

HMS Anybus Communicator for PROFINET with Siemens S7-300 PLC and TIA Portal software







History

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1.10	2013-11-08	New template, general update	SDa
1.00	2012-09-24	Minor corrections	NiA
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Contents

1 B	Background	3
2 S	olution Overview	3
3 C	Configuration	
3.1	Anybus Communicator IO Size	
3.2	TIA Portal Setup	5
3.3	Assigning Device Name	
3.4	Setting up the Force and Watch table	
3.5	Compile, Download and Test	
4 N	Aore Information About the Network and Products	



1 Background

Materials used in the development of this application note:

- HMS Anybus Communicator PROFINET to Serial Gateway (HMS part no. AB7013)
- Siemens S7 300 PLC (Siemens part no. 6ES7 315-2EH14-0AB0)
- SCALANCE X208 Switch (Siemens part no. 6GK5 208-0BA10-2AA3) with Siemens PS307 power supply (Optional)
- Anybus Configuration Manager RS232/422/485 Software Version 4.1.1.1
- Siemens TIA Portal Software Version 11.0
- Documentation consulted: Anybus Communicator PROFINET User Manual ver. 3.01
- Documentation consulted: SIMATIC S7-300 Programmable Controller Hardware and Installation Manual
- Programming Cables (Anybus Configuration Cable, PROFINET Cables)

2 Solution Overview

This document explains the procedure for configuring PROFINET communication between a Siemens PLC and the HMS Anybus Communicator, using TIA Portal software. It is assumed that the setup for the Anybus Communicator module for the serial communications has already been performed. If not, communications on the serial end of the Anybus Communicator module must be set up before proceeding.

3 Configuration

3.1 Anybus Communicator IO Size

In this example, the Anybus Communicator is set up for 10 bytes of input data and 3 bytes of output data. The serial configuration setup for each application in the Anybus Communicator will have different amounts of bytes. To check the amount of input and output bytes in the application, right-click on the Sub-Network and select **Sub-Network Monitor**, as shown below.





The **Sub-Network Monitor** window should now appear. This will show the number of input bytes (10) and output bytes (3) in the Anybus Communicator. If there are no colored boxes, the Anybus Communicator has not yet been configured.

Configure the serial interface of the Anybus Communicator before proceeding.

🛞 Subnetwork Monitor		
File Columns		
**		
New Node		
Select All Deselect All		
Consume 1		
In Área 10 butes (512)	Out Area 2 hutas (E12)	
		General Area 0 bytes (1



3.2 TIA Portal Setup

In order to configure the PROFINET network, it is first necessary to set up the PLC and the master hardware.

- 1) Open the TIA Portal software and select **Add new device**.
- 2) Select the PLC CPU to be used.

VA Sie	mens - \$7300					-	
						Totally Integrated Automation PORT	AL
Sta			Add new device				
	Devices & networks PLC programming Visualization Online & Diagnostics	 Show all devices Add new device Configure networks Help 	Hill PC systems	 ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Order n Version Descrip PROFIN FB3/FC 2 ports transp. (MPI or config con	CPU 315-2 PNDP DOI: 10.000 DO	
				▶ In Unspecified CPU 300 ▶ In SIMATIC \$7-400		Add	

The other components of the rail can now be added to the system, from the **Hardware catalog**. This is where the power supply is selected, along with the digital input/output module.





- 3) Double-click on the **PLC_1** to bring up the properties.
- 4) In the **PROFINET interface properties**, add a new subnet for PROFINET, and assign an IP address for the protocol.

PLC_1 [CPU 315-2 PN	/DP]	🗟 Properties	🗓 Info 🔒	足 Diagnostics	
General					
🕨 General 📃 🔨	Ethernet addresses				^
MPI/DP interfa PROFINET inte	Interface networked with				
Startup	Subnet:	PN/IE 1			
Cycle		Add sources			
Clock memory 🔳 🖡		Add new sub	net		
Interrupts					
Diagnostics s 🖡	IP protocol				
System diagn					
Clock	IP address:	10 . 10 . 14 .	80		
Web server	Subnet mask:	255 . 255 . 255 .	. 0		
Retentive me 🗸		Use IP router			~

To include the Anybus Communicator in the network, the Anybus Communicator GSDML file must be imported into the configuration tool. This file can be downloaded from the HMS web site.

