ProtoAir FPA-W44
Start-up Guide

For Interfacing Chiltrix Products:

Chiller, Fan_Coils, Fan_Coils_Prior

To Building Automation Systems:

BACnet MS/TP, BACnet/IP, Modbus TCP/IP, Modbus RTU and Cloud

APPLICABILITY & EFFECTIVITY

Explains Chiltrix ProtoAir hardware and how to install it.

The instructions are effective for the above as of June 2019.

Document Revision: 1.C
Web Configurator
Template Revision: 3

Technical Support

Thank you for purchasing the ProtoAir for Chiltrix.

Please call or email us for technical support of the ProtoAir product.

Support Contact Information:

HotSpot Energy Inc.
4021 Holland Blvd.
Chesapeake VA 23323

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(757) 410-8640

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www.hotspotenergy.com

Synopsis

The ProtoAir Gateway ships with device profiles pre-programed. It is set up as a Wi-Fi Access Point (AP) so it can be found with a Wi-Fi enabled Laptop to get the registration process started.

The first step is the physical layer. Once the unit is wired to your Chiller and any other Modbus Enabled products, perhaps, even a Psychrologix controller, then power can be applied to the system. The power LED should glow. The Psychrologix Controller should function as normal, passing all communications traffic through the ProtoAir Gateway to the Chiller(s) and any other Modbus enabled items. At this point one should see much activity in the Transmit and Receive LEDs on the unit and the SS LED should blink about once every second.

The next step is to connect the laptop (pc) to the gateway though the unit's Wi-Fi Access Point (AP). Once this connection is made, the profile(s) loaded aboard the gateway can be activated. At this point, your chiller can be monitored and to a large degree, controlled by your laptop.

The third step is to setup the Network configurations to permit the gateway to gain direct access to your Wi-Fi router making it a Wi-Fi client, capable of its own communication thought your network and out to the internet, without the laptop, providing remote control and monitoring of you system.

Using the Cloud, one can monitor, graph and analyze your system's function and to trouble shoot any issues. Alarms can be set. Control commands can be issued and all systems can be monitored from anywhere in the world or from a BAS via BACnet-iP or BACnet-MSTP.

Quick Start Guide

1. Record the information about the unit. (**Section** 3.1)
2. Configure COM settings for the device to connect to the ProtoAir. (**Section** 3.3)
3. Connect the ProtoAir 3 pin RS-485 R1 port to the RS-485 network connected to each of the devices. (**Section** 4.1)
4. Connect the ProtoAir 3 pin RS-485 R2 port to the field protocol cabling. (**Section** 4.2)
5. Connect power to the ProtoAir 3 pin power port. (**Section** 4.5)
6. Connect a PC to the ProtoAir via Ethernet cable or by the ProtoAir's Wi-Fi Access Point. (**Section** 5)
7. Use a web browser to access the ProtoAir Web Configurator page to select the profile of the device attached to the ProtoAir and enter any necessary device information. Once the device is selected, the ProtoAir automatically builds and loads the appropriate configuration. (**Section** 6)

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1 CERTIFICATION

1.1 BTL Mark – BACnet®[1] Testing Laboratory

The BTL Mark on ProtoAir is a symbol that indicates that a product has passed a series of rigorous tests conducted by an independent laboratory which verifies that the product correctly implements the BACnet features claimed in the listing. The mark is a symbol of a high-quality BACnet product.

Go to www.BACnetInternational.net for more information about the BACnet Testing Laboratory. Click here for the BACnet PIC Statement.

[1] BACnet is a registered trademark of ASHRAE

2 INTRODUCTION

2.1 ProtoAir Gateway

The ProtoAir wireless gateway is an external, high performance **building automation multi-protocol gateway** that is preconfigured to automatically communicate between Chiltrix's devices (hereafter simply called "device") connected to the ProtoAir and automatically configures them for BACnet/IP, BACnet MS/TP, Modbus RTU and Modbus TCP/IP.

It is not necessary to download any configuration files to support the required applications. The ProtoAir is pre-loaded with tested profiles/configurations for the supported devices.

FPA-W44 Connectivity Diagram:

The ProtoAir can connect with the Cloud. The Cloud allows technicians, the OEM's support team and the Chiltrix support team to remotely connect to the ProtoAir. The Cloud provides the following capabilities for any registered devices in the field:

- Remotely monitor and control devices.
- Collect device data and view it on the Cloud Dashboard and the Smart Phone App.
- Create user defined device notifications (alarm, trouble and warning) via SMS and/or Email.
- Generate diagnostic captures (as needed for troubleshooting) without going to the site.

3 PROTOAIR SETUP

3.1 Record Identification Data

Each ProtoAir has a unique part number located on the side or the back of the unit. This number should be recorded, as it may be required for technical support. The numbers are as follows:

Model	Part Number
ProtoAir	FPA-W44-1841

Figure 1: ProtoAir Part Numbers

- FPA-W44 units have the following 3 ports: RS-485 + Ethernet + RS-485

3.2 Point Count Capacity and Registers per Device

The total number of registers presented the device(s) attached to the ProtoAir cannot exceed:

Part number	Total Registers
FPA-W44-1841	5,000

Figure 2: Supported Point Count Capacity

Devices	Registers Per Device
Chiller	203
Fan_Coils	37
Fan_Coils_Prior	29

Figure 3: Registers per Device

3.3 Configuring Modbus Device Communications

3.3.1 Input COM Settings on Any Device Connected to the ProtoAir

- **Any connected serial device MUST have the same baud rate, data bits, stop bits, and parity settings as the ProtoAir.**
- Figure 4 specifies the device serial port settings required to communicate with the ProtoAir.

Port Setting	Device
Protocol	Modbus RTU
Baud Rate	9600
Parity	None
Data Bits	8
Stop Bits	1

Figure 4: COM Settings

3.3.2 Set Node-ID for Any Device Attached to the ProtoAir

- Set Node-ID for the device attached to ProtoAir. The Node-ID needs to be uniquely assigned between 1 and 255.
- Document the Node-ID that is assigned. The Node-ID assigned is used for deriving the Device Instance for BACnet/IP and BACnet MS/TP (**Section 6.3**)

NOTE: The Modbus TCP/IP field protocol Node-IDs are automatically set to be the same value as the Node-ID of the device.

3.4 Attaching the Antenna

Wi-Fi Antenna:

Screw in the Wi-Fi antenna to the front of the unit as shown in Figure 46.

NOTE: Using an external antenna is also an option. An external antenna can be plugged into the SMA connector. The best antenna for the job depends on the range, topography and obstacles between the two radios.

4 INTERFACING PROTOAIR TO DEVICES

4.1 Device Connections to ProtoAir

The ProtoAir has a 3-pin Phoenix connector for connecting RS-485 devices on the R1 port. This port is for the CX-34(s) (A="+" and B="-" terminals), V-18 controller (if applicable), or any other Modbus slave devices.

NOTE: Use standard grounding principles for RS-485 GND.

Device Pins	ProtoAir Pin Label	Pin Assignment
RS-485 + "A"	TX+	RS-485 +
RS-485 – "B"	RX-	RS-485 -
RS-485 GND	GND	RS-485 GND

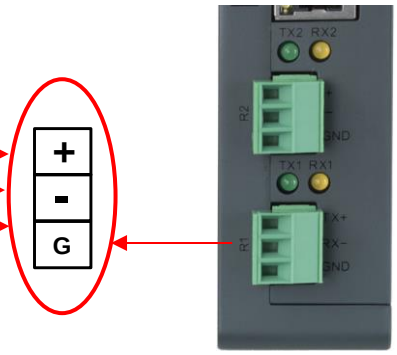


Figure 5: RS-485 Connections from Devices to the ProtoAir

4.2 Wiring Field Port to RS-485 Serial Network

- Connect the RS-485 network wires to the 3-pin RS-485 connector on the R2 port. (**Figure 6**). This port connects to the Psychrologix controller's A+/B- terminals (if applicable).
  - Use standard grounding principles for RS-485 GND
- See **Section 5** for information on connecting to an Ethernet network.

BMS Wiring	ProtoAir Pin Label	Pin Assignment
RS-485 + "A"	+	RS-485 +
RS-485 – "B"	-	RS-485 -
-	GND	RS-485 GND

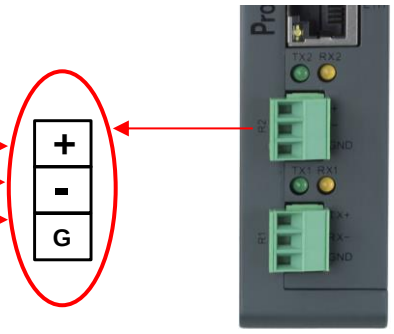


Figure 6: Connection from ProtoAir to RS-485 Field Network

NOTE: The ProtoAir will act as a Modbus master and connect to the Modbus RTU slave devices on the R1 port. If there is an additional Modbus master, such as the Psychrologix Controller, this master will connect to the R2 port of the ProtoAir and can poll all of the Modbus RTU slave devices through the ProtoAir.

4.3 Bias Resistors

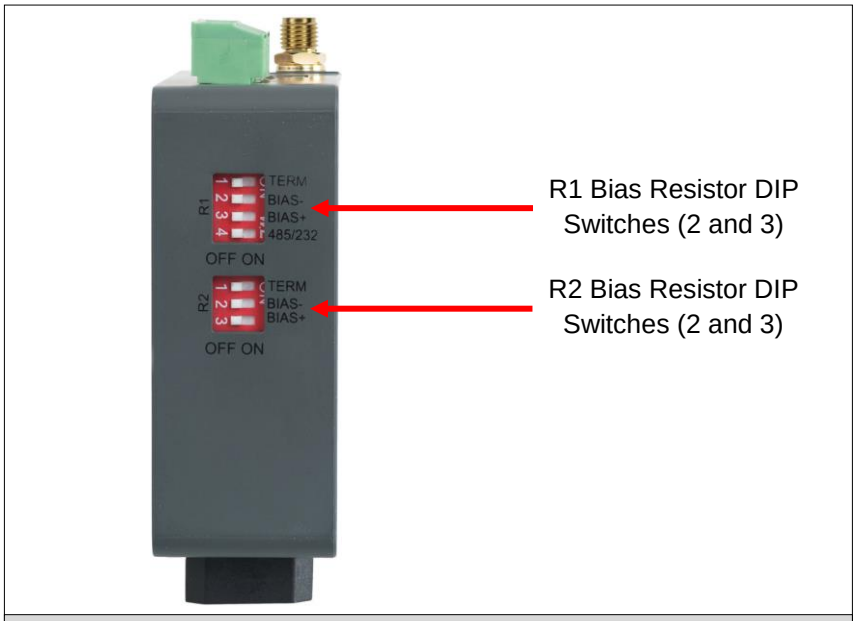


Figure 7: Bias Resistor DIP Switches

To enable Bias Resistors, move both the BIAS- and BIAS+ dip switches to the right as shown in Figure 7.

The ProtoAir bias resistors are used to keep the RS-485 bus to a known state, when there is no transmission on the line (bus is idling), to help prevent false bits of data from being detected. The bias resistors typically pull one line high and the other low - far away from the decision point of the logic.

The bias resistor is 510 ohms which is in line with the BACnet spec. It should only be enabled at one point on the bus (for example, on the field port were there are very weak bias resistors of 100k). Since there are no jumpers, many gateways can be put on the network without running into the bias resistor limit which is < 500 ohms.

NOTE: See www.ni.com/support/serial/resinfo.htm for additional pictures and notes.

NOTE: The R1 and R2 DIP Switches apply settings to the respective serial port.

NOTE: If the gateway is already powered on, DIP switch settings will not take effect unless the unit is power cycled.

4.4 Termination Resistor

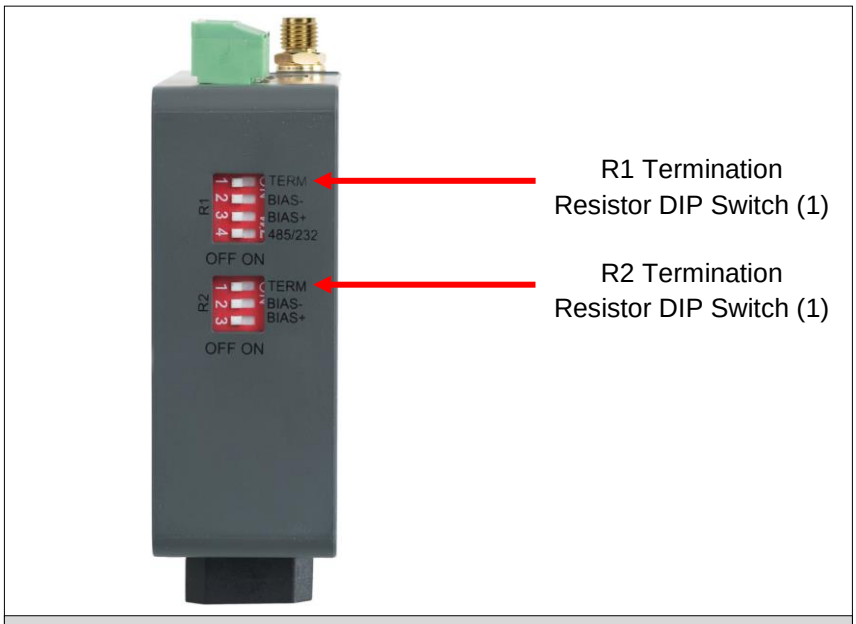


Figure 8: Termination Resistor DIP Switch

If the ProtoAir is the last device on the serial trunk, then the End-Of-Line Termination Switch needs to be enabled. **To enable the Termination Resistor, move the TERM dip switch to the right as shown in Figure 8.**

Termination resistor is also used to reduce noise. It pulls the two lines of an idle bus together. However, the resistor would override the effect of any bias resistors if connected.

