MVB-EMD

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.

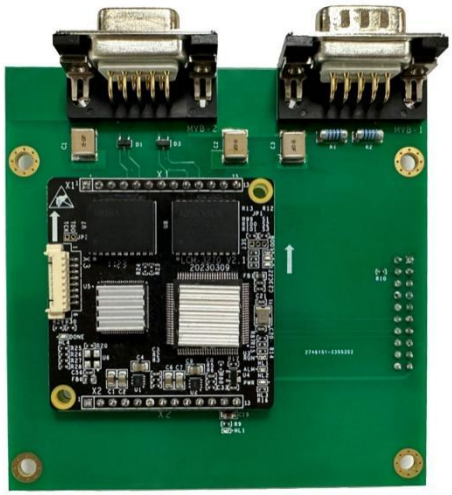
Table of Contents

1 Overview

1.1 Introduction

The Yacer MVB-EMD embedded slave network card, provided one full-featured MVB redundant interface and one UART extended serial port to realize protocol conversion between MVB and serial port.

Small size, 2.54 mm pin connector. + 5V power supply, low power consumption. Industrial wide temperature, suitable for embedded applications.



1.2 Features

- One UART extended serial port;
- One MVB redundant EMD interface, support MVB slave protocol;
- Support multiple PD source ports and sink ports;
- Support MVB bus PD data acquisition function;
- + 5V power supply, Low power consumption;
- Small size, Industrial wide temperature.

1.3 Applications

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

1.4 Order Information

Model	Description	MVB D-Sub Bolts
MVB-EMD-200	1 x dual redundancy MVB + 1 x UART interface	M3 Bolts
MVB-EMD-200-UNC	1 x dual redundancy MVB + 1 x UART interface	UNC4-40 Bolts

