NTP 服务(Server&Client)

测试报告

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Ⅰ 版本记录

Version	DATE	EDIT
1.0	2023-7-14	赵智

Table 1: 版本记录

Ⅱ 分配

Name	Company, department	number	EDIT

Table 2: 分配

Ⅲ 安全提示说明

本软件的安全使用说明如下:

SafetyNotice	description			
危险!	无视安全准则使用本产品可能危及生命!			
警告!	无视安全准则使用本产品可能造成重大人身伤害和重大财产损失!			
注意!	无视安全准则使用本产品可能造成人身伤害和财产损失!			
提示:	防止产生故障必须注意的信息			

Table 3: 安全提示说明

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1 PLC 作 NTP 客户端测试

1.1 测试条件

使用 PLC 作为 NTP 的客户端,使用 Windows 系统的 PC 作为 NTP 服务器,具体硬件及软件版本如下:

1.1.1 PLC

测试硬件: X20CP1381 AS版本: AS V4.10.2.37 Runtime版本: B4.82

1.1.2 Windows:

Edition Windows 10 Enterprise

Version 22H2

Installed on 2021/3/25

OS build 19045.2965

Experience Windows Feature Experience Pack 1000.19041.1000.0

1.2 测试内容

1.2.1 Windows 设置 NTP Server

1.2.1.1 方法 1

在 Run 中输入 gpedit.msc

🖅 Run	×
	Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
<u>O</u> pen:	gpedit.msc ~
	OK Cancel <u>B</u> rowse

在打开的Local Group Policy Editor 窗口中, 找到Computer Configuration-Administrative Templates-System-Windows Time Service

File Action Vice Help Image: Action Vice Help <t< th=""><th>Local Group Policy Editor</th><th>– 🗆 X</th></t<>	Local Group Policy Editor	– 🗆 X					
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Crended \Standard / Isetting(s) TJ开 Global Configuration Settings,按下图设置 Global Configuration Settings Previous Setting Not Configured Comment Otex Setting Not Configured Disabled Supported on: At least Windows Server 2003 operating systems or Windows XP Professional Options: Help: This policy setting allows you to specify Clock discipline and General Parameters InnounceFlags CocalClockDispersion MaxPollInterval To	 PIN Complexity Power Management Remote Assistance Remote Procedure Call Removable Storage Access Scripts Service Control Manager Service Control Manager S Shutdown Shutdown Shutdown Options Storage Health Storage Health Storage Health Storage Health Storage Sense System Restore Troubleshooting and Diagi Troubleshooting module 5 User Profiles Windows Time Service Windows Components Mundows Components User Configuration 	Setting State Comment					
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Options: Help: UpdateInterval 100 Image: This policy setting allows you to specify Clock discipline and General values for the Windows Time service (W32time) for domain controllers including RODCs. General Parameters Image: This policy setting is enabled, W32time Service on target machines use the settings provided here. Otherwise, the service on target machines use the settings provided here. Otherwise, the service on target machines use the settings provided here. Otherwise, the service on target machines use the settings provided here. Otherwise, the service on target machines use the settings provided here. Otherwise, the service on target machines use the settings provided here. Otherwise, the service on target machines use the settings of lags, see on target machines use the settings of lags, see https://go.microsoft.com/fwlink/?linkid=847809. MaxPollInterval Image: This parameter controls the rate at which the W32time corrects the local clock's frequency. Lower values cause slower corrections. Default: 4 (scalar). Original Clock bigerial HoldPeriod This parameter indicates how many consistent time samples the client computer must receive in a series before subsequent time.	Global Configuration Settings Global Configuration Settings ONot Configured O Disabled Supported on: At least Windows:	Previous Setting Next Setting					
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OK Canada Analy	UpdateInterval 100 General Parameters AnnounceFlags 5 EventLogFlags 2 LocalClockDispersion 0 MaxPollInterval 10 MinPollInterval 6 ClockHoldoverPeriod 7800 RequireSecureTimeSyncRequests 0	This policy setting allows you to specify Clock discipline and General values for the Windows Time service (W32time) for tomain controllers including RODCs. If this policy setting is enabled, W32time Service on target machines use the settings provided here. Otherwise, the service on target machines use locally configured settings values. For more details on individual parameters, combinations of parameter values as well as definitions of flags, see https://go.microsoft.com/fwlink/?linkid=847809. FrequencyCorrectRate This parameter controls the rate at which the W32time corrects he local clock's frequency. Lower values cause slower corrections; larger values cause more frequent corrections. Default: 4 (scalar). HoldPeriod This parameter indicates how many consistent time samples the client computer must receive in a series before subsequent time					