5) Open the **Options** menu as shown below, and select **Install general station description file**.

Online	Options	Tools	Window	Help	
X 🗈	🍟 Settings				
	Support packages				
	Install general station description file (GSD)				
	🏄 Show reference text				
	🛄 Global	librarie	s		۲



The Anybus Communicator will be available in the hardware catalog after the GSDML file has been imported.

Tota	ally Integrated Automation PORTAL
Hardware catalog	∎ 🛯 🕨
Options	
	Har
✓ Catalog	lwa
<search></search>	int int 🔤
🗹 Filter	ata
🕨 🛅 PLC	- E E E E E E E E E E E E E E E E E E E
🕨 🧮 HMI	
PC systems	2
Image:	0
Detecting & Monitoring	
Distributed I/O	et
Field devices	0
	<i>ه</i>
🛨 🫅 PROFINET IO	
🕨 🫅 Drives	
🛨 🛅 Gateway	l as
🕨 🛅 Siemens AG	ks
👻 🛅 HMS Industrial Netwo	rks
👻 🛅 Anybus Communic	ator 🕕
👻 🛅 Migration	E
🚺 Anybus Com	municator
🚺 Anybus Commu	inicator 👼
🕨 🛅 X-gateway COPM P	RT
🕨 🛅 Ident Systems	
🕨 🫅 Sensors	
PROFIBUS DP	



- 6) Select the Network View tab, to show the PROFINET PN/IE_1 network that was created.
- 7) From the hardware catalog, drag the Anybus Communicator module into the network.

S7300 > Devices & networ	ks	_ 🖬 🖬 🗙
	🛃 Topology view 🛛 🚠 Network view	Device view
Network	HMI connection 💌 號 🚉 🔍 🛨 100% 💌	
PLC_1 CPU 315-2 PN/DP	SCALANCE1 SCALANCE X208 PLC_1 PN/IE_1	s-Comm Commu igned PROFIBUS_1
<		> 🗉

8) Double-click on the **Anybus Communicator module** to bring up the **Device View**. The device is named under **General** in the **Properties** tab. The example below uses the name **abc**.

S7300>abc	_ # i	∃×
	🛃 Topology view 🛛 🚠 Network view 🛛 🛐 Device view	N
🏦 abc	🔽 🖽 🛃 🔍 ± 100%	
<		>
	Device data	
abc	📴 Properties 🚺 🗓 Diagnostics 💷 🗉	
General		
General PROFINET interfa	General	*
General Ethernet addr Advanced opt Identification & Diagnostics addr	Name: abc Author: admin Comment:	



9) In the **PROFINET** interface, select PN/IE_1 as the Subnet.

\$7300>abc	_ • • •
	🚝 Topology view 🛛 🔒 Network view 🛛 🛐 Device view
🔐 abc	Image: Second
	DP-NORM
<	
1.	Device data
abc	🖾 Properties 🚺 Info 🚺 🗓 Diagnostics 💷 🗉
General	
▶ General	
 PROFINET interfa 	
General Ethornot addr	Ethernet addresses
Advanced opt	Interface networked with
Identification &	
Diagnostics addr	Subnet: PN/IE_1

10) Add the **Input** and **Output modules** so that they match the input and output sizes as set on the Anybus Communicator. In the example earlier, the Anybus Communicator was set up for 10 bytes input and 3 bytes output, so these values must be used here too.

🛞 Subnetwork Monitor	
File Columns	
18 18 1	
New Node	
Select All Deselect All	
Produce 1	
In Area 10 bytes (512)	Out Area 3 bytes (512)
0000	0200



An input 008 byte and an input 2 bytes are dragged from the Hardware catalog into the Device overview list, bringing the total to 10 input bytes.

Similarly, an output 2 byte and an output 1 byte are dragged in, bringing the total to 3 Output bytes.



