

MVB-Analyzer

Datasheet

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.

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1 Overview

1.1 Introduction

Yacer MVB-Analyzer protocol analyzer provides MVB interface, two Ethernet interfaces and two extended interfaces to collect and receive MVB frames, WTB frames, synchronous HDLC frames, CAN frames, and UART serial data from the vehicle bus and send them to the computer via the Ethernet interface.

By using the accompanying MVB-Monitor monitoring and analyzing software, it is possible to analyze the MVB bus data and perform MVB master simulation to find out troubleshooting and evaluate the operation status of the MVB bus.

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



1.2 Applications

- MVB (Multifunction Vehicle Bus) Monitoring and Analysis
- WTB (Wire Train Bus) Monitoring and Analysis
- HDLC (High-level Data Link Control) Protocol Monitoring and Analysis
- CAN Bus monitoring and analysis
- RS-232/422/485 serial port data monitoring analysis
- MVB, WTB, HDLC, UART, CAN to Ethernet interface conversion
- Train TCMS (Train Control and Management System) system
- Train Communication Network (TCN)

1.3 Features

- Two 10/100M Ethernet interfaces, supporting Ethernet switching and dual-IP function;
- MVB redundant interface, optional ESD+, EMD media interface
- Extended interface optional RS-232, RS-422, RS-485 serial or CAN bus interface
- Serial port supports asynchronous UART, synchronous HDLC protocol
- Perfect isolation and protection
- Industrial wide temperature

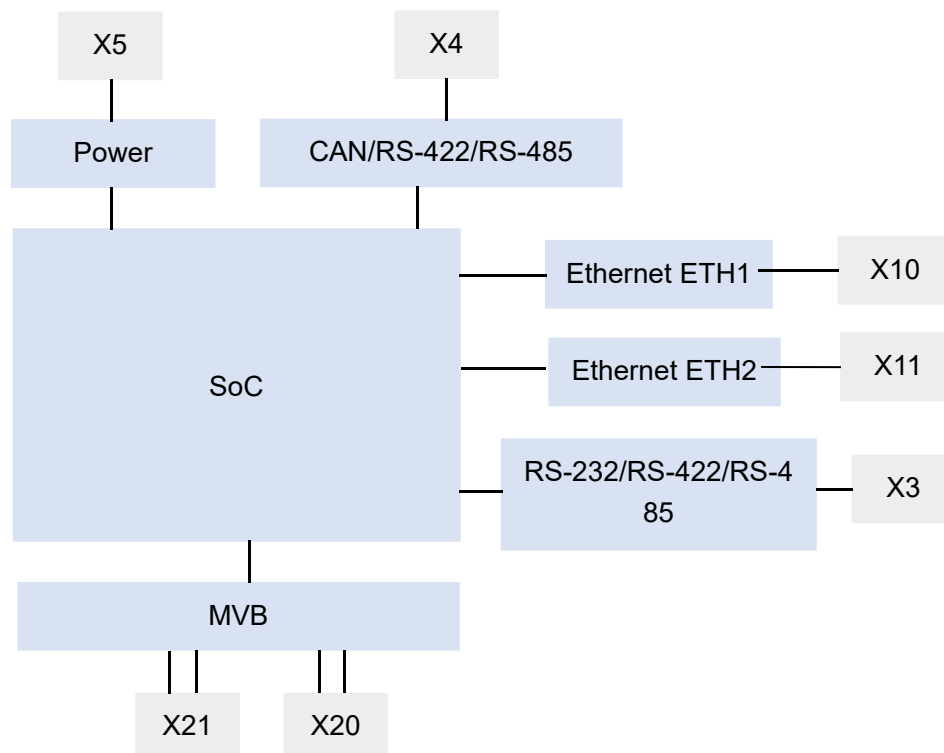
1.4 Order Information

MVB-Analyzer	-	M	0	5	5	-LV	
MVB physical layer media type:							
• EMD		M					
• ESD+		S					
Protocol Support:							
• UDP			0				
• UDP, HDLC			1				
Extended Interface X3 Definition:							
• None				0			
• Full-duplex RS-232 serial port				3			
• Full-duplex RS-422 serial port				4			
• Half-duplex RS-485 serial port				5			
Extended Interface X4 Definition:							
• None					0		
• Full-duplex RS-422 serial port					4		
• Half-duplex RS-485 serial port					5		
• CAN Bus interface					6		
Supply voltage range:							
Nominal 24V, tolerance 9 ~ 36VDC						-LV	
Nominal 36V, 48V, tolerance 18 ~ 75VDC						-MV	
Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC						-HV	
MVB D-Sub Bolts:							
• M3 Bolts							<empty>
• UNC4-40 Bolts							-UNC

1.5 Function Blocks

The basic functions blocks are shown in the following figure:

- X20, X21 are dual-line redundant MVB interface;
- X3 extended interface: Optional RS-232, RS-422 or RS-485;
- X4 extended interface: Optional CAN, RS-422 or RS-485;
- ETH1, ETH2 are two 100M Ethernet interfaces, which are connected X10, X11;
- X5 is the power interface.



1.6 Technical Specifications

Item	Parameters	Details
MVB Interface	Connector	1 x male D-Sub 9 (X20) + 1 x female D-Sub 9 (X21)
	Physical media	Optional EMD, ESD+
	Logical media	Support EMD, ESD
	Isolation	2.5 kVrms
Extended Interface X3	Connector	1 x male D-Sub 9 (X3)
	Interface type (Three-in-one)	<ul style="list-style-type: none"> RS-232 full-duplex serial port RS-422 full-duplex isolated serial port RS-485 half-duplex isolated serial port
	Working mode	Asynchronous UART Optionally supporting synchronous HDLC protocol
	Baud rate	Synchronous ≤ 6 Mbps Asynchronous ≤ 1.5 Mbps
	Isolation	2.5 kVrms
Extended Interface X4	Connector	1 x male D-Sub 9 (X4)
	Interface type (Three-in-one)	<ul style="list-style-type: none"> CAN bus isolation interface (CAN 2.0A, CAN 2.0B, ISO 11898) RS-422 full-duplex isolated serial port RS-485 half-duplex isolated serial port
	Working mode	Asynchronous UART Optionally supporting synchronous HDLC protocol
	Baud rate	Serial port: Synchronous ≤ 6 Mbps Asynchronous ≤ 1.5 Mbps CAN: 50 Kbps ~ 1 Mbps
	Isolation	2.5 kVrms
Ethernet Interface	Connector	2 x M12 with D-coding
	Function	Ethernet switching, dual-IP
	Rate	10/100 Mbps adaptive, 100 Mbps full-duplex
	Network protocol	TCP/IP
	Programming interface	UDP Server, UDP Client Support Unicast/Multicast/Broadcast

Item	Parameters	Details
	Isolation	1.5 kVrms
Configuration Software	Configuration tool	yacer-DMS configuration management software
	Monitor software	MVB-Monitor monitoring and analyzing software
	Acquisition software	MVB-Acquisition acquisition and display software
Power	Power supply	LV: Nominal 24V, tolerance 9 ~ 36VDC MV: Nominal 36V, 48V, tolerance 18 ~ 75VDC HV: Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC
	Isolation protection	>1.5 kVrms, supporting Anti-reverse protection
	Power consumption	< 3W
	Power connector	3 pin connector with 5mm pitch (Phoenix Contact MSTB 2,5 / 3-GF or equivalent)
Mechanical Characteristics	Dimensions	H x W x D: 124 x 36 x 104 mm
	Weight	500g
Operating Environment	Operating temperature	-40 ~ +70°C
	Storage temperature	-40 ~ +85°C
	Operating humidity	5 ~ 95% RH (no condensation)

2 Hardware and Physical Interfaces

2.1 Appearance



2.2 LED Indicators

Item	Description
RUN	Running indicator, flashing during normal operation
ALARM	Alarm indicator, on when the device is not ready or fails, and constantly off during normal operation
MVB A	Line A indicator, blinking once after one frame is received or transmitted
MVB B	Line B indicator, blinking once after one frame is received or transmitted
X3	X3 extended interface indicator, blinking once after data is received or transmitted
X4	X4 extended interface indicator, blinking once after data is received or transmitted
LINK/ACT	Link/ACT indication of the Ethernet interfaces

2.3 Ethernet Interfaces ETH1, ETH2 (X10, X11)

2.3.1 Function Description

ETH1, ETH2 are dual 10/100M Ethernet interfaces with connectors X10 and X11 as M12 (D-coding).

There are two working modes for the dual Ethernet interface:

- Ethernet switching mode: Enable the built-in Ethernet switching function;
- Dual IP mode: Each Ethernet interface has an independent IP address.