NOTE: The R1 and R2 DIP Switches apply settings to the respective serial port.

NOTE: If the gateway is already powered on, DIP switch settings will not take effect unless the unit is power cycled.

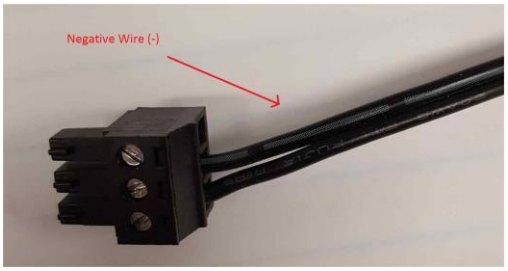
4.5 Power-Up ProtoAir

Check power requirements in the table below:

Power Requirement for ProtoAir External Gateway		
	Current Draw Type	
ProtoAir Family	12VDC	24V DC/AC
FPA – W44 (Typical)	250mA	125mA
NOTE: These values are 'nominal' and a safety margin should be added to the power supply of the host system. A safety margin of 25% is recommended.		

Figure 9: Required Current Draw for the ProtoAir

Apply power to the ProtoAir as shown below in **Figure 10**. **Note:** the power supply that comes with the unit has hash marks on one of the wires, this indicated "Negative (-).



Ensure that the power supply used complies with the specifications provided in **Appendix D.1**.

- The ProtoAir accepts 12-24VDC or 24VAC on pins L+ and N-.
- **Frame GND should be connected.**

Power to ProtoAir	ProtoAir Pin Label	Pin Assignment
Power In (+)	L +	V +
Power In (-)	N -	V -
Frame Ground	FG	FRAME GND

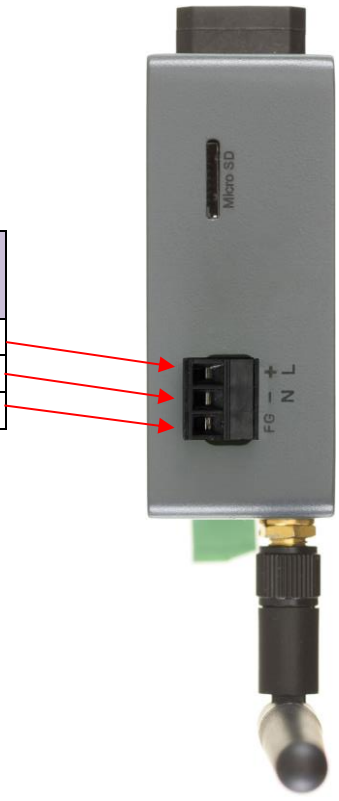


Figure 10: Power Connections

5 CONNECT THE PC TO THE PROTOAIR

There are two ways to connect the PC to the ProtoAir, either by **Ethernet cable** (**Section 5.1**) or **Wi-Fi Access Point** (**Section 5.2**).

5.1 Connecting to the ProtoAir via Ethernet (skip this section if your PC has Wi-Fi)

First, connect a Cat-5 Ethernet cable (straight through or cross-over) between the local PC and ProtoAir.

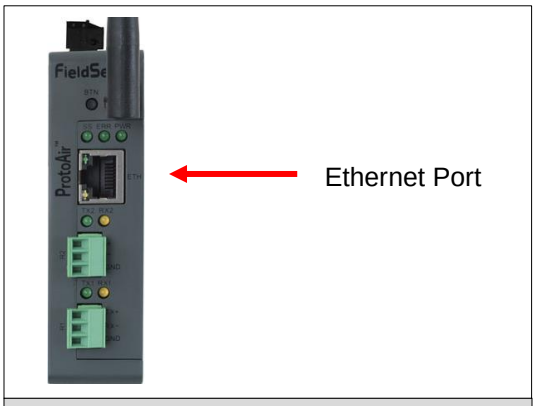


Figure 11: Ethernet Port Location

5.1.1 Enable Access Through the Local Browser

There are two methods to enable access to the ProtoAir in the local browser, either by changing the subnet of the connected PC (Section 5.1.1.1) or using the FieldServer Toolbox to change the IP Address of the ProtoAir (Section 5.1.1.2).

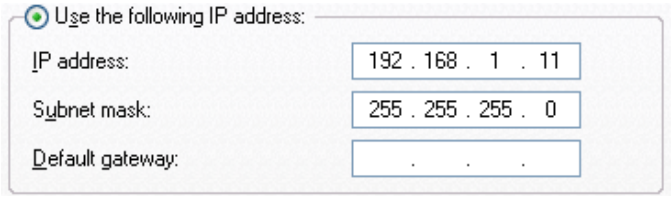
NOTE: Only perform one method or the other.

5.1.1.1 Changing the Subnet of the Connected PC

The default IP Address for the ProtoAir is **192.168.1.24**, Subnet Mask is **255.255.255.0**. If the PC and ProtoAir are on different IP networks, assign a static IP Address to the PC on the 192.168.1.xxx network.

For Windows 10:

- Find the search field in the local computer's taskbar (usually to the right of the windows icon) and type in "Control Panel".
- Click "Control Panel", click "Network and Internet" and then click "Network and Sharing Center".
- Click "Change adapter settings" on the left side of the window.
- Right-click on "Local Area Connection" and select "Properties" from the dropdown menu.
- Highlight Internet Protocol Version 4 (TCP/IPv4) and then click the Properties button.
- Select and enter a static IP Address on the same subnet. For example:



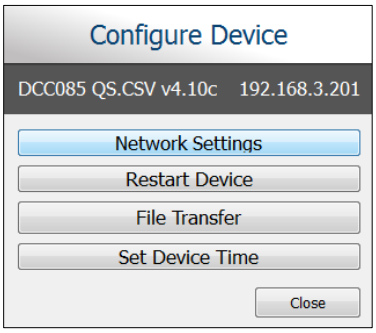
- Click the Okay button to close the Internet Protocol window and the Close button to close the Ethernet Properties window.

5.1.1.2 Changing the IP Address of the ProtoAir with FieldServer Toolbox

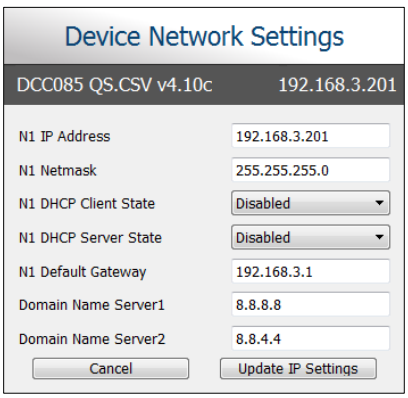
- Ensure that FieldServer Toolbox is loaded onto the local PC. Otherwise, download the FieldServer-Toolbox.zip via the Chiltrix website.
- Extract the executable file and complete the installation.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Find the desired gateway and click the Configure Device button (gear icon) to the right of the gateway information.

NOTE: If connectivity status is green, then the IP Address doesn't need to be changed (the ProtoAir is already on the same subnet). Skip the rest of the section and go to Section 6.

- Select Network Settings in the Configure Device window.



- Modify the IP Address (N1 IP Address field) of the gateway Ethernet port.
  - Change additional fields as needed



NOTE: If the gateway is connected to a router, the Default Gateway field of the gateway should be set to the IP Address of the connected router.

NOTE: Do not change the DHCP Server State (N1 DHCP Server State field).

NOTE: If DNS settings are unknown, set DNS1 to "8.8.8.8" and DNS2 to "8.8.4.4".

- Click Update IP Settings, then click the "Change and restart" button to reboot the Gateway and activate the new IP Address. See the FieldServer Toolbox and GUI Manual for more information.

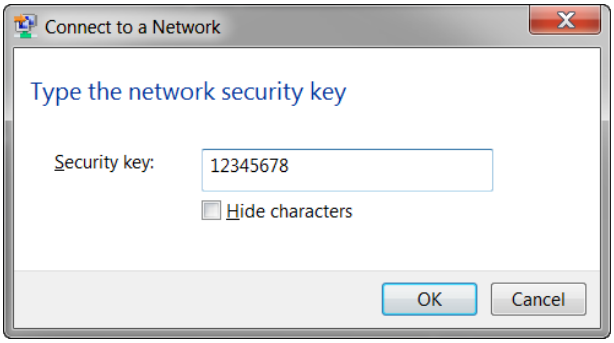
5.2 Connecting to the ProtoAir Over Wi-Fi Access Point (Preferred Method)

When the ProtoAir is first powered up, the Wi-Fi Access Point will be enabled allowing direct connection to the ProtoAir with Wi-Fi.

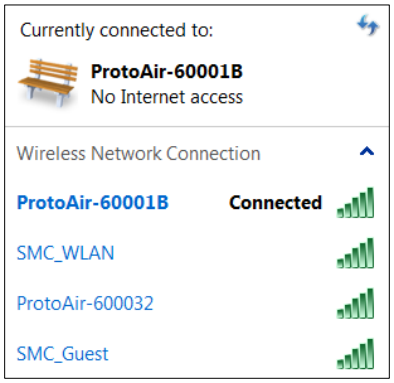
To connect to the ProtoAir Wi-Fi Access Point:

- Click the icon (found in the bottom-right corner of the computer screen) to open the available Wireless Network Connections.
- Select the desired ProtoAir and click Connect.

- Enter the Security key. The **default is 12345678**.



The available Wireless Network Connection menu should now show that the computer is connected to the ProtoAir.



6 CONFIGURE THE PROTOAIR

6.1 Accessing the ProtoAir Web Configurator

- Navigate to the IP Address of the ProtoAir on the local PC using one of two methods:
  - Open a web browser and enter the IP Address of the ProtoAir; the default Ethernet address is 192.168.1.24, the default Wi-Fi Access Point address is 192.168.50.1
  - If using the FieldServer Toolbox (**Section 5.1.1.2**), click the Connect button

NOTE: If the IP Address of the ProtoAir has been changed, the IP Address can be discovered using the FS Toolbox utility. See Appendix A.1 for instructions.

- Once at the Web App splash page, click the Login button.

Figure 12: Web App Splash Page

- Enter the previously set up or default username and password.

NOTE: The default username is "admin". The default password is "admin".

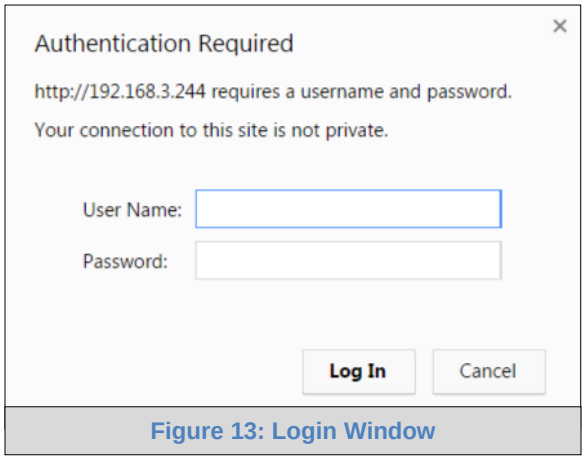


Figure 13: Login Window

- From the Web App landing page (Figure 14), click the Settings tab and then click Configuration.

Figure 14: Web App Landing Page

- Then click the Profiles Configuration button to go to the Web Configurator page.

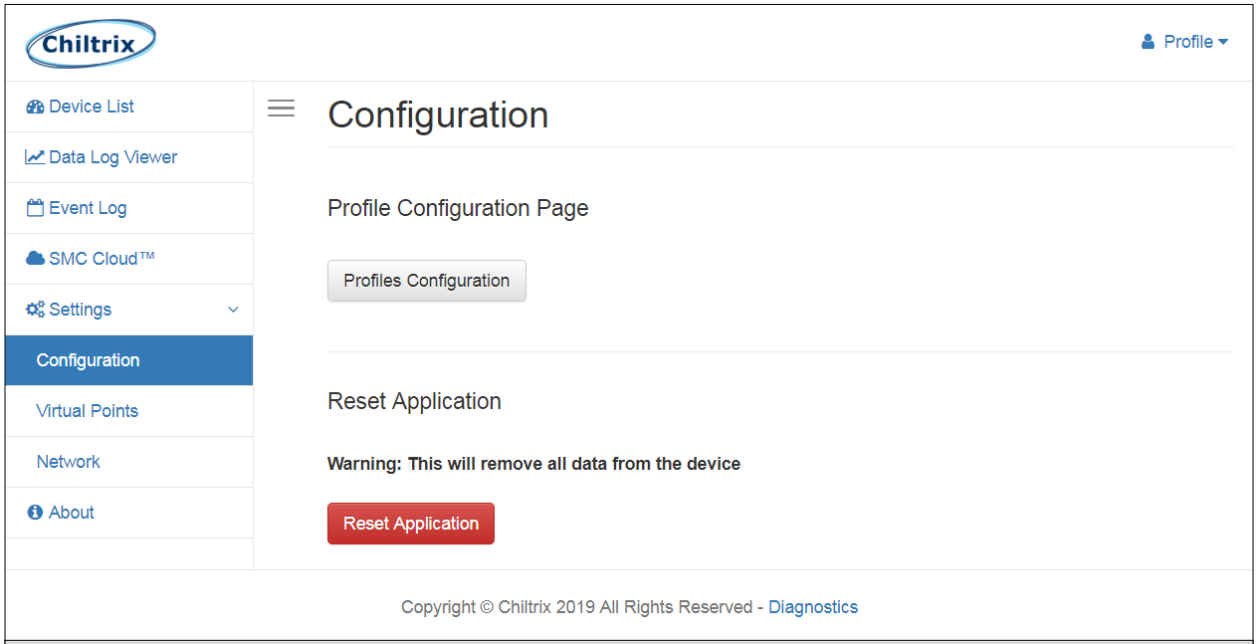


Figure 15: Configuration Tab

- This opens up a new tab in your browser named “Gateway Profile Configuration”.