The choice of the modules to add depends on the Anybus Communicator's configuration setup in the Configuration Manager Tool. Other examples are shown below:

Bytes required by application	Modules to use
4 Input + 2 Output	4 Input + 2 Output
7 In + 12 Out	4 In + 2 In + 1 In + 8 Out + 4 Out
33 Output	32 Output + 1 Output
68 Input	64 Input + 4 Input



3.3 Assigning Device Name

Before communication can start, the **Device Name** for the devices configured must be assigned to the device.

- 1) Go to the **Network View** and right-click on the PROFINET network.
- 2) Select Assign device name.

S7300 > Devices & networks		_ ₽ ≣×
	Topology view 🔒 Network	view 🛐 Device view
Network 11 Connections HMI connection	📃 🔍 🛨 100% 💌	=
		^
C_1 SCALANCE1 DD : U 315-2 PN/DP SCALANCE X208 DD :	abc Anybus Com	mu DP-NORM
	PLC 1	
	PLC_1.PROFINET IO-System (100)	
PN/IE 1		
	X Cut Ctrl+X	~
< Ⅲ	E Copy Ctri+C	> 🗉
Network consistence 10 commu		
Network overview Connections TO commun	Rename F2	
Y Device Type	P Online & diagnostics Otdub	Master system Comm
abc Anybus Communicator	Assign device name	^
< m	Show force values	>
	國 Properties	Diagnostics 🛛 🗖 🗖 🗸



A new popup will now appear, showing a list of the PROFINET devices on the network.

- 1) Select **abc** from the drop-down menu.
- 2) Select the **Anybus Communicator**.
- 3) Click the **Assign Name** button to send the assigned name to the module.

Assign PROFINET device nar	ne.				×
		PROFIN	IET device name.	abc Anybus Communica	ator
		Type of th	e PG/PC interface: PG/PC interface:	🛃 PN/IE 💹 Broadcom NetX	▼ treme 57x▼
		or or or	nly show devices of the nly show devices with I nly show devices witho	e same type bad parameter sett out names	tings
	Acces	sible devices in the netwo	ork: 🔁		
	IP address	MAC address	Туре	Name	Status
	10.10.14.80	00-0E-8C-B0-2A-C5	\$7-300	plc_1	🧭 ок
Flash LED	10.10.14.81	00-0E-8C-C2-31-31	SCALANCE X-200	scalance1	🧭 ок
2	10.10.14.84	00-30-11-02-65-44	Anybus Communic	abc	🥑 ок
_	10.10.14.86	00-0E-8C-C7-C6-CA	IM151-3	et200s	🕑 ок
				3	Assign name
					Close



3.4 Setting up the Force and Watch table

To view input and output data, a tag can be added to the watch table. A name can be entered, as well as the data type. For the address, refer to the **I address** of the module that was entered in the Anybus Communicator, as shown below.

VĄ	MA Siemens - S7300											
Pre	oject B	Edit Vi	iew Insert Online	Opti	ons	Tools	5	Window Help				
	ž 🖪 🛛	📑 Save	project 昌 🐰 🗎	۵)	<	⊫ິ) ± (213	2 🖬 🖥 🖽 🖬	🖳 🔝 🚿 Go onlin	e 📝 Go offline	🗛 🖪 l	
	Projec	t tree			•	\$730	0	PLC_1 [CPU 315	i-2 PN/DP] → PLC t	ags		
	Devi	ices									Tags	🗉 Use
	🗳 G	0		Ē		1	**	🖻 🗄 🛈			_	
bu						PL	C t	ags				
i.	•	- 🔙 Prog	gram blocks	•	^			Name	Tag table	Data type	Address	
am	•	- 📑 Tech	nnological objects			1		first_output	Default tag table 💌	Word 🔳	%QW1	-
ogr	•	🕞 Exte	ernal source files			2	-	second_output	Default tag table	Int	200112	
pr	-	r 🚬 PLC	tags			3	-	input	Default tag table	DWord	%ID1:P	
9		<u></u> <	bow all tags			4	- -	Tag 1	Default tag table	Word		

Device	overview					
**	Module	Rack	Slot	laddress	Q addre	Туре
	👻 abc	0	0	2031*		Anybus Communic
	Interface	0	0 X1			Anybus-Communic
	Input 008 bytes_1	0	1	18		Input 008 bytes
	Input 002 bytes_1	0	2	910		Input 002 bytes
	Output 002 bytes_1	0	3		12	Output 002 bytes
	Output 001 byte_1	0	4		3	Output 001 byte
		0	-			

Output tags can be entered in the Force table. The test tag **first_output** has been added, with a force value of **#00AA**, referencing the first output address of the Anybus module.