在 Time Providers 中打开 Enable Windows NTP Server 配置,设置为 Enable

Local Group Policy	/ Editor						-		×
File Action View	Help								
Pint Pow Recc Rem Rem Scrip Scrip	Complexity A er Management overy ote Assistance ote Procedure Call ovable Storage Access ots	Select an item	oviders to view its descriptio	on. Setting E Configure W E Enable Wind E Enable Wind	indows NTP Client ows NTP Client ows NTP Server	State Not configured Not configured Not configured	Comme No No No	ent	
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	Enable Windows I	NTP Server		Previous	Setting Next Settin	19			
	 Not Configured Enabled Disabled 	Comment: Supported on:	At least Windows	Server 2003 operating	systems or Windows XP	Professional			
	Options:		н	elp:		∨			
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					OK Car	cel Apply]		
设置电周	」 面的 IP 地址:	:							

Property	Value					
Connection-specific DN						
Description	Intel(R) Ethernet Connection (4) I219-LM					
Physical Address	E4-B9-7A-66-4E-73					
DHCP Enabled	No					
IPv4 Address	192.168.0.110					
IPv4 Subnet Mask	255.255.255.0					
IPv4 Default Gateway						
IPv4 DNS Server						
IPv4 WINS Server						
NetBIOS over Tcpip En	Yes					
<	>					

1.2.1.2 方法 2

🖅 Run	×
	Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
<u>O</u> pen:	regedit ~
	OK Cancel <u>B</u> rowse

 $\label{eq:computer_HKEY_LOCAL_MACHINE SYSTEM \currentControlSet \services \weightarrow \configuration \services \services \weightarrow \services \services$



Edit DWORD (32-bit) Value	×
Value name: AnnounceFlags	
Value data:	Base Hexadecimal
	OK Cancel

Comput-

 $er\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NtpServer$

🞬 Registry Editor			– 🗆 X
File Edit View Favorites Help			
Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet	\Servic	es\W32Time\TimeProviders\NtpServer	
Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet volume volume vyci vsmraid VSS VST VSTRAID vwifibus vwififlt W32Time Parameters SecureTimeLimits SecureTimeLimits NtpClient NtpServer VVIICTIMEProvider		WW32Time\TimeProviders\NtpServer Name AllowNonstandardModeCombinations ChainDisable ChainEntryTimeout ChainLoggingRate ChainMaxEntries ChainMaxHostEntries DIINAme Enabled EventLogFlags InputProvider RequireSecureTimeSyncRequests	Type REG_SZ REG_DWORD REG_DWORD REG_DWORD REG_DWORD REG_DWORD REG_EXPAND_SZ REG_DWORD REG_DWORD REG_DWORD REG_DWORD
 TriggerInfo WaaSMedicSvc WacomPen WalletService wanarp wanarpv6 WarpJITSvc 			
Maure Cur Cur	>	<	>

Edit DWORD (32-bit) Value	×
Value name: Enabled	
Value data:	Base Hexadecimal Decimal
	OK Cancel

以管理员身份运行命令窗口



输入命令 w32tm /stripchart /computer:127.0.0.1,有时间回显说明配置成功了。(注意 空格)

