

# Configuring RAD-900-IFS with GW MODBUS TCP/RTU for Modbus TCP I/O Emulation

Published: 2018-10-22

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### Introduction

#### **Objectives:**

This document covers configuring the RAD-900-IFS wireless module and the GW MODBUS TCP/RTU 1E/DB9 for I/O to MODBUS TCP communication between a master site and two remote slave sites.





#### **Requirements:**

The following hardware and software was used in the development of this procedure

- Wireless Module 2901540 RAD-900-IFS (Quantity 3)
- Combination I/O modules 2901533 RAD-DAIO6-IFS (Quantity 2)
- Antenna 2885676 RAD-ISM-900-ANT-OMNI-RPSMA (Quantity 3)
- Communication Gateway 2702764 GW MODBUS TCP/RTU 1E/1DB9 (Quantity 1)
- Software
  - PSI CONF 2.60 or higher available at www.phoenixcontact.com/catalog/2901540
  - I IPAssign\_v1.1.3 available at www.phoenixcontact.com/catalog/2703981
  - o Wintech Modscan 32 available at https://www.win-tech.com/html/demos.htm
    - Note: This is a trial version

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## Procedure

#### Configuring the RAD-900-IFS wireless modules for PLC Mode communication

- Set the yellow thumbwheels of the three RAD-900-IFS modules to 01, 02 and 03 and reference the data sheet for power connections. Set the white thumbwheels of the RAD-DAIO6-IFS modules to 01 and 02. Connect the RAD-DAIO6-IFS modules to the RAD-900-IFS modules via the TBUS connectors supplied in the box. The RAD-DAIO6-IFS module with thumbwheel setting 01 should be connected to RAD-900-IFS module with yellow thumbwheel setting 02. The RAD-DAIO6-IFS module with thumbwheel setting 02 should be connected to RAD-900-IFS module with yellow thumbwheel setting 03. Apply power to all three wireless modules.
- 2. Open PSI-CONF 2.60 and select the 900 MHz selection under the Wireless tab. Click 'Next'

Device Selection Welcome! Please select the device to be con DeviceNet Moder	igured:	]						
2313559 FL COMSERVER WL 231	Bluetooth	2702184 RAD-RS485-IFS	2,4GH2 JP 2702863 RAD-2400-IFS-JP	2702878 RAD-9004FS-AU	2901540, 2702877 ND-9004FS, B	2,4GHZ 2901541 RAD-2400-IFS	2904909 RAD-968-IFS	
					Ŭ			

#### 3. Click on 'New'

Consta new network remiert	Correct network context file
New New	
	Edit in Waard
Open saved network project from file	Edit in Individual Settings
Read physical network	Compare physical network



4. Select 'Point To Point / Star' and click 'Next'



5. Set the number of slaves to '2' and click "OK'.



6. On Wizard, Step 2, confirm information is correct and click 'Next'.



7. On 'Wizard, Step 3', select 'PLC/Modbus RTU mode' in the 'Application of wireless network section'. Leave the Modbus address at 1. In PLC mode, the Modbus address will function as a single Modbus ID for the entire wireless network. For a simple bench test the rest of the settings can be left unchanged, but depending on the environment that the system will be installed in the "Network Settings' and 'Network speed/distance relation' settings may need to be adjusted. Click 'Next'





8. On 'Wizard, Step 4', leave the settings at default and click 'Next'.

9. On 'Wizard, Step 5', review the data and click 'Next'



10. On 'Wizard, Step 6', make sure your programming cable is connected from your computer to the wireless module with Yellow thumb wheel setting '01'. Click 'Transfer' to send the configuration to the wireless modules. You will be prompted to save your configuration. Choose a file location to save your program.