2.3.2 Pin Definition

X10, X11 Pin	Description
1	TD +
2	RD +
3	TD -
4	RD -



2.4 MVB Interface

X20 (Male D-Sub 9 connector)	X21 (Female D-Sub 9 connector)

2.4.1 EMD Pin Definition

Pin	X20 (Male) Signal Name	X21 (Female) Signal Name	Description
1	A.Data_P		Line A positive (+)
2	A.Data_N		Line A negative (-)

Pin	X20 (Male) Signal Name	X21 (Female) Signal Name	Description
3			
4	B.Data_P		Line B positive (+)
5	B.Data_N		Line B negative (-)
6	A.Term_P		Line A matching resistor positive (+)
7	A.Term_N		Line A matching resistor negative (-)
8	B.Term_P		Line B matching resistor positive (+)
9	B.Term_N		Line B matching resistor negative (-)

2.4.2 ESD+ Pin Definition

Pin	X20 (Male) Signal Name	X21 (Female) Signal Name	Description
1	A.Data_P		Line A positive (+)
2	A.Data_N		Line A negative (-)
3			
4	B.Data_P		Line B positive (+)
5	B.Data_N		Line B negative (-)
6	A.Bus_GND		Line A ground
7	B.Bus_GND		Line B ground
8	A.Bus_5V		Line A power supply
9	B.Bus_5V		Line B power supply

2.5 RS-232/422/485 Interface (X3)

2.5.1 Function Description

X3 is an extended serial port, defaults to asynchronous UART working mode, optionally supports the synchronous HDLC protocol model.

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



2.5.2 Pin Definition

X3 uses the male D-sub 9 connector, pin defined as follows:

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 -

2.5.3 Terminator RS-485

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

2.6 CAN/RS-422/485 Interface (X4)

2.6.1 Function Description

X4 is an extended interface, users can choose serial port or CAN bus interface when ordering. When the serial port is configured, one of the following configurations can be selected from the factory:

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

When configured as a serial port, the default is asynchronous UART mode, optionally models that support the synchronous HDLC protocol.



2.6.2 Pin Definition

PIN	CAN	RS-422 Full-duplex	RS-485 Half-duplex
1	Term +		
2	CAN_L		
3	ISO_GND	ISO_GND	ISO_GND
4		TxD +	Data +
5		TxD -	Data -
6	Term -		
7	CAN_H		
8		RxD +	Term +
9		RxD -	Term -

2.6.3 Terminator CAN bus

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

2.6.4 Terminator RS-485

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

2.7 Power Interface (X5)

2.7.1 Function Description

MVB-Analyzer 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 Value	Maximum Value
LV	24V	9V	36V
MV	36V, 48V	18V	75V
HV	72V, 96V, 110V	40V	160V

2.7.2 Pin Definition

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

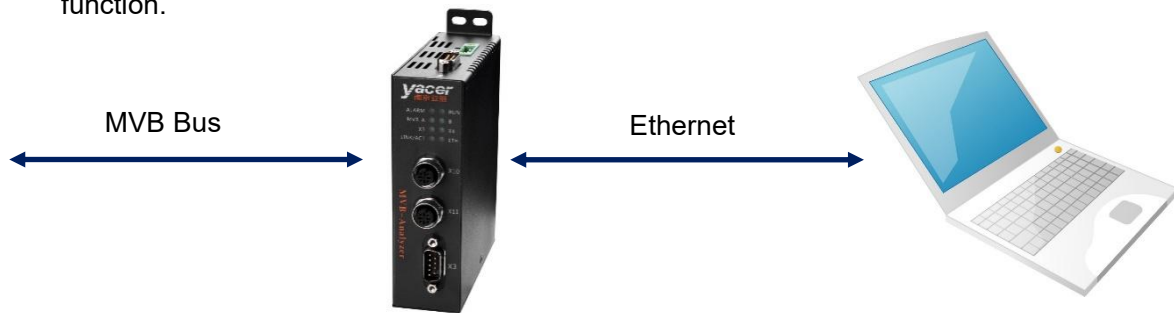
Pin	Signal Name	Description
1	V +	Power +
2	FG	Protection ground
3	V -	Power -



3 MVB-Monitor Software

3.1 Monitor and Analyze MVB Bus Data

MVB-Analyzer listens through the MVB interface to grab all the data of MVB bus, convert it to UDP message, and send it to the computer in real time. The MVB-Monitor monitoring and analyzing software running on the computer can scan and analyze the received MVB bus data. The MVB-Monitor software can generate master simulation data, send it to MVB-Analyzer through the Ethernet, and control the analyzer to achieve the MVB master station simulation function.



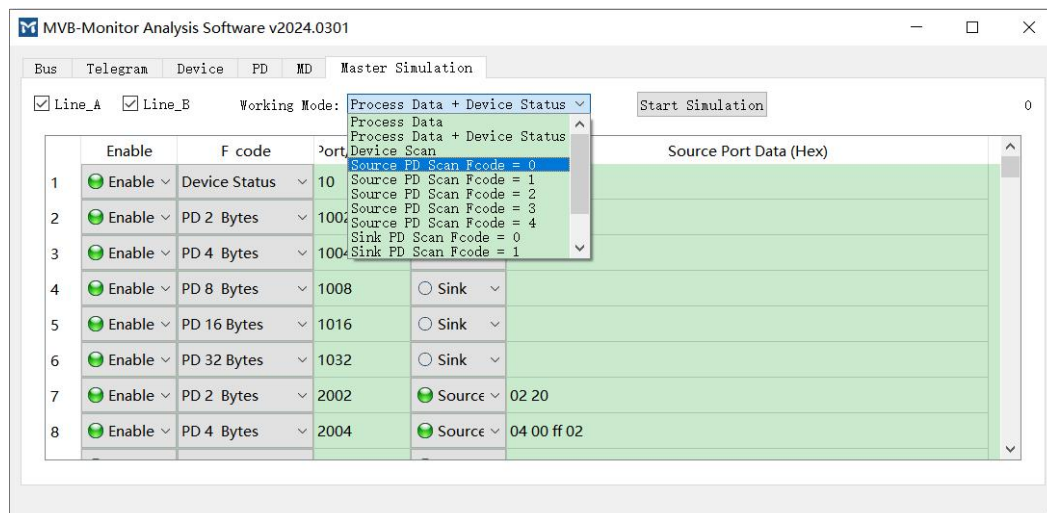
3.2 Get MVB-Monitor Software

The user can obtain a compressed package MVB-Monitor.zip in the following ways:

- In the “tools” directory of the accompanied U disk of MVB-Analyzer;
- Software channel on the official website (www.yacer.com.cn).

3.3 Run MVB-Monitor Software

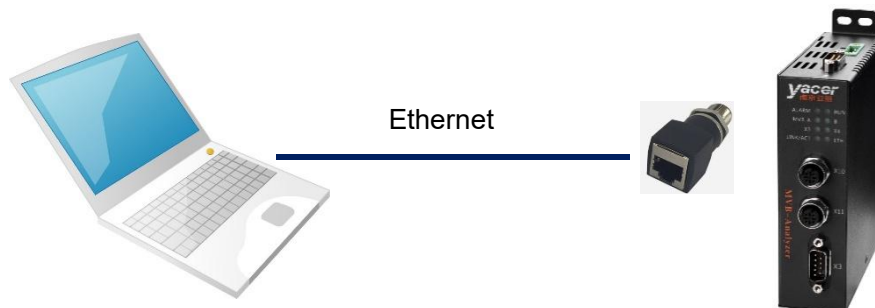
MVB-Monitor is a free installation application software, unzip MVB-Monitor.zip, enter the working directory and double click the file MVB-Monitor.exe to run.



4 Building Configuration Environment

4.1 Connect Configuration Computer to MVB-Analyzer

Connect the management computer with any Ethernet interface port of MVB-Analyzer through network cable, and run yacer-DMS configuration management software on the computer to configure the parameters and monitor the state of MVB-Analyzer.



4.2 Get yacer-DMS Configuration Management Software

The user can obtain a compressed package yacer-DMS.zip of configuration management software in the following ways:

- In the “tools” directory of the accompanied U disk of MVB-Analyzer;
- Software channel on the official website (www.yacer.com.cn).