🔤 Administrator: Command Prompt			_	×
Microsoft Windows [Version 10.0.19045.2965] (c) Microsoft Corporation. All rights reserved.				^
C:\\INDOWS\system32>net stop w32time The Windows Time service is stopping. The Windows Time service was stopped successfully.				
C:\\INDOWS\system32>net start w32time The Windows Time service is starting. The Windows Time service was started successfully.				
C:\WINDOWS\system32>w32tm /stripchart /computer:127.0.0.1 Tracking 127.0.0.1 [127.0.0.1:123].				
The current time is 2023/7/14 14:44:07. 14:44:07, d:+00.0005106s o:+00.0001852s [14:44:09, d:+00.0003317s o:+00.0001228s [C	* *]		
C:\WINDOWS\system32>				
				~

1.2.2 PLC 设置

PLC 设置如下:

🎉 C:\Users\zhaoz\Desktop\NTPTest\NTPTe	t.apj/CP1381 - Automation Studio V 4.10.2.37 # AS Single Com	puter License		-				
File Edit View Insert Open Project	t Debug Source Control Online Tools Window Help	0						
	- 🐟 👶 🖓 🔱 🏠 👌 🖄 🐟 🛛) 🕘 🤳 🛗 🛗 👗 📢	₩ ∰ 🖉 🖗	s 🔏 😃 📲 🗐 🖓 🖏 🖏 🕼 🐘 👘	ê (🥿			
hysical View 🗸 🔻 🛷 🕯		P1381 [Configuration]* x	(20CP1381.IF2 [C	Configuration]	-			
2 🖉 😫 🗞 🗟 🖉 🚛 🛐	1 V V V V V V V V V V V V V V V V V V V							
lame L. Na	me	Value	Unit	Description	^			
E 🛷 X20CP1381	. 10 X20CP1381	value	Onic	Descipion				
Serial	Configuration ID	NTPTest CP1381		Unique configuration ID Required form	nat S			
ETH	Configuration version	100		Configuration version for conditional in	stall			
	Module system on target	1.0.0		consguration voloion for contaitorian	oton.			
⊷ USB	⊕ M Simulation							
🖕 X1	Memory configuration							
🖕 X2	⊕ Martin System							
🦕 X3	🖶 🚰 Reboot							
	🖶 🚰 Communication							
L	🖶 🚰 Timing							
,	🖶 🚰 Resources							
	🔃 🚰 File devices							
	🖕 🚰 Time synchronization							
	🛶 📦 Time zone	(GMT +08:00) Beijing						
	Adjust clock for daylight saving	off						
	⊡ In International Internatio	_						
	Activate NTP server	off						
	Activate NTP client	on						
	B- Server into	100 100 0 110		ID a data an an bantanana				
	NIP Server I	192.168.0.110		IP address or host name				
	NTP Server 2			IP address or host name				
	NTP Server 3			IP address or host name				
>	Internet file system			IF address of nosthame	~			
🖌 Logical 🧬 Physica 🦂 Config <	TT" La DUCTUELUE AVAICUI				>			
orts the "hw" elements ascending by their nar	ne A	ANSL: tcpip/COMT=2500 /DAIP=19	2.168.0.10 /REP	O=11159 /ANSL=1 /PT=11169 X20CP1381 D4.83	RUN			

1.2.3 关闭 Windows 防火墙

1.2.3.1 正常关闭方式



P Customize Settings			_	×
← → • ↑	Search Co	ntrol Panel	Ą	
	Customize settings for each type of network			
	You can modify the firewall settings for each type of network that you use.			
	() For your security, some settings are managed by your system administrator.			
	Domain network settings		1	
	🔿 🔿 Turn on Windows Defender Firewall			
	Block all incoming connections, including those in the list of allowed apps			
	Notify me when Windows Defender Firewall blocks a new app			
	Turn off Windows Defender Firewall (not recommended)			
	Private network settings			
	Turn on Windows Defender Firewall			
	Block all incoming connections, including those in the list of allowed apps			
	Notify me when Windows Defender Firewall blocks a new app			
	Turn off Windows Defender Firewall (not recommended)			
	Public network settings			
	Turn on Windows Defender Firewall			
	Block all incoming connections, including those in the list of allowed apps			
	Notify me when Windows Defender Firewall blocks a new app			
	🗙 🛛 Turn off Windows Defender Firewall (not recommended)			
	•			
	ОК	Cancel		

