

Application Note PROFINET to Modbus RTU Gateway

OVERVIEW

Industrial communication protocols are used to establish a client-server or master-slave communication between industrial automation devices, such as Programmable Logic Controllers (PLC), Remote Terminal Unit (RTU), Distributed Control Systems (DCS) and Human Machine Interfaces (HMI). For industrial automated applications, there are many industrial Ethernet communication protocols, such as Modbus TCP, EtherNet/IP and PROFINET.

As new protocols are created, it becomes more and more difficult for various devices to communicate with each other and form a cohesive system. The SignalFire Gateway natively communicates over Modbus RTU or Modbus TCP, but may need to be converted to another protocol to communicate with a master device.

PROFINET is an Ethernet communication protocol created by Siemens for high-speed data transfer. This document describes how to configure a Phoenix Contact PROFINET Gateway to integrate your SignalFire network into your Siemens system. It is assumed the reader is familiar with SignalFire

Within SignalFire's 900MHz RF system, it polls the remote sensors and IO modules configured within the network and stores its measurement information within the gateway's memory registers. Due to our Gateway being a slave device, as it was designed, a master Modbus device will need to be added to the Modbus network to interrogate these registers. There are two data exchange options to collect this data from the wireless system. The first option is for a Modbus Master to read and/or write to registers within each remote wireless node directly. This is called "Transparent Modbus" mode. Within this mode, a Modbus Master can read and write directly to and from the nodes over the wireless network. The other option allows a Modbus Master to access registers from the Gateway. This mode is called "Pre-Configured Register Set" mode using the "Slave Register Remapping" feature. It allows register mapping of up to 750 registers from remote sensors and IO modules to be stored in the gateway's memory. In comparison to the first mode, Transparent Modbus, this gateway's Pre-Configured Register Set mode using the Slave Register Remapping feature is more efficient because it reads or writes a large chunk of registers to and from the gateway rather than using more of the network's bandwidth to individually read and/or write message requests to each individual wireless node.

MATERIAL USED

SignalFire Gateway SignalFire USB-to-Serial cable Siemens S7-1200 Controller (P/N: 6ES7 214-1BG31-0XB0) Phoenix Contact PROFINET Gateway (PN GW) (P/N: GW PN/MODBUS 1E/1DB9) Ethernet Switch



Figure 1

NOTE The 'A' and 'B' lines need to be swapped between the Phoenix Contact and Gateway. All devices in this system can take 24VDC for power.

Depending on your network settings, you may have to change your computer's IP address. The computer had its IP settings changed as follows:



Figure 2

Click here to download configuration files

PROCEDURE

SignalFire Gateway Slave Register Remapping Configuration

Set up the SignalFire network with its nodes as needed. Keep in mind that every SignalFire node needs to have the same Radio Network, Radio Network Group, and Encryption Key as the Gateway to connect to it, but must each have a unique Slave ID. Refer to either the Gateway manual or the Quick Startup Guide for putting together a SignalFire network.

Each node that checks into the Gateway will have its own Slave ID, cache its registers at the Gateway, and can be addressed individually. While this is a valid way to pull information from the network, it is far more efficient and flexible to use the Gateway's Slave Register Remapping system. That allows the user to access only the registers needed and pull them all from the Gateway's Slave ID (default 247).

Go to Settings \rightarrow Slave Register Remapping, and type in the Slave ID's and addresses of the registers needed in the Siemens PLC. Click "Write to GW" to set them in memory. There are 750 Remapped Addresses ranging from register 5000 through 5749. In Figure , each node's battery voltage register is remapped to the Gateway.