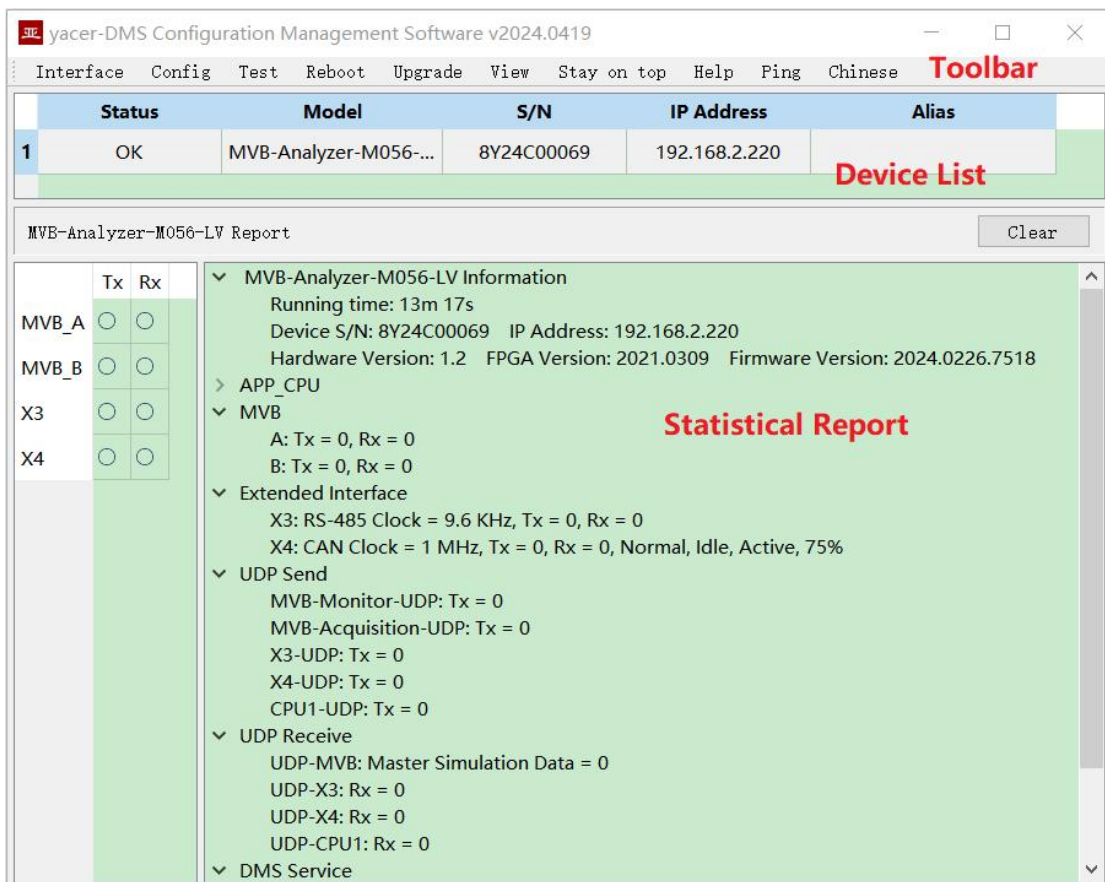
4.3 Run yacer-DMS software

The yacer-DMS is a free installation 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 devices;
- Statistical Report: Displaying the receive/transmit indication & statistics, and device details.

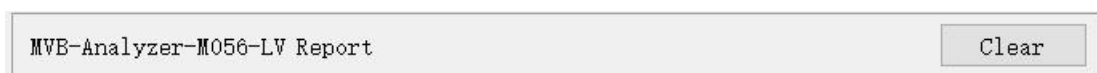


4.5 Statistical Report

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

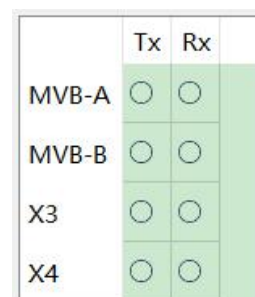
4.5.1 Control Panel

The statistics report is refreshed once per second and the statistics can be cleared by clicking the “Clear” button.



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.

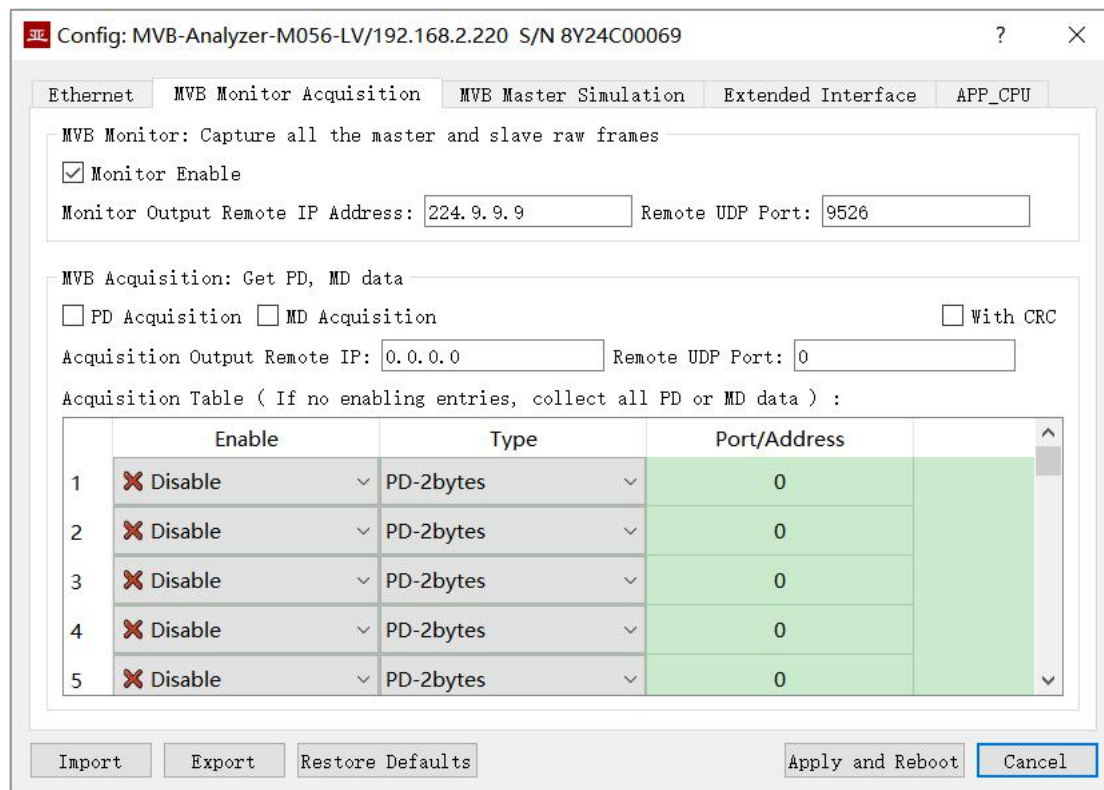
4.5.3 Information Panel

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




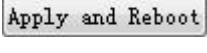
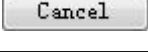
- Device information: Running time, S/N number, version number;
- APP_CPU: Application CPU operation information;
- MVB: MVB interface status information, receive/transmit statistics;
- Extended Interface: Status and receive/transmit statistics of extended interfaces;
- UDP Send: Number of packets sent from MVB and extended Interfaces to UDP;
- UDP Receive: Number of packets received on UDP to MVB and extended Interfaces;
- DMS Service: DMS message receive/transmit statistics.

4.6 Configure Device

Click on 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 following operation buttons are located at the bottom of the dialog:

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

5 Function and Configuration

5.1 Ethernet Configuration

5.1.1 Device alias

Allow users to set aliases for MVB-Analyzer to add descriptions or mnemonic identities to the device.

The screenshot shows a configuration window with several tabs: Ethernet, MVB Monitor, MVB Master Simulation, Extended Interface, and APP_CPU. The 'Device Alias' field is currently empty.

5.1.2 Ethernet Interface Working Mode

Ethernet interface can choose between auto negotiation and forced 100M full-duplex operation modes.

	IP Address	Subnet Mask	Default Gateway	Working Mode
ETH1	192.168.2.220	255.255.255.0	0.0.0.0	Auto Negotiation

The 'Working Mode' dropdown menu is open, showing three options: 'Auto Negotiation', 'Auto Negotiation', and '100M Full-duplex'.