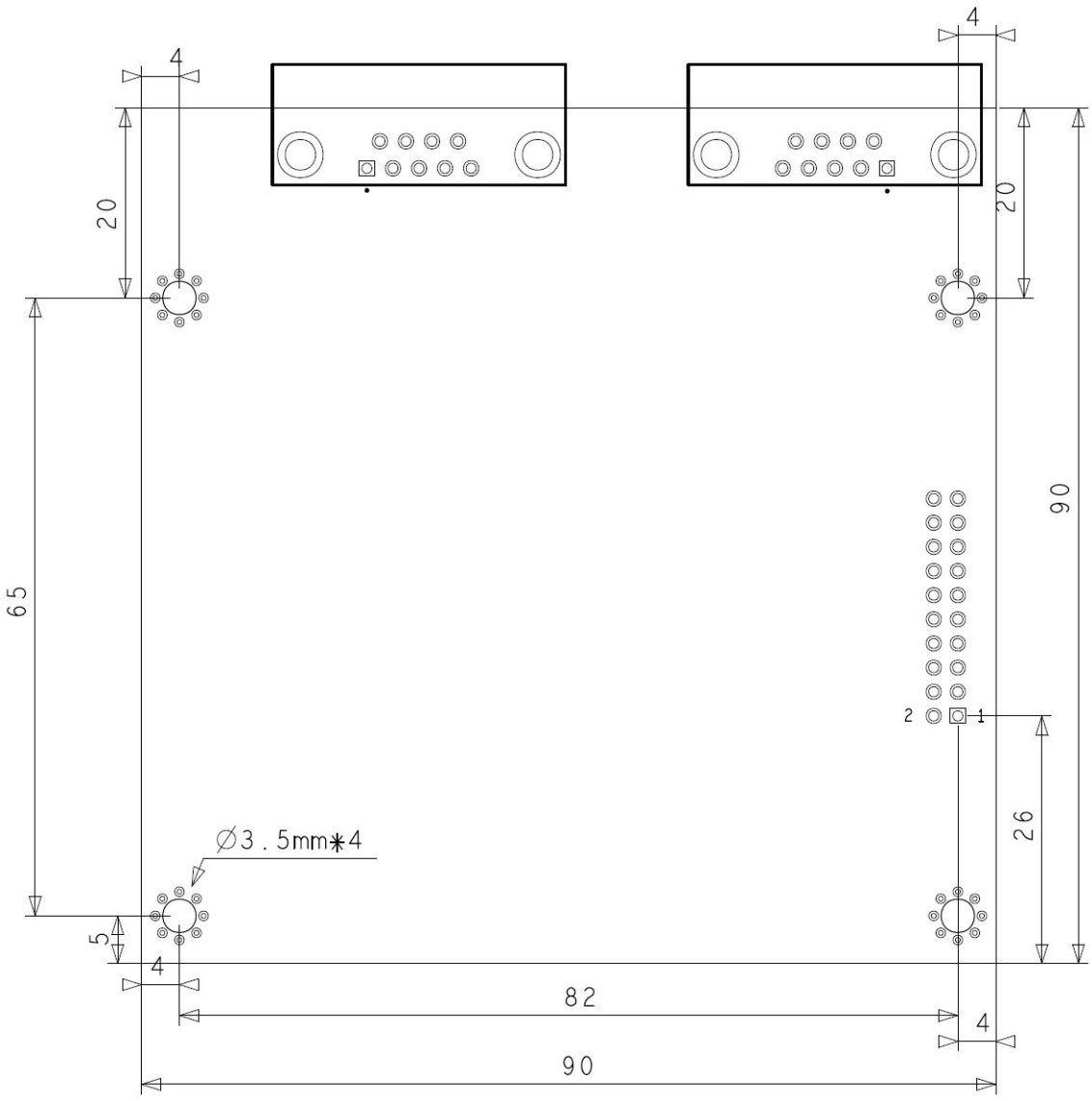
1.5 Technical Specifications

Item	Parameters	Details
MVB Interface	Connector	1 x DB9 male + 1 x DB9 female
	Media support	EMD
	Device class	Class 1
	Device capabilities	Device_Status, Process_Data(PD)
	Number of PD ports	16
	Isolation	2.5 kVrms
UART Serial port	Level standard	3.3V LVCMOS
	Working mode	Asynchronous UART
	Duplex mode	Full-duplex
	Baud rate	≤ 921.6 Kbps
Configuration Management	Configuration interface	Dedicated DMS-UART interface (with Yacer ' s DMS-UART-8P configuration cable)
	Configuration tool	yacer-DMS configuration management software
Power Requirements	Input voltage	+5V DC
	Power consumption	< 2 W
Mechanical Characteristics	Connector	1 x 20 PIN double-row pin connector (2*10) with 2.54mm pitch
	Dimensions	90 mm x 90 mm
	Weight	100 g

Item	Parameters	Details
Operating Environment	Operating temperature	-40 ~ +85℃
	Storage temperature	-40 ~ +85℃
	Operating humidity	5 ~ 95% RH (no condensation)

NOTE: If you need to support more MVB PD ports, please contact the manufacturer.

1.6 Mechanical Dimension Drawing



2 Hardware and Physical Interface

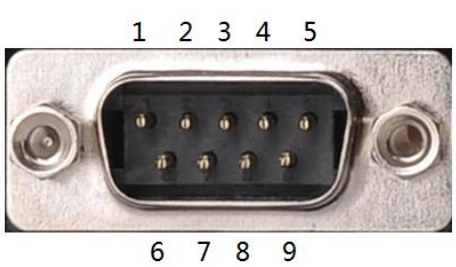
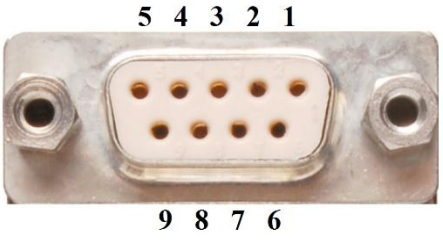
2.1 LED Indicators

LED	Description
RUN	Running indicator, green light flashes during normal operation
ALM	Alarm indicator ● Blinking during initialization phase: waiting for host computer configuration command ● Normal operation status off: the device is working normally ● Normal operation status on: device failure
PWR	Power indicator, always on after power on

2.2 MVB Interface (MVB-1, MVB-2)

The MVB interface is an EMD interface with the following pin definitions:

Pin	MVB-1(male) Signal Name	MVB-2(female) Signal Name	Description
1	A_Data_P		Line A positive (+)
2	A_Data_N		Line A negative (-)
3	NC		Must be left suspended
4	B_Data_P		Line B positive (+)
5	B_Data_N		Line B negative (-)
6	A_Term_P		1 and 6 shorted, 2 and 7 shorted to enable 120 ohm matching resistor on line A
7	A_Term_N		
8	B_Term_P		4 and 8 shorted, 5 and 9 shorted to enable 120 ohm matching resistor on line B
9	B_Term_N		

MVB-1 (DB9 male connector)	MVB-2 (DB9 female connector)
	

2.3 Extended Interface (J1)

A 20 PIN double-row pin connector (2*10) with a pitch of 2.54mm is used, and the pins are defined as follows:

Pin	Signal	Direction	Description
1	NC		Must be left suspended
2	NC		Must be left suspended
3	RESET_IN	I	NIC reset input, active low (holds more than 10ms). Module has POR function, pins can be suspended
4			
5	NC		Must be left suspended
6	NC		Must be left suspended
7	NC		Must be left suspended
8	NC		Must be left suspended
9	GND		Ground
10	GND		Ground
11	UART_RXD	I	Serial data receive
12			
13	UART_TXD	O	Serial data transmit
14			
15	GND		Ground
16	GND		Ground
17	+5V	I	Power input, +5V DC
18	GND		Ground
19	+5V	I	Power input, +5V DC
20	GND		Ground

3 System and Configuration

3.1 Module Configuration

MVB-EMD provides a variety of easy and flexible configuration functions to meet the different application scenarios of users.

3.1.1 Static Configuration

The MVB-EMD module has internal FLASH memory to save the configuration. When the module is in normal running operation, the user can configure the MVB-EMD using the following methods:

- Interactive configuration via the DMS-UART interface using the yacer-DMS configuration management software;
- The host computer gives the configuration commands through the UART interface.

The new configuration generated by the above method is saved in FLASH and the configuration takes effect after the module is rebooted.

