MVB-Analyzer

MVB Protocol Analyzer

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MVB-Analyzer

Datasheet

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Foreword

Notational Conventions

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

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



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1 Overview

1.1 Introduction

The Yacer MVB-Analyzer protocol analyzer provides 1x MVB interface, 2x Ethernet interfaces, and 2x expansion interfaces. It can collect MVB frames, WTB frames, synchronous HDLC frames, CAN frames, and UART serial port data of the train communication bus and send them to the computer through the Ethernet interface.

With the help of the Yacer MVB-Monitor monitoring and analysis software, the MVB bus data can be analyzed and diagnosed, and the MVB master station simulation can be realized to help engineers debug the MVB interface of the equipment and monitor the MVB bus operation.

Industrial wide temperature, perfect isolation protection, small size, suitable for train network communication.



1.2 Applications

- MVB (Multifunction Vehicle Bus) monitoring & analysis
- WTB (Wire Train Bus) monitoring
- HDLC (High-level Data Link Control) protocol diagnostic test
- CAN bus detection
- RS-232/422/485 serial port acquisition test
- MVB, WTB, HDLC, UART, CAN to Ethernet
- Train Communication Network (TCN)
- Development and debugging of train equipment



1.3 Features

- 1x MVB interface, optional ESD+, EMD media
- 2x 100M Ethernet interfaces
- 2x expansion interfaces, optional RS-232, RS-422, RS-485 serial or CAN bus interface
- Serial port supports asynchronous UART, synchronous HDLC protocol
- Easy-to-use MVB-Monitor analysis software
- Open programming interface

1.4 Order Information

MVB-Analyzer -	М	0	5	5	-LV	
MVB physical layer media type:						
• EMD	м					
● ESD+	S					
Protocol Support:						
• UDP		0				
• UDP, HDLC		1				
Extended Interface X3 Definition	on:					
• 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	on:					
• 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 ~ 36	VDC				-LV	
Nominal 36V, 48V, tolerance 18 ~ 75VDC					-MV	
Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC -HV						
MVB D-Sub Bolts:						
M3 Bolts <empty></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 expansion interface: Optional RS-232, RS-422 or RS-485;
- X4 expansion 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	Connector	1 x male D-Sub 9 (X20) + 1 x female D-Sub 9 (X21)	
	Physical media	Optional EMD, ESD+	
Interface	Logical media	Support EMD, ESD	
	Isolation	2.5 kVrms	
	Connector	1 x male D-Sub 9	
Expansion	Optional type	 RS-232 full-duplex serial port RS-422 full-duplex isolated serial port RS-485 half-duplex isolated serial port 	
Interface X3	Working mode	Asynchronous UART Synchronous HDLC protocol (Optional)	
	Baud rate	Synchronous ≤ 6 Mbps Asynchronous ≤ 1.5 Mbps	
	Isolation	2.5 kVrms	
	Connector	1 x male D-Sub 9	
Expansion	Optional type	 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 	
Interface X4	Working mode	Asynchronous UART Synchronous HDLC protocol (Optional)	
	Baud rate	Serial port: Synchronous ≤ 6 Mbps Asynchronous ≤ 1.5 Mbps CAN: 50 Kbps ~ 1 Mbps	
	Isolation	2.5 kVrms	
	Connector	2 x M12 with D-coding	
	Function	Ethernet switching, dual-IP	
Ethernet Interface	Rate	100 Mbps	
	Network protocol	TCP/IP	
	Programming	UDP Server, UDP Client	
	interface	Support Unicast/Multicast/Broadcast	



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



2 Hardware and Physical Interfaces

2.1 Appearance



2.2 LED Indicators

ltem	Description			
RUN	Running indicator, flashing when the device is running normally			
ALARM	Alarm indicator, on when the device is malfunctioning, and off when the device is normal			
MVB A	Line A indicator, blinking once after one frame has been received or transmitted			
MVB B	Line B indicator, blinking once after one frame has been received or transmitted			
X3	Expansion interface X3 indicator, blinking once after data has been received or transmitted			
X4	Expansion interface X4 indicator, blinking once after data has been received or transmitted			
LINK/ACT	Link/ACT indicator of the Ethernet interfaces			



2.3 Ethernet Interfaces ETH1, ETH2 (X10, X11)

2.3.1 Function Description

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

There are two working modes:

- 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



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 expansion serial port, which defaults to asynchronous UART working mode, optionally supports the synchronous HDLC protocol.

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:

DIN	RS-232	RS-422	RS-485
Full-duplex		Full-duplex	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, short pin 8 and 9 to 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 expansion interface. Users can choose between a serial port or a CAN bus interface when placing an order. If a serial port is ordered, one of the following configurations can be selected at the time of factory shipment:

- RS-422: Full-duplex with isolation
- RS-485: Half-duplex with isolation

When configured as a serial port, it defaults to the asynchronous UART working mode and optionally supports 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, short pin 1 and 6 to enable terminal matching with a matching resistance of 120 ohms.