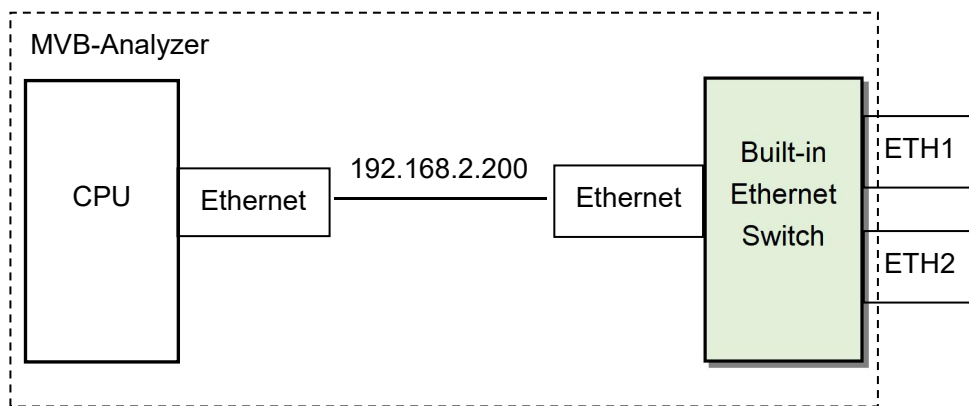
5.1.3 Enable Ethernet Switch

By default, check the “Enable Ethernet switch” checkbox to enable the built-in Ethernet switch, providing the Ethernet switching function between ETH1 and ETH2.

The screenshot shows the 'Enable Ethernet switch' checkbox checked. Below it is a table with the same configuration as in 5.1.2, but the 'Working Mode' is set to 'Auto Negotiation'.

	IP Address	Subnet Mask	Default Gateway	Working Mode
ETH1	192.168.2.220	255.255.255.0	0.0.0.0	Auto Negotiation

While the Ethernet switching function has been enabled, MVB-Analyzer only has one IP address. The network function figure as follows:



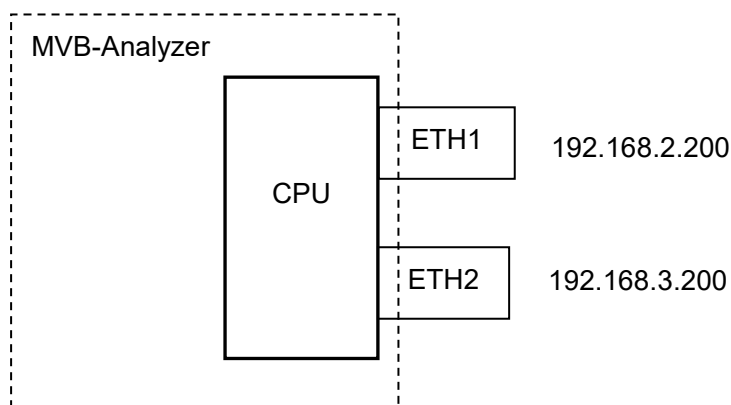
5.1.4 Dual IP Configuration

When the “Enable Ethernet switch” checkbox is unchecked, ensure ETH1 and ETH2 are not on the same subnet for configuration as they have an independent IP address.

Enable Ethernet switch

	IP Address	Subnet Mask	Default Gateway	Working Mode
ETH1	192.168.2.200	255.255.255.0	0.0.0.0	Auto Negotiation ▼
ETH2	192.168.3.200	255.255.255.0	0.0.0.0	Auto Negotiation ▼

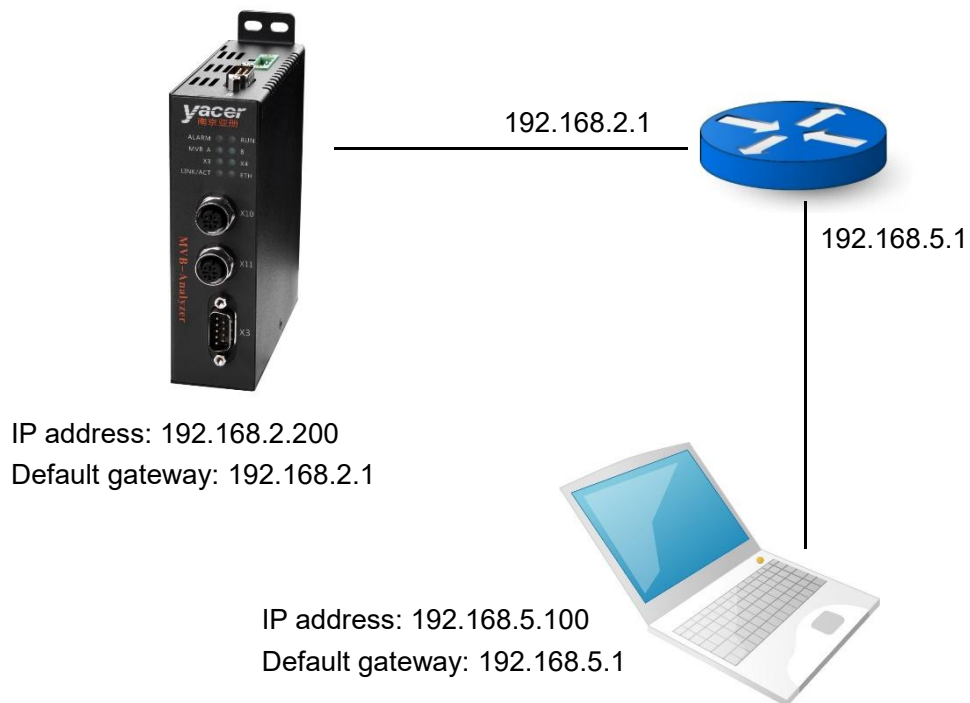
With the dual-IP function figure as follows, the MVB-Analyzer is equivalent to a PC equipped with two network cards.



5.1.5 Default Gateway

By default, the default gateway is 0.0.0.0, representing that there is no gateway configuration. If MVB-Analyzer needs to communicate with the host on other subnet, it must rely on an external router. At this time, the MVB-Analyzer's IP address must be on the same subnet with the IP address of the connected router port. Meanwhile, the IP address of router is set to the default gateway.

As shown below, the IP address of MVB-Analyzer is 192.168.2.200 and the IP address of remote PC is 192.168.5.100 respectively. As they do not belong to the same subnet, they must rely on the router for communication. MVB-Analyzer and computer need to set the IP address of the connected router port to the default gateway of this device.



5.2 MVB Monitor Acquisition Configuration

MVB monitoring includes two parts:

- MVB Monitor: Capture all master and slave raw frames from the MVB bus and send them to the host computer via UDP protocol;
- MVB Acquisition: Capture PD and MD data and send them to the host computer via UDP protocol.

MVB Monitor: Capture all the master and slave raw frames

Monitor Enable

Monitor Output Remote IP Address: Remote UDP Port:

MVB Acquisition: Get PD, MD data

PD Acquisition MD Acquisition With CRC

Acquisition Output Remote IP: Remote UDP Port:

Acquisition Table (If no enabling entries, collect all PD or MD data) :

	Enable	Type	Port/Address
1	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
2	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
3	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
4	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
5	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
6	<input checked="" type="checkbox"/> Disable	PD-2bytes	0
7	<input checked="" type="checkbox"/> Disable	PD-2bytes	0

Users can specify up to 128 acquisition entries through the acquisition table.

If you do not enable any acquisition table entries, i.e., when all table entries of the acquisition list are set to Disable for the above figure, all process and message data on the MVB bus are acquired.

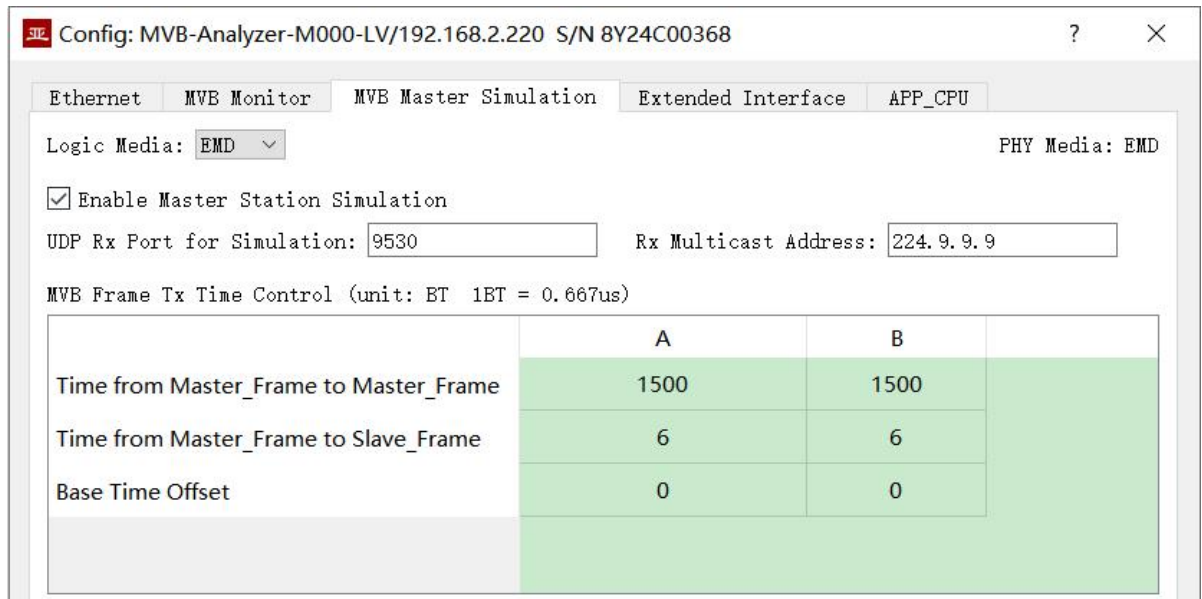
5.3 MVB Master Simulation

To avoid bus conflicts, the MVB master simulation function is turned off when the device is manufactured.