NOTE: The Cloud tab see Figure 15) allows users to connect to the Cloud which enables secure remote connection to field devices through a FieldServer and its local applications for configuration, management, maintenance.

6.2 Setting ProtoAir Configuration Parameters

Select the field protocol by entering the appropriate number into the Protocol Selector Value and clicking the Submit button. **Wait for the system to reset as the configuration is updated.**

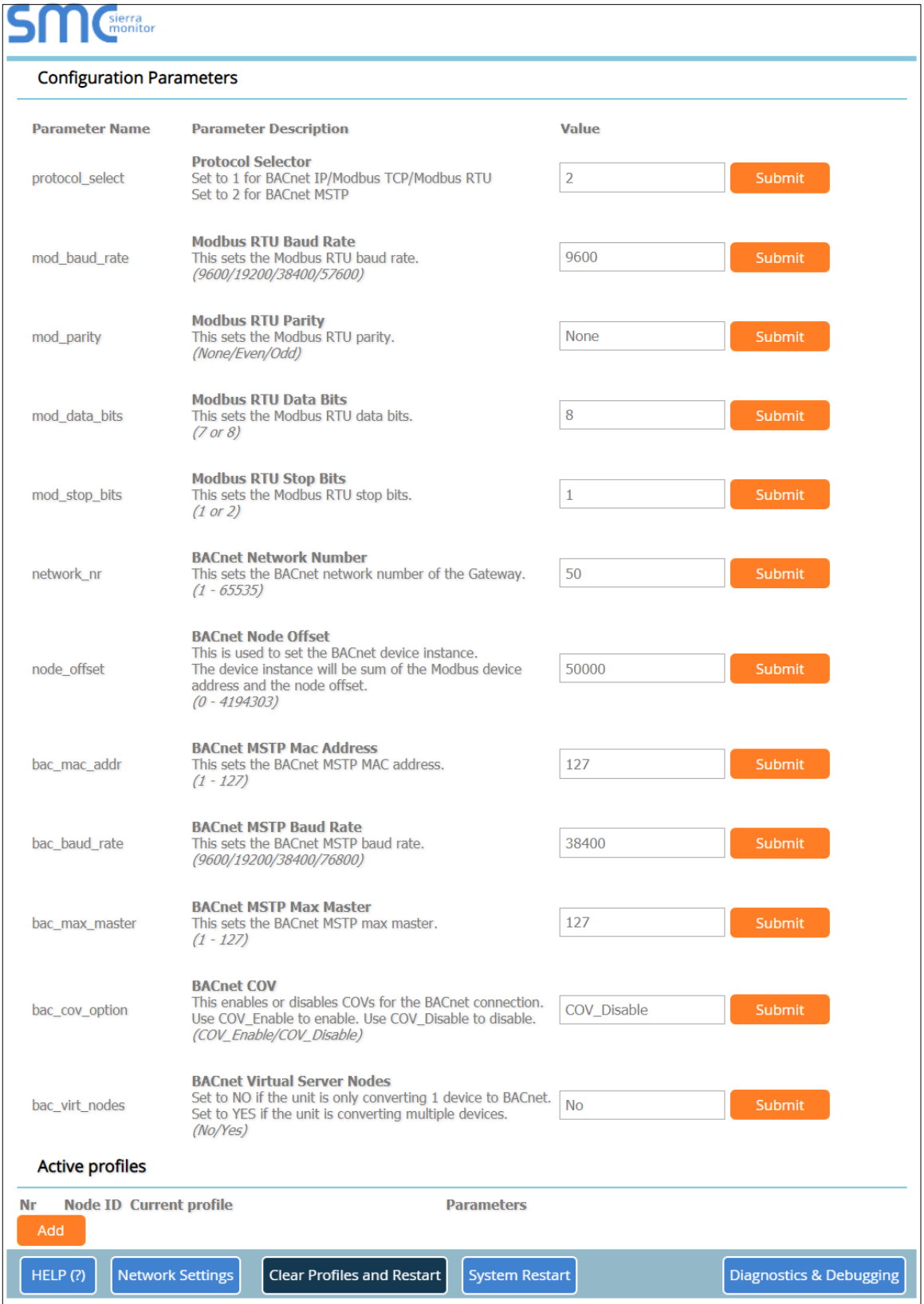


Figure 16: Web Configurator Showing no Active Profiles

NOTE: profiles are NOT used for Modbus TCP/IP.

- In the Web Configurator, the Active Profiles are shown below the configuration parameters. The Active Profiles section lists the currently active device profiles, including previous Web Configurator additions. This list is empty for new installations, or after clearing all configurations. (**Figure 16**)
- To add an active profile to support a device, click the Add button under the Active Profiles heading. This will present a drop-down menu underneath the Current profile column.
- Once the Profile for the device has been selected from the drop-down list, enter the value of the device's Node-ID which was assigned in **Section 3.3.2**. For a single Chiltrix Chiller, this Node-ID is the units Modbus RTU address, usually "1". If more than one (up to three total) then the addresses would be "1 , 2 and 3" , for example, related with multiple copies of the desired profile.

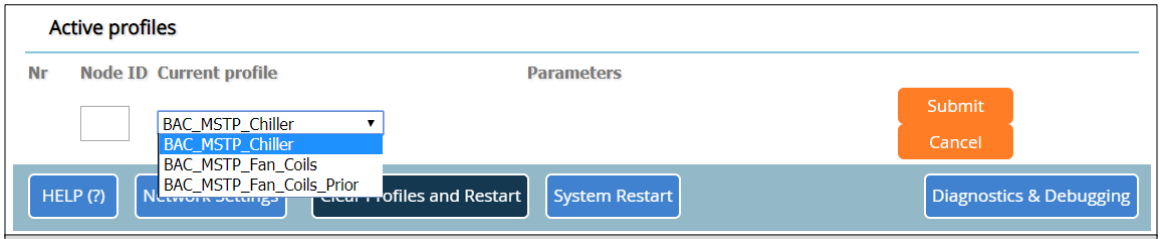


Figure 17: Profile Selection Menu

- Then press the "Submit" button to add the Profile to the list of devices to be configured.
- Repeat this process until all the devices have been added.
- Completed additions are listed under "Active profiles" as shown in **Figure 18**.

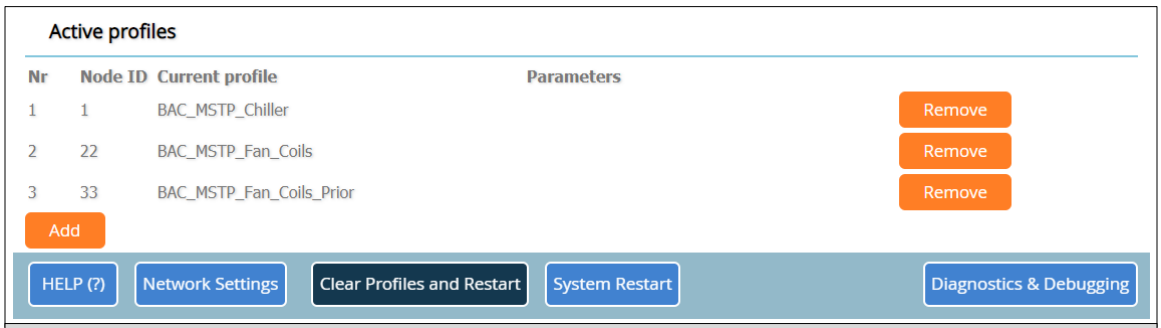


Figure 18: Web Configurator Showing Active Profile Additions

NOTE: If multiple devices are connected to the ProtoAir, set the BACnet Virtual Server Nodes field to "Yes"; otherwise leave the field on the default "No" setting.

- At this point, if you return to the "System View" tab on your browser, you will now see your Chiller and some of its parameters. Clicking on the Chiller Name opens up all the available Data Registers and all available live data can be viewed, and some data can be changed effectively giving you direct access to control of your system.

6.2.1 Verify Device Communications

- **Check that the port R1 TX1 and RX1 LEDs are rapidly flashing**. See **Appendix A.4** for additional information and images.
- Confirm the software shows communication without errors. Go to **Appendix A.2** for instructions.

6.3 BACnet: Setting Node_Offset to Assign Specific Device Instances

- Follow the steps outlined in **Section 6.1** to access the ProtoAir Web Configurator.
- The Node_Offset field shows the current value (default = 50,000).
  - The values allowed for a BACnet Device Instance can range from 1 to 4,194,303
- To assign a specific Device Instance (or range); change the Node_Offset value as needed using the calculation below:

  Device Instance (desired) = Node_Offset + Node_ID

  For example, if the desired Device Instance for the device 1 is 50,001 and the following is true:
  - Device 1 has a Node-ID of 1
  - Device 2 has a Node-ID of 22
  - Device 3 has a Node-ID of 33

  Then plug the device 1's information into the formula to find the desired Node_Offset:

  50,001 = Node_Offset + 1

  ➢ **50,000 = Node_Offset**

  Once the Node_Offset value is input, it will be applied to all devices as shown below:
  - Device 1 Instance = 50,000 + Node_ID = 50,000 + 1 = 50,001
  - Device 2 Instance = 50,000 + Node_ID = 50,000 + 22 = 50,022
  - Device 3 Instance = 50,000 + Node_ID = 50,000 + 33 = 50,033
- Click "Submit" once the desired value is entered.

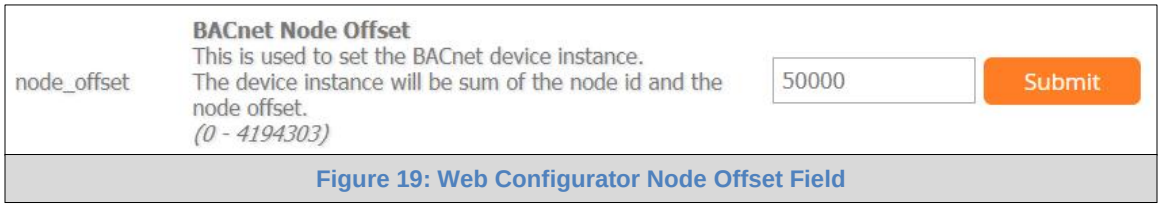


Figure 19: Web Configurator Node Offset Field

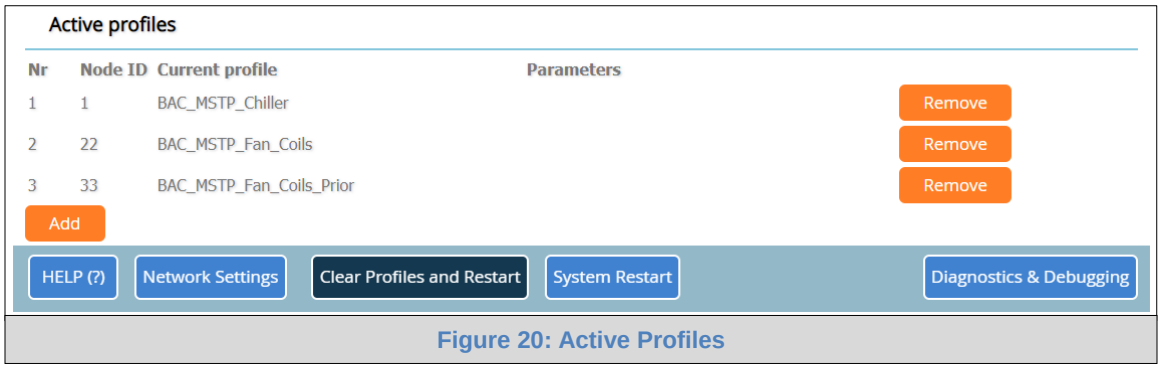


Figure 20: Active Profiles

6.4 How to Start the Installation Over: Clearing Profiles

- Follow the steps outlined in **Section 6.1** to access the ProtoAir Web Configurator.
- At the bottom-left of the page, click the “Clear Profiles and Restart” button.
- Once restart is complete, all past profiles discovered and/or added via Web configurator are deleted. The unit can now be reinstalled.
- Note: This will not remove the profiles loaded on the gateway itself; it only removes access to these profiles from the browser and GUI. These profiles can be reactivated at any time and reassigned to the active list.

