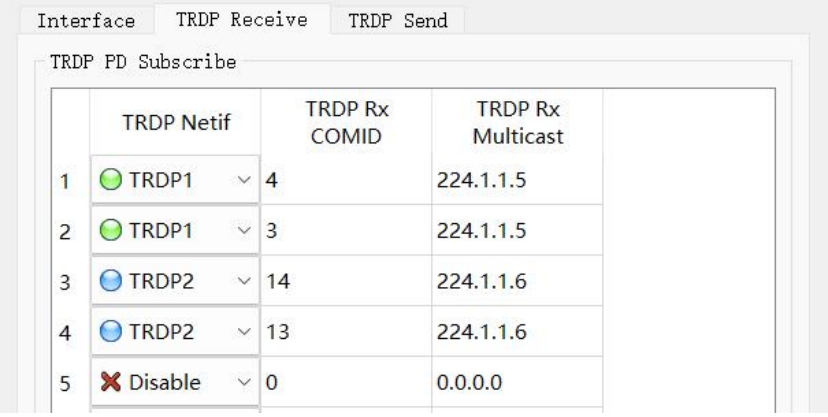
4.10 TRDP Receive Configuration

This page can configure up to 32 TRDP PD Subscribe entries and supports multicast reception.

The subscribed TRDP PD data is forwarded to the host computer through the Serial port, CAN interface, or TCP/IP Ethernet interface.

In Local initialization mode, TRDP-Gateway initializes the TRDP PD Subscribe entries with this configuration.

In Host initialization mode, this page shows the configuration parameters from the host.



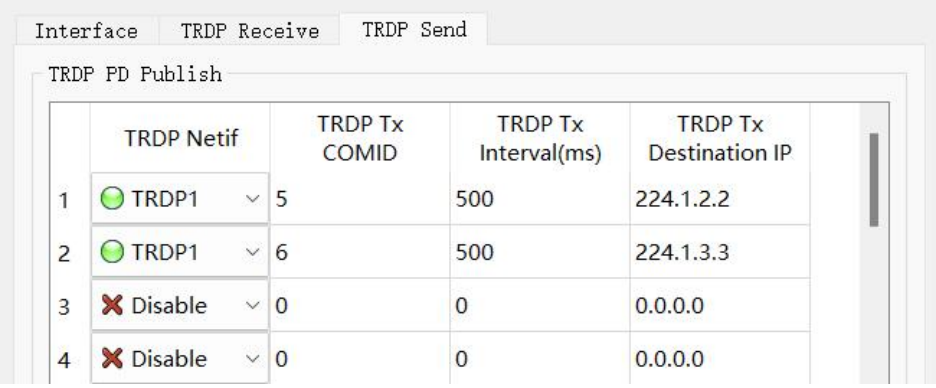
4.11 TRDP Send Configuration

This page can configure up to 32 TRDP PD Publish entries.

TRDP-Gateway receives data from the host computer through Serial port, CAN interface, or TCP/IP Ethernet interface, refreshes the PD buffer of TRDP protocol, and then periodically sends PD data according to the configuration. Its destination address can be unicast, multicast, or broadcast.

In Local initialization mode, TRDP-Gateway initializes the TRDP PD Publish entries with this configuration.

In Host initialization mode, this page shows the configuration parameters from the host.



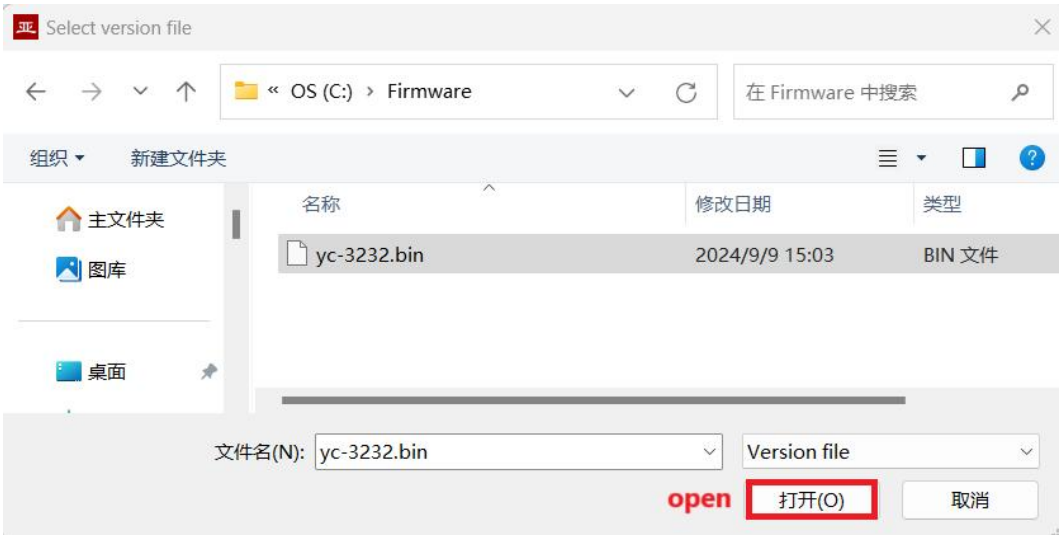
4.12 Firmware Version Upgrade

4.12.1 Start Upgrade

Click the “Upgrade” button on the toolbar to pop up the version upgrade dialog, and then click the “Start” button.