2.6.4 Terminator RS-485

In RS-485 mode, short pin 8 and 9 to 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.

According to different factory configurations, the power input range is shown in the following table:

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

The MVB-Analyzer monitors and collects all the data on the MVB bus through the MVB interface. After converting the data into UDP messages, it sends them to the computer in real time. The MVB-Monitor monitoring and analysis software running on the computer can scan and analyze the received MVB bus data.

The MVB-Monitor software is able to generate master station simulation data, send it to the MVB-Analyzer via Ethernet, and control the analyzer to realize the MVB master station simulation function.



3.2 Get MVB-Monitor Software

Users can obtain the compressed package of the monitoring and analysis software, MVB-Monitor.zip, in the following ways:

- In the "Software Tools" directory of the USB flash drive that comes with the MVB-Analyzer.
- On the software channel of Yacer's official website: <u>https://www.yacer.com.cn</u>.

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.

ıs	Telegran	Device PD	MD	Master Si	nulation		
]Lin	ne_A 🗹 Line	_B Vorking	g Noc	le: Process Process	Data + Devic Data	Status Y Start Simulation	
	Enable	F code	1	Process ort, Device S	Data + Devic Scan	Status Source Port Data (Hex)	^
1	\varTheta Enable 🗸	Device Status	~ '	0 Source H	PD Scan Foode PD Scan Foode	1 2	
2	\varTheta Enable 🗸	PD 2 Bytes	~ .	002 Source H	PD Scan Fcode PD Scan Fcode	= 3	
3	\varTheta Enable 🗸	PD 4 Bytes	~ .	Sink PD 004 Sink PD	Scan Fcode = Scan Fcode =	×	
4	😝 Enable 🗸	PD 8 Bytes	~ .	008	⊖ Sink ~		
5	\varTheta Enable 🗸	PD 16 Bytes	~ '	016	◯ Sink ~		
6	\varTheta Enable 🗸	PD 32 Bytes	~ .	032	⊖ Sink ~		
7	\varTheta Enable 🗸	PD 2 Bytes	~ 2	2002	\varTheta Source 🗸	2 20	
8	\varTheta Enable 🗸	PD 4 Bytes	~ :	2004	Source ~	04 00 ff 02	



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 (<u>www.yacer.com.cn</u>).

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.



프 yace	r-DM	S Configu	iration N	/lanageme	ent Softwar	e v2024	.0419					-		\times
Interf	face	Config	Test	Reboot	Upgrade	View	Stay on	top	Help	Ping	Chinese	To	olbar	
	Stat	us		Model		S/N	N	1	P Addre	255		Alias		
1	Oł	ς	MVB-A	nalyzer-M	1056	8Y24C0	0069	19	2. <mark>168.</mark> 2	.220	Devic	e Lis	st	
MVB-Ana	alyze	r-M056-LV	/ Report										Clea	r
MVB_A MVB_B X3 X4	Tx O O O O O O	Rx 0 0 0 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	 MVB- Ru Ru De Ha APP_C MVB A: B: Exten X3 X4 UDP S M' X3 X4 UDP S UDP G UDP G	Analyzer- inning tim evice S/N: ardware Vi CPU Tx = 0, Rx Tx = 0, Rx ded Interf 8: RS-485 (0 Send VB-Acquis 9-UDP: Tx 1-UDP: Tx PU1-UDP: Tx PU1-UDP: Tx Receive DP-MVB: N DP-X3: Rx	M056-LV II e: 13m 17s 8Y24C000 ersion: 1.2 c = 0 c = 0 cace Clock = 9.6 or UDP: Tx or UDP: Tx ition-UDP: Tx ition-UDP: Tx Tx = 0 Aaster Simu	nformati 69 IP A FPGA \ KHz, Tx z, Tx = 0 = 0 Tx = 0	on ddress: 19 Version: 2 = 0, Rx = , Rx = 0, N 0ata = 0	92.166 021.0 S 0 Norma	8.2.220 309 Fi Statis al, Idle, <i>I</i>	rmware tical Active, 7	Version: 20 Report 75%	024.022	26.7518	^
				OP-X4: Rx OP-CPU1: I Service	= 0 Rx = 0									~

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.