Configure the following parameters, and then use the MVB-Monitor monitoring and analyzing software to achieve the MVB Master Simulation function:

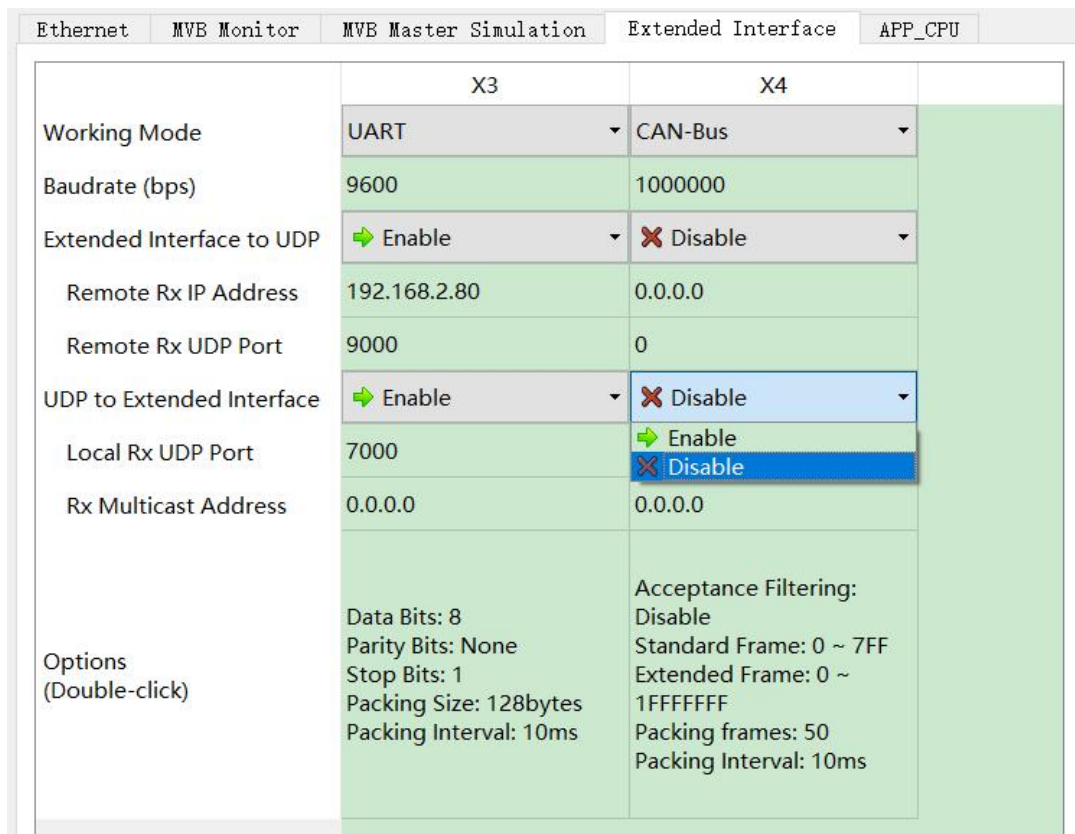
- MVB logical layer media type: configure the media type for sending master and slave frames;
- Allow master simulation checkbox: enable the master simulation function;
- Simulation data reception port and multicast address: configure the reception port and address for receiving simulation data from MVB-Monitor software;

- MVB frame sending time control: configure Tmm, Tms time interval.



5.4 Extended Interface Configuration

Configure the working mode, parameters, baud rate and forwarding relationship with UDP for extended interfaces X3 and X4.



5.4.1 Working Mode

Extended interfaces X3 and X4 can be configured as CAN or serial ports in the factory. When configured as a serial port, it can support a variety of synchronous and asynchronous working modes described in the table below.

Working Mode		Description
Asynchronous	UART	universal asynchronous serial, equivalent to the serial port on the common computer
	UART-PPP	Frame transfer on UART interface using PPP protocol
Synchronous	HDLC-NRZI	Synchronous HDLC protocol based on the NRZI encoding
	HDLC-DBPL	Synchronous HDLC protocol based on the Differential Bi-Phase Level encoding
	HDLC-MAN	Synchronous HDLC protocol based on the Manchester encoding
	HDLC-DiffMAN	Synchronous HDLC protocol based on the differential Manchester encoding formats

Users can select the desired working mode from the “working mode” combo box. Due to different parameter configuration of each working mode, contents of the “Options” cell will be adjusted automatically according to the determined working mode.

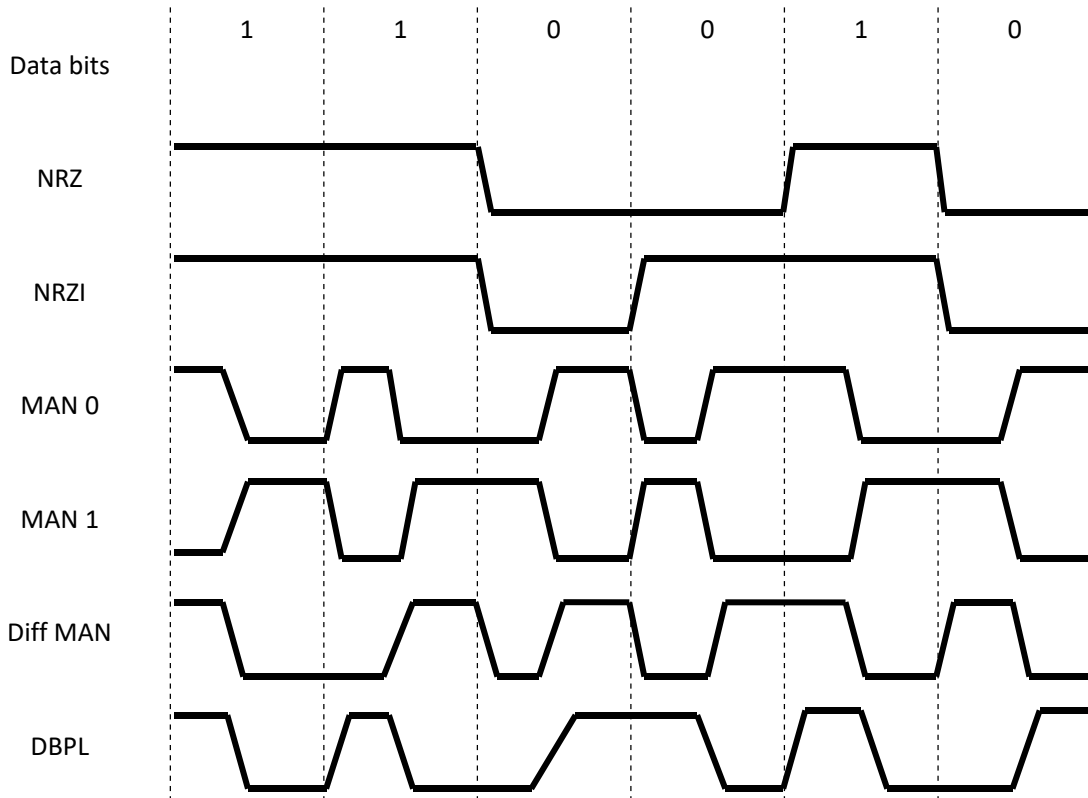
If further configuration of working parameters of the selected working mode is required, mouse double-click on the “Options” cell to pop up the parameter configuration dialog.

5.4.2 Baud rate

No matter which mode the serial port works in, the baud rate of both sides of the communication must be the same to ensure reliable and stable data communication.

