

PROFIBUS & PROFINET A match made in Karlsruhe

By: James Powell P.Eng.



PROFIBUS and PROFINET

- two protocols, both alike

in dignity, in fair Stradford,

where we lay our scene.





- Introduction
- Shared history and organization
- Similarities in setup procedure
- Shared identification
- Similar communications priorities
- Similar data maps
- Similar design question
- Same grounding rules
- Similar troubleshooting
- Conclusions
- Questions and answers



Personal journey:

- 1999 certified PROFIBUS DP network Engineer
- 2000 neck deep in first major PROFIBUS network problem
- 2009 Published a book on PROFIBUS for process automation
- 2011 certified PROFIBUS DP and PA instructor
- 2012 certified PROFINET network Engineer
- 2013 worked on my first PROFINET network problems
- 2015 published 2nd edition added PROFINET





Introduction





PROFINET was developed from PROFIBUS

PROFIBUS is like a book with many chapters:

- PROFIdrive
- PROFIsafe
- PROFIBUS PA

PROFINET is like a book with many chapters:

- PROFIdrive
- PROFIsafe
- PROFIBUS PA







Innovation

- A Profile is a standarization of a particular type of field device from the bus point of view, regulating how the information is presented on the bus and in what format, as well as defining standard parameters and setup.
- Profiles for:
 - Drive systems
 - Process automation
 - Robots and numerical control
 - Encoders
 - Hydraulic drives
 - Low voltage switchgear
 - Dosing and weighing
 - Liquid pumps



Shared history and organization

One organization to rule them all ...



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With PROFIBUS:

- Import the GSD file into the network configuration software
- Drag the device onto the network
- Setup the modules
- Download to controller

With PROFINET

- Import the GSD file into the network configuration software
- Drag the device onto the network
- Setup the modules
- Download to controller



With PROFIBUS the line is purple





With **PROFINET** the line is green

etup procedure1 → Devices & networks			_∎≣×	Hardware catalog	.
	📱 Topology view 🛔	Network vie	w 🛐 Device view	Options	
🚉 🔍 ± 100%		3	Topology overview		
		^	Port interconnection	✓ Catalog	
			Device / port	<pre>Search></pre>	iti j
	10 device 1		 \$71500/ET200MI 	P Filter	
CPU 1518-4 PN/	IM 153-4PN		✓ PLC_1		
	Not assigned		 PROFINET 		
	·····		Port_1	PC systems	
			Port_2	Drives & starters	
			 PROFINET 	Network components	
			Port_1	Detecting & Monitoring	
			 PROFINET 	i 🗸 🖬 Distributed I/O	
			Port_1	• T 2005P	
			 S7300/ET200M s 	t FI 200MP	
		4	▼ IO device_1	ET 2005	
			 PROFINET 	і 👻 🛅 ЕТ 200М	
		•	Port_1	✓ Interface modules	
			Port_2	✓ Im PROFINET	
			 GSD device_1 		
			▼ SINAMICS-S12	2 6ES7 153-4AA01-0XB0	,
			▼ PN-IO	6ES7 153-4BA00-0XB0	1
			Port 1	▶ 🚰 ET 200pro	
			Port 2	ET 200eco PN	
				Additional Ethernet devices	



Shared Identification

Devices look the same:

	S Properties	Sinfo Diagnostics	24		
General IO tags Sy	stom constants Texts				
PROFIBUS address	Catalog information				
Module parameters	Short designation:	M153-2	1		
ama stamp Weschdog Sime synchronitation Isochronous mode SYNCPREEZE Diagnostics addresses	Description	RI 153-2 hus interface module for up to 12 57- 300 SMs, FAS (except FM 356-4), module replacement during operation. Can be used redundantly with active lackplane bus in an H system, supports isochronous mode; also exaliable as SIPLUS module with order number 6AG1 153-2BAD2-7XBD.			
	Order number:	6ES7 153-28402-0X80			
	Firmware version:				
	•	Update module description			
	identification & Maintenance				
	Plant designation.	(4		
	Location identifier:		Ŧ		
	Installation date:	Tuesday, October 21, 2014 13:45	T		
	Additional information:		1		

) device_1	IM 153 APN		S Properties	Linfo 1 Diagnostics	eno.		
General	10 tags	System constants	Texts				
ROPINET interface [K1] Module parameters			Slot:	0	-		
Hardware identifier	Catalog inform	Catalog information					
		Short designation:	IM 153-4PN HF				
D⊋		Description:	PROPINET ID device interface module IM 153-4 Ph HF for E1200M electronic modules, firmwen V4.0; also available as SPLUS module with order number 6AG1 153-4AADD-7XB0				
			Order number:	6ES7 153-48A00-0X80			
	6	firmware version:	V4.0				
			Update module description				
	Identification &	Maintenance		_			
			Hent designation.				
		Location identifier:					
		0.000	Installation date:	Tuesday, October 21, 2014 13:47			
		Add	tional information:				



Identification and maintenance information:

- Order number of the field device
- MAC address
- Hardware version
- Software version
- Device type
- Vendor ID



- Cyclic communications top priority
- Acyclic communications lower priority





PROFIBUS Cyclic and acyclic





PROFINET Cyclic and Acyclic





PROFINET Cyclic and Acyclic





Similar Data Maps





- Designing any network you have a similar process:
 - Locate the equipment
 - Group the equipment from a network point of view
 - Select best pacement of network equipment
 - Be ready to modify
- PROFIBUS DP, PA and PROFINET also a question about constant monitoring?
 - With DP Do I design in a bus monitor (COMbrick or SoftingTHscope)
 - With PA Do I use dumb terminal strips or an advanced junction box with short circuit protection and a built in repeater
 - With PROFINET Do I use a managed switch?



Grounding rules!

Ground at every point

Use grounding grid and possibly a grounding cable as well





Riddle me this batman!

What are the three most common causes of PROFIBUS and PROFINET network Issues?

1. Physical layer problems!

2. Physical layer problems!

3. Physical layer problems!





- Physical layer checking is similar:
 - Check grounding
 - Check cables
- Tools are different:
 - PROFIBUS DP and PA use a meter to check cables
 - PROFINET use a cable tester
- Bus Monitors:
 - PROFIBUS is mature Tools like ProfiTrace and Softing's bus tester
 - PROFINET Netilities NetProfi, netAnalyzer



The two protocols have

- Shared history and organization
- Similarities in setup procedure
- Shared identification
- Similar communication priorities
- Similar data maps
- Similar design question
- Same grounding rules
- Similar troubleshooting

















James Powell Senior Product Specialist Industrial Communications

PD PA S PI TEC 6 Siemens Milltronics 1954 Technology Drive Peterborough Ontario, Canada K9J 7B1

Phone: +1 (705) 750-5295 Cell: +1 (705) 750-5295

E-mail: james.powell@siemens.com