MVB-Analyzer-M056-LV Report

 Tx
 Rx

 MVB-A
 O
 O

 MVB-B
 O
 O

 X3
 O
 O

 X4
 O
 O

Clear

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.

ther	met MVB Monitor Acquisi	tion MVB Master	Simulation	Extended Interface	APP_CPU	
MVB	Monitor: Capture all the m	master and slave ra	w frames			
~ M	Ionitor Enable					
Moni	itor Output Remote IP Addr	ess: 224.9.9.9	Remote	UDP Port: 9526		
				19.		
MVB	Acquisition: Get PD, MD da	ata				
F	D Acquisition 🗌 MD Acquis	sition			🗌 With CRO	.C
Acqu	uisition Output Remote IP:	0. 0. 0. 0	Remote U	DP Port: 0		
Acqu	uisition Table (If no enal	oling entries, coll	ect all PD c	r MD data) :		
	Enable	Туре		Port/Address	1	^
1	🗙 Disable 🗸 🗸	PD-2bytes	~	0		
2	🗙 Disable 🗸 🗸	PD-2bytes	~	0		
3	🗙 Disable 🗸 🗸	PD-2bytes	~	0		
4	🗙 Disable 🗸 🗸	PD-2bytes	~	0		
5	🗙 Disable 🗸 🗸	PD-2bytes	~	0		-
		5				_

The following operation buttons are located at the bottom of the dialog:



Button	Function
Tanant	Open the configuration file, read the configuration parameters refresh the
Import	configuration dialog
Russia	Export configuration parameters from the configuration dialog to a file for
Export	saving
Restore Defaults	Refresh the configuration dialog with the factory paramters
J. J. J. D. J.	Write the configuration parameters in the dialog to the deivce, and restart
Abbia and vepoor	the device to make the configuration take effect
Cancel	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.

Ethernet MVB Monitor MVB Master Simulation Extended Interface APP_CPU
Device Alias:

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 🗸 🗸	
				Auto Negotiation	
				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.

	🗹 Enable E	thernet switch		
	IP Address	Subnet Mask	Default Gateway	Working Mode
ETH1	192.168.2.220	255.255.255.0	0.0.0.0	Auto Negotiation V

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 E	thernet switch			
	IP Address	Subnet Mask	Default Gateway	Working Mode	
ETH1	192.168.2.200	255.255.255.0	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.

/ M	onitor Enable				
oni	tor Output Remote IP Addro	ess: 224.9.9.9	Remote	e UDP Port: 9526	
٧B	Acquisition: Get PD, MD da	ata			
P	D Acquisition 🗌 MD Acqui	sition			🗌 With CR
cqu	isition Output Remote IP:	192.168.2.80	Remote U	DP Port: 1000	
cqu	uisition Table (If no enal	oling entries, colle	ct all PD c	r MD data) :	
	Enable	Туре		Port/Address	
1	🗙 Disable 🗸 🗸	PD-2bytes	~	0	
2	🗙 Disable 🛛 🗸	PD-2bytes	~	0	
2		PD-2bytes	~	0	
3	🗙 Disable 🗸 🗸				
3	X Disable ∨X Disable ∨	PD-2bytes	~	0	
2 3 4 5	 ★ Disable ✓ ★ Disable ✓ ★ Disable ✓ 	PD-2bytes PD-2bytes	~	0	
2 3 4 5 5	 X Disable X Disable X Disable X Disable X Disable 	PD-2bytes PD-2bytes PD-2bytes	~ ~ ~	0 0 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.

Ithernet MVB Monitor MVB Master Simi	ulation Extended Inte	rface APP_CPU		
.ogic Media: EMD 🗸			PHY Media:	EM
ZEnable Master Station Simulation				22
DP Rx Port for Simulation: 9530	Rx Multicast A	Address: 224.9.9	. 9	
WB Frame Tx Time Control (unit: BT 1BT	= 0.667us)			
	Α	В		
Time from Master_Frame to Master_Frame	1500	1500		
Time from Master_Frame to Slave_Frame	6	6		
Base Time Offset	0	0		
Base Time Offset	0	0		

5.4 Extended Interface Configuration

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

Cthernet MVB Monitor	MVB Master Simulation	Extended Interface	APP_CPU
	Х3	X4	
Working Mode	UART	CAN-Bus	-
Baudrate <mark>(</mark> bps)	9600	1000000	
Extended Interface to UDP	🔶 Enable	- 🗙 Disable	•
Remote Rx IP Address	192.168.2.80	0.0.0.0	
Remote Rx UDP Port	9000	0	
UDP to Extended Interface	🔶 Enable	- 🗙 Disable	•
Local Rx UDP Port	7000	Enable Disable	
Rx Multicast Address	0.0.0.0	0.0.0.0	
Options (Double-click)	Data Bits: 8 Parity Bits: None Stop Bits: 1 Packing Size: 128bytes Packing Interval: 10ms	Acceptance Filtering: Disable Standard Frame: 0 ~ 7 Extended Frame: 0 ~ 1FFFFFF Packing frames: 50 Packing Interval: 10ms	FF



