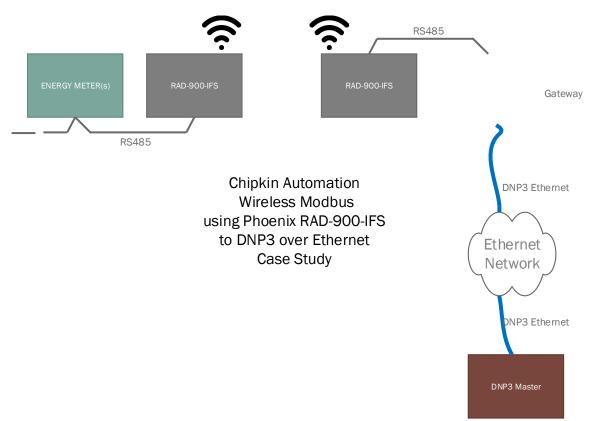


## Case Study Wireless Modbus using Phoenix RAD-900-IFS to DNP3 over Ethernet

In this project - the customer could not bring an Ethernet access point to the location where the power meters were installed. A wireless solution was required as per the block diagram below.





### Introduction

Running new conduit and cable was impossible but getting the data was essential.

In this application the inconvenience of a location without a network drop was overcome using a wireless solution from Phoenix Contact. RS485 Modbus RTU power meters located in a location where running new conduit would have been expensive and possibly disruptive.

The problem arises because you have limited choices when you install new power meters on existing equipment.

## Chipkin Automation Systems

Protocol to protocol – Enabling the IOT Internet of Things

Products that support approx. 140 major protocols. If we don't have a solution for you, we will make you one. More than a dozen customers a year have a custom driver developed for them.

Chipkin are highly regarded for their outstanding support. System integration isn't always trivial even if that is what they tell you.

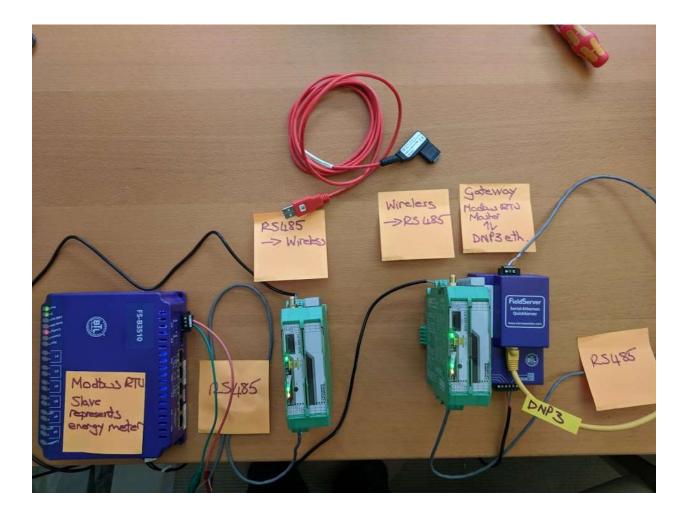
The Chipkin BACnet stack comes with a 100% copyright infringement indemnity to make corporate lawyers happy. Customers get direct access to the stack developers for coaching and problem solving.



### Lab Setup

Purple unit on left is a Modbus RTU server device. In this case a gateway has been programmed to be a Modbus Server, emulating a series of Power Meters with the same set of registers and points as the installed energy meters at the customer's site.

The purple unit on the right is a gateway configured to read Modbus data from a series of RS485 connected Energy meters and to serve the data to a remote monitoring station that uses DNP3.0 Ethernet over TCP/IP.





### Requirements

Wireless module - RAD-900-IF



https://goo.gl/j6VyAS

PSI-CONF Software

https://goo.gl/9gTKAz

PSI-CONF USB Cable – Proprietary cable is required

https://goo.gl/na78QX

QS-1010 Dual RS485 gateway

http://store.chipkin.com/products/fieldserver-devices/quickserver-gateways



### Wireless Module Configuration

#### Step 1 – Launch the software

	- 🗆 X
Device Selection Welcome! Prease select the devices to be configured:	
DeviceNet Modem Wireless	
(1)         (1) <td>900mm 2702878 RAD-900-FS-AU</td>	900mm 2702878 RAD-900-FS-AU
	MAD-300-IFS-40
2901540 2901541 2904665 RAD-9004FS RAD-9604FS RAD-96644FS	
	Next
	Weicomel           Prese select the device to be configured:           DeviceNet         Modem         Wireless           Expansion         Blastotting         1000000000000000000000000000000000000

Step 2 – Connect the cable. Read from the Devices

PSI-CONF 2.50		- 🗆 X
<u>File Language Extras ?</u>		
Device Selection	Network Project	
Connection Mode	14 - 15 m - 24 - 15 - 15	
Online Local		
Offline		
Network Project	Create new network project	Current network project file
Wizard	New	-
Individual Settings	New	
Local Device		
Diagnostic		Edit in Wizard
Transfer		
Update firmware	Open saved network project from file	
	Cipen	Edit in Individual Settings
	Read physical network	Compare physical network with project file
PHENIX		
Current Device: RAD-300-IFS Order No.:		
2901540 onnection: -	Firmware Version: Device Name: Serial No.:	

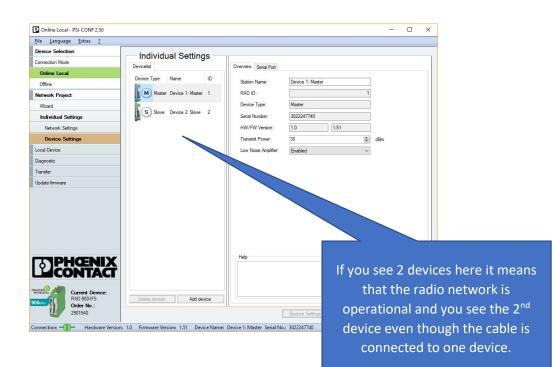


#### Step 3 : Edit Individual Settings

<u>File Language Extras ?</u>					No problem.
Device Selection	Individual S	ettings			working the
Connection Mode	Overview [Senal Port]	loungs			
Online Local	Overview [donarrow]				up. Carry on,
Offline	Interface Type:	RS485	~		
Network Project	Data Rate:	9600	~	bit/s	of the radio
Local Device	Data Package Size:	1400	* *		and a set of a state
Individual Settings	Serial Parity:	None	~		repeating th
Network Settings	Serial Stopbits:	1	~		
Device Settings	Serial Databits:	8	Ý		
Set Factory Defaults	TFrameEnd:	20	l.	٦	
Diagnostic	TideMin:	39		} bit ∼	
Transfer	Serial Handshake:	None	~	-	
Update firmware		10000			
opdate inniware					
upoare imiware	Help Current Interface Typ	e. There is a choice betv	veen an RS-232 or R	S-485 interface. The type of seria	I interface is specified by the application.
	Current Interface Typ	interface the terminating	reen an RS-232 or R redistors must be acti	S-485 interface. The type of seria valed if necessary, it can be act	I interface is specified by the application valed via two DIP switches, located on the
PHŒNIX	Current Interface Typ When using the RS-485	interface the terminating	reen an RS-232 or R redistors must be acti	S-485 interface. The type of seria valed of necessary. It can be act	I interface is specified by the application, vated via two DIP exetches, located on the

#### If you see 1 device.

No problem. Once things are working the 2<sup>nd</sup> device will show up. Carry on, connecting to each of the radio modules and repeating the steps.





Step 4: Make Sure the RS485 settings match the settings for the Energy Meters and The Gateway.

ile Language Extras ?						
Nevice Selection	Individual Settin					
onnection Mode	Devicelist	iys	Overview Serial Port			
Online Local		lines.	Overview [Jenal Fort]			
Offline	Device Type Name	ID	Interface Type:	RS485	~	
twork Project	Master Device 1: Mast	er 1	Data Rate:	9600	~	bit/s
Vizard			Data Package Size:	1480	÷	
ndividual Settings	S Slave Device 2: Slave	2	Serial Parity:	Even	~	
Network Settings			Serial Stopbits:	1	~	
Device Settings			Serial Databits:	8	~	
cal Device			TFrameEnd:	20	1	٦
ignostic			TidleMin:	39	\$	} bit ~
ansfer			Serial Handshake:	None	~	<b>F</b>
pdate firmware				Langed 617		
			Help			
CONTACT			there must be a certain t time TidleMin must be in within a frame. Idle refers to the state, w	nimum time between two ime, so it does not come t any case larger, as the m where no activities take pla wo consecutive frames is	o a concatenation of aximum distance betw ace on an interface, i	several frames. The ween the characters
Current Device: RAD-900-IFS Order No.:	Delete device Add c	levice				
2901540			[	Restore Settings	Save	Transfer

levice Selection				
onnection Mode	Individual Settings			
	Devicelist	Overview Serial Port		
Online Local	Device Type Name ID	Station Name:	BAD-900-IES	ĩ
Offine	Master RAD-900-IFS 1	RAD ID:	http://www.ro	]
etwork Project	Master RAD-900-IFS I		1	
Wizard	S Slave RAD-900-IFS 2	Device Type:	Master	
Individual Settings		Serial Number:	3022221469	
Network Settings		HW/FW Version:	1.0 1.80	]
Device Settings		Transmit Power:	30	dBm
ocal Device		Low Noise Amplifier:	Disabled ~	
iagnostic				
ansfer				
lpdate firmware				
DPHŒNIX		Help		



Online Local - PSI-CONF 2.50					
<u>Eile Language Extras ?</u>					
Device Selection	Individual Settings				
Connection Mode	Devicelist	Overview Serial Port			
Online Local	Device Type Name ID				
Offline	lit _	Interface Type:	RS485	~	
Network Project	Master Device 1: Master 1	Data Rate:	9600	~	bit/s
Wizard	S Slave Device 2 Slave 2	Data Package Size:	1480	\$	
Individual Settings	S Slave Device 2: Slave 2	Serial Parity:	Even	~	
Network Settings		Serial Stopbits:	1	~	
Device Settings		Serial Databits:	8	~	
Local Device		TFrameEnd:	20	÷.	٦
Diagnostic		TidleMin:	39	\$	} bit ∨
Transfer		Serial Handshake:	None	~	
Update fimware			La concentra de		
		Help			
	Delete device Add device				
2901540			Bestore Settings	Save	Iransfer
Connection: - Hardware Version	n: 1.0 Firmware Version: 1.51 Device Name:	Device 1: Master Serial No.	: 3022247740		

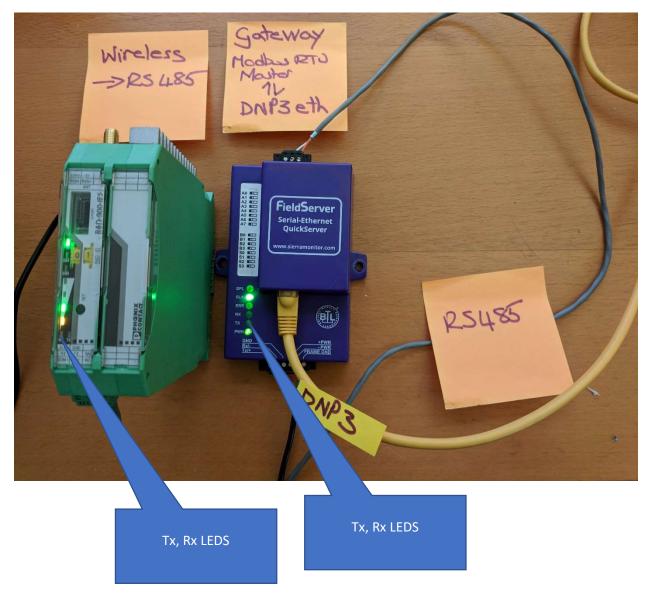
<u>Eile L</u> anguage <u>E</u> xtras <u>?</u>								
Device Selection	Individual Setti	nae						
Connection Mode	Devicelist	igs	Overview Serial Port					
Online Local	Device Type Name	ID	Senar or	12		2		
Offline	BR		Station Name:	RAD-900-IFS				
etwork Project	M Master RAD-900-IFS	1	RAD ID:	2		\$		
Wizard			Device Type:	Slave		~		
Individual Settings	S Slave RAD-900-IFS	2	Serial Number:	3022247749				
Network Settings			HW/FW Version:	1.0	1.80			
Device Settings			Transmit Power:	30		\$	dBm	
ocal Device			Low Noise Amplifier:	Disabled		~		
liagnostic								
ransfer								
lpdate firmware								
PHENIX			Help					
Current Device:	Delete device Add	device	1					
Order No.:								



Online Local - PSI-CONF 2.50					- 0	×
<u>File L</u> anguage <u>E</u> xtras <u>?</u>						
Device Selection	Network Setti	nas				
Connection Mode	Radio Network	igo				
Online Local			1			
Offline	Use Confstick:	Off	~			
Network Project	RF Band:	Band #1	~			
Wizard	Network ID:	126	-			
Individual Settings	Transmissions:	3	-			
Network Settings	RF Encryption:	Disabled	~			
Device Settings	Encryption Key:			min. 4, max 16 characters		
Local Device	Data rate of the radio interface:	125	~	kBit/s		
Diagnostic	Network:	Point To Point / Star	~			
Transfer	Network Application:	Serial data	~			
Update firmware	Modbus Address:	1				
	Watchdog:	Enabled 10		ms		
	Blocked frequency ranges:	Range 1: 902-903 MHz           Range 2: 903-904 MHz           Range 3: 904-905 MHz           Range 4: 905-906 MHz           Range 5: 906-907 MHz	¢ >			
PHENIX	Help					
LICONTACT				This is the mode tha	tis	
				required to relay set	rial	
Current Device: RAD-900-IFS				data. In this case th	ne	
Order No.:				serial data happens	to	
2901540				be Modbus. Do not	ranere	r
onnection: – Hardware Versio	on: 1.0 Firmware Version: 1.51	Device Name: Device 1: Ma	aster Serial N	NO.: 30		
				confused with the		
				Modbus Mode of t	ne	
				Radio module.		



#### Step 5 – Check for communications





#### Step 6 : Check for Data Transfer

The one screen represents the server data (right) and the other screen represents the data inside the gateway.

Data Array Data Array Name Scan_Interval Data_Array_Length Data_Format DA_Function_After_Store Data_Array_Function Oldest		1.86	Ms		ay 1 / 3 DA_U16 50 UInt10							*	Data Ar Data Ar Scan_In Data_Ar Data_Fo DA_Func Data_Aru Oldest	ray ray_Nam terval ray_Ler rmat tion_Af	ngth fter Sta			Data Ar	DA_UIO 258 UIntid	
0: 10: 20: 30: 40:	0 10 20 0 8	999 11 0 0	2 12 8 8	3 13 0 0 0	4 14 0 0	5 15 0 0	6 16 9 9	7 17 0 0 0	8 18 0 0 0	9 19 0 0		0; 10; 20; 30; 40; 50; 60; 70; 80; 90; 100; 110;	0 10 20 30 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	90111100000 <b>0</b> 00000	* 12 22 12 0 0 0 0 0 0 0 0	7 13 23 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	* 14 14 16 0 0 0 0 0 0 0 0	5 15 25 35 0 0 0 0 0 0	144	
•)								in set		and and a										



Images and Videos

https://photos.app.goo.gl/f6pM6OVaSWSgib4j2

All Vid file names to begin with Chipkin - Wireless Modbus using Phoenix RAD-900-IFS to DNP3 over Ethernet and Quickserver protocol gateway

VID\_20171117\_163155

Data Transfer as indicated by the Tx,Rx LEDS and the number of message and bytes sent and received by the gateway.

VID\_20171117\_163116

Data Transfer as indicated by the Tx,Rx LEDS

VID\_20171117\_155333

Data transfer shown by displaying server (energy Meter) data and the data in the Modbus master of the gateway.

VID\_20171117\_155300

VID\_20171117\_153331

Data Transfer as indicated by the Tx,Rx LEDS

Keywords Wireless Modbus Phoenix RAD900IFS Modbus Phoenix RAD900IFS DNP3 Phoenix RAD900IFS protocol



Phoenix RAD900IFS integration Wireless Energy Data Energy meter integration using wireless Remote monitoring Modbus DNP3