	Remapped Address	Slave ID	Register Address	Data Type			Node Name	Register Value	Description	í
	5000	3	65532	16bit UINT		~	Temp	3354	Battery Voltage (mV)	
	5001	6	65532	16bit UINT		~	WIO	24097	Supply Voltage (mV)	
	5002	10	65532	16bit UINT		~		23692	Battery Voltage (mV)	
	5003			16bit UINT		~				
	5004			16bit UINT		~				
	5005			16bit UINT		~				
] Re	map All Registers	to Data Type	e Float		Display	'	D		Fail Mode	
Rea	d From GW	Write to G	w a	lear Gateway	Sh	ow	Register Values in HE)	X	Fail with High Value Fail with Low Value	
Loa	d from File	Save to Fi	le	Clear Table	Us	e E	xtended Slave ID (2-by	tes)	 Fail with Last Value (else 	High)
Impor	t from CSV	Event to C	CV C	CV/ Template			S	et	O Fail with Last Value (else	Low)

Figure 3

PROFINET Gateway Configuration

Power up the PROFINET Gateway (PN GW), wire its DB9 port to the Modbus RTU network, and its Ethernet port to an Ethernet switch as shown in Figure. From a Browser, type in the IP address of the PN GW and a window will pop up to enter the default username (Admin) and password (admin). Go to the Serial Settings tab and set the Serial Port Configuration to the settings in Figure 4. This will allow the PN GW to communicate on the same Modbus RTU RS485 network as the SignalFire Gateway.

C A Not secure 192.168.0.2/portconfig.asp?p=1 ware: 1.0.1		
ware: 1.0.1		
		Reboot Device Log Out
eneral Settings LAN Settings Serial Se	ttings Modbus Settings Data Mapping Settings Diagnostics	Device Maintenance
verview Port 1 Configuration		
erial Port Configuration	Modbus Configuration	
Port Name: Port 1 Port Mode: \$82.4852-wre ♥ Baud Rate: \$9200 ♥ Partly: none ♥ Data Bits: 8 ♥ Stop Bits: 1 ♥ Flow Control: none ♥ RS-485 Terminating Resistor: off ♥ DTR Mode: off ♥ bx Timeout Between Packets (ms): 200 Discard Messages With Errors: ♥	Serial Device(s): Modbus RTU Slaves Modbus Slaves Settings Response Timeout (ms): 1000 Inactivity Wait Time Before Tx (ms): 0 Send Write Messages First Write Mode: Read/Write Device ID Offset Mode: Off Device ID Offset Node: 0 Modbus Master/Slaves Settings Forward Braadcasts From Serial Master: Privard Braadcasts From Serial Master: Privard Slave Device ID Ranger min: 1 max: 1	



The PN GW communicates with RS-485 to the SignalFire Gateway, so its communication parameters need to match. Make sure the Baud Rate, and Data/Parity/Stop bits of the Phoenix PN (seen above) match those same parameters for the SignalFire Gateway; the Gateway's settings can be found in the bottom left of its ToolKit configuration window. The default setting is 9600-8N1.

MODBUS RS485	Settings	
Gateway Slave ID:	247	•
Baud Rate:	9600	•
UART Mode:	8N1	•

Figure 5

The next step is to configure the PN GW data to be mapped between the Modbus network and the PROFINET network. This section is where the Modbus data is mapped. Select the "Data Mapping Settings" tab then select the "Modbus to Modbus" as shown in Figure 6.

