### 倍福 EL6632 与西门子 S120 控制器通讯

#### 概述

本文件主要测试 EL6632 模块与西门子 S120 控制器的 ProfiNet 通讯。

测试设备:EL6632,计算机,西门子 S120 控制器,西门子书本型模块若干(由于本文主要介绍 EL6632 的通 讯,其他部分不一一概述。)

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测试步骤:

- 1、 将西门子 S120 控制器的 CF 卡下的文件路径:SIEMENS\SINAMICS\DATA\CFG 下的 CBE20GSD.ZIP 文 件拷贝出来并解压,然后将解压的文件放至倍福安装文件夹下面:TwinCAT\3.1\Config\lo\Profinet。 然后重新打开 TwinCAT 软件,此时软件会自动加载 xml 文件;
- 2、 在 TwinCAT 软件里面建立一个项目,然后鼠标右击 I/O 下的 Device,点击扫描(Scan),弹出对话框选择是,会将 EK1100 下的模块全部都扫描上来,确认 EL6632 模块是否挂在 EK1100 上,如果扫描不到任何模块,请检查网卡的驱动是否安装到位。如下图所示:



扫描 EtherCAT 从站

3、 再次点击 Device,鼠标右击,选择"Add New Item",添加 ProfiNet Device,如下图所示:



添加 Profinet I/O 控制器

4、 添加 Profinet EL6632(RT+IRT)后, 需要对 Profinet EL6322(RT+IRT)进行配置, 先设定适配器, 再设定 其他项。如下图所示:

\$120_One + × M	AIN	
General Adapter ]	PROFINET   Sync Task   Settings   Box States   Diag Histor	ry Diagnosis
💿 Network Adap	ter (INTE) PET DEPAN	
Description:		/ 点击"Search"按
Device Name:	Term 14 (EL6632)	知 <sup>抽索</sup> Drofingt 协
PCI Bus/Slot: MAC Address	Search	田, 按系FIOIIIEt 疘
IP Address:	192. 168. 1. 1 (255. 255. 255. 0)	制器MAC地址。
	🔲 Promiscuous Mode (use with Wireshalk onl 🔲 Virtual Device Names	
🖉 🔘 Adapter Refer	rence	
Adapter:		空武者全部是0 此时
Freerun Cycle	4	
		<b>闻佣以网线蚁</b> 有网下驰
		动是否有问题

ProfiNet 适配器设置

接着设置 Profinet 项下的参数,并扫描 Profinet 设备,请将 TwinCAT 软件处于 Configuration (配置)模式下,请切记这一点。如下图:

S120_One 🕫 🗙 MAIN		
General Adapter PROFINET Sync Task Se	ettings Box States Diag Histor	y Diagnosis
Protocol AMS NetId: 192.168.11.100.2.1	Port Settings	
Protocol AMS 65535	Scan PMIO Devices	
Server AMS NetId: 192.168.11.100.1.1	Topology	模式下,点击此按钮,开
Server AMS PortNr.: 851	IRT Config	始扫描ProfiNet设备
PN SW Version:		
Scan Devices		
Transferrary Learning II	as ano ann	
s120 0x40 0xec 0xf8	PAL 9 192,168, 1,22 255,255,255, 0	Hescan Devices
		Add Devices
		此你是云扫描到的ProfiNet
修改ProfiNatiG冬		
is converted		设备。
▲ 站名, 注意设备的	引P地址站名	×
Stationnane s120 必须和实际设备的	的IP地址和站	
。 名一致,否则永远	远连接不通	Set Stationname Search Error L
IP address 192 168 1 2	2	Set IP configuration
		Start Flash
Subner 200 . 200 . 205 . 0		Beset to factory settings
Gateway 192 . 168 . 1 . 1		

扫描设备,修改站名和 IP 地址

修改完成站名和 IP 地址后,添加此 ProfiNet 设备,请注意添加设备的固件版本,如下图所示:



固件版本选择

5、 添加完成后,可以在 Device 下面看到一个 S120 的设备,如下图所示:

Solution Explorer 🔹 🖣 🗙	S120_One * × MAIN
Solution Explorer         □	S120_One * X MAIN  General Adapter F20FINIT Sync Tesk Settings Box States Diag Mintery Diagnonis  Settings  Studierd (vis Mapping)  Special Sync Tesk  Vereate new I/O Task  Sync Tesk  Wee: FlcTesk  Wee: FlcTesk
<ul> <li>Term 1 (EK1100)</li> <li>W Device 1 (EL632)</li> <li>Innge</li> <li>Innuts</li> <li>Quotuts</li> <li>Xuotuts</li> <li>Xuotuts</li> <li>Xuotuts</li> <li>PLC Instance - Device 1 (EL6632)</li> </ul>	Adjustable by Protocol Priority: 20

6、 扫描完成 ProfiNet 设备后,可以查看一下 ProfiNet 工站之间的关系是否与设计时的一致性,在 "PROFINET"项下点击"Topology",然后"Refresh"刷新一下,如下图所示:

S120_One - Microsoft Visual Studio FILE EDIT VIEW PROJECT BUILD DEBUG TWINCAT TWINSA	FE PLC TOOLS WINDOW HELP	₹2 Quic	k Launch (Ctrl	+Q)	<mark>۶</mark> –	ъ х
PLC	- Kelease • WinCAI KI (xb4) • p	•	iq] P [:] =		* =	
Solution Explorer + X	S120_One ≄ × MAIN					
001 0-0 ×-	General Adapter PROFINET Sync Task Settings Box States Diag Mistory Diagnosis					-
Search Solution Explorer (Ctrl+3)         P -	Protocal ANS Net12: 192: 108. 11. 100. 2. 1         Port Settings           Protocal ANS         65535         Scan. PHID Devices           Server ANS Net12: 192: 108. 11. 100. 1. 1         Topology         Server ANS PortKr.: 651           Server ANS PortKr.: 651         IMT Config         PM SF Version:	点击此接 设备的对应	钮,查看Profil 应关系	Net		
PLC Instance - Device 2 (EtherCA1) 1     PLC Instance - Device 1 (EL6632)						
Error List						
▼ •   ③ 0 Errors   1 0 Warnings   ① 0 Messages   Clear			Se	earch Error I	list	ρ
Description	Fi	le	Line	Column	Project	
Free Line Contract						
Ready						

Online data	Offline data
el6632-pncontroller port-001 port-002 port-001 port-002 port-001 port-002 port-002 port-003 port-004	el6632-pncontroller port-001 port-002 <b>3</b> st20 <b>9</b> port-001 <b>9</b> port-001 <b>9</b> port-001 <b>9</b> port-001 <b>9</b> port-001 <b>9</b> port-002 <b>9</b> port-002 <b>9</b> port-002 <b>9</b> port-002 <b>9</b> port-002 <b>9</b> port-003 <b>9</b> Port-003 <b>9</b> Port-004
Refresh	Refresh

7、EL6632 模块支持 RT 和 IRT 模式,如果需要更改模式,请在"IRT Configuration"下进行配置,如下 图所示:

miles i un	e controlled by Profinet	Name of IRT Sync Domain
Off		el6632-syncdomain
🔘 On		Set Sync Domain name
ame RealTi	meClass for all devices	IRT SendClockFactor
Off		V SCF from master task
💿 On	IRT (RTClass3)	- 500.000 us
ame LineDe	elay for all ports	
Off		
🔘 On	10 * m	LineDelay = 50 ns
utomatic po	rt assignment	
Off		
🔘 On	Hint: The profinet startup :	equence will increase up to 30 seconds!
dditional Of	iset for Tdx	
	0 Tin	elOInputValid in us
() Ult	0 Tin	nelOOutputValid in us
ioi Uff ◯ On		

8、 针对模块部分配置完成后,需要添加 ProfiNet 设备的文件,展开添加的设备"S120",下拉列表里面有 一个"API",鼠标指针指到上面,点击鼠标右键,然后"Add New Item"(添加新项),如下图所示:



注意添加的"Module Type"要与 ProfiNet 设备里面的通讯报文一致,即 S120 里面用标准报文 1 (Standard Telegr. 1),TwinCAT 里面配置的通讯报文也必须是标准报文 1,若 S120 里面配置多条报 文,TwinCAT 里面也需要配置同样条数的报文,且 TwinCAT 里面的报文需要用空报文隔开。(切记 多条报文时,TwinCAT 里面需要用空报文将多条报文隔开)