Wizard, Step 4					
Step 1 Project configuration	Step 2 Device configuration	Step 3 Radio Network configuration	Step 4 Serial configuration	Step 5 Settings overview	Step 6 Safe & transfer
Wizard, Step 6					
Step 1 Project configuration	Step 2 Device configuration	Step 3 Radio Network configuration	Step 4 Serial configuration	Step 5 Settings overview	Step 6 Safe & transfer
N Lat	Transfer Not transferred at transfer date:	Save Save as Not saved Last save date:			

#### 11. When prompted, click 'OK' to go online to the wireless module

			Save		
Transfer			Save as		
	Information				23
Not transferred		To use th	ne transfer function the connection	mode will now be switched to onlin	ie mode.
Last transfer date: -			ОК	Cancel	



12. Click on 'Start Transfer' under 'Local Transfer' to send the configuration to each device. Once you transfer the configuration to one wireless module, move your programming cable to the next wireless module. The Transfer Window will show you which module you are connected to and which modules have had the configuration transferred.

Wizard, Step 6					
Step 1 Project configuration	Step 2 Device configuration	Step 3 Radio Network configuration	Step 4 Serial configuration	Step 5 Settings overview	Step 6 Safe & transfer
Ŀ	Choose TransferDialog	aferred to the device connected to the P	E		
Cancel					Back Finish
Cancel					Back Finish
Cancel Wizard, Step 6 Step 1 Project configuration	Step 2 Device configuration	Step 3 Radio Network configuration	Step 4 Serial configuration	Step 5 Settings overview	Back Prish
Cancel Wizard, Step 6 Step 1 Project configuration	Step 2 Device configuration	Sep 3 Rado Network configuration	Step 4 Serial configuration	Sep 5 Settings overview	Step 6 Safe & transfer



13. Once you have sent the configuration to each wireless module, the wireless network configuration is complete. The RF Link LEDs on the wireless modules should illuminate. On the master wireless module (Yellow Thumbwheel on 01) should have one amber LED illuminated (assuming there is more than one slave wireless module in the network) and depending on the antennae on the slave wireless modules, there should be an amber and module green LEDs illuminated. Red ERR LEDs will be flashing at this point since there is no Modbus communication.

The wireless network configuration is complete and is set up for PLC Mode communication.

# Configuring the GW MODBUS TCP/RTU 1E/DB9 module for Modbus RTU to TCP communication

- 1. The GW MODBUS TCP/RTU 1E/DB9 comes with a default IP address of 192.168.254.254. Set your computer's IP address in the same network as the GW MODBUS TCP/RTU 1E/DB9 (192.168.254.XXX). Reference the data sheet for power connections and apply power to the GW MODBUS TCP/RTU 1E/DB9.
- For the GW MODBUS TCP/RTU 1E/DB9 that will be connected to the master RAD-900-IFS wireless module (yellow thumbwheel 01), there is no configuration needed. The default settings of the GW MODBUS TCP/RTU 1E/DB9 are compatible with the settings made on the master RAD-900-IFS.

The configuration for the GW MODBUS TCP/RTU 1E/DB9 is now complete.

#### Making the physical connections

In this setup, there are three stations, the master station, slave station 1 and save station 2. Connect an antenna to each wireless module and make the physical connections for the data cables and I/O modules for each station shown below.

#### **Master Station**

- 1. Connect a RJ45 cable from the computer to the GW MODBUS TCP/RTU 1E/DB9 with IP address 192.168.254.254.
- 2. Connect a Straight through RS232 cable from GW MODBUS TCP/RTU 1E/DB9 to RAD-900-IFS with yellow thumbwheel of '01'.





#### Slave Station 1

1. Verify the RAD-DAIO6-IFS module with thumbwheel setting 01 is connected to RAD-900-IFS module with yellow thumbwheel setting 02.



#### **Slave Station 2**

1. Verify the RAD-DAIO6-IFS module with thumbwheel setting 02 is connected to RAD-900-IFS module with yellow thumbwheel setting 03.





Your setup is complete and you are ready to verify communication. Your network layout should match the drawing below.



#### Verifying communication with Modscan32

- 1. Launch Modscan32 on the computer connected to the Master Station's GW MODBUS TCP/RTU 1E/DB9.
- 2. Verify your computer has a unique IP address in the same network as the GW MODBUS TCP/RTU. (192.168.254.XXX).
- 3. Make the following settings in the 'ModSca1' window.
  - a. Device Id: 1
  - b. MODBUS Point Type: 03: Holding Register
  - c. Address: 0011
  - d. Length: 1

ModScan32 - ModScan1	
File Connection Setup View Window Help	
Address: U011 Device Id: 1 MoDBUS Point Type Valid Slave Responses: 0 Length: 1 HD2: HOLDING REGISTER - Reset Cirs reservice NOT CONNECTED! ==	
40011: (0000000000000)	
р	

4. Click on the 'Connection' drop down and click 'Connect'.



ModScan32 - ModSca1	
File Connection Setup View Window Help	
Connect Disconnect	
Auto-Start	
QuickConnect     Device Id:     1       Address:     0011     MoDBUS Point Type       Length:     1     03: HOLDING REGISTER         Reset Ctrs	
** Device NOT CONNECTED!           40011:         <00000000000000000000000000000000000	

- 5. Click on the 'Protocol Selections' button.
- Verify the 'Transmission Mode' is set to 'RTU' and the 'Force Modbus command 15 and 16.....' box is checked. In PLC Mode, Radioline supports Modbus read function codes 03 and 04 and Modbus write function code 16. Click 'OK'

Connection D	Details	23
Conn	Modbus Protocol Selections	
- Configura	Transmission Mode STANDABD DANIEL/ENRON/OMNI O ASCII O RTU O ASCII O RTU	
Baud F Word Lei	Slave Response Timeout 2000 (msecs)	
P	Delay Between Polls 2000 (msecs)	
	Force modbus command 15 and 16 for single-point writes. (To be used in cases where the slave does not support the single-point write functions 05 and 06.)	
	OK Cancel	



7. Configure the 'Connect Using' drop down for 'Remote Modbus TCP Server' and the 'IP Address' for the Master GW MODBUS TCP/RTU 1E/DB9 (192.168.254.254). Click 'OK'.

Connection Detai	ils X						
Connect U:	sing:						
$\left( \right)$	Remote modbusTCP Server						
	IP Address: 192.168.254.254						
	Service Port: 502						
Baud Rate: Word Length: Parity: Stop Bits:	19200       ▼         8       ▼         EVEN       ▼         1       ▼         Delay       0         ms after RTS before transmitting first character before releasing RTS						
Protocol Selections OK Cancel							



 A connection to the Master RAD-900-IFS module via the IP address of the GW MODBUS TCP/RTU 1E/DB9, 192.168.254.254 should now be established. The 'Number of Polls' and 'Valid Slave Responses' should be incrementing.

ng ModSca1	
Address: 0011 Device Id: 1 Number of Polls: 4	
Length: 1 03: HOLDING REGISTER  Reset Ctrs	
40011: <000000000000000>	

9. Make sure the Binary view is selected in Modscan and then double click on the 0's next to 48011. You can then toggle the output register of the RAD-DAIO6-IFS with thumbwheel address 01. Once you check the boxes in the 'Write Register' window and click 'Update', an LED on the RAD-DAIO6-IFS should illuminate.

File Connection Setup View Window Help		
ModSca1		
Address: 0011 Device Id: 1 MODBUS Point Type Length: 1 03: HOLDING REGISTER 40011: 00000000000000000	Ils: 127 Write Register Node: 1 Address: 11 Bit Pattern Update Cancel	



10. To communicate with the RAD-DAIO6-IFS module with thumbwheel 03, open a new connection window and follow directions 3-7 using address 0021 instead of 0011.

File Connection Setup View Window Help		
ModScal		
n ModSca2		
Address: 0021 Device Id: 1 MODRUS Point Type Valid Slave Responses: 2014		
Length: 1 103: HOLDING REGISTER  Reset Ctrs		
40021: <0000000000000>		

11. Your setup is complete and Modbus I/O Emulation via Modbus TCP has been established.

# Disclaimers and notes

- 1. The purpose of this document is to provide basic configuration settings to show communication. Each application has different requirements and those need to be discussed before implementing any solution.
- 2. The setup described in this document, whether being simulated with Modscan or with a standard PLC, will only pass Modbus data from one point to another.
- This setup was a point to multi-point setup in a bench test environment. The addition of repeaters and RF interference can cause added latency and should be expected. If there are concerns about these items a temporary installation should be tested.
- 4. The installation of these components in a real application is at the discretion of the user.