													Reboot De
Sener	al Settir	ngs	LAN Settings Ser	lal Settings	Mod	bus Settin	igs	Data Map	Diagnostics		Device M	intenance	
Modh	ue to M	odbue	Shared Memony Ver	fy Data Ma	oping Sha	red Memo	o/ Man						
noub	us to M	oubus	Shared Memory Ven	ry Data Ma	sping Shai	ieu memo	тутмар						
Andb	us to M	odbus Cor	figuration										
						_	_				_		
			Modbus (F	(ead)		Dall	Change		Modbus (Write)				
				warmene .	Length	Rate	of	Device	Function	Address	Delete		
		Device	Function	Address	Longer					distance of the			
Line	Active	Device ID	Function code	Address (base 1)	(Regs/colls)	(ms)	State	ID	code	(base 1)			
Line 1	Active	Device ID 247 247	Function code 03: Holding Registers (40x) • 03: Holding Registers (40x) •	Address (base 1) 5001	(Regs/colls) 100	(ms) 2000	State	1D 252 252	code 16: Multiple Registers (40x) ✓ 16: Multiple Registers (40x) ✓	(base 1) 1			
Line 1 2 3	Active	Device ID 247 247 247	Function code 03: Holding Registers (40x) ¥ 03: Holding Registers (40x) ¥ 03: Holding Registers (40x) ¥	Address (base 1) 5001 5101 5201	(Regs/colls) 100 100	(ms) 2000 2000 2000	State State State State	1D 252 252 252	code 16: Multiple Registers (40x) 16: Multiple Registers (4	(base 1) 1 201 401			
Line 1 2 3 4	Active	Device ID 247 247 247 247 247	Function code 03: Holding Registers (40x) ~ 03: Holding Registers (40x) ~ 03: Holding Registers (40x) ~ 03: Holding Registers (40x) ~	Address (base 1) 5001 5101 5201 5301	(Regs/colls) 100 100 100 100	(ms) 2000 2000 2000 2000	State V V	ID 252 252 252 252 252	code 16: Multiple Registers (40x) • 16: Multiple Registers (40x) • 16: Multiple Registers (40x) • 16: Multiple Registers (40x) •	(base 1) 1 201 401 601			
Line 1 2 3 4 5	Active V V V	Device ID 247 247 247 247 247 247	Function code 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v	Address (base 1) 5001 5101 5201 5301 5401	(Regs/colls) 100 100 100 100 50	(ms) 2000 2000 2000 2000 2000	State V V V	ID 252 252 252 252 252 252	code 16: Multiple Registers (40x) ~ 16: Multiple Registers (40x) ~ 16: Multiple Registers (40x) ~ 16: Multiple Registers (40x) ~ 16: Multiple Registers (40x) ~	(base 1) 1 201 401 601 801			
Line 1 2 3 4 5 6	Active Y Y Y Y Y Y Y Y	Device ID 247 247 247 247 247 247 247 247	Function code 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v 03: Holding Registers (40x) v	Address (base 1) 5001 5101 5201 5301 5401 5451	(Regs/colls) 100 100 100 100 50 25	(ms) 2000 2000 2000 2000 2000 2000	State V V V V	ID 252 252 252 252 252 252 252	code 16: Multiple Registers (40x) v 16: Multiple Registers (40x) v 16: Multiple Registers (40x) v 16: Multiple Registers (40x) v 16: Multiple Registers (40x) v	(base 1) 1 201 401 601 801 1001			

Figure 6

The left side of the panel is the entry for which registers to read off the SignalFire Gateway. Specify the Slave ID (247 for the Gateway), the function code (03 Holding Registers), starting address, and number of consecutive addresses to read from that starting address.

There is an offset of 1, so a starting address of 5001 in the Ethernet/IP will actually correspond to an address of 5000. Modbus protocol also has a 125-register limit for a single read, so break up reads into smaller sections if more than 125 registers are needed from any one Slave ID.

As mentioned earlier in this application note, the Siemens S7-1200 memory is limited to 475 because of the memory of this small controller where other larger controller can provide up to 720 registers which is a limit of PROFINET.) On the Modbus (Write) section of this configuration window, enter in the Modbus array of the length of 100 for registers as a Modbus Function Code 16 for a multiple register write. After all of this data is entered, select "Apply Changes" button on the bottom right of the configuration window.

The next step is to configure the shared memory portion of the PN GW. This is the section of the PN GW where the PROFINET data is mapped. First, it must be enabled and the Shared Memory Device ID set to 252. Within six of the eight Blocks of Shared Holding Registers must be configured as shown within the figure below. For example, set the first Block to have an Address Range of 1-200, PNIO Read Enabled, Write Master(s): Modbus to Modbus and Description: 200 holding registers.