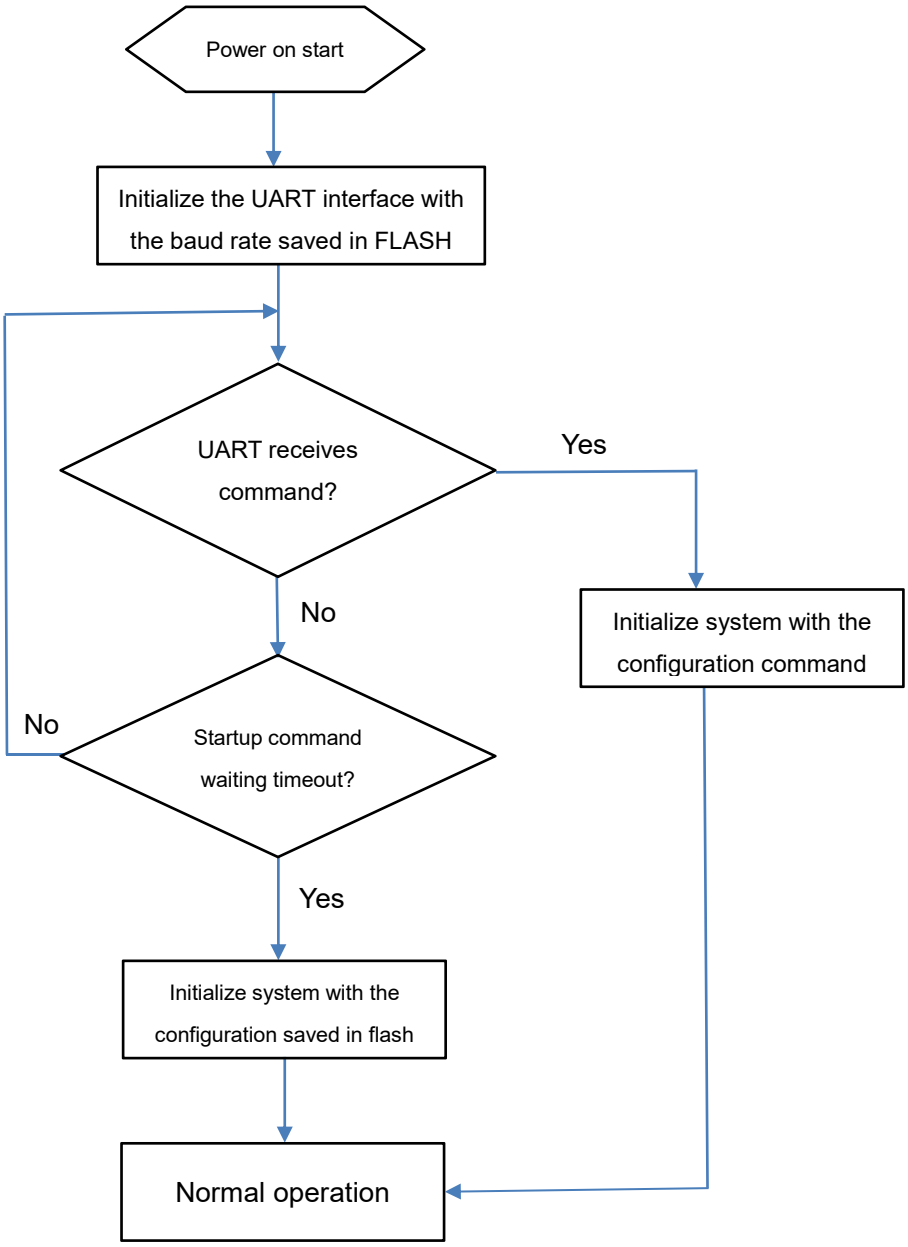
3.1.2 Dynamic Configuration

When the module is powered up, the UART interface is initialized with the baud rate parameters saved in FLASH (factory default 115200bps) and waits for a configuration command from the host computer.

If a legitimate configuration command is received within the waiting time window, the MVB-EMD is initialized with the configuration parameters carried by the command. If the configuration command is not received within the timeout, the MVB-EMD is initialized with the configuration saved in FLASH.

The size of the wait time window is 5 seconds by default and can be modified by static configuration. If the window is set to 0, the configuration is initialized by loading directly from FLASH.

3.2 Startup Process



4 Build Configuration Environment

4.1 Configuration via dedicated DMS-UART interface

Use the DMS-UART-8P configuration cable to connect the module's DMS-UART interface (X3) to the computer's USB port.

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 MVB-EMD accompanied U-Disk;
- Official website of Yacer (http://www.yacer.com.cn) Software channel.