S120_One - Microsoft Visual Studio				₹2	Quick Launch	(Ctrl+Q)	ρ_	5 X
FILE EDIT VIEW PROJECT BUILD DEBUG T	WINCAT TWINSAFE PLC TO	OOLS WINDOW HELP						
C - O   B - D - C    A 日 A   ラ - C	* • • Attach •	- Release - Twi	nCAT RT (x64) 🔹 🔊				🖸 • 📮	
🔛 🔜 🗖 🌮 🤇 🚳 🍋 🐾 🛛 <local></local>	• . PLC •		6 4 1 0 1 4 4 1 0 1 -					
Solution Explorer	- ¶ × S120_One +							
000 0-0 4-	General D	liamosis						
Search Solution Explorer (Ctrl+;)	ρ.	APT	71.1					
<ul> <li>W Device 1 (EL6632)</li> </ul>	A ane.	X11	14. 1					
📑 Image	Type:	Application Process Iden	tifier					
P 🛁 Inputs	Connent							
▲ ■ s120								
Inputs								
P GOUTPUTS			*					
Term 1 (DAP Module)		Disabled	Create symbols					
▲ ➡ Term 2 (DO with standard telegal	r. 1)							
Subterm 1 (Parameter Access)	s Point)	励标准报文1						
<ul> <li>Subterm 2 (standard telegrad</li> <li>Inputs</li> </ul>	m 1, PZD-2/2)							
🛃 ZSW1								
P NIST_A								
Outputs     STW1								
SINI SNSOLLA								
<ul> <li>Mappings</li> </ul>								
PLC Instance - Device 2 (EtherCAT) 1								
PLC Instance - Device 1 (EL0032)	·							_
Error List								- # ×
▼ • ③ 0 Errors ▲ 0 Warnings ◎ 0 Messages	Clear					Search Erro	or List	P
Description				File	Line	Column	Project	
Error List Output								
Ready								1

添加完报文后,在 PLC 程序里面声明变量和标准报文里面的输入输出变量关联起来,然后激活 TwinCAT 配置,运行 PLC,确定 EL6632 模块上所有指示灯全部显示绿色,S120 控制器上的指示灯 都为绿色,表示 ProfiNet 通讯已经建立。





# 实物连接图



## 附录关于 EL6632 指示灯状态的说明及 S120 通讯配置

## EL6632 指示灯状态说明

EtherCAT 诊断灯

LED 标签	LED 颜色	显示状态	状态文字描述
		LED 灯不亮	初始化端子模块;终端固件功能更新;
	Dung / 44	200 毫秒闪烁	邮件通讯功能和不同标准参数设定;
Run	绿色	1 秒熄灭 200 毫 秒闪烁	同步管理器通道和验证分布式时 <b>钟</b> ;输出保持安全状态;
		常亮	<b>正常操作状态</b> ;合理的邮件和进程数据通讯

ProfiNet 运行/错误诊断

指示灯绿色	指示灯红色	指示灯定义
常灭	200 毫秒闪烁	终端开始
200 毫秒闪烁	常灭	无站名
1 秒熄灭,200 毫秒闪烁	常灭	无 IP 地址
常亮	常灭	EL 终端参数化

ProfiNet 错误诊断

指示灯绿色	指示灯红色	指示灯定义
常灭	500 毫秒闪烁	无 AR 与其他设备建立连接
常灭	1 秒熄灭,200 毫秒闪烁	至少有一种设备未建立 AR
200 毫秒闪烁	常灭	至少有一种设备发出了错误信号,列如有一个不同的模块,IO-CR 被设置错误位(问题指示器)
1 秒熄灭,200 毫秒闪烁	常灭	至少有一种设备表明它是"停止"状态
常亮	常灭	所有 ProfiNet 设备处于数据交换模式

## SIEMENS S120 通讯配置

S120 控制器需要对控制单元和电机驱动器分别做通讯参数设定,控制单元需要设置站名, IP 地址, 网关和子 网掩码,如下图:

STARTER - S120 - [S120_CU320_2_DP.CU_S_126 - Expert list]							ð ×
Project Edit Target system View Options Window	v Help						- 8
	XE 88	+443					
- Pa casa	🗄 🚺 🎥 🕒 🗣 🗄 Ent	ter search text 👻 🚧 😽 🖬 hexadeo	ima 🕶 🖬				
	r						
Insert single drive unit	Expert list						
FILE SIZE CU32E Z DP	Parameter	Parameter text	Offline value CU_S_126 Unit	Modifiable to	Access level	Minimum	Maximum ^
-> Overview AVA/34111 KAE, ITAB	T All	All 💌	All Al	AI	Al 💌	All 💌	All 💌
□ 》Commun並設置,网关设置,子	244 @ r8912[0]	E Default Gateway of Station active	0		1		
Topology	246 🕀 r8913[0]	IE Subnet Mask of Station active	0		1		
□ = EU_S_126 <sup>00</sup> / 地印设直	246  [] [0915[0]	IE MAC Address of Station	OH		1		
-to Insert DCC chart	247 ⊕ p8940[0]	CBE20 Name of Station	5	Operation	1		255
Configuration	248 ( p8941[0]	CBE20 IP Address of Station	192	Operation	1	0	255
> Expert list	249 ⊕ p8942[0]	CBE20 Default Gateway of Station	192	Operation	1	0	255
Control logic	250 ⊕ p8943[0]	CBE20 Subnet Mask of Station	255	Operation	1	0	255
On least for days	251 p8944	CBE20 DHCP Mode	14	Operation	1	0	255
-G- inpus/outpus	252 p8945	CBE20 interface configuration	[0] No function	Operation	1		
-> Communication	253 @ r9407[0]	PS file parameter index parameter not transferred	0		1		
	254 @ r9408[0]	PS file fault code parameter not transferred	255		1		
🗈 🦲 Infeeds	255 r9490	Number of BICO interconnections to other drives	0		3		
Input/output components	256 @ r9491[0]	BVCI of BICO interconnections to other drives	0		3		
🕀 🦳 Encoder	257 🕀 r9492[0]	BO/CO of BICO interconnections to other drives	0		3		
E Drives	258 @ p9493[0]	Reset BICO interconnections to other drives	[15] Finished	Ready to run	3		
Documentation	259 p9495	BICO behavior to deactivated drive objects	[0] Do not do anything	Ready to run	3		~
Project	🗓 S120_CU320_2_DP 🔞	VECTOR_05 1 A_INF_02 1 CU_S_126					
Image: Weight of the second	3 information						
Level Message							^
							<u> </u>
19 Information 5120_C0320_2_DP: VECTOR_037	1%						
20 mformation \$120_C0320_2_DP. VECTOR_047	076						
21 Information 5120_C0320_2_DP. VECTOR_058	35%						
22 mormation 5120_C0320_2_DP. VECTOR_065	1276						
23 minimation 5120_00320_2_0P. VECTOR_071	0076						v
BICO server							

### 电机驱动器需要设置通讯类别,通讯报文类型,硬件端口分配,如下图所示:

I ×		nter search text 🗸 🏟 🖓 📴 😽	hexadecimz • 🔂				
\$120							
	Expert list						
Quantiew	Parameter	Parameter text	Offline value CU_S_126	Unit Modifiable	to Access level	Minimum	Maximun
Communication	Al _	All					All
all 米別沿星。	220 r8513	CO: Data transfer 1 receive wordwise	0.000	%	2		-
E / Topology 通机突加坡直	221 r8514	CO: Data transfer 2 receive wordwise	0.000	%	2		
	222 r8515	CO: Data transfer 3 receive wordwise	0.000	%	2		<u> </u>
-to Insert DCC chart	223 p8835	CBE20 firmware selection	[1] PROFINET V2.2	Commission	in 3	-	
-> Configuration	224 p8836	SINAMICS Link address	0	Commission	in 3	0	64
-> Expert list	225 🕞 p8839	PZD interface hardware assignment					
-> Control logic	226 p8839[0]	IF1	[2] Option module	Commission	n 3		
- Inputs/outputs	227 <b>p8839[1]</b>	F2	[1] Communication interf	Commission	in 3		
> Communication	228 p8840	COMM BOARD monitoring time	10	ms Operation	3	0	6.5535E+
· · · · · · · · · · · · · · · · · · ·	229 @ p8841[0]	COMM BOARD send configuration data	0	Operation	3	0	65535
H → Diagnostics	230 p8842	COMM BOARD start configuration	0	Operation	3	0	1
Infeeds	231 p8848	IF2 PZD sampling time	4.00	ms Commission	in 3	1	16
Input/output components	232 @ r8849[0]	COMM BOARD receive configuration data	0		3	-	-
Encoder	233 r8854	COMM BOARD state	[6] Cyclic communicatio		3		
🕀 🦳 Drives	234 ⊕ r8858[0]	COMM BOARD read diagnostics channel	4201		3		
P Documentation	235 @ r8859[0]	COMM BOARD identification Data	100		3		
t	S120_CU320_2_DP	★ VECTOR_05 第 A_INF_02 第 CU_S_126					
Level Message							
All							
19 Information S120_CU320_2_DP: VECTOR_031	/1%						
20 Information S120_CU320_2_DP: VECTOR_041	78%						
21 Information S120_CU320_2_DP: VECTOR_050	85%						
22 Information \$120 CU220 2 DD VECTOD 06 (	0.244						