										Reboot Device Log Ou
eneral Set	ttings LAN S	ettings	Serial S	ettings M	odbus Settings	Data Mapping Setting	s Diagnostics	Device Maintenance		
odbus to N	Modbus Share	d Memory	Verify D	ata Mapping 📗 Si	hared Memory M	lap				
ared Mer	nory Configuration									, î
Enable	Shared Memory									
Shared	Memory Device ID		252							
Holding	Register Start Addre	ess (Base 1)	400001							
Coll Blo	ock Start Address (Ba	ase 1)	1							
Shared	Holding Registers									
Block	Address Range	Accept Broadcast Messages	PNIO Read Enable	Disable Data Mapping Writes On Lost PNIO Read Connection	Clear Data On Lost PNIO Connection	Write Master(s)	Serial Port / IP Address	Description		
1	1-200					Modbus to Modbus		200 holding registers	Display	
2	201-400					Modbus to Modbus		200 holding registers	Display	
3	401-600					Modbus to Modbus		200 holding registers	Display	
4	601-800					Modbus to Modbus		200 holding registers	Display	
100	801-1000		2			Modbus to Modbus		200 holding registers	Display	
5	1001-1200					Modbus to Modbus		200 holding registers	Display	
6						And the second s		0001 10 010	And in case of the local division of the loc	
6 7	1201-1400					All (Except PROFINET IO) -		200 holding registers	Display	



After all of the data is entered, select "Apply Changes" button on the bottom right of the configuration window. Once this is complete the PN GW is configured.

Siemens S7-1200 GSDML & PROFINET Network Configuration

Follow the directions of Section 5 of the PC-QRG_918_EN_01_GW-PN-MODBUS-with-TIA-Portal document (<u>link to download</u>). It will instruct one to create a new project within TIA Portal,

configure the PROFINET network, download the GSDML file and assign the IP addresses of the controller & PN GW. Within the module configuration section 5.3 of this document, refer to it as an example but follow the next section of this application note.

Configure the head modules and submodules of the PN GW GSDML within the TIA Portal software as shown in Figure 8. To view the slots for reading and writing holding registers or coils, navigate to the Device View tab. Insert the modules into slots 1.1 through 1.6. On the right pane of the TIA Portal, navigate to the Hardware Catalog and open the Modules folder. Select coils or holding registers to read or write the data. Click and drag the selected module to the first slot in the device view which is the middle top pane. Next, open the Submodules folder in the Hardware Catalog. This will display the read and write options. Select the appropriate read or write option along with the number of corresponding coils or registers. Choose a length that is equal to or greater to the number of coils or registers being read or written. Drag the read or write command appropriate subslot. The subslots correspond to the Shared Memory Blocks in the PN GW. For example, subslot 1.1 corresponds to Shared Memory Block 1.





Assign the PROFINET device, as described within the section 5.4 of the document referred to earlier and download the program. During this process, the program is downloaded to the controller and the PN GW. Both of GSDML subslots of the automation controller and the PN GW Shared Memory Blocks become synchronized. If these PROFINET network configurations are not synchronized correctly, the TIA Portal software will provide tips for assistance.

Siemens S7-1200 Tag Configuration

To configure the PROFINET tags within a TIA Portal program, go to the Project tree under the Device tab, select the PLC>PLC tags>Default tag table, then double click it. Go to Default tag table window and select the last row where it states <Add new>. Type in the tag description, select Word for Data Type and the address of the subslot, which is the data needed to monitor. The three SignalFire registers configured within the Slave Remapping Table with the SF Gateway are configured and listed within this tag table. The other tags configured within this table are the first tag of each subslot/Shared Memory Blocks used as a test of viewing data from each subslot/Shared Memory Block. These tags are shown in Figure 9.



To view the data online, connect to the PLC and select the "Monitor all" icon at the top of this Default Tag Table. In Figure 10, the data for the first three tags show the Source Voltage values read from the SignalFire Gateway in hexadecimal format. The other tags are shown as 16#FFFF Hex (65535 Decimal), automatically inserted by the SF Gateway when a register is not configured.