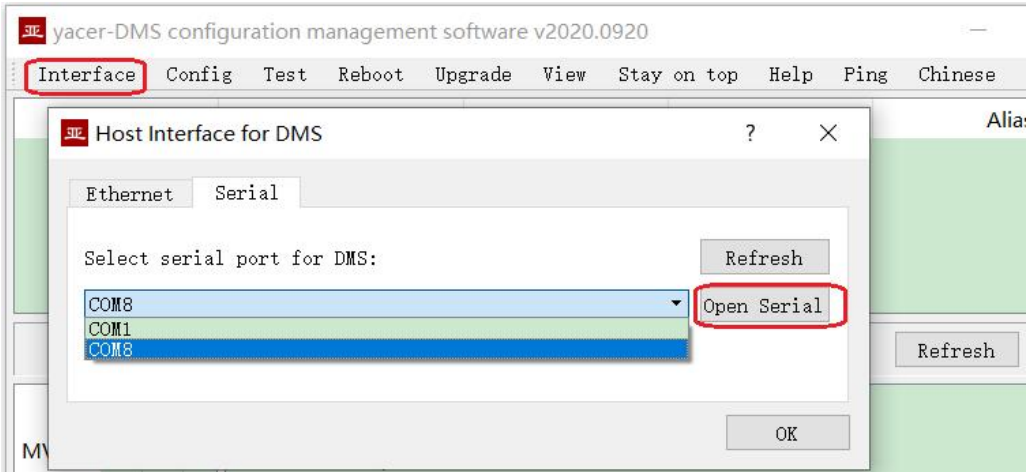
4.3 Run yacer-DMS Software

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.

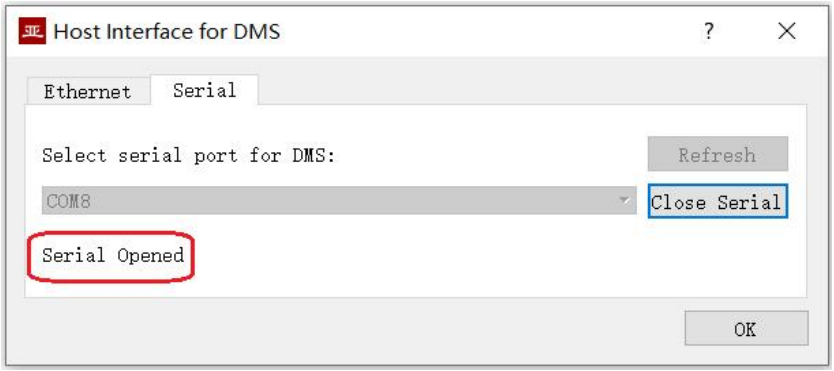
4.4 Select and Open the Configuration Serial Port

When the DMS-UART-8P configuration cable is connected to the USB interface of the management computer, the computer adds a USB emulation serial port.

Click the 'Interface' button on the yacer-DMS toolbar to pop up the “Host Interface for DMS” configuration dialog. Enter the “Serial” page, select the USB simulation serial port or other serial ports involved in the configuration from the drop-down list, click “Open Serial”.



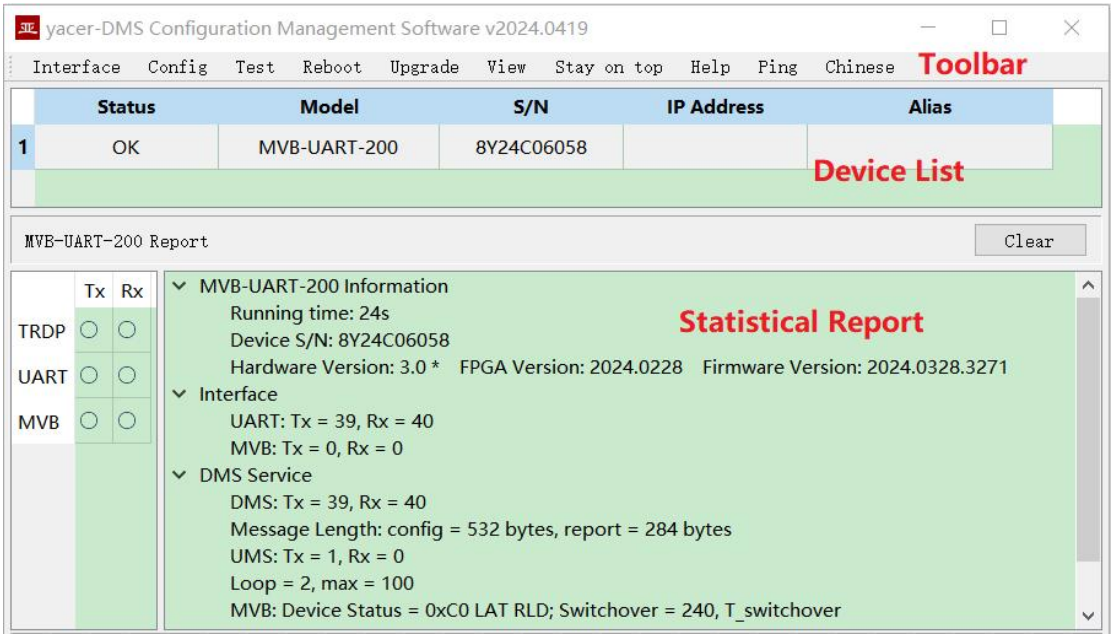
If the serial port is successfully opened, the state is as follows:



4.5 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.



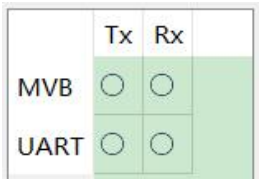
4.6 Statistical Report

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

4.6.1 Control Panel

4.6.2 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.