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
		universal asynchronous serial, equivalent to the serial
Acupatropous	UART	port on the common computer
Asynomonous	UART-PPP	Frame transfer on UART interface using PPP protocol
	HDLC-NRZI	Synchronous HDLC protocol based on the NRZI
		encoding
	HDLC-DBPL	Synchronous HDLC protocol based on the Differential
Synchronous		Bi-Phase Level encoding
Synchronous		Synchronous HDLC protocol based on the
		Manchester encoding
		Synchronous HDLC protocol based on the differential
HDLC-DIIIMAN		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	•	
	E 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:	CRC-16 HDLC 👻
	Disable
	CRC-16 HDLC
	CRC-16 SDLC

CRC Type	Description
	CRC disabled:
Disable	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.

Preamble Flag:	0x7E	•
Preamble Number:	0	*
	0	
	1	
	2	
	3	
	4	
	15	
	6	
	17	



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:

CRC:	CRC-16 HDLC	-
	E 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:

CRC:	CRC-16 HDLC	•
	E 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

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

The Manchester Options dialog box is shown below:

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:	8	*
Parity Bits:	None	•
Stop Bits:	1	•
Rx Packing Size:	128	bytes
Rx Packing Interval:	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 Siz	:e: 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:	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.

Parity Bits:	None	*
Stop Bits:	1	•
	🗹 CRC Enable	

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: 10 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.

nitor 🛛 MVB Master	Simulation	Extended Interface	APP_CPU
APP CPU Re	eceive		
🜩 Enable	•		
🔶 Enable	-		
 Enable Disable 			
🔶 Enable	•		
8000			
ress 0.0.0.0			
	APP CPU R APP CPU R CPU R C	APP CPU Receive APP CPU Receive Calculation APP CPU Receive Calculation APP CPU Receive Calculation APP CPU Receive APP CPU Receive APP CPU Receive APP CPU Receive APP CPU Receive APP CPU Receive APP CPU Receive APP CPU Receive APP CPU	hitor MVB Master Simulation Extended Interface APP CPU Receive Enable Enable Enable Enable Enable Olisable Ol



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.

Interf	ace	Config	Test	Reboot	Upgrade) View	Stay	on top	Help	Ping	Chinese			
	Statu	IS		Model		S/N	I	1	P Addro	ess		Alias		
1	ОК		MVB-A	nalyzer-N	1056	8Y24C0	0069	19	2.168.2	.220				
		🎩 Vers	ion Upg	rade: 192	.168.2.220) S/N 8Y2	4000	69				?	×	
MVB-Ana	alyze:		Fil	e Size:] 1	ytes						ear
	Тх			Send:) Ŀ	ytes						
MVB_A	0		R	eceive:	-] Ł	ytes						
VB_B	0	9 s	tatus.											8
(3	0		lease click the "Start" button to upgrade!											
X4	0	14												
												Star	t)
													_	

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.



- × T 🎴	« Poo	ols (F:) > firmware	~ ⁽¹⁾		"mware"	
织▼ 新建文件	夹				· ·	6
USystem (C:)	^	名称	修改日期	类型	大小	
		😂 yc-7518.bin	2020/5/21 16:52	BIN 文件	2,329 KB	
Docs (E:)						
Pools (F:)						
Downloads (0)) ,					
	TH4	S(N): vc-7518 bin	~	Version file	(vc-7518.bin;ap)	. ~
	×1+1			1.000 1.00 M 10.00	V 11	

6.1.3 Complete Upgrade

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

version Upgrade: 192.16	58.2.220 S/N 5Y20C0)1254	?	×
File Size:	2384656	bytes		
Send:				
Receive:				
Version upgrade of after reboot! F:/firmware/yc-7518.bin Version file read succes	Star	t		
Version file uploading. Version file upload comp File receiving complete File CRC check succeede Start programming the f Successfully erased old The file is programmed, Verify successful, file	Stor	9		
			Exit	t



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.

```
    MVB-Analyzer-M156 Information
Running time: 36m 45s
Device S/N: 5Y20C01254 IP Address: 192.168.2.220
Hardware Version: 2.0 FPGA Version: 2020.1203 Firmware Version: 2020.1210
```

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	2 <u></u> 2	\times
正来来来来来来来	在 Ping 192.168.2.200 具有 331 字节的数据: 自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255 自 192.168.2.200 的回复: 字节=331 时间<1ms TTL=255		
			\sim

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

Reference: MVB-Analyzer_DataFormat

8.2 MVB Master Simulation

Reference: MVB-Analyzer_Master_Simulation

8.3 CAN Transmission Format in UDP Protocol

Reference: CAN-bus_Programming_Manual



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.