有些公司电脑因为安全需要,不能关闭防火墙,可以参考下述方法。

1.2.3.2 防火墙开全端口

		curity > Windows Defender Firew	all 1					~ 0	
troi Panel Hores	Help protect y	your PC with Windows Def	ender Firewall						
ww.Panermonie	Windows Defend	P Windows Defender Firewall wi	th Advanced Security			- 0 ×			
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ibleshoot my network			Acronis Media Builder Acronis Mobile Backup Server	All Yes All Yes	Allow V Filter by State				
	Dom 😵		Acronis Mobile Backup Status Server	All Yes	Allow View	•			
	📕 💙 Priva		Acronis System Report	All Yes	Allow G Refresh				
	Networks at hor		Acronis True Image 2020 Allin	All Yes All Yes	Allow R Help				
	Windows Defen		G Allow EDP	Domain Yes	Allow				
	Incoming conne		G APlayer	All Yes	Allow				
	Active private ne		G ar000	Private Yes Private Yes	Block				
	Notification stat		G ar000	Private Yes Private Yes	Allow				
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🔗 New Inbound Rule Wizard	l i i i i i i i i i i i i i i i i i i i	×
Protocol and Ports		
Specify the protocols and ports to	which this rule applies.	
Steps:		
Rule Type	Does this rule apply to TCP or UDP?	
Protocol and Ports	<u> І</u> СР	
 Action 	<u>U</u> DP	
Profile		
• Name	Does this rule apply to all local ports or specific local ports? All local ports Specific local ports: Example: 80, 443, 5000-5010	
	< <u>B</u> ack <u>N</u> ext	> Cancel

Action											
Specify the action to be taken wh	en a connection matches the conditions specified in the rule.										
Steps:											
Rule Type	What action should be taken when a connection matches the specified conditions?										
Protocol and Ports	Allow the connection										
Action	This includes connections that are protected with IPsec as well as those are not.										
Profile	○ Allow the connection if it is secure										
Name	This includes only connections that have been authenticated by using IPsec. Connections will be secured using the settings in IPsec properties and rules in the Connection Security Rule node. Customize Block the connection										

<u>.</u>	New Inbound Rule Wizard		×								
D	rofile										
Spe	ecify the profiles for which this n	e applies.									
Ste	eps:										
,	Rule Type	When does this rule apply?									
,	Protocol and Ports										
	Action	✓ Domain									
	Profile	Applies when a computer is connected to its corporate domain.									
	Name	 Private Applies when a computer is connected to a private network location, such as a home or work place. Public Applies when a computer is connected to a public network location. 									
	Pew Inbound Rule Wiza	< <u>B</u> ack <u>N</u> ext > Cancel	<								
	Specify the name and description	of this rule.									
	Steps:										
	Rule Type										
	Protocol and Ports										
	Action										
	Profile	Name: all-TCP									
	Name										
		Description (optional):									
		c Back Finish Cancel									