STARTER - S120 - [S120_CU320_2_DP.VECTOR_05 - Expert lis	t] / Help					-		× - 8 >
	XE 🔚 🔤 📽							
Encoder	E 📴 🕞 🖭 🗄 En	ter search text 🗸 🏘 🗹 🔯 🖛 hexa	adecima 🔹 🕞					
Drives	Expert list							
Insert drive	Param Data	a set Parameter text	Offline value VECTOR_05	Unit Modifiat	le to Access level	Minimum	Maximu	m ^
		All	▼ All _	AI AI	.▼ AI	All	All	•
E- C VECTOR_04	254 p868	Power unit DC switch debounce time	65000	ms Ready to	run 3	0	65000	
E-B VECTOR_05	255 p895[0] P	BI: Activate/deactivate power unit components	1	Ready to	run 1			
	256 ⊕ r896	BO: Parking axis, status word	OH		2			
> Configuration	257 p897	BI: Parking axis selection	0	Ready to	run 2			1.00
> Expert list	258 ⊕ r898	CO/BO: Control word sequence control	1000H		2			
- X Drive navigator	259 🕀 r899	CO/BO: Status word sequence control	2240H		2			
Control logic	260 p922	PROFIdrive telegram selection	[1] Standard telegram 1, P	Ready to	run 1			
V Setpoint channel	261 (1 r924[0]	ZSW bit pulses enabled, Signal number	0		3			
Second channel	262 p925	PROFIdrive clock synchronous sign-of-life tolerance	1	Operation	3	0	65535	
Open-loop/closed-loop control	263 r930	PROFIdrive operating mode	1		3			
⊕-≫ Functions	264 r944	CO: Counter for fault buffer changes	0		2			
Messages and monitoring	265  () r945[0]	Fault code	0		2			
B → Commissioning	266 @ r947[0]	Fault number	0		3	8		
> Communication	267 ① r948[0]	Fault time received in milliseconds	0	ms	3	3		
Diagnostics	268 ⊕ r949[0]	Fault value	0		3			
P & VECTOR 06	269 p952	Fault cases, counter	0	Operation	3	0	65535	
the A VECTOR 07	270 p970	Reset drive parameters	[0] Inactive	Commissi	onin 2			
	271 p971	Save drive object parameters	[0] Inactive	Operation	1			
	272 (E) r975[0]	Drive object identification, Company (Siemens = 42)	42		2			
SINAMICS LIBRARIES	273 @ r979[0]	PROFidrive encoder format, Header	21265		3			
MONITOR      ✓	274 00 01000101	Macro Connactor Innute (CI) for enaad estimate	In	Deady to	run 1	n	000000	1.
	🗓 \$120_CU320_2_DP 📓	VECTOR_05 A_INF_02 CU_S_126						
s IV U emor(s) IV U warning(s) IV 23	Information						_	
Level Message								^
Al								•
19 Information S120_CU320_2_DP: VECTOR_037	1%							~
DICO								

关于西门子 S120 其他参数设定就不一一叙述了。