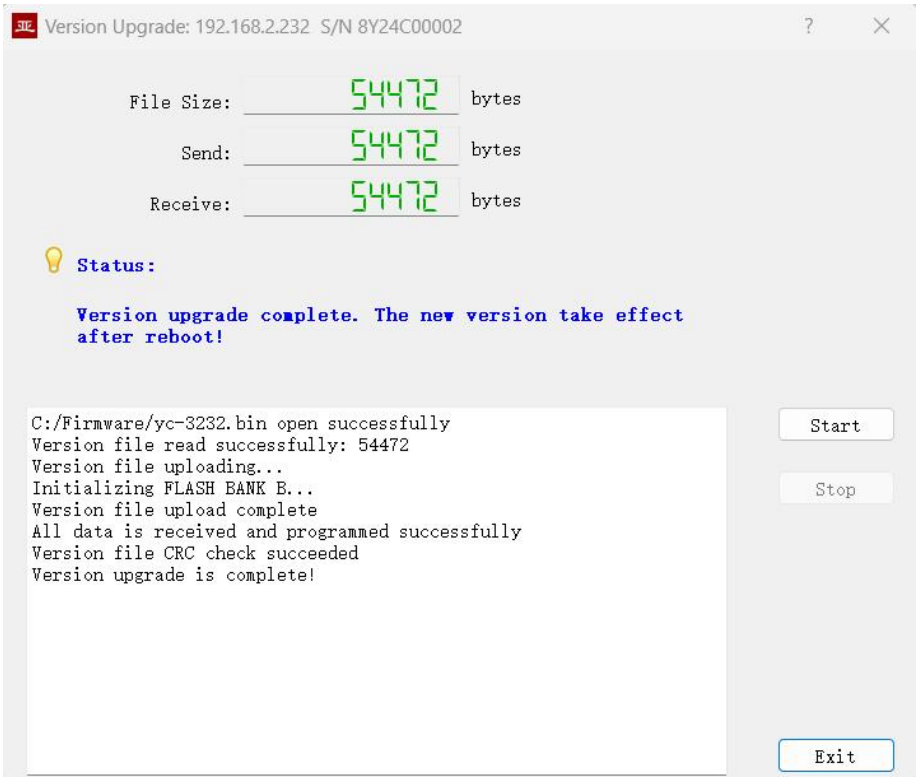
4.12.2 Select Version File

Pop up the “Select version file” dialog, and find the firmware version file to be updated, select it and click "Open".



4.12.3 Complete Upgrade

When the page displays “Version upgrade complete” status, it indicates that the version upgrade is completed.



4.12.4 Re-Power Up to Take Effect

Re-power the device and wait a minute or so for the new version to boot up and take effect.

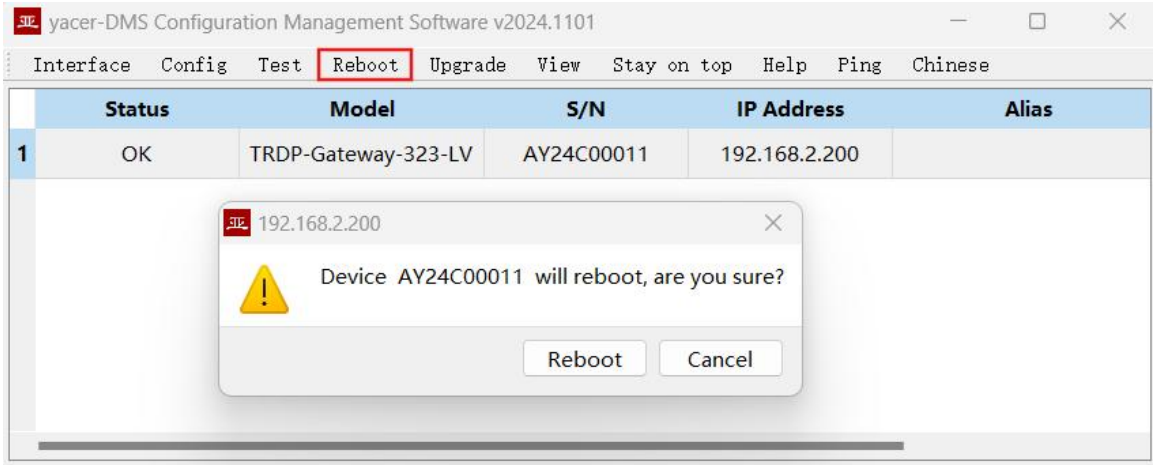
NOTE: The device cannot be powered down during the waiting period.

4.12.5 Confirm Upgrade

After the upgrade is completed, power up the device again, observe the version information in the statistical report, and determine whether the new version is successfully updated by the version date.

4.13 Reboot Device

Click the “Reboot” button on the toolbar to pop up the device reboot dialog, and then click the “Reboot” button to reboot the device.


yacer-DMS Configuration Management Software v2024.1101
Interface
Config
Test
Reboot
Upgrade
View
Stay on top
Help
Ping
Chinese
Status
Model
S/N
IP Address
Alias
1
OK
TRDP-Gateway-323-LV
AY24C00011
192.168.2.200
192.168.2.200
Device AY24C00011 will reboot, are you sure?
Reboot
Cancel

5 Software Development

Reference:

- *THCP Protocol Programming Manual*

UART-PPP protocol implementation C code:

- yacer_uart_ppp.c

THCP references C code:

- thcp_Inc.h
- thcp_canInc.h
- thcp_can.c: CAN conversion code for the THCP protocol

About the Manual

- The manual is for reference only. If there is inconsistency between the manual and the actual product, the actual product shall prevail.
- We are not liable for any loss caused by the operations that do not comply with the manual.
- All the designs and software are subject to change without prior written notice. The product updates might cause some differences between the actual product and the manual. Please contact the customer service for the latest program and supplementary documentation.
- There still might be deviation in technical data, functions and operations description, or errors in print. If there is any doubt or dispute, we reserve the right of final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- Please visit our website, contact the supplier or customer service if there is any problem occurring when using the device.
- If there is any uncertainty or controversy, we reserve the right of final explanation.