\$7300 →	PLC_1 [CPU 315-2	N/DP] → Watch a	and force tables)	Force table		- 1
I₀ F⊳	F D D T					
i	Name	Address	Display format	Monitor value	Force value	F
1	"first_output":P	%QW1:P	Hex 💌		16#00AA	
2		<add new=""></add>				



3.5 Compile, Download and Test

- 1) The project should now be saved.
- 2) Compile the program, by right-clicking on the PLC and selecting **Compile >> All**.

VA	Siemens - S7300				
Pr	oject Edit View Insert	Online Options	Tools Window	Help	
	🛉 🎦 🔚 Save project ا 昌	X 🗉 î 🗙	ାର : ଜା = 🛄 ।	🖥 🛄 🌆 🖳	🛛 🛃 💋 Go online 📓
	Project tree	□ 4	\$7300 > Device	s & networks	
	Devices				
	BOO	<u></u>	Network	Connections	IMI connection
rks			, ;		
N N	- PLC 1 [CPU 315-2 P				
net	Device configura	Open		昌 Print	Ctrl+P ALANG
~	Q Online & diagno	Open in new ed	itor	🚔 Print pr	eview
es	Program blocks	¥ Cut	Ctrla	🗙 國 Propert	ies Alt+Enter
<u>š</u>	Technological of	Copy	Ctrl	.c	
De	Fechnological of Fetoreal course	Paste	Ctrl	V	
	External source i			-	IO c
	PLC tags	🗙 Delete	D	el	
	E PLC data types	Rename	F	2	
	Watch and force	Go to device			2 PN/D
	📴 Program info	Go to library			E X-20
	🖂 PLC alarms				E X208
	🔄 Text lists	Go to Topology	/iew		
	✓ Details view	Go to network v	iew		
	I	Compile		► All	
		Download to de	vice	Hardwa	ire
	Name	💋 Go online	Ctrl+Alt+	O Softwar	re
	🖬 Program blocks	🔊 Go offline	Ctrl+Alt-	⊧F Softwai	e (rebuild all blocks)
	Technological objects	😨 Online & diagno	stics Ctrl+	.D	



3) Select **Download to device >> All**.

Project tree	III 🖣 5730	0 > Devices & I	networks
Devices			
🖻 O O	📑 🔂	etwork 📘 Conn	ections HMI connection
PLC_1 [CPU 315-2 PN]	/DP1	010.4	
🛐 Device configurat	Open		📕 Print Ctrl+P
😮 Online & diagnost	Open in new editor		Print preview
🕨 🔙 Program blocks	🗶 Cut	Ctrl+X	國 Properties Alt+Enter
🕨 🙀 Technological obj	🛅 Сору	Ctrl+C	_
🕨 🔚 External source fil	💼 Paste	Ctrl+V	0
🕨 🌄 PLC tags	🗙 Delete	Del	C
🕨 ি PLC data types	Rename	F2	
🕨 詞 Watch and force t	Co to device		PI
📴 Program info	Go to device Go to library		×
🖂 PLC alarms			×
Text lists	🚔 Go to Topology view		
✓ Details view	ᡖ Go to network view		
	Compile	•	
Name	Download to device	•	All
Regerarn blocks	💋 Go online	Ctrl+Alt+O	Hardware configuration
Technological objects	🛃 Go offline	Ctrl+Alt+F	Software
	🚱 Online & diagnostics	Ctrl+D	Software (all blocks)

4) Click the **Go online** button for the PLC. A popup will appear for selecting the PG/PC interface. Clicking the **Refresh** button will show the devices accessible in the sub-network.