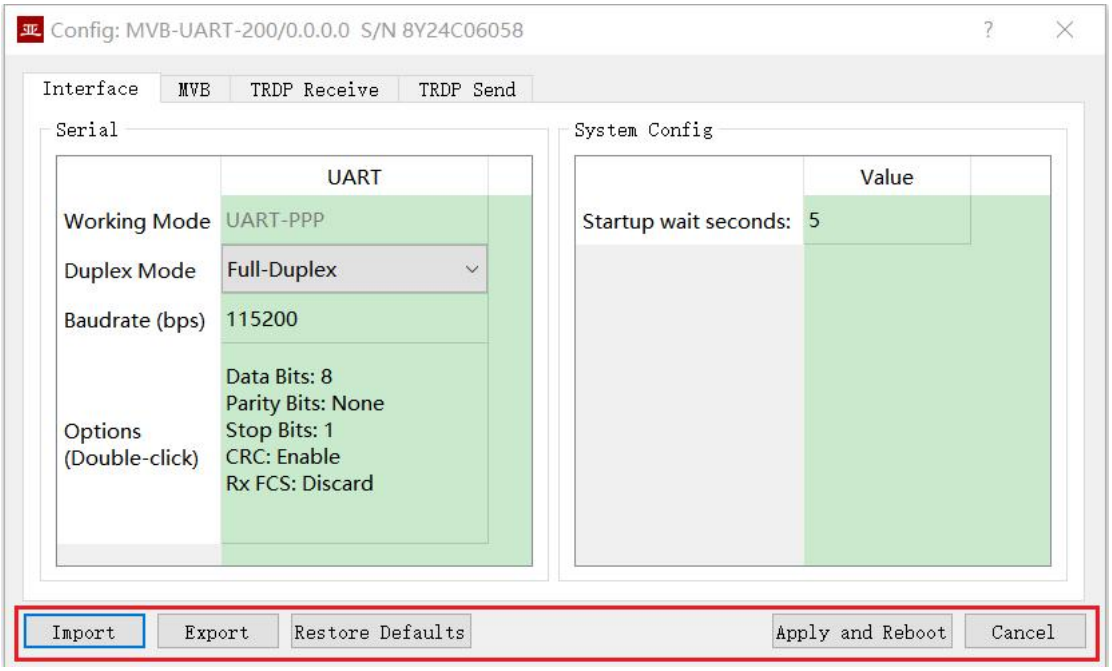
4.6.3 Information Panel

The right side of the statistical report is the information panel, which can display the following contents:

- Device information: Running time, S/N number, version number;
- Interface: Receive/transmit statistics of MVB and UART interface;
- DMS Service: Configuration management message receive/transmit statistics.

4.7 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.



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

5 Function and Configuration

5.1 System Configuration

Startup Command Wait Seconds: Users can set the startup command wait time here to adjust the dynamic configuration time window.

System Config

	Value
Startup wait seconds:	0

5.2 Extended serial port configuration

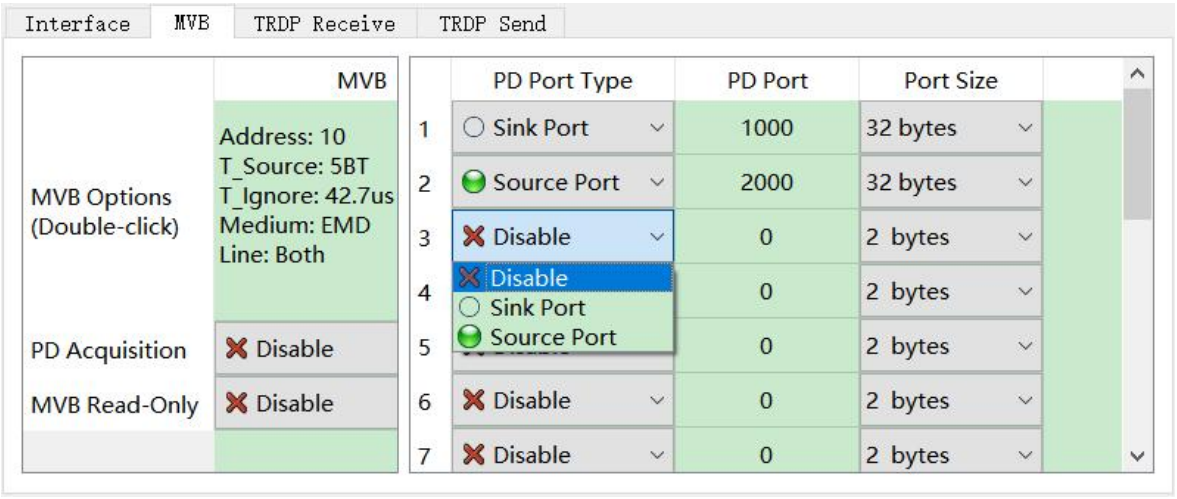
It is possible to communicate with the UART of the host computer through the extended serial port to transmit MVB data or control commands. Since UART sends and receives character stream without head and tail, in order to transmit an MVB packet, a UART-PPP frame is constructed by adding 0x7E as the start and end flag at the beginning and end of the packet, and inserting a frame check sequence.