7 NETWORK SETTINGS

7.1 Navigate to the FS-GUI Network Settings

- Open the FS-GUI page.
  - From the Web App landing page, click the word “Diagnostics” found in blue at the bottom of the screen

Figure 21: Web App Landing Page

  - From the Web Configurator page, click on the blue “Diagnostics & Debugging” button in the bottom right corner of the screen

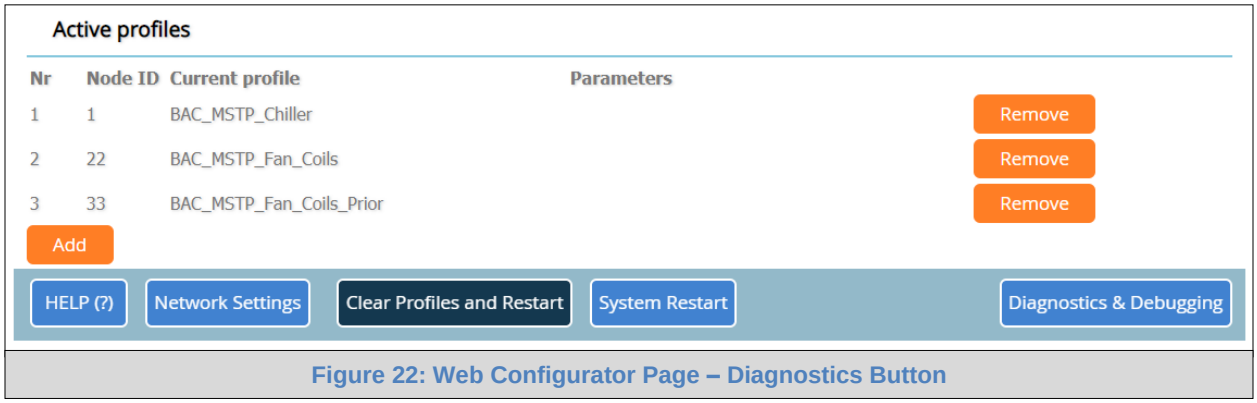


Figure 22: Web Configurator Page – Diagnostics Button

- Find the Navigation tree on the left side of the screen.

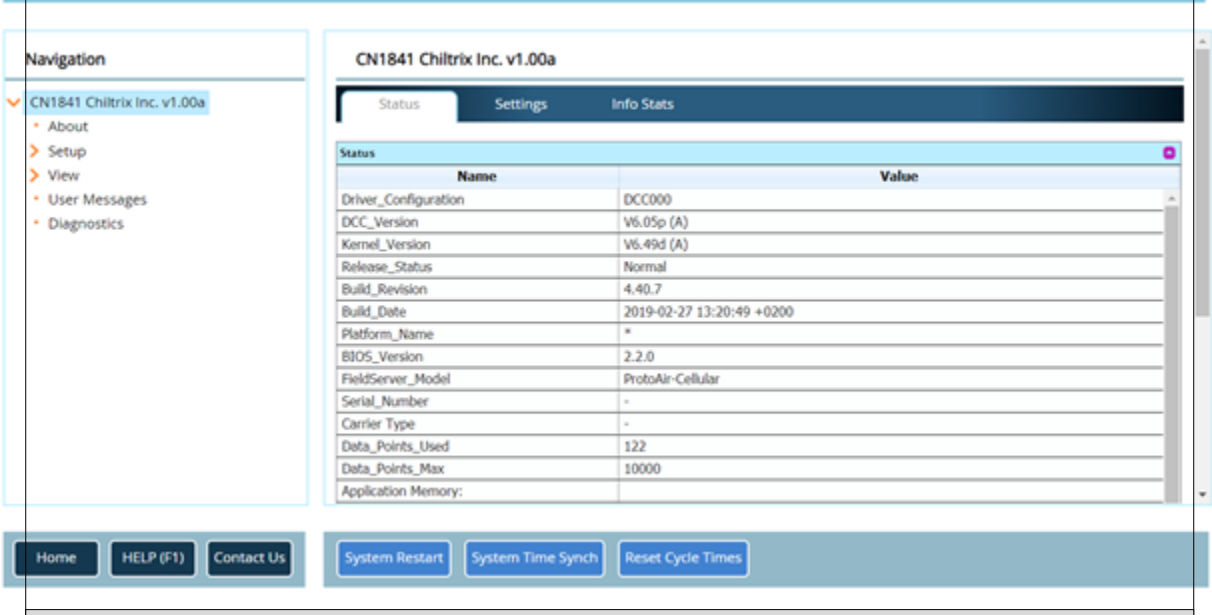


Figure 23: FS-GUI Landing Page

- Click the orange arrow next to the ProtoAir CN number and title to expand the tree.
- Click on the orange arrow next to Setup to expand the tree.
- Click on Network Settings.

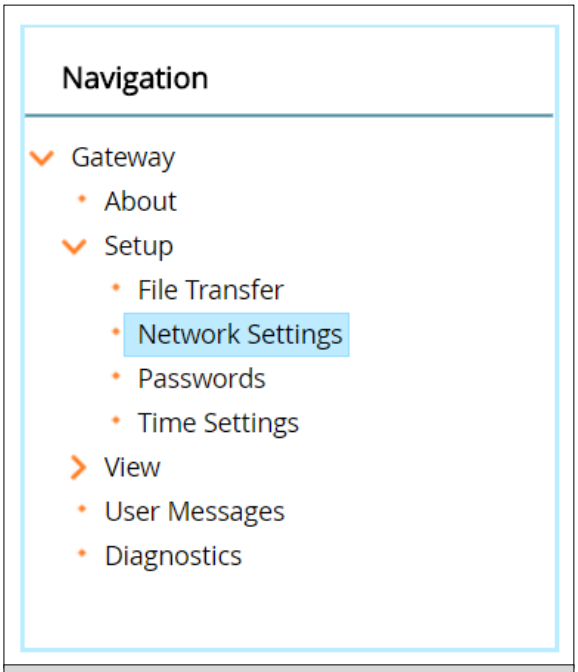


Figure 24: Generic FS-GUI Navigation Panel – Network Settings

7.2 Change the ProtoAir IP Address

Configure the IP settings of the ProtoAir using the following methods:

- When using the Ethernet port to connect to the local network (**Section** 7.2.1).
- When connecting the ProtoAir to a local wireless access point, configure the Wi-Fi Client Settings in the ProtoAir (**Section** 7.2.2).

NOTE: For Wi-Fi Access Point network information see Appendix B.4.

7.2.1 Update Wired Network Settings

IP Settings tab is the landing page when selecting Network Settings on the navigation tree. To change the IP settings, follow these instructions:

- Enable DHCP Client State to automatically assign IP Settings or modify the settings manually as needed, via these fields: IP Address, Netmask, Default Gateway and Domain Name Server1/2.

NOTE: If connected to a router, set the Default Gateway to the same IP Address as the router.

- Click Update IP Settings, then click on System Restart to restart the Gateway and activate the new IP Address.
- Connect the ProtoAir to the local network or router.

NOTE: If the FS-GUI was open in a browser, the browser will need to be pointed to the new IP Address of the ProtoAir before the FS-GUI will be accessible again.

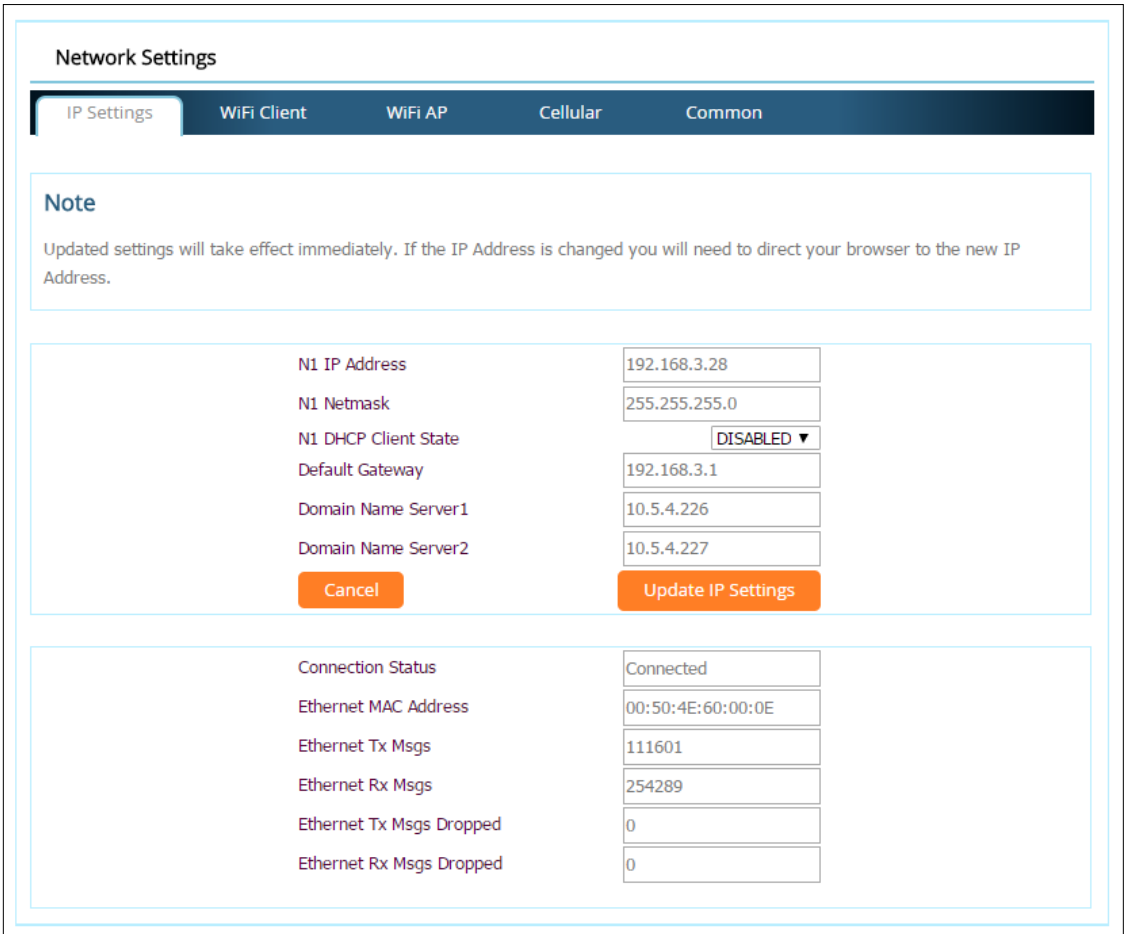


Figure 25: FS-GUI Ethernet Port Network Settings

IP Setting Fields	Definition
Connection Status	Status of connection
MAC Address	Ethernet MAC Address
Tx/Rx Msgs	Number of transmitted and received messages
Tx/Rx Msgs Dropped	Number of unanswered Tx or Rx messages

7.2.2 Update Wi-Fi Client Settings

From the FS-GUI Network Settings landing page, click on the Wi-Fi Client tab. To change the Wi-Fi client settings, follow these instructions:

- Set the Wi-Fi Status to ENABLED for the ProtoAir to communicate with other devices via Wi-Fi.
- Enter the Wi-Fi SSID and Wi-Fi Password for the local wireless access point.
- Enable DHCP to automatically assign all Wi-Fi Client network settings or manually modify the setting using the fields immediately below (IP Address, Network, etc.).

NOTE: If connected to a router, set the IP gateway to the same IP Address as the router.