同理 UDP - ALL

Protocol and Ports Specify the protocols and ports to which this rule applies. Steps: Does this rule apply to TCP or UDP? Protocol and Ports ICP Action IDP Profile Does this rule apply to all local ports or specific local ports? IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports or specific local ports? IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis rule apply to all local ports IDDE sthis rule apply to all local ports IDE sthis r	P New Inbound Rule Wizard									
Specify the protocols and posts to which this rule apples. Steps: Does this rule apply to TCP or UDP? Protocol and Ports ICP Action UDP Profile Does this rule apply to all local ports or specific local ports? Image: All local ports Specific local ports: Specific local ports Example: 80, 443, 5000-5010	Protocol and Ports									
Steps: Does this rule apply to TCP or UDP? Protocol and Ports ICP Action UDP Profile Does this rule apply to all local ports or specific local ports? Image: Ima	Specify the protocols and ports	to which this rule applies.								
 Rule Type Protocol and Ports Action Profile Name Does this rule apply to all local ports or specific local ports? All local ports Specific local ports: Example: 80, 443, 5000-5010 	Steps:									
Protocol and Ports Action Profile Name Does this rule apply to all local ports or specific local ports?	Rule Type	Does this rule apply to TCP or U	DP?							
 Action Profile Name Does this rule apply to all local ports or specific local ports? All local ports Specific local ports: Example: 80, 443, 5000-5010 	Protocol and Ports	<u>о т</u> ср								
Profile Name Does this rule apply to all local ports or specific local ports?	Action	① <u>U</u> DP ③ ③ ① □								
Name Does this rule apply to all local ports or specific local ports?	Profile									
All local ports Specific local ports: Example: 80, 443, 5000-5010	Name	Does this rule apply to all local p	orts or specific local ports?							
Specific local ports: Example: 80, 443, 5000-5010		All local ports								
Example: 80, 443, 5000-5010		 Specific local ports; 								
(Back Next) Cancel		· _ ·	Example: 80, 443, 5000-5010							
(Back Next) Cancel										
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(Back Next > Cannol										
C Back Next Cancel										
			< <u>B</u> ack <u>N</u> ext > Cancel	1						

出站规则同理

最后检查配置

是否 TCP/UDP 均允许全部端口/全部网络 出/入站

Windows Defender Firewall with File Action Yiew Help File Action Yiew Help Windows Defender Firewall with Stribbond Fuller	h Advanced Security	A																Ac	⊡ ×
Monotoring Monotoring	Name	Profile	Enabled	Action	Override	Program	Local Ad	Remote Ad	Protocol	Local Port	Remote Port	Authorized Users	Authoriz	Authorized Local Pri-	Local User Owner	PolicyAppId	Application Package	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	bound Rules New Rule Filter by Pr Filter by Sta Filter by Gr Filter by Gr Refresh Export List Help Rected Items
	🕑 all-TCP	All	Yes	Allow	No	Any	Any	Any	тср	Any	Any	Any	Any	Any	Any	None	Any	•	Disable Rule
	()=-1.00	<u>A</u> 3	Ves	Allow	No	Any	Any	λαγ	UDP	Any	Any	<u>Any</u>	Any	Avy	Any	None	, kny	*	Cut Copy Defee Help
< >>		61	115	Allow	NO	Drittig tem	any	Ally		Any	жлу	Pilly	BIY	Any	Ally	NOR	Rity	v	

Defender Firewall with	Outbound Rules																Act
und Rules	Name	Gr Profile	Enabled	Action	Override	Program	Local Address	Remote Addr	Protocol	Local Port	Remote Port	Authorized Co	Authorized L.	Local User Owner	PolicyAppId	Applicatio	^ Out
ring	S all-TCP	All	Yes	Allow	No	Any	Any	Any	TCP	Any	Any	Any	Any	Any	None	Any	7
																	7
																	A
																	2
																	50
																	4
																	11-

注意:以上为测试允许全部全协议/全端口开放过墙,实际上 NTP 服务为 123 端口,协 议为 UDP。按需调整即可。

1.2.4 测试结果

更改 windows 系统时间:

💣 Date and Time Settings	×
Set the date and time:	
Date:	Time:
◆ 2023年7月 → 一 二 三 四 五 六 日 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6	15:00:03
Change calendar settings	OK Cancel

通过 online info 或者 SDM 可以看到 PLC 的时间在短暂等待后会自动同步于 windows 时间:



2 PLC 作 NTP 服务器测试

在做 PLC 作为 NTP 服务器的测试时,客户端也同样使用一台贝加莱 PLC,这样可以避免 因为公司 PC 的操作系统影响测试的顺利进行。

2.1 测试条件

2.1.1 NTP 客户端

PLC 型号: X20CP1586 AS 版本: AS V4.10.2.37 Runtime 版本: B4.91 IP 地址: 102.168.0.11

2.1.2 NTP 服务器

PLC 型号: X20CP1381 AS 版本: AS V4.10.2.37 Runtime 版本: B4.82 IP 地址: 102.168.0.10

2.2 测试内容

2.2.1 NTP 客户端配置

Nama	Value	Linit	Description
E X20CP1586	Value	Onit	Description
Configuration ID	client Config1		Unique configuration ID. Required format. Spaces at the beginning or end of the strin
Configuration version	1.0.0		Configuration version for conditional install. Required format: X.Y.Z where X, Y, Z are
Module system on target			
Memory configuration			
🗄 🚰 System			
🖶 🚰 Reboot			
🖶 🚰 Communication			
🖶 🚰 Timing			
🖶 🚰 Resources			
🗄 😁 🚰 File devices			
🖕 🚰 Time synchronization			
🛶 🖉 Time zone	(GMT +08:00) Beijing, Chongqing, Ho		
Adjust clock for daylight saving	off		
ė−, 🚰 NTP			
Activate NTP server	off		
🗄 📲 Activate NTP client	on		
id—, ∰ Server info			
NTP Server 1	192.168.0.10		IP address or host name
NTP Server 2			IP address or host name
NTP Server 3			IP address or host name
NTP Server 4			IP address or host name
🗊 👘 Internet file system			
🗄 😁 🚰 Ethernet parameters			
🕀 😁 DNS parameters			
🕀 📩 Online parameters			
🕂 🚰 FTP Server			
🖶 🚰 TFTP Server			
🛱 Minimally supported hardware			
`			

2.2.2 NTP 服务器配置

Name	Value	Unit	Description	^
E 18 X20CP1381				
Configuration ID	NTPTest_CP1381		Unique configuration ID. Required format. Spaces at the beginning or end of the strir	
Gonfiguration version	1.0.0		Configuration version for conditional install. Required format: X.Y.Z where X, Y, Z are	
🖶 🚰 Module system on target				
🗄 🔠 Simulation				
🗄 🖷 🚰 Memory configuration				
🗄 🚰 System				
🖶 🚰 Reboot				
🖶 🚰 Communication				
🖶 🚰 Timing				
🖶 🚰 Resources				
🖶 🚰 File devices				
🗧 🚰 🛛 I ime synchronization				
🕂 🖗 Time zone	(GMT +08:00) Beijing, Chongqing, Ho			
 Adjust clock for daylight saving 	off			
id-,i∰ NTP				
Activate NTP server	on			
Stratum of local clock	14		local clock is used as fallback reference clock, if the configured NTP servers are ur	
🗄 🖷 🚰 Activate NTP client	off			
🗊 😁 Internet file system		-		
🖶 🚰 Ethernet parameters				
DNS parameters				
🕂 🚰 Online parameters				
🕂 🚰 FTP Server				
🖶 🚰 TFTP Server				
🖶 🚰 Additionally supported hardware				
🖶 🚰 Web Server				
System diagnostics				
🖶 🚰 DTM Server				
🗰 🏁 OPC-LIA System			2	1

2.2.3 测试结果

先将两台 PLC 的以太网接在同一网络,修改作为 NTP 服务器的 PLC 的时间,等待一段时间后,客户端 PLC 的时间自动与服务器同步,可以在 Online info 中查看控制的时间。

Conline Info	Kara CE (LID) Date /Time	>
Local Date/Time		Get from Target Date: 2023年7月3日
	15:37:37	Тіте: 6:37:30 ОК

3 客户使用方式

客户现场使用 NTP 的方式是, IT 部门的服务器作为 NTP 的 Server, 贝加莱 PLC 作为 Client 同步 IT 时间,同时该 PLC 作为 NTP 的 Server 给现场智能电表等设备提供时间;并 且这台 PLC 使用 IF2 与 IT 服务器连接,使用 IF3 作以太网通讯与现场设备连接。

为模拟这种应用场景,在办公室使用两套 PLC 测试,拓扑图如下:



经过测试,这种结构两台 PLC 都能正确同步到电脑的时间。