Serial

	UART
Working Mode	UART-PPP
Duplex Mode	Full-Duplex
Baudrate (bps)	115200
Options (Double-click)	Data Bits: 8 Parity Bits: None Stop Bits: 1 CRC: Enable Rx FCS: Discard

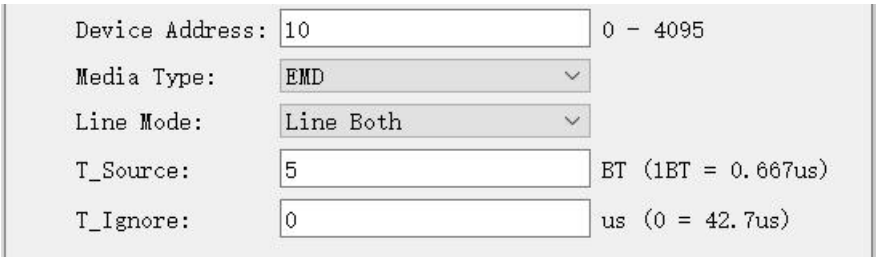
5.3 MVB Interface and Forwarding Configuration

The MVB configuration page is shown below, with the MVB interface and forwarding configuration on the left, and the PD port configuration table on the right.



5.3.1 MVB Interface Configuration

Double-click the advanced option cell to pop up the MVB parameter configuration dialog.

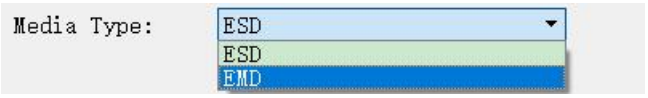


5.3.1.1 Device Address

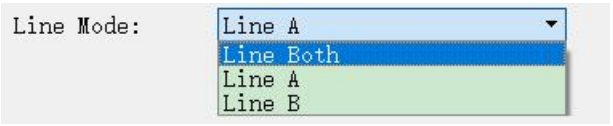
Users configure device address in the range of 0 to 4095 according to field requirements.

5.3.1.2 Media Type

According to the application requirements, users can choose the medium type.



5.3.1.3 Line Type



Users can choose:

- Line Both: double-line redundancy;
- Line A: A line single line mode;
- Line B: B line single line mode.

5.3.1.4 Other Parameters

Using default values, users do not modify or adjust as much as possible.

5.3.2 Serial to MVB Configuration

MVB-EMD receives data from the host computer through the UART interface and refreshes the time buffer of the PD source port. When the MVB interface receives a process data request from the master station, the MVB-EMD automatically sends a process data response carrying the latest data content.

The serial to MVB function of the MVB-EMD is turned on automatically and does not need to be configured.

5.3.3 MVB to Serial Configuration

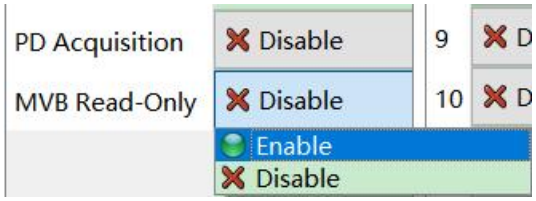
The PD data of the MVB sink port is forwarded to the host computer through the UART interface.

The serial to MVB function of the MVB-EMD is turned on automatically and does not need to be configured.

5.3.4 PD Acquisiton

Acquisition of all PDs:

- Enable: MVB-EMD receives all PD frames on the MVB bus and forwards them to the host computer;
- Disable: MVB-EMD only receives data from the sink port in the PD port configuration table.



If the MVB Read-only mode is Enable, the MVB-EMD module works in pure receive mode and does not output all frames including device status and PD to the MVB bus.

5.3.5 PD Port Configuration Table

The default version of MVB-EMD supports the configuration of up to 16 process data ports. If users need to configure more PD ports, please contact the manufacturer for customization.

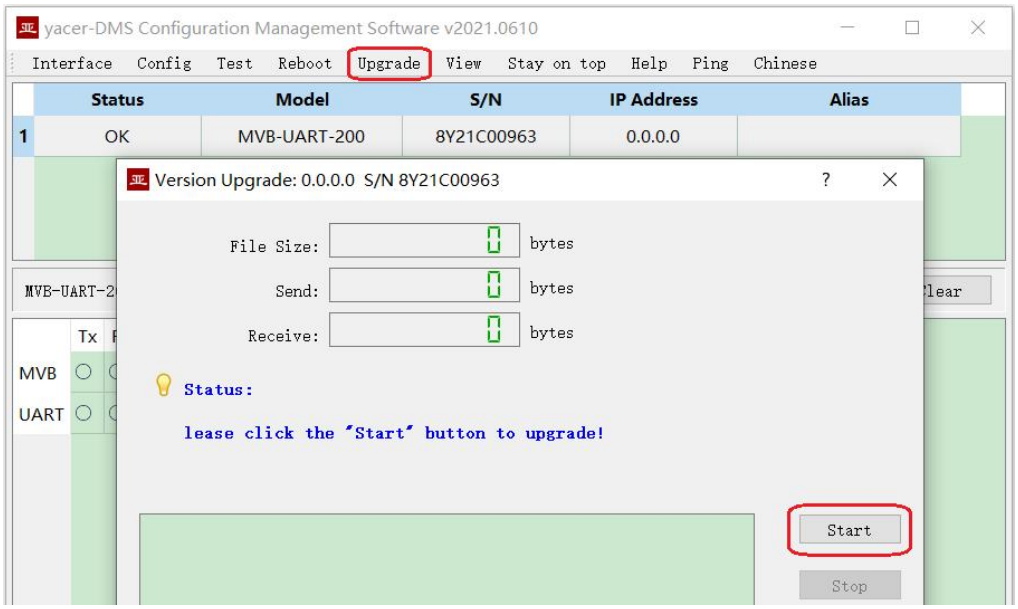
Each PD port entry includes the following parameters:

- PD Port Type: Sink or Source port, disable means this entry is invalid;
- PD Port: Set port number 0 ~ 4095;
- Port Size: 2, 4, 8, 16, 32 bytes correspond to 0 ~ 4 of fcode;

5.4 Firmware Version Upgrade

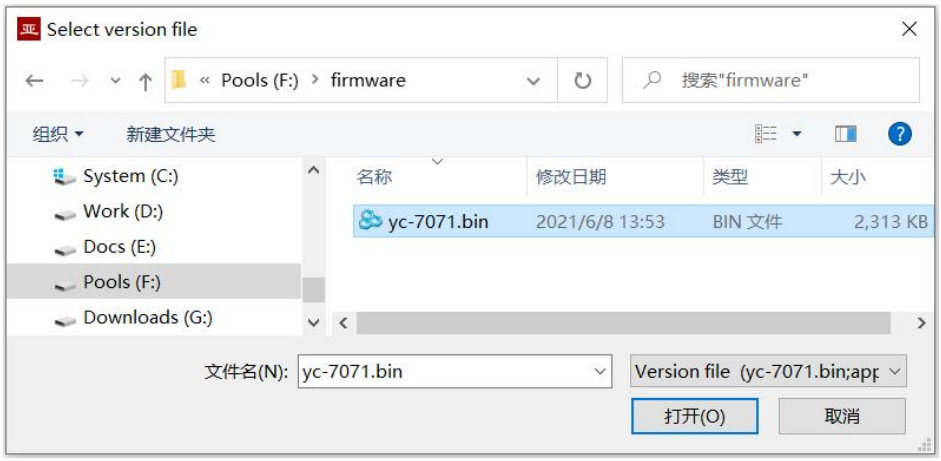
5.4.1 Start Upgrade

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



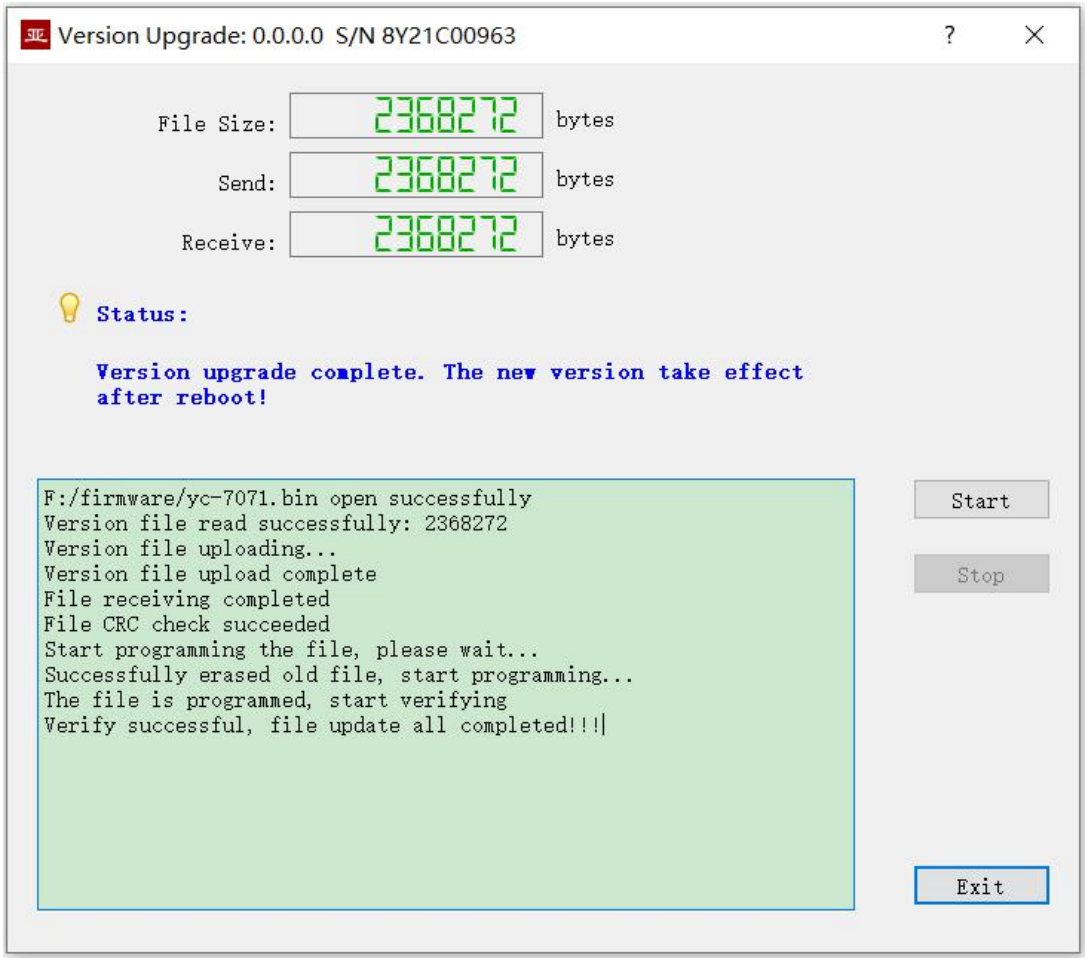
5.4.2 Select Version File

Pop up the “Select version file” dialog, and find the folder where the latest firmware version is stored, select the corresponding file, and click “Open” to start the update.



5.4.3 Complete Upgrade

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

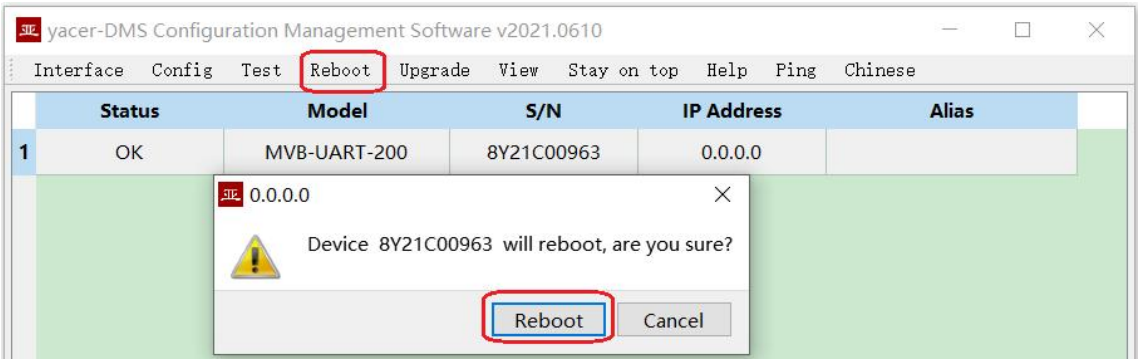


5.4.4 Confirm Upgrade

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.

5.5 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.



6 Software Development

Reference:

- *TCN-PACKET Programming Manual*
- *TCN-UMS Programming Manual*

Reference Code:

- *yacer_uart_ppp.c*

7 Verification and Debugging of MVB

7.1 Auxiliary Equipment