Go online					
	Configured access nod	les of "PLC-1"			
	Device	Device type	Type	Address	Subnet
	PLC_1	CPU 315-2 PN/DP	PN/IE	10.10.14.80	PN/IE_1
		CPU 315-2 PN/DP	PROFIBUS	1	PROFIBUS_1
		Тур	e of the PG/PC interfa	ice: 📃 PN/IE	-
			PG/PC interfa	ice: 🛛 🔝 Broadcom Ne	tXtreme 57x 🔻 🔯
			Connection to sub	net: PN/IE 1	
			1 et diatav	/au	
			rscyatev	/dy.	
				- cha	
	Accessible devices in t	arget subnet:			w all accessible devices
	Device	Device type	Туре	Address	Target device
11.	PLC_1	CPU 315-2 PN/DP	PN/IE	10.10.14.80	PLC_1
BR					
Flash LED					
					Refresh
Online status information:					_
📲 Start scanning					_
Trying to connect to a	address 10.10.14.80.				
Scanning ended.					~
				— Go <u>o</u>	nline <u>C</u> ancel



5) Once online, go to the **PLC tag table**, right-click and select **Monitor All**.

\$ 7	300	PLC_1 [CPU 315-2	PN/DP] PLC tags	
			🕣 Tags	User constants
3	¢	🖻 🕂 🛈		
	PLC	tags		
	-	Name	Tag table Data type	Address F
1		first_output	Sector and Sector	🗐 %QW1 📃
2		second_output	Add row	%QW9
3		1 input		%ID1:P
4		Tag_1	K Cut Ctrl+X	%IW1
5		<add new=""></add>	Ctrl+C	
			Paste Ctrl+V	
			🗙 Delete Del	
			Rename F2	
			Cross-reference information Shift+F8	
			👷 Monitor all	
			🔯 Properties	

In the **Monitor value** column, the **input** tag shows the first input double word value from the Anybus Communicator. The **first_output** tag set up will force and write the force value of #00AA into the Anybus Communicator output table.

\$730	S7300 → PLC_1 [CPU 315-2 PN/DP] → PLC tags = = ×											
						Tags	🗉 Use	er const	ants ,	🗐 Syste	em constants	
	2 2 2 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5											
P	_C t	ags										
		Name	Tag table	Data type		Address		Retain	Visibl	Acces	Monitor value	
1	-00	first_output	Default tag table 💌	Word		%QW1	-			~	E 16#00AA	
2	-	second_output	Default tag table	Int		%QW9				~	E] 187	
3		input	Default tag table	DWord		%ID1:P					16#0305_270F	

6) Use the **Anybus Configuration Manager Tool** to view the current input and output data on the Anybus Communicator.



7) Right-click on the node and select **Node Monitor**, as shown below. A monitor screen will appear, showing the input and output bytes in grey.



🏶 Monitor - Contr	oller			
Eile]Node Command	Columns View			
🐮 🐮 😭 🖉 🎽	(¢			
Read Coils Query				
Slave Address	Function	Starting Address (Hi,Lo)	Quantity Of Outputs (Hi,I	Che
Value	Value	Value	Value	Errc
0x02	0x01	0x0000	0x0000	CR(
Read Coils Response				
Slave Address	Function	Byte count	Coil Status	Che
In Area 10 bytes (512)		Out Area 3 bytes (512)	
0000 3 5 27 0008 4B 4A 0010 0018 0020 0028 0030 0038 0040 0048	F FC 19 0 8	0200 0 AA 0208 0210 0218 0220 0228 0230 0238 0230 0238 0240 0240 0248		

The data shown in the gray boxes is the actual data currently inside the Anybus Communicator. This data matches the data seen in the Monitor column of the TIA portal. The force value from the PLC of 00AA can be seen in the Output area of the Anybus Communicator.



4 Further Information

The latest manuals can be found on HMS homepage: <u>www.anybus.com</u> See also: <u>http://support.automation.siemens.com</u>