5.4.3 Encoding format of the synchronous serial port

For HDLC-NRZI, HDLC-DBPL, HDLC-MAN, HDLC-DiffMAN and other synchronous working modes, the link layer adopts the HDLC protocol with the encoding format difference as follows:



5.4.4 HDLC-NRZI Parameter Configuration

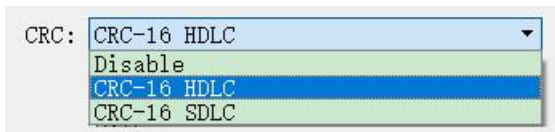
The option dialog of the HDLC-NRZI working mode is shown as follows:

CRC:	CRC-16 HDLC
	<input type="checkbox"/> Forward received FCS field
Preamble Flag:	0x7E
Preamble Number:	3 bytes

5.4.4.1 CRC

To verify the correctness of data communication, CRC functionality should be enabled.

By default, the CRC-16-HDLC check mode should be selected for HDLC communication.



CRC Type	Description
Disable	CRC disabled: <ul style="list-style-type: none"> Send: No CRC calculation, no FCS field for HDLC frame Receive: No CRC verification
CRC-16 HDLC	16-bit ISO HDLC CRC verification
CRC-16 SDLC	16-bit IBM SDLC CRC verification

5.4.4.2 Forward received FCS field

This configuration will only take effect if CRC is enabled.

The HDLC frame structure is shown in the following table, where FCS is the frame check sequence field.

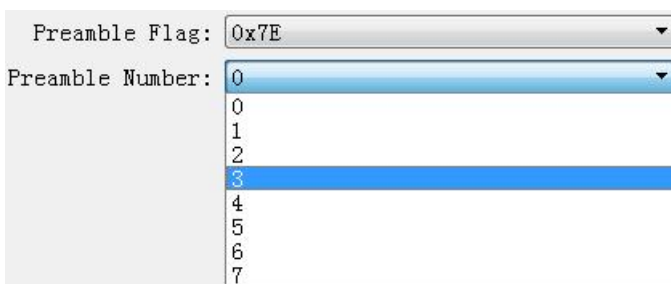
Open Flag	Address Field	Control Field	Information Field	FCS Field	Closing Flag
0x7E	1 byte	1 byte	variable length	CRC 2 bytes	0x7E
0x7E	User data			CRC 2 bytes	0x7E

If this check box is checked, the user data + FCS field is forwarded.

If this check box is unchecked, MVB-Analyzer discards the FCS field of the last 2 bytes of data and forwards only user data after receiving the HDLC frame and performing the CRC checksum.

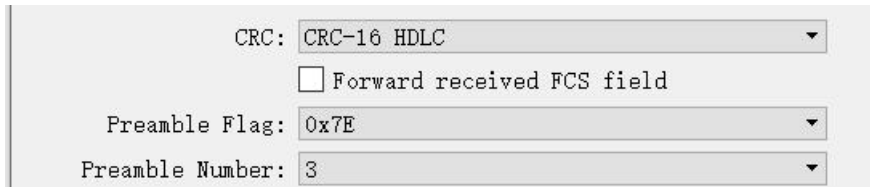
5.4.4.3 Preamble Flag & Number

In half-duplex communication, it is often necessary to add preamble flags in front of the frame for receiver synchronization. The most common is to add 2-5 0x7E flag.



5.4.5 HDLC-DBPL Parameter Configuration

HDLC-DBPL uses the Differential Bi-Phase Level encoding format, and its Options dialog box is shown below:



The screenshot shows the HDLC-DBPL Options dialog box with the following settings:

- CRC: CRC-16 HDLC
- Forward received FCS field
- Preamble Flag: 0x7E
- Preamble Number: 3

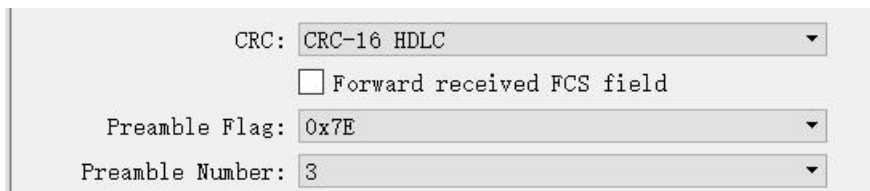
The parameters of HDLC-DBPL have the same meaning as HDLC-NRZI.



It is important to note that many claims that DBPL encoding is in fact differential Manchester encoding, so users need to carefully refer to the definition of the Synchronous Serial Encoding Format chapter to choose the correct working mode.

5.4.6 HDLC-DiffMAN (differential Manchester) Configuration

The Differential Manchester Options dialog box is shown below:



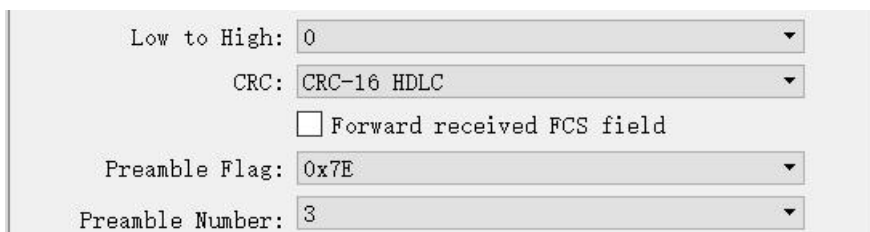
The screenshot shows the HDLC-DiffMAN Options dialog box with the following settings:

- CRC: CRC-16 HDLC
- Forward received FCS field
- Preamble Flag: 0x7E
- Preamble Number: 3

The parameters of HDLC-DiffMAN have the same meaning as HDLC-NRZI.

5.4.7 HDLC-MAN (Manchester) Parameter Configuration

The Manchester Options dialog box is shown below:



The screenshot shows the HDLC-MAN Options dialog box with the following settings:

- Low to High: 0
- CRC: CRC-16 HDLC
- Forward received FCS field
- Preamble Flag: 0x7E
- Preamble Number: 3

In addition to the same configuration parameters as NRZI, the Manchester encoding format has parameters with the meaning of edges with low to high waveforms for data lines:

- 0: Low to high edges represent logical 0;
- 1: Low to high edges represent logic 1.

5.4.8 UART Parameter Configuration

UART is a type of character stream communication. Data bits, parity bits and stop bits define the basic working parameters of the asynchronous serial port, which must be identical to the configuration of opposite device.

Generally, data bits are defined as 8 bits (1 byte), so that UART corresponds to the communication of byte streams.

Data Bits:	<input type="text" value="8"/>	▼
Parity Bits:	<input type="text" value="None"/>	▼
Stop Bits:	<input type="text" value="1"/>	▼
Rx Packing Size:	<input type="text" value="128"/>	bytes
Rx Packing Interval:	<input type="text" value="10"/>	ms

When converting the byte stream of UART into UDP message or HDLC frame, if every byte is converted into a UDP message for transmission, the overhead is too large and the efficiency is too low.

In order to improve the efficiency, MVB-Analyzer will buffer the received byte stream, and then send out a UDP message composed of several buffered bytes. This process is called packing.

Packing is controlled by two parameters, which are called Packing Size & Packing interval.

5.4.8.1 Packing Size

For example, if the Packing Size is set to 128 bytes, then when UART receives 128 bytes, a packet will be formed for forwarding.

Rx Packing Size:	<input type="text" value="128"/>	bytes
------------------	----------------------------------	-------

5.4.8.2 Packing Interval

For example, the above example sets the Packing Interval to 10ms. If the UART does not receive new data after 10ms, the data in the buffer will be forwarded as a packet regardless of whether 128 bytes are received.

Rx Packing Interval:	<input type="text" value="10"/>	ms
----------------------	---------------------------------	----

5.4.9 UART-PPP Parameter Configuration

When the serial port works in the asynchronous UART mode, the serial port sends and receives the character stream without head and tail. In order to transmit a packet, a UART-PPP frame is constructed by adding 0x7E as the start and end marks at the beginning and end of the packet, and inserting a frame check sequence.

Data Bits: 8
Parity Bits: None
Stop Bits: 1
 CRC Enable
 Forward received FCS field

5.4.10 CAN Interface Configuration

X4 can be selected as CAN bus interface in the factory, and the configuration is as follows:

Acceptance Filtering
Standard Frame IDmin: 0 (Hex)
Standard Frame IDmax: 7FF (Hex)
Extended Frame IDmin: 0 (Hex)
Extended Frame IDmax: 1FFFFFFF (Hex)
Rx Packing Frame Number: 50
Rx Packing Interval: 10 ms

Because the CAN frame is very short, if each CAN frame is converted into a UDP message for transmission, the overhead is too large and the efficiency is too low.