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I ame biolece I to the N	-720	SE Broffblet Betracel Commen		Default tan table	1571			PORT
Joel nee		SI-PIONNEL PIOLOCOI CONVER	NOT P POLI [CP0 1214C KODOMY]	Procitags Proverault tag table	[37]	a Tam 10 lises equal tasks	Insta	1
Jevices	-					a rags a oser constants (xel s)	ystem constants options	
		문 만 글 글 😳 🛄 🗱					1	
		Default tag table					 Find and replace 	
SF ProfiNet Protocol Conversion	20 ^	Name	Data type Address	Retain Acces Write Visibl,	Monitor value Comment			
Add new device		1 -0 SFGW M85000	Word %/W68		16#0D1D		Find:	
d Devices & networks		2 SFGW M85100	Word %/W69		16#1D5D			
PLC_1 [CPU 1214C AC/DC/Rly]	2 0	3 4 SFGW M85200	Word %W70		16#5DA5		(T) whole work out	
Device configuration		4 4 SFGW M85101	Word %/W268		16#FFFF			
😼 Online & diagnostics		5 43 SFGW MB5201	Word %/W468		16#FFFF		Match case	
Program blocks	•	6 43 SFGW M85301	Word %/W668		16#FFFF		Find in substructures	
Technology objects		7 43 SFGW M85401	Word %W868		16#FFFF		C Sind in hidden sents	
External source files		8 43 SEGW M85451	Word %W2		16NFFFF			
PLC tegs	0	ewan bhas					Use wildcards	
Show all tens							Use regular expressions	
Add new tag table		Committee					-	
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Conta types								
Not new tata type							- Pino	
Se viatori and force tables							People ce with	
Contine backups							sepiece with	
Device proxy data		1					-	
Program into							Whole document	
PLC alarm text lists	-						C From current position	
 Local modules 	~						C real control period	
PLC_1 [CPU 1214C AC/DC/R/y]	Z						() Selection	
 Distributed HO 	~						Replace Replace a	
PROFINETIO-System (100):	Z							
😓 Ungrouped devices							✓ Languages & resources	
▼ 📑 GWPNMODBUS [GWPN/MOD	Z						2002/02/02/02/02/02	
Device configuration							Editing language:	
S Online & diagnostics							English (United States)	
B GWPNMODBUS [GW PN/MO	~							
Holding Registers_1	~						Peferenze la source i	
al Canada antilana	- · ·						weiterence langdage.	
п	~						English (United States)	
etails view		in the second						
ne Data type	De							
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GWPNMODBUS-Holdin Hw_SubMo	284							
GWPNMODBUS-Holdin Hw_SubMo	277	1					Schoolder Electric Software I	endate.
GWPNMODBUS-Holdin Hw_SubMo	278						Schleder Clectric Software (poare
GWPNMODBUS-Holdin Hw SubMo	279						No automatic check for Updates w	as possible sind
GWPNMODBUS-Holdin Hw SubMo	280 ~						3/31/2020.	
11	>					Properties Info Diagno	ostics Please check your Internet connect	tion.

Figure 10

Online System Verification and Diagnositcs

To view Modbus communication across the RS-485 line, click on the "RS485 Modbus Details" button, and a transmission log will pop up. Figure 11 is the SignalFire Toolkit menu for a Gateway with the three nodes communicating. It is displaying each of the 125 register array requests with a message of "SUCCEEDED" in green.

COM Port: COM9 V Retenti COM	Double-click a F	low to View Registers							Auto Refresh	Refresh List
COM9 Open	Slave ID	Node Type	Node Name	RSSI (dBm)	Battery Voltage (V)	Checkin	TTL (min): Current/Max	Mainboard	Radio Firmware	Configur
Open Close Offine	3	Sent HART	Temp	-41	3.872	5 sec	2/2	0.62	2.51	
TCP Connection	6	WIOM	WIO	-41	24.084	1 min	7/7	0.22	2.50	
	10	MB Stick	100 March 100 Ma	-42	9.240	1 min	6/7	0.79	2.50	
Refresh info Apply All Settings	22	MB Stick	Modbus Transmission	Log		- 0 ×	6/7	0.79	2.50	
dio Address 64356			Response Sent to RTU: S	SlaveID=247 Opc laveID=247 Opco	code=0x03 Addr=5500 ode=0x03	Count=125				
do Address 64366 Sof 4700 ve Entres in Use 4 of 240 Sio Packets/Minute 15			Response Sent to RTU: S SUCCEEDED Read Request from RTU: Response Sent to RTU: S SUCCEEDED Read Request from RTU: Response Sent to RTU: S SUCCEEDED Read Request from RTU: SUCCEEDED	SlaveID=247 Opc laveID=247 Opco SlaveID=247 Opco laveID=247 Opco SlaveID=247 Opco SlaveID=247 Opco SlaveID=247 Opco SlaveID=247 Opco laveID=247 Opco	code=0x03 Addr=5500 ode=0x03 Addr=5500 ode=0x03 Addr=5625 ode=0x03 Addr=5375 ode=0x03 Addr=5300 ode=0x03 Addr=5000 ode=0x03 Addr=5000 ode=0x03 Addr=5000	Count=125 Count=125 Count=125 Count=1	×			
lo-Addres 6436 storen Ude 65 of 4700 re Entres in Use 4 of 240 lio Packets/Minute 15			Response Sent to RTU-S SUCCEEDED Read Request from RTU- Response Sent to RTU-S SUCCEEDED Read Request from RTU- Response Sent to RTU-S SUCCEEDED Read Request from RTU- feeponse Sent to RTU-S SUCCEEDED	SlaveID=247 Opc laveID=247 Opc laveID=247 Opc laveID=247 Opc SlaveID=247 Opc laveID=247 Opc SlaveID=247 Opc laveID=247 Opc hex Dump Sho	oode=0.003 Addr=5500 dde=0.003 Node=0.003 Addr=5625 dde=0.003 Addr=5625 dde=0.003 Addr=5375 dde=0.003 Addr=5000 dde=0.003 Addr=5000 dde=0.003 Addr=5000 dde=0.003 Addr=5000 dde=0.003 Addr=5000	Count=125 Count=125 Count=125 Count=1 Log to Tech Support BUG_20200330_101756	v			

Figure 11

The data being polled was configured within the SignalFire Gateway's Slave Register Remapping shown in Figure 12. The Slave Register Remapping window can be accessed by going under Settings.

	ouble-click a F	Row to View	Registers									🗹 Auto Refresh	Refresh List
COM9 Open	Slave ID	- No	ode Type		Node Name		RSSI (dBm)	Battery Voltage (V)	Checkin	TTL (min): Current/Max	Mainboard	Radio Firmware	Configur
Open Office	3	Sent HA	ART	Temp			-43	3.873	5 sec	2/2	0.62	2.51	
TEP Connection	6	WIOM		WIO			-43	24.084	1 min	7/7	0.22	2.50	
	10	MB Stick	k				-28	9.240	1 min	6/7	0.79	2.50	
Hefresh Info Apply All Settings	Slave Reg	aister Rem	apping								0.79	2.50	
duct GATEWAY(DIN V2)													
ply Voltage 24.358 tloader Version 2.02					-					Hetresh			
eway Version 8.26	HA	Remapped Address	Slave ID	Address	Data Type		Node Name	Register Value	e Description	<u>^</u>			
eway Version Date 23-Aug-2019	 50 	000	3	65532	16bit UINT	~	Тепр	3872	Battery Voltage	: (mV)			
lo Version 2.50	50	001	6	65532	16bit UINT	~	WIO	24084	Supply Voltage	: (mV)			
sters in Use 65 of 4700	50	002	10	65532	16bit UINT	~		9240	Battery Voltage	r (mV)			
e Entries in Use 4 of 240	50	003			16bit UINT	~							
to Packets/Minute 15	50	004			16bit UINT	~							
	50	005			16bit UINT	~							
	50	006	-		16bt UINT	~							
	50	107			16bt UINT	~							
	50	008			19bit UINT	~							
	50	009			16br UINT	~							
	50	110			16br UINT	~							
	50	111	-		16be LIINT								
	50	112			16be LIINT	-							
					THE CHINE		-			~			
	Remap Al	Registers t	to Data Type	Float		Display			Fail Mode				
	Read From	GW	Write to GW	Cle	ar Gataway	Show	Register Addres	ises in HEX	Fail with High V	alue			
the first state of the second state of the sec	Thouse Thom	un	The to on		a Galendy	L JION	riegister values	ITTEX	O Fail with Low V	alue		Bemote Co	ofiguration
DIO Settings MODBUS RS4	Landform	File	Save to File	C	lear Table	Use E	Extended Slave I	D (2-bytes)	Fail with Last V	alue (else High)			
DIO Settings MODBUS RS4	Load from												
DIO Settings MODBUS RS4 dio Network 0 • Gateway Slave I	Import from (CSV	Export to CS	/ CS	V Template			Set	Fail with Last V	alue (else Low)			Ready

Figure 12

Within the PN GW, there are diagnostics options to view serial statistics and logs and others for Modbus and PROFINET. These diagnostics snapshots are shown in the Figures 13-16.

GW PN/MODBUS	× 💽 GW MODB	US TCP/RTU 🗙 🛛 🕲	192.168.0.31	🗙 🛛 🔫 mosquitto.signal-fir	e.cloud × +		- 🗆 ×
← → C ▲ Not	secure 192.168.0.2/comm	stats.asp			· .		x Ø R :
							TAPHENIX
Firmware: 1.0.1							LICONTACT
۵							Rebot Device 1 Los Out
General Settings	LAN Settings	Serial Settings	Modbus Settings	Data Mapping Settings	Diagnostics	Device Maintenance	
Communication	Modbus Diagnostics	PROFINET IO Diagnos	tics Data Mapping I	Diagnostics			
Serial Statistics	TCP Statistics	Serial Logs					
6							Î
Serial Port Statistic	cs						
Serial Interfac	e Statistics	Port 1					
TX Byte Count	(To Device):	232					
TX Message/R	esponse Count:	29					
RX Byte Count	(From Device):	4900					
TX or RX Broa	dcast Message Count:	0					
Master/Slaves	Private Messages:	0					
Parity Error Co	unt:	0					
Framing Error	Count:	0					
Dropped Mess	age/Response	0					
Count:							
Count:	je/Response	0					
Device Timeou	its:	0					
Blocked Write	Messages:	0					
GW PN/MODBUS	× GW MODE	US TCP/RTU × 🛇	192.168.0.31	🗙 🛛 🧏 mosquitto.signal-fir	e.cloud × +		- 0 ×
← → C ▲ Not	secure 192.168.0.2/seriall	og.asp					☆ 🔗 🛛 😢 🗄
Firmware: 1.0.1							PHENIX
<u>م</u>							Reboot Device Log Out
Constal Cottings	LAN Collins	Carlal Cattlena	Madhus Californi	Data Manajara Cattinga	Discretion	Davies Heistersee	
General Settings	LAN Settings	Senai Settings	Modbus Settings	Data Mapping Settings	Diagnostics	Device Maintenance	
Communication	Modbus Diagnostics	PROFINET IO Diagnos	tics Data Mapping I	Diagnostics			
			11.0				
Serial Statistics	TCP Statistics	Serial Logs					
Serial Receive/Tran	nsmit Logs - Format: Pkt(n) ddd hh:mm:ss:mss:Tx	/Rx:(data)				
Reset Log	Refresh						
Port 1 Modbus/F	RTU Public Slave(s) Rx/Tx	Packets (first 32 packets	, max of 520 bytes):				
Packet(1) 005 03	:59:01.647:Tx>(F7h)(03h)(13h)(88h)(00h)(64h)(D4h)(19h)				
Packet(2) 005 03	:59:01.810:Rx>(F7h)(03h)(60:01.827.Tx>(F7h)(03h)(C8h)(0Dh)(1Dh)(5Dh)(A5h))(5Ch)(4Bh)(FFh)(FFh)(I C6b)	FFh)(FFh)(FFh)(FFh)(FFh)(FFI	n)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(F	Fh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(
Packet(4) 005 03	:59:01.990:Rx>(F7h)(03h)(C8h)(FFh)(FFh)(FFh)(FFh)(FFh)	(FFh)(FFh)(FFh)(FFh)(F	Fh)(FFh)(FFh)(FFh)(FFh)(FFh)	()(FFh)(FFh)(FFh)(FFh)	(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh	Eh)(EEh)(EEh)(EEh)(EEh)(EEh)(EEh)(EEh)
Packet(5) 005 03	:59:02.007:Tx>(F7h)(03h)(14h)(50h)(00h)(64h)(55h)(5	i6h)				
Packet(6) 005 03	:59:02.170:Rx>(F7h)(03h)(C8h)(FFh)(FFh)(FFh)(FFh)	(FFh)(FFh)(FFh)(FFh)(F	Fh)(FFh)(FFh)(FFh)(FFh)(FFh)	i)(FFh)(FFh)(FFh)(FFh)	(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)	Fh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(
Packet(7) 005 03	:59:02.407:Tx>(F7h)(03h)(' :59:02.571.Px>(F7h)(03h)('	14h)(B4h)(00h)(64h)(15h)(6	51h) (EEBVEEBVEEBVEEBVEEBVE	Chveehveehveehveehveehveeh			
Packet(9) 005 03	:59:03.417:Tx>(F7h)(03h)((54h)(18h)(00h)(32h)(54h)(8	(FEI)(FEI)(FEI)(FEI)(F		((EEI)(EEI)(EEI)(EEI)	(FEI)(FEI)(FEI)(FEI)(FEI)(FEI)	
Packet(10) 005 0	3:59:03.510:Rx>(F7h)(03h)	(64h)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FF	h)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(F	Fh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(
Packet(11) 005 0	3:59:03.511:Tx>(F7h)(03h)	(15h)(4Ah)(00h)(19h)(B5h)	(4Ch)	PPL (PPPL (PPPL			
Packet(12) 005 0	3:59:03.570:Rx>(F7h)(03h) 3:59:03.647:Tx>(F7h)(03h)	(32n)(FFN)(FFN)(FFN)(FFN) (13h)(88h)(00h)(64h)(D4h))(FFN)(FFN)(FFN)(FFN)((19h)	ren)(FEN)(FEN)(FEN)(FEN)(FE	n)(FFN)(FFN)(FFN)(FFN))(FFN)(FFN)(FFN)(FFN)(FFN)(F	rn)(rrn)(rrn)(rrn)(rrn)(rrn)(rrn)(rrn)(
Packet(14) 005 0	3:59:03.810:Rx>(F7h)(03h)	(C8h)(0Dh)(1Bh)(5Dh)(A5h	n)(5Ch)(4Bh)(FFh)(FFh)	(FFh)(FFh)(FFh)(FFh)(FFh)(FF	Fh)(FFh)(FFh)(FFh)(FFh	h)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)(FFh)
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Modbus Slav	e Devices																
Port 1 M	odbus/RTL	J Public S	slave(s)														
Device Id 247	Active Yes	Tx Req 22	Rx Rsp 22	Time- outs	Last Rsp Time 0.06 sec	Avg Rsp Time 0.13 sec	Min Rsp Time 0.06 sec	Max Rsp Time 0.16 sec	Tx Broadcasts 0	Invalid Rsp 0	Error Rsp 0	Blocked Writes	i				
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Figure 15

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Figure 16

Conclusion

The PN GW is the least complicated PROFINET-to-Modbus-RTU Gateway to setup and has the most diagnostics to assist troubleshooting issues on the market. To speed the configuration of this gateway up, SignalFire has made configuration files available online (<u>click here to</u> <u>download</u>). The files include configuration for the PN GW, the six subslots of the PN GW GSDML for a Siemens S7-1200 PLC TIA Portal, and another two files for larger Siemens PLCs.

To get an PROFINET Gateway up and running, the major steps are as below.

- 1) Load the Phoenix Contact Phoenix Contact PROFINET to Modbus RTU Gateway configuration files
- 2) Download the SignalFire Gateway PROFINET to Modbus RTU TIA Portal PLC Controller file into your S7-1200 PLC. NOTE: The TIA Portal PLC program may need to be modified per the specific automation controller used plus the GSDML may need to be added.
- 3) Configure the addresses from each wireless node on a SignalFire Gateway into the Slave Register Remapping table.