- Yacer MVB-Analyzer;
- Computer;
- Straight-through cable.

7.2 Auxiliary Software

The following software can be obtained by MVB-EMD attached U-Disk or accessing *http://www.yacer.cn* 'Software' channel:

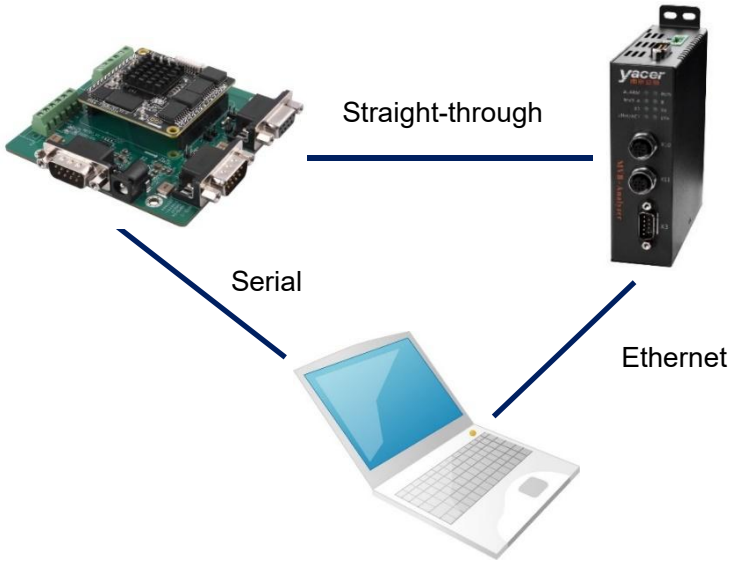
- yacer-DMS configuration management software;
- MVB-Monitor monitoring and analysis software;
- MVB-Serial debugging assistant.

7.3 Debugging and Testing Scheme

MVB-EMD interconnects the MVB bus with the MVB-Analyzer through a straight-through cable, and connect the serial port of the computer through a serial cable.

MVB-Analyzer connects the network port of the computer through the network cable. The MVB-Monitor software running on the computer can control the MVB-Analyzer to simulate the host, so as to realize the data transceiver of MVB interface of MVB-EMD.

At the same time, MVB-Serial debugger is running on the computer to simulate the communication between the host computer and the UART interface of MVB-EMD.



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.