In order to improve the efficiency, MVB-Analyzer buffers the received can frames, and then forwards the buffered CAN frames into a packet, which is called packing.

Packing is controlled by two parameters, which are called Packing Frame Number & Packing interval.

5.4.10.1 Packing Frame Number

The maximum Packing Frame Number is 50.

Rx Packing Frame Number: 50

As shown in the figure above, the Packing Frame Number is 50. When MVB-Analyzer receives 50 CAN frames, it is assembled into a data packet for forwarding.

5.4.10.2 Packing Interval

As the example above sets the packet interval to 10 ms, if no new CAN frame is received for more than 10 ms, the CAN frames of the buffer will be combined into a single packet to forward regardless of whether they are full or not.

Rx Packing Interval: ms

5.4.10.3 Acceptance filtering

The acceptance filtering allows users to set the frame ID range that is allowed to be received.

5.5 APP_CPU Configuration

The APP_CPU configuration page enables Ethernet, MVB and extended interface data to be forwarded to the application CPU for processing by the user's secondary development software.

All options should be disabled when the application CPU is not enabled.

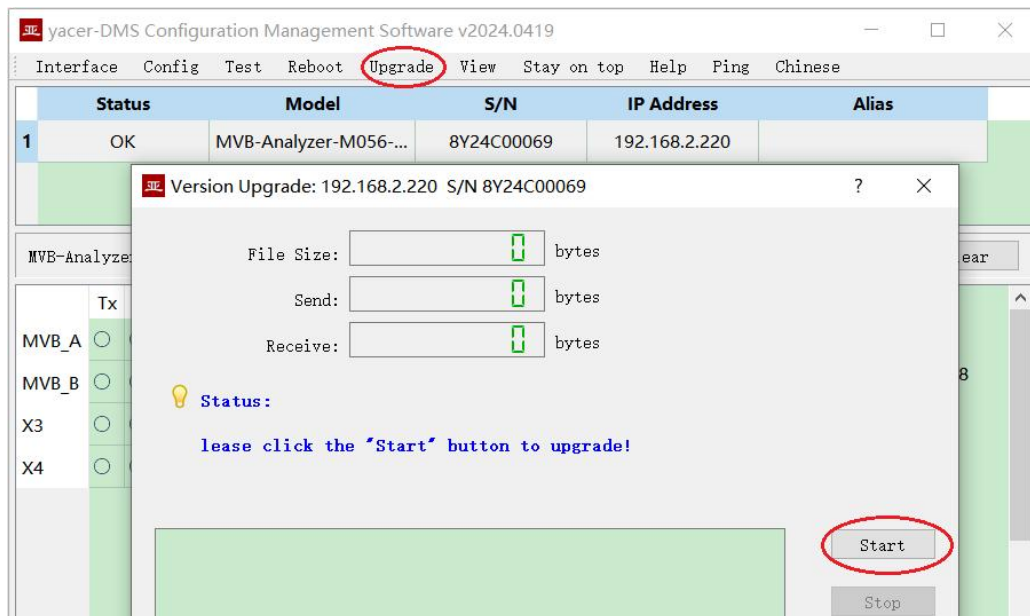
Ethernet	MVB Monitor	MVB Master Simulation	Extended Interface	APP_CPU
APP CPU Receive				
MVB to APP_CPU	➔ Enable	▼		
X3 to APP_CPU	➔ Enable	▼		
X4 to APP_CPU	➔ Enable	▼		
	✖ Disable			
UDP to APP_CPU	➔ Enable	▼		
Rx UDP Port	8000			
Rx Multicast Address	0.0.0.0			

6 System Maintenance

6.1 Firmware Version Upgrade

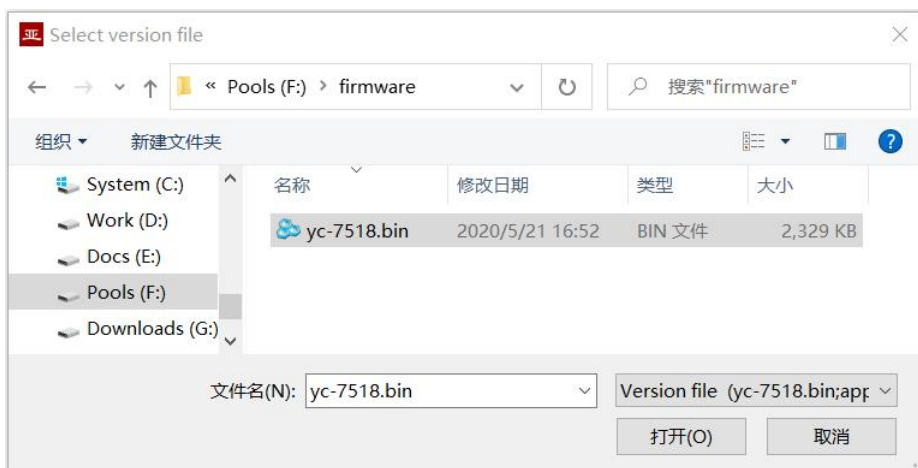
6.1.1 Start Upgrade

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



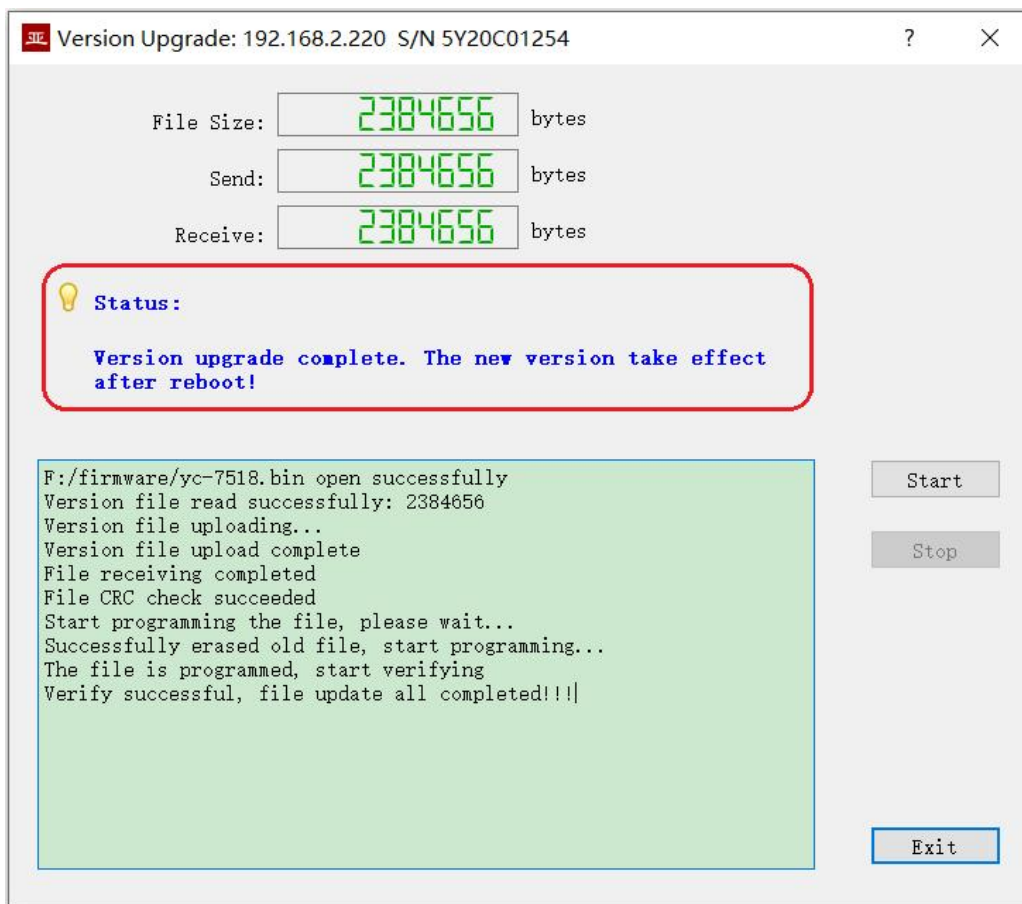
6.1.2 Select Version File

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.