- Click Update Wi-Fi Settings, then click on System Restart to restart the gateway and activate Wi-Fi Client settings.
- **Go to Common settings (Section 7.2.3) to set the Primary Connection to Wi-Fi Client.**

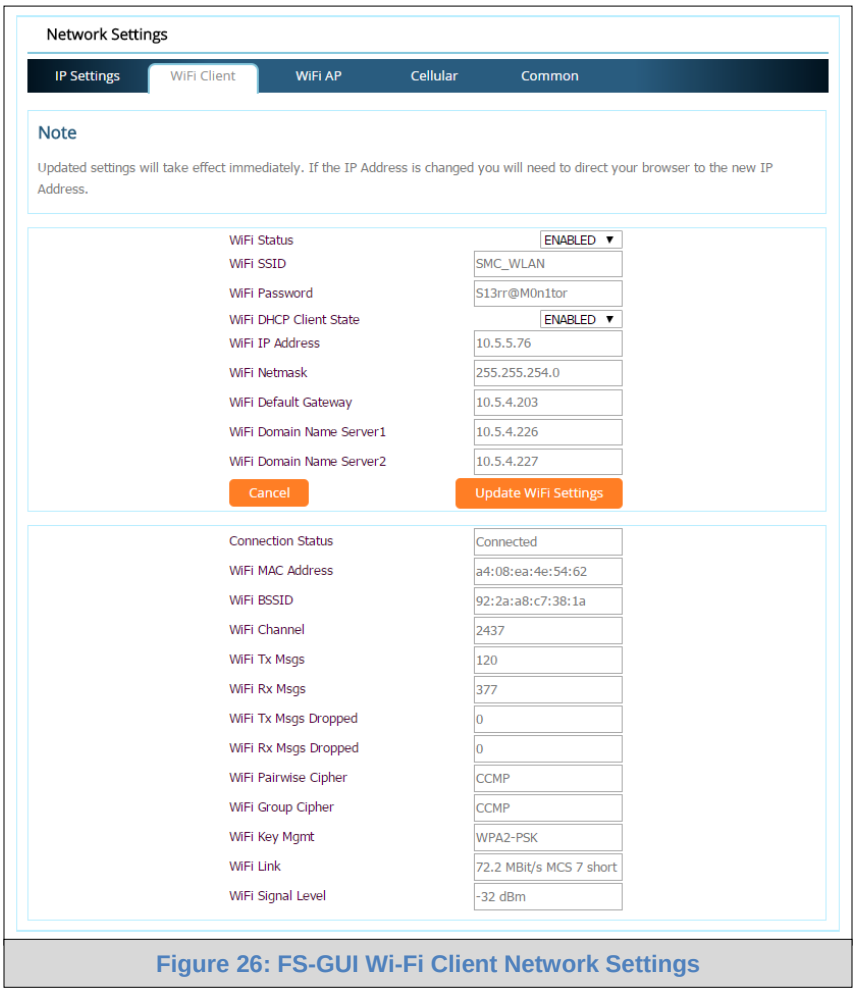


Figure 26: FS-GUI Wi-Fi Client Network Settings

Wi-Fi Client Fields	Definition
Connection Status	Status of connection
MAC Address, BSSID, Channel	Wi-Fi Client MAC Address, BSSID, and Channel
Tx/Rx Msgs	Number of transmitted and received messages
Tx/Rx Msgs Dropped	Number of unanswered Tx or Rx messages
Pairwise Cipher	Type of encryption used for unicast traffic
Group Cipher	Identifies the type of encryption used for multicast / broadcast traffic
Key Mgmt	Encryption type
Link	Connection speed
Signal Level	Signal level in dBm (see Appendix A.6)

7.2.3 Common Settings

The Common Settings make it possible to choose the primary connection when both Ethernet and Wi-Fi Client connections are available.

- From the FS-GUI Network Settings landing page, click on the Common tab.

NOTE: The default Primary Connection is Ethernet.

- Select the desired option from the drop-down menu on the right.
- Click Update Common Settings, then click on System Restart to restart the gateway and activate the new settings.

NOTE: If using Wi-Fi Client and not Ethernet, change Primary Connection to Wi-Fi.

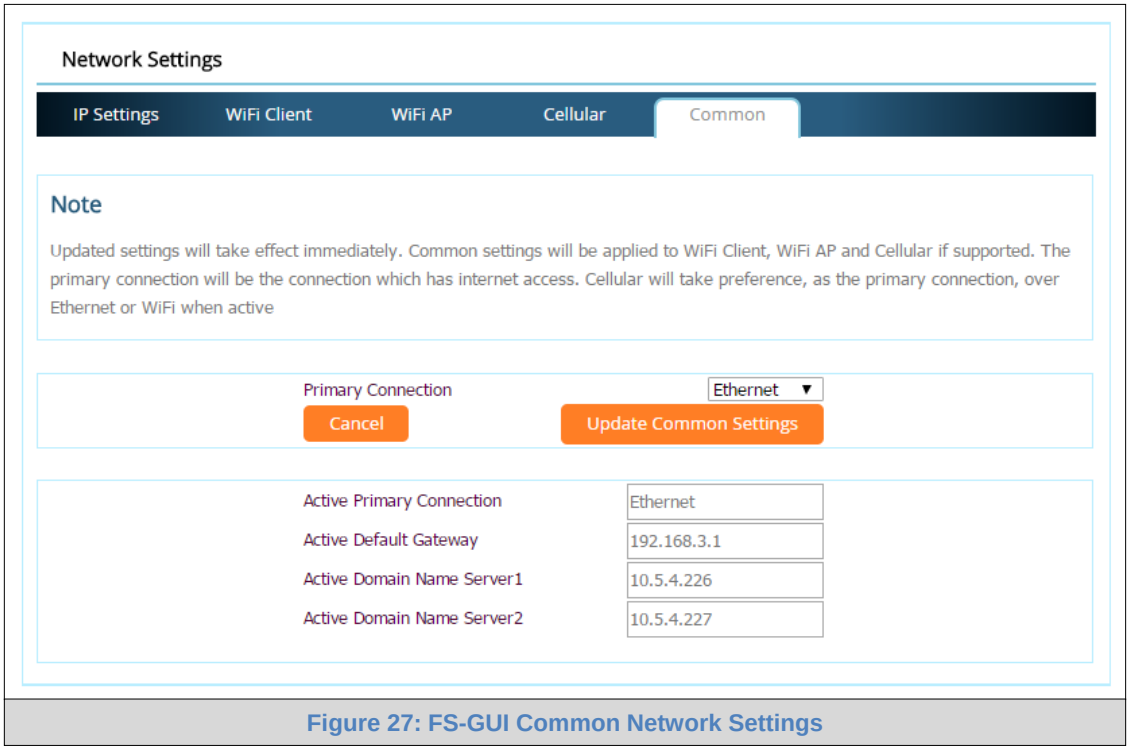


Figure 27: FS-GUI Common Network Settings

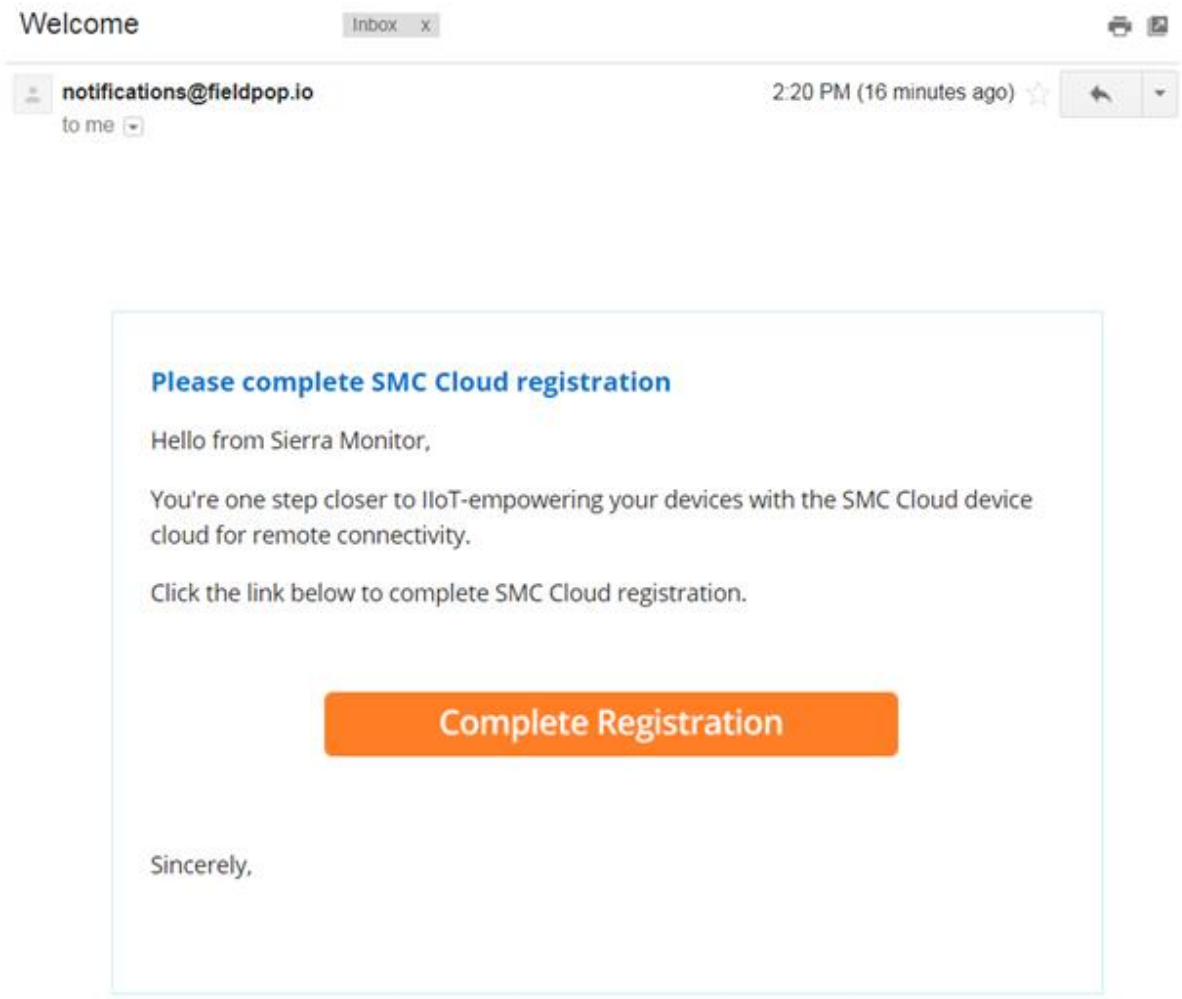
NOTE: The fields below the update button show the settings as they were set in the IP Settings or Wi-Fi Client pages. They are not editable on the Common page.

8 CLOUD USER SETUP, REGISTRATION AND LOGIN

8.1 User Setup

Request an invitation to Cloud from the manufacturer's support team and follow the instructions below to set up login details: Request from info@chiltrix.com

- The "Welcome to Cloud" email will appear as shown below.



NOTE: If no Cloud email was received, check the spam/junk folder for an email from notification@fieldpop.io. Contact the manufacturer's support team if the email cannot be found.

- Click the “Complete Registration” button and fill in user details accordingly.

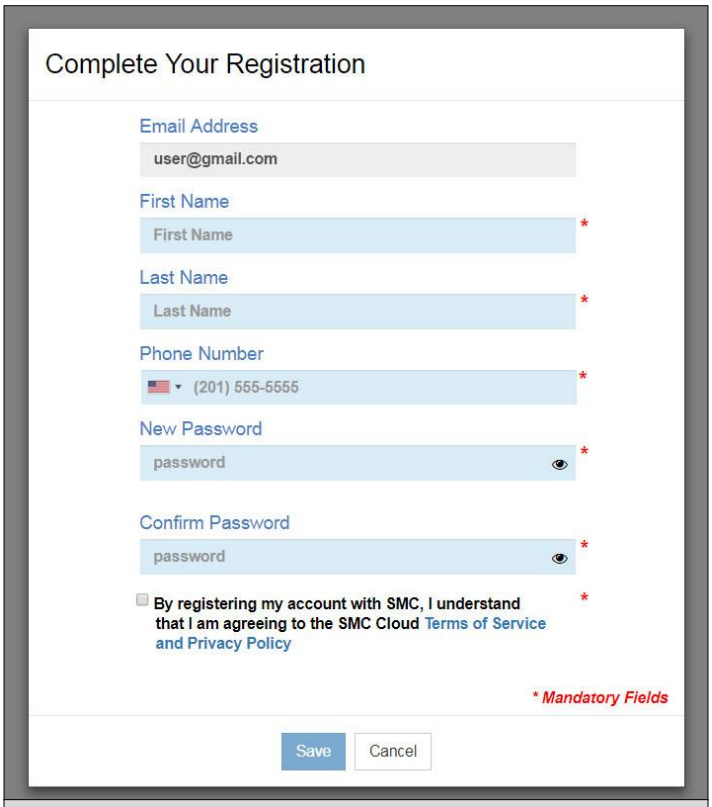


Figure 28: Setting User Details

- Fill in the name, phone number, password fields and click the checkbox to agree to the privacy policy and terms of service.
- Click “Save” to save the user details.
- Click “OK” on when the Success message appears.
- Record the email account used and password for future use.

8.2 Registration Process

Once the Cloud user credentials have been generated, the ProtoAir can be registered onto the Cloud server.

- Click on the Cloud tab on the left-hand side of the screen.

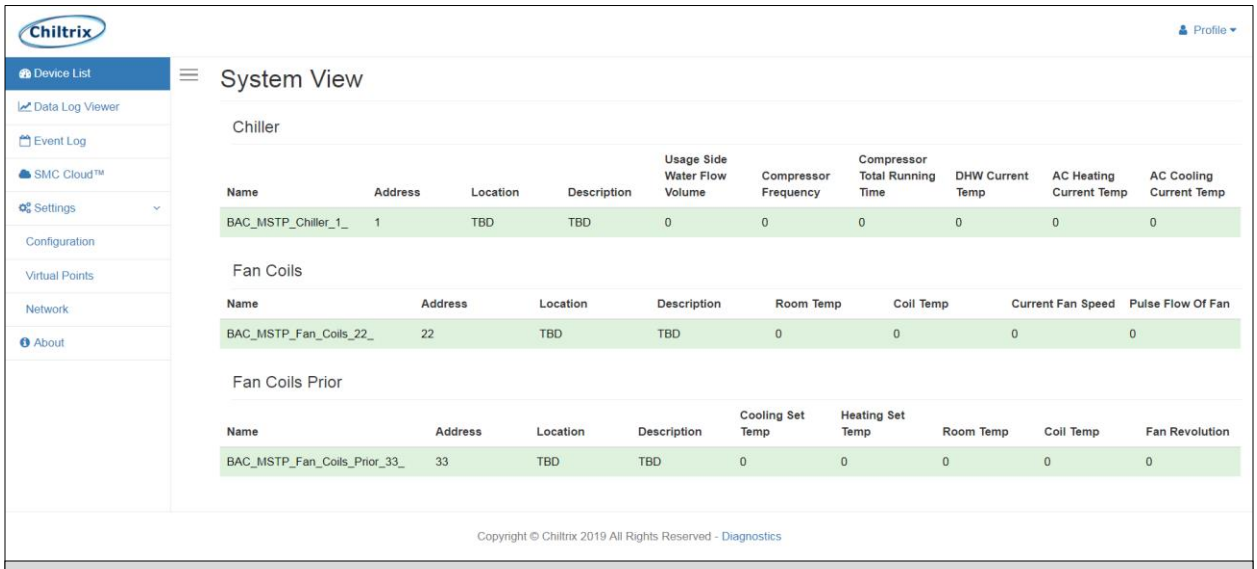


Figure 29: Web App Landing Page – Cloud Tab

- The following informational splash page will appear, click Close to view the registration page.