6.1.3 Complete Upgrade

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



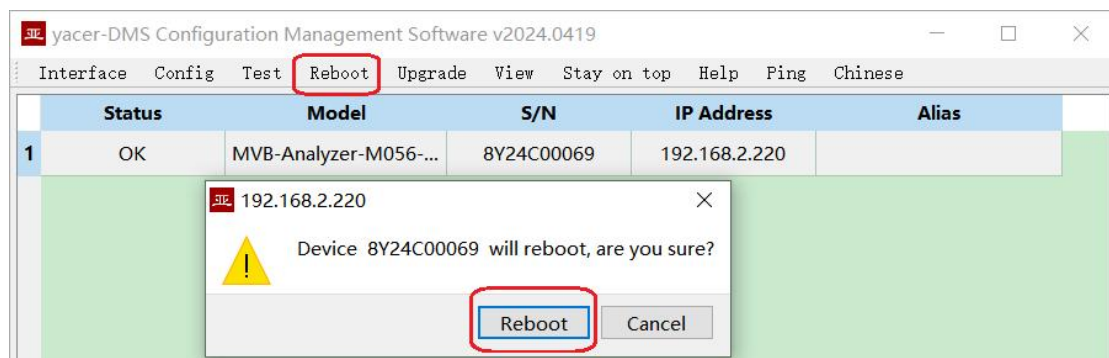
6.1.4 Confirm Upgrade

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.



6.2 Reboot Device

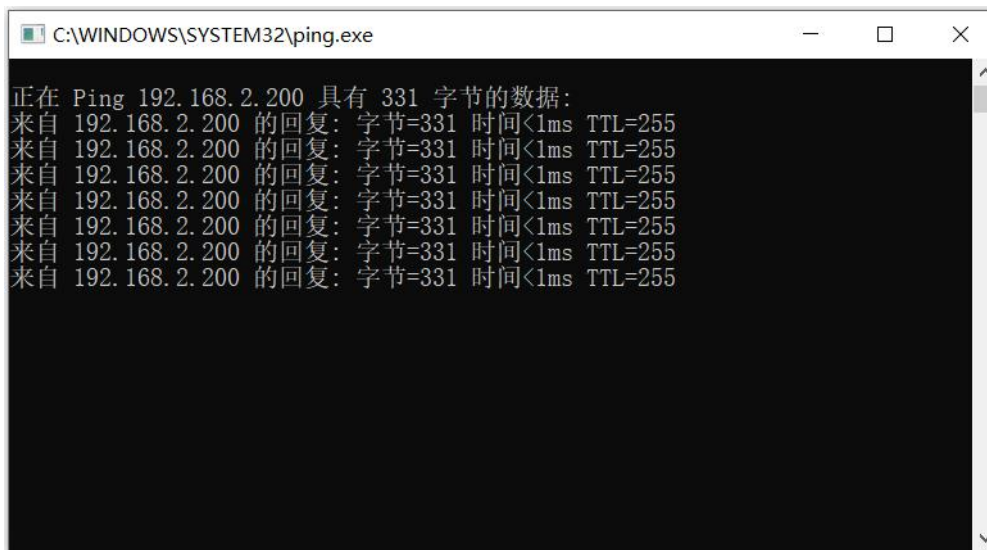
Click the “Reboot” button on the toolbar to pop up the device reboot dialog, and then click the “Reboot” button to reboot the device.



6.3 Ping

By clicking the "Ping" button on the toolbar, DMS automatically starts the ping command on the selected device to check whether the network connection between the configuration management computer and MVB-Analyzer is working properly.

Before executing the Ping command, first make sure that the IP addresses of the computer and MVB-Analyzer are in the same subnet.



```
C:\WINDOWS\SYSTEM32\ping.exe

正在 Ping 192.168.2.200 具有 331 字节的数据:
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
来自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255
```

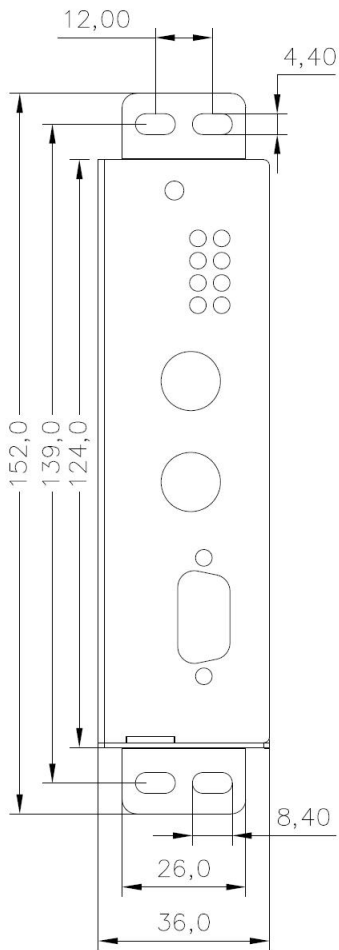
7 Mechanical Characteristics & Installation

The material of the housing shell is stainless steel. The thickness of the sheet metal is 1mm.

Dimensions (Height x Width x depth) : 124 x 36 x 104mm.

MVB-Analyzer can be mounted directly using four M4 Screws.

Mounting hole diameter = 4.4mm.



8 Software Development

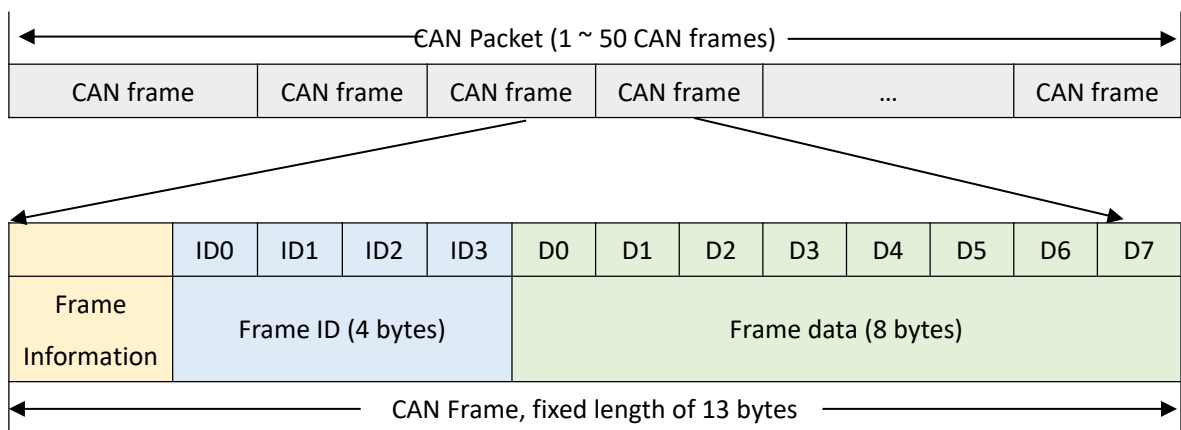
8.1 MVB Data Conversion Format

See *MVB-Analyzer_DataFormat.pdf*.

8.2 CAN Transmission Format in UDP Protocol

8.2.1 Packet Format

CAN packets consist of 1 to 50 CAN frames, each CAN frame has a fixed length of 13 bytes.



8.2.2 Frame Information

Frame information is 1 byte long and its format is defined as follows:

- FF: identification of standard frame and extended frame, 1 for extended frame and 0 for standard frame;
- RTR: identification of remote frame and data frame, 1 for remote frame and 0 for data frame;
- DLC: length of the actual CAN data.

Frame Information	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	FF	RTR	Reserved	Reserved	DLC.3	DLC.2	DLC.1	DLC.0

8.2.3 Frame ID

Frame ID occupies 4 bytes, and the number of ID bits is different for standard frame and extended frame.

Standard frame ID: The standard frame ID is 11 bits, the range of value is 0x000 ~ 0x7FF, and the valid padding is ID.10 ~ ID.0.

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Standard Frame ID 4 bytes	ID0								
	ID1								
	ID2						ID.10	ID.9	ID.8
	ID3	ID.7	ID.6	ID.5	ID.4	ID.3	ID.2	ID.1	ID.0

Extended frame ID: The extended frame ID is 29 bits, the range of value is 0x00000000 ~ 0x1FFFFFFF, and the valid padding is ID.28 ~ ID.0.

		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Extended Frame ID 4 bytes	ID0				ID.28	ID.27	ID.26	ID.25	ID.24
	ID1	ID.23	ID.22	ID.21	ID.20	ID.19	ID.18	ID.17	ID.16
	ID2	ID.15	ID.14	ID.13	ID.12	ID.11	ID.10	ID.9	ID.8
	ID3	ID.7	ID.6	ID.5	ID.4	ID.3	ID.2	ID.1	ID.0

8.2.4 Frame Data

Frame data occupies 8 bytes, the valid data length is 0 ~ 8 bytes, the first byte is the starting byte of the valid data, the valid length is determined by the DLC value in the frame information.

Frame Data	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
8 bytes	Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7

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.