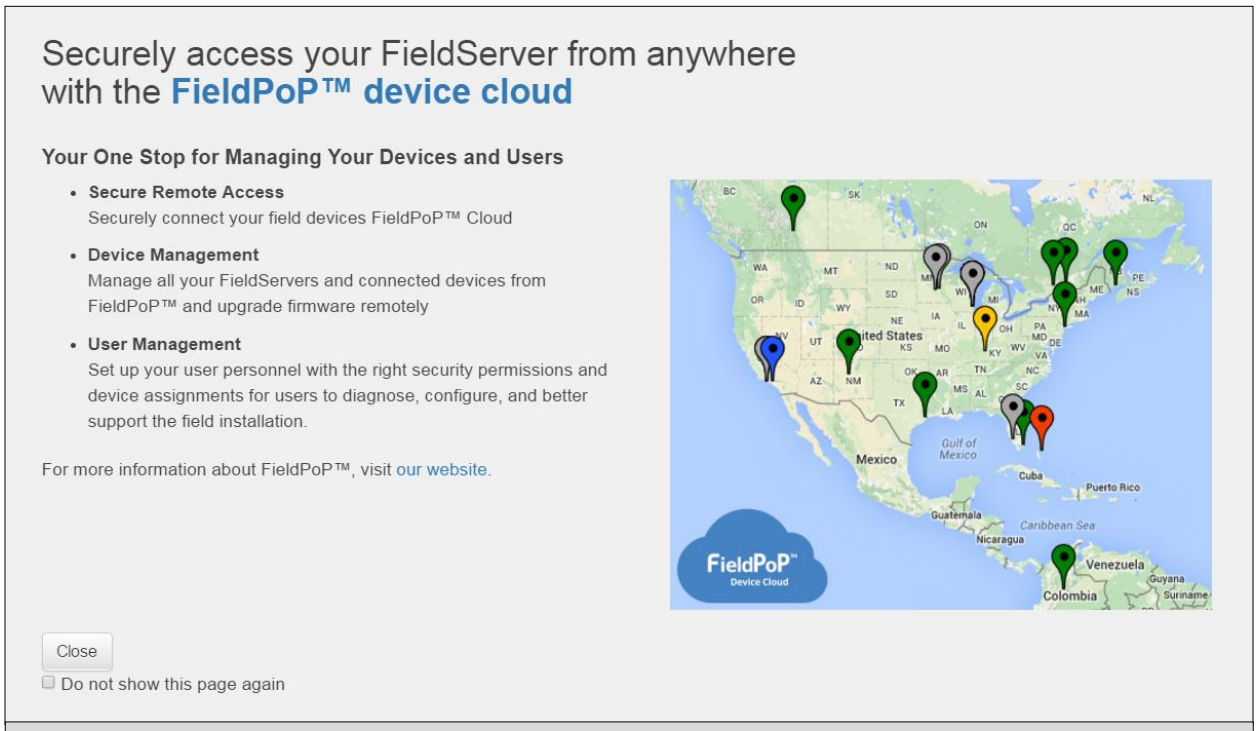


Figure 30: Registration Information Page

- If a warning message appears instead of the splash page, follow the suggestion that appears on screen.
- If the ProtoAir cannot reach the Cloud server, the following message will appear.

Figure 31: Cloud Connection Problems Message

  - Follow the directions presented in the warning message and check that the DNS settings are set up with the following Domain Name Server (DNS) settings:

    DNS1=8.8.8.8

    DNS2=8.8.4.4
  - Ensure that the ProtoAir is properly connected to the Internet

NOTE: If changes to the network settings are done, remember to click "Update IP Settings" and then power cycle the ProtoAir.

- On the registration page, fill in user credentials and all other device information fields for registration of each individual ProtoAir in the field.

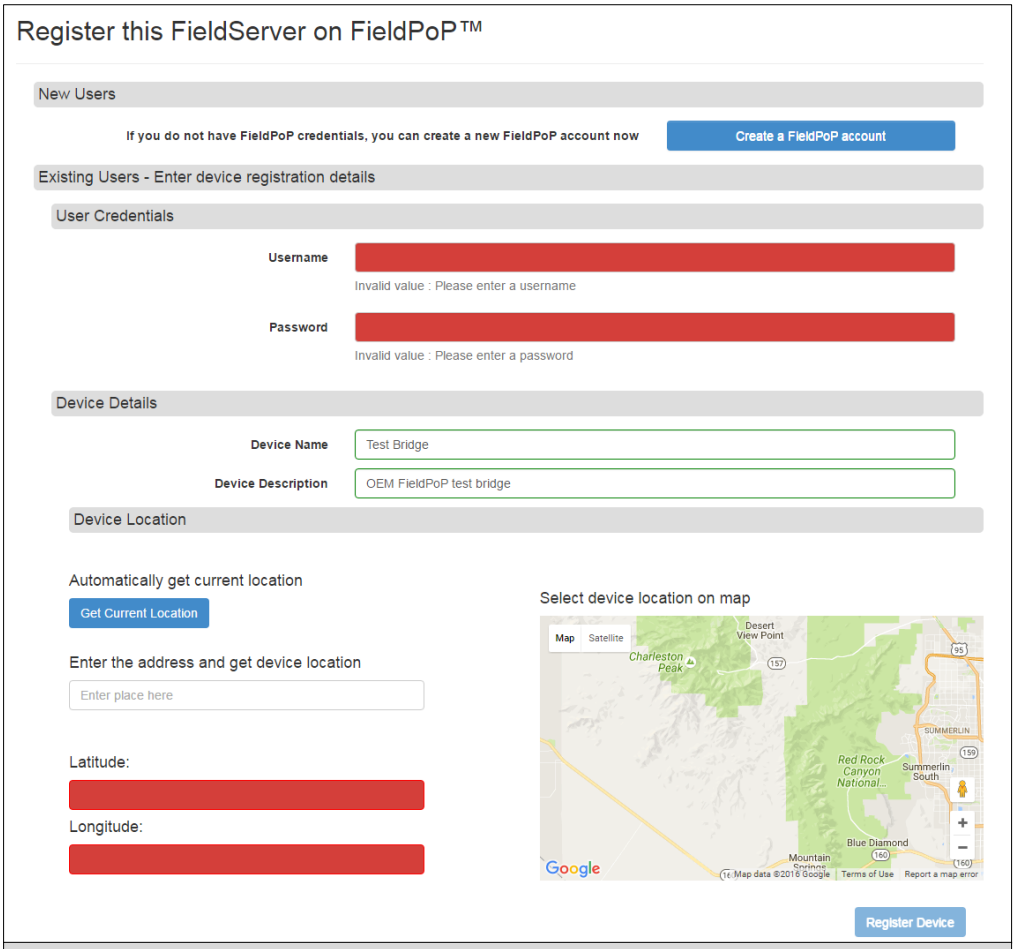


Figure 32: Cloud Registration Page

- To input the device location, do one of the following:
  - Enter the address in the address field
  - Click the “Get Current Location” button to auto-populate

NOTE: This button will only work if location services have been enabled on the local browser. If using the Chrome browser and connected via LAN, this method will not work.

  - Drop a location directly on the Google map
  - Enter the latitude and longitude manually
- Click Register Device.

- Once the device has successfully been registered, the following screen will appear listing the device details and additional information auto-populated by the ProtoAir.


Register this device on FieldPoP™
Device Registered
Device Name: Winterfell Group
Device Description: Demo - Winterfell Group
Device Location: 56.185263, -4.050275
MAC Address: 00:50:4E:11:1B:4A
Tunnel Server URL: tunnel.fieldpop.io
Device ID: pepperminthawk_V1IFzf-6I
Product Name: test
Product Version: 0.0.5
Update Device Details

8.3 Login to Cloud

After the ProtoAir is registered, go to www.cloud.net and type in the appropriate login information as per registration credentials.

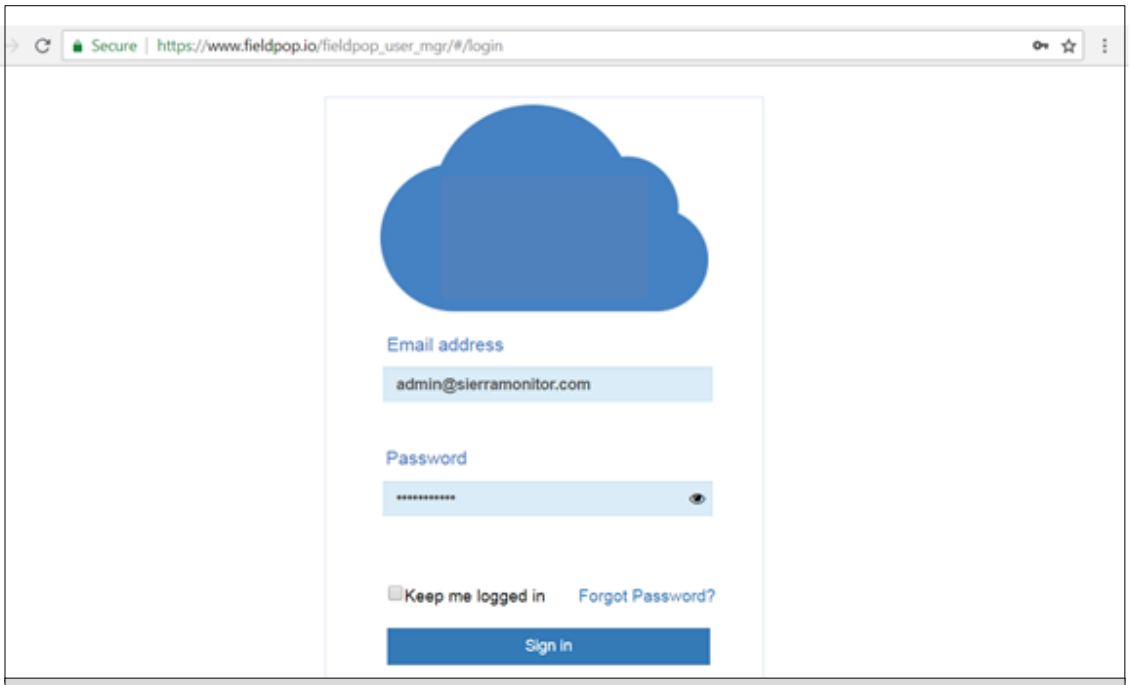


Figure 33: Cloud Login Page

Be sure to check the "Keep me logged in" box.

NOTE: If the login password is lost, contact Chiltrix for recovery instructions.

On first login, the Privacy Policy window will appear. Read the Terms of Service, click the checkbox to accept the terms and then click the Continue button to access Cloud.

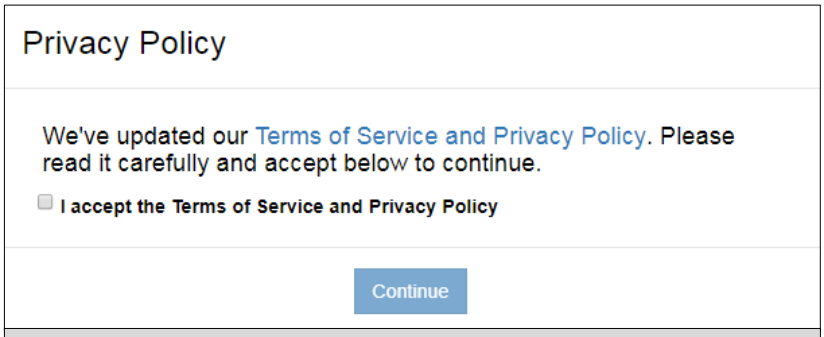


Figure 34: Cloud Privacy Policy

Figure 35: Cloud Landing Page


smc
SMC cloud
User
Device Management
User Management
Notifications
Reports
Audit Logs
Data Logs
Dashboards
Webhooks
Map
Satellite
Customers
Google
Map data ©2018
Terms of Use
Copyright © 2018 Sierra Monitor Corporation
About Us

Appendix A Troubleshooting

Appendix A.1 Lost or Incorrect IP Address

- Ensure that FieldServer Toolbox is loaded onto the local PC.

- Extract the executable file and complete the installation.

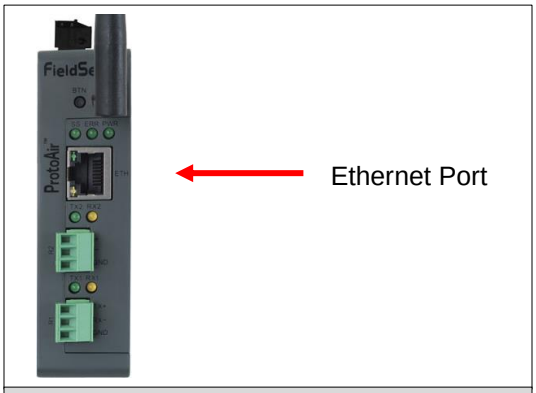
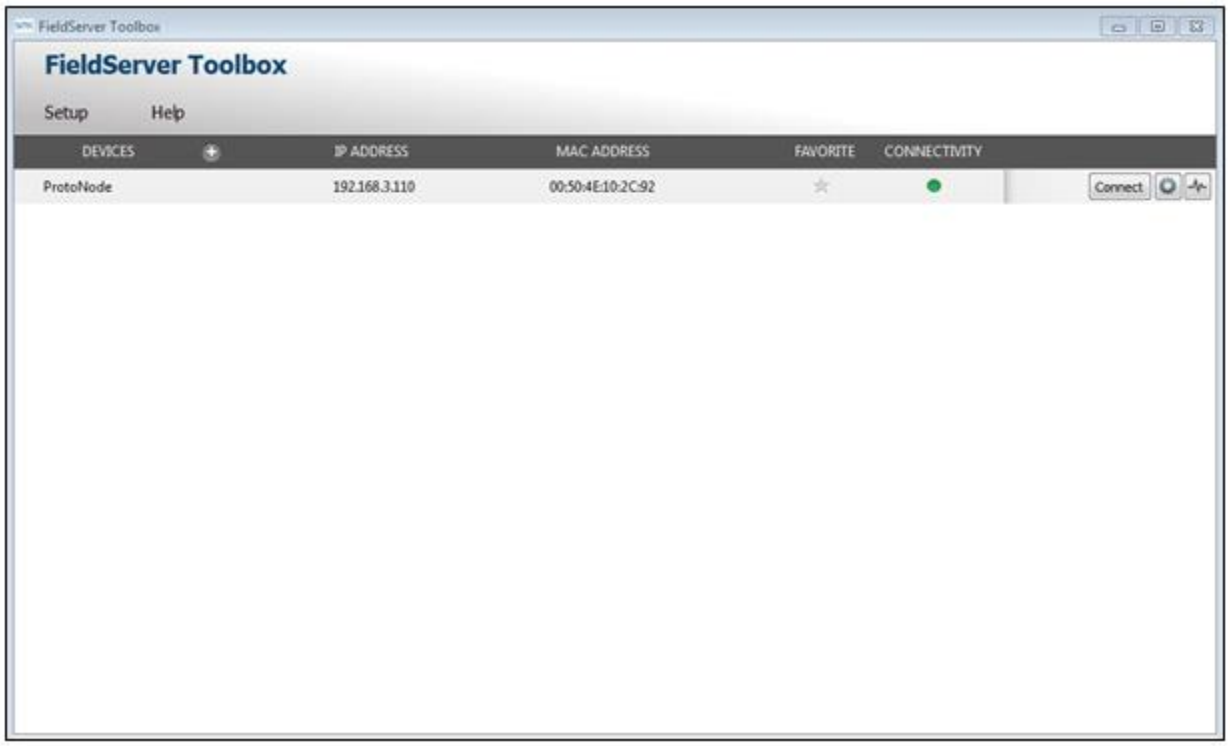


Figure 36: Ethernet Port Location

- Connect a standard Cat-5 Ethernet cable between the user's PC and ProtoAir.
- Double click on the FS Toolbox Utility and click Discover Now on the splash page.
- Check for the IP Address of the desired gateway.



- If correcting the IP Address of the gateway: click the settings icon  on the same row as the gateway, then click Network Settings, change the IP Address and click Update IP Settings to save.

Appendix A.2 Viewing Diagnostic Information

- Type the IP Address of the ProtoAir into the web browser or use the FieldServer Toolbox to connect to the ProtoAir.
- Click on Diagnostics Button, then click on view, and then on connections.
- If there are any errors showing on the Connections page, refer to **Appendix A.3** to check the wiring and settings.

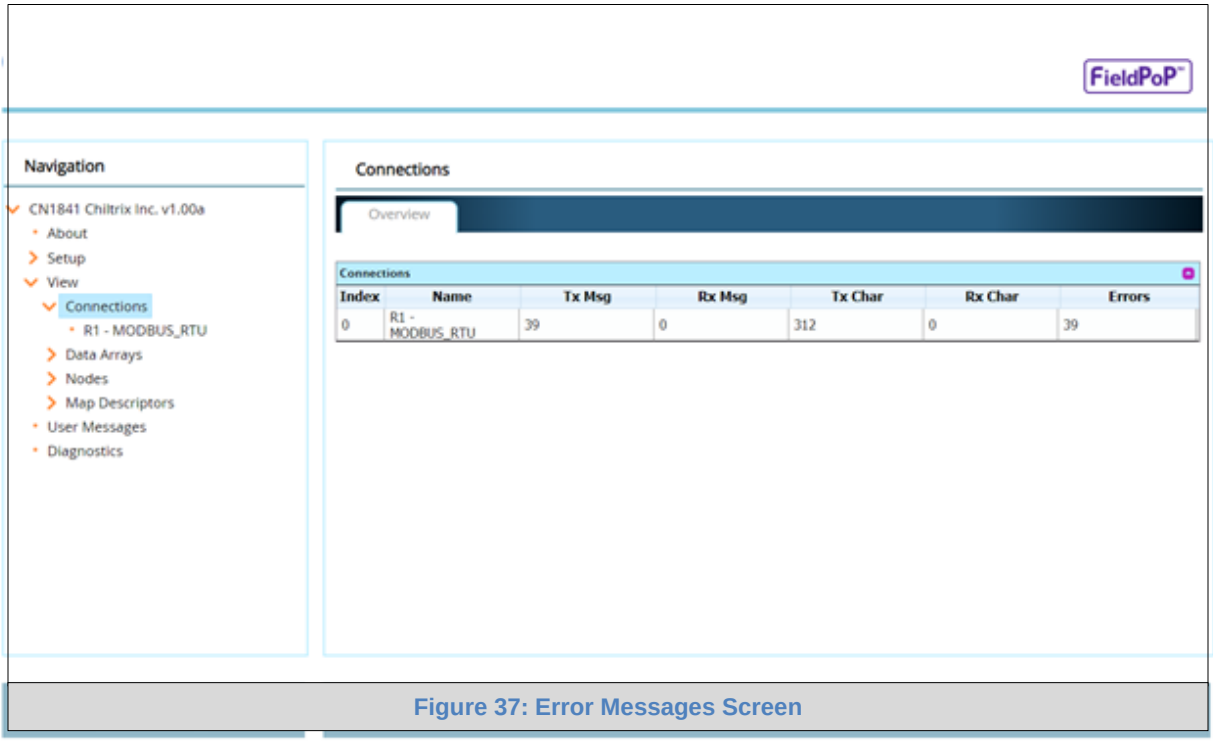


Figure 37: Error Messages Screen

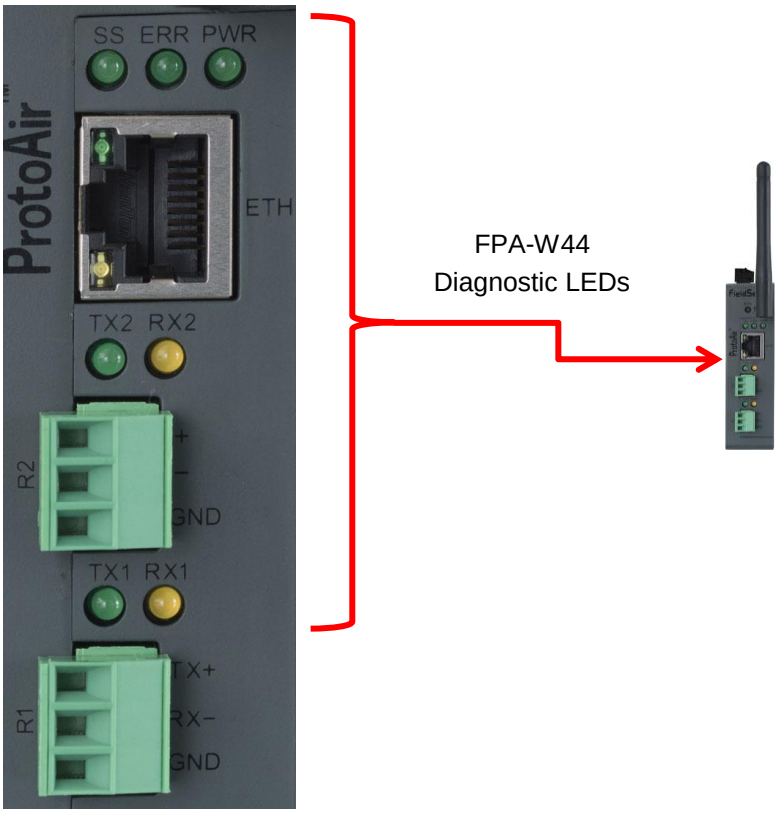
Appendix A.3 Checking Wiring and Settings

- No COMS on Modbus RTU side. If the Tx/Rx LEDs are not flashing rapidly then there is a COM issue. To fix this, check the following:
  - Visual observations of LEDs on ProtoAir (**Appendix A.4**)
  - Check baud rate, parity, data bits, stop bits
  - Check Detector ID matches the correct device
  - Verify wiring
  - Verify the device was listed under the Web Configurator Active Profiles (**Section 6.2**)
- Field COM problems:
  - Visual observations of LEDs on the ProtoAir (**Appendix A.4**)
  - Verify IP Address setting
  - Verify wiring

NOTE: If the problem still exists, a Diagnostic Capture needs to be taken and sent to technical support. (Appendix A.5)

Appendix A.4 LED Diagnostics for Communications Between ProtoAir and Devices

See the diagram below for ProtoAir FPA-W44 LED Locations.



Tag	Description
SS	The SS LED will light if the unit is not getting a response from one or more of the configured devices.
ERR	The SYS ERR LED will go on solid indicating there is a system error. If this occurs, immediately report the related “system error” shown in the error screen of the FS-GUI interface to support for evaluation.
PWR	This is the power light and should always show steady green when the unit is powered.
RX	The RX LED will flash when a message is received on the serial port on the 3-pin connector. **If the serial port is not used, this LED is non-operational.** RX1 applies to the R1 connection while RX2 applies to the R2 connection.
TX	The TX LED will flash when a message is sent on the serial port on the 3-pin connector. **If the serial port is not used, this LED is non-operational.** TX1 applies to the R1 connection while TX2 applies to the R2 connection.

Figure 38: Diagnostic LEDs

Appendix A.5 Taking a FieldServer Diagnostic Capture

When there is a problem on-site that cannot easily be resolved, perform a diagnostic capture before contacting support so that support can quickly solve the problem. There are two methods for taking diagnostic captures:

- **FieldServer Toolbox:**
  This method requires installation of the FS Toolbox program. A FS Toolbox diagnostic capture takes a snapshot of the loaded configuration files and a log of all the communications on the serial ports over a specified period of time. If the problem occurs over an Ethernet connection, then take a Wire Shark capture.
- **Gateway's FS-GUI Page:**
  This method doesn't require downloading software. The diagnostic capture utilities are embedded in the FS-GUI web interface. Starting a diagnostic capture takes a snapshot of the loaded configuration files and a log of all the communications over a specified period of time. This works for both serial and Ethernet connections.

NOTE: The information in the zipped files contains everything support needs to quickly resolve problems that occur on-site.

Appendix A.5.1 Using the FieldServer Toolbox

Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem.

- Ensure that FieldServer Toolbox is loaded onto the local PC.
- Extract the executable file and complete the installation.

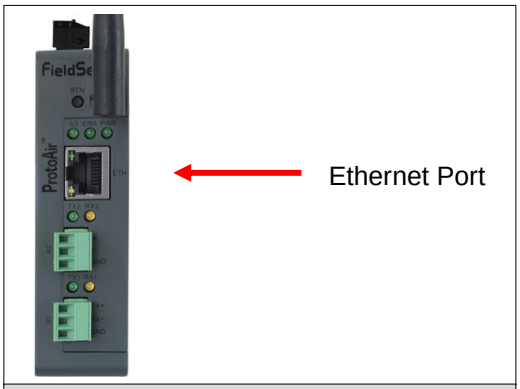
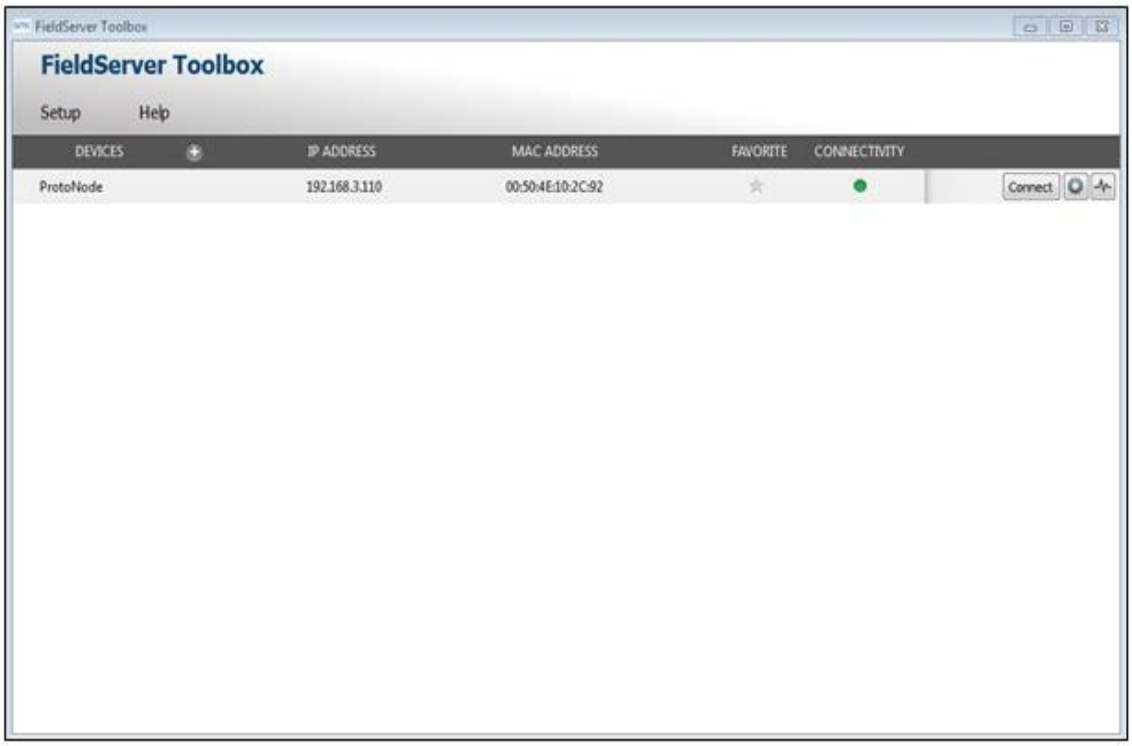
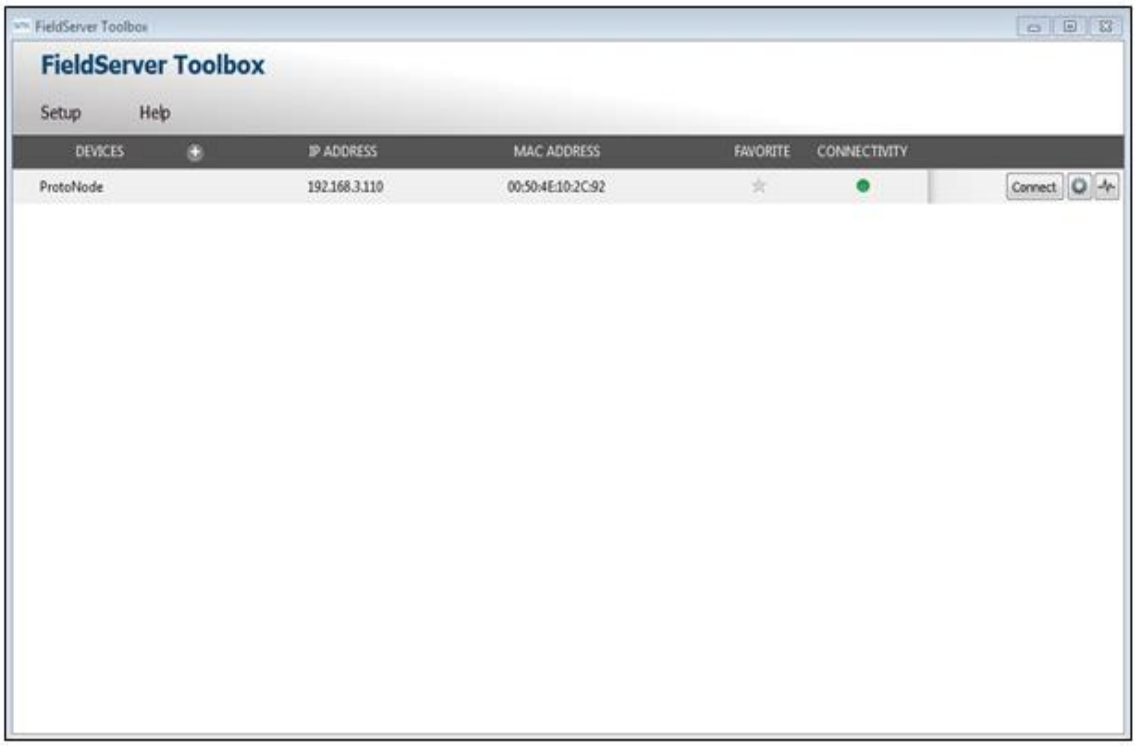


Figure 39: Ethernet Port Location

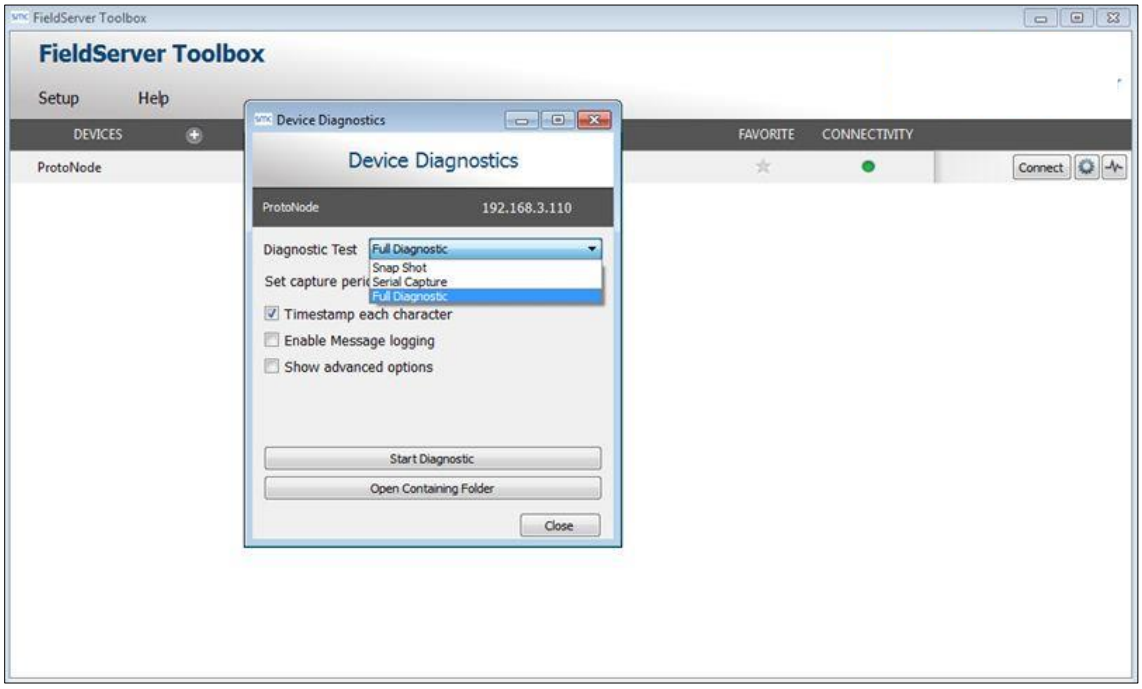
- Connect a standard Cat-5 Ethernet cable between the PC and ProtoAir.
- Double click on the FS Toolbox Utility.

- **Step 1:** Take a Log
  - Click on the diagnose icon  of the desired device



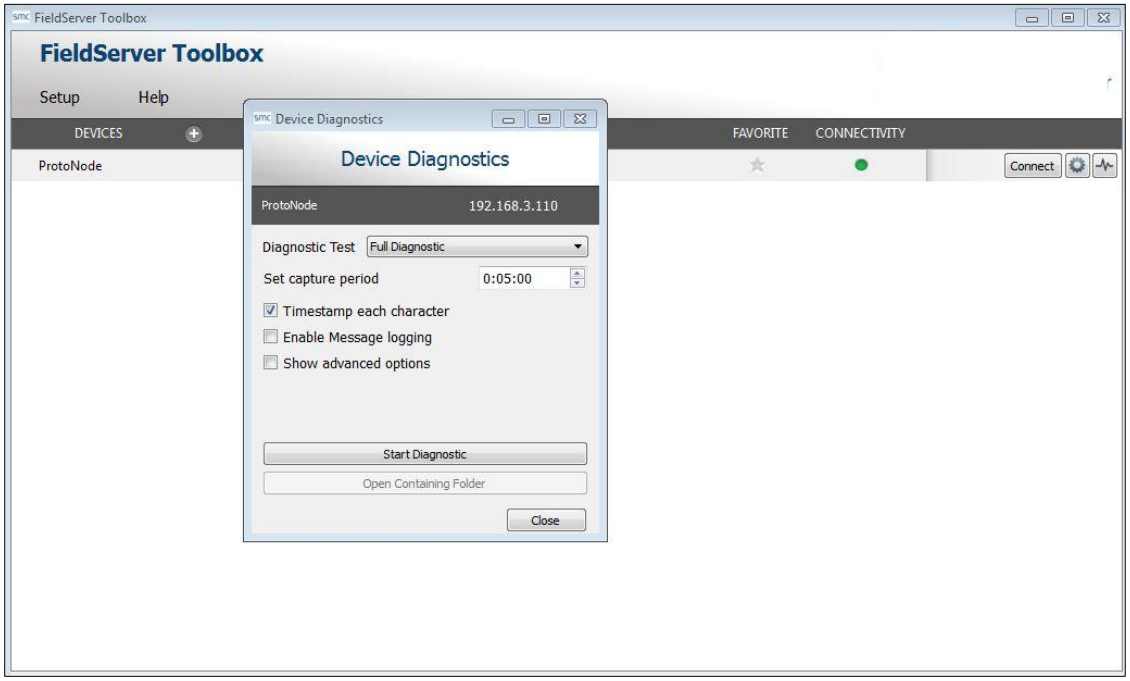


  - Ensure “Full Diagnostic” is selected (this is the default)



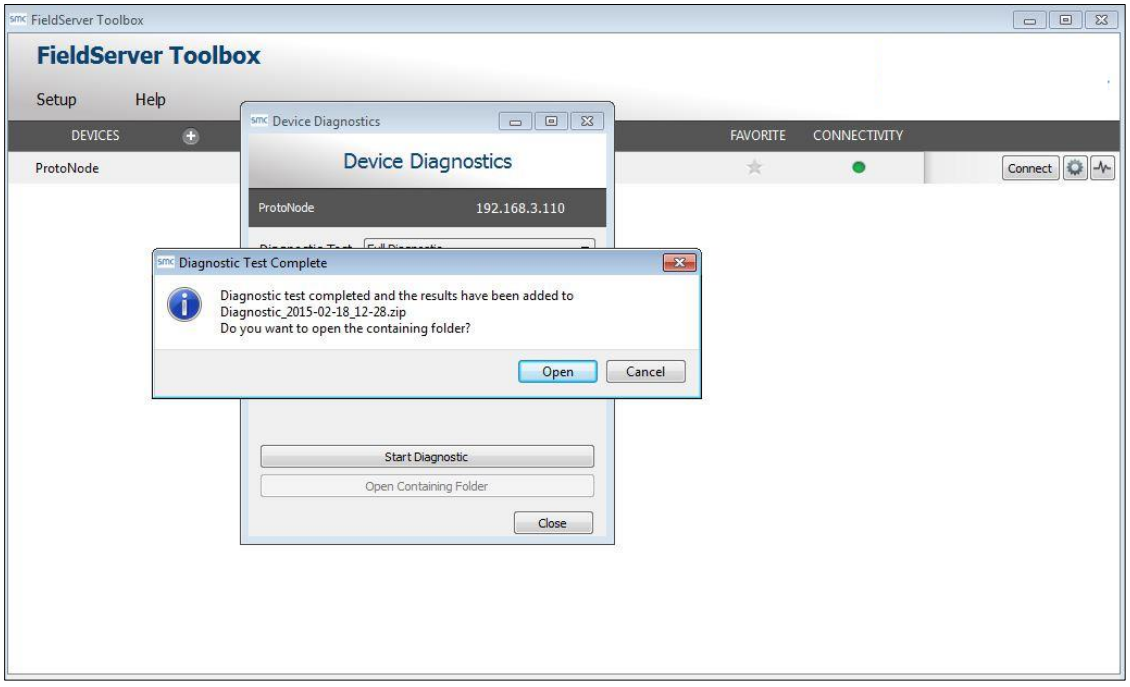
NOTE: If desired, the default capture period can be changed.

- Click on “Start Diagnostic”



- Wait for Capture period to finish, then the Diagnostic Test Complete window will appear

- **Step 2**: Send Log
  - Once the Diagnostic test is complete, a .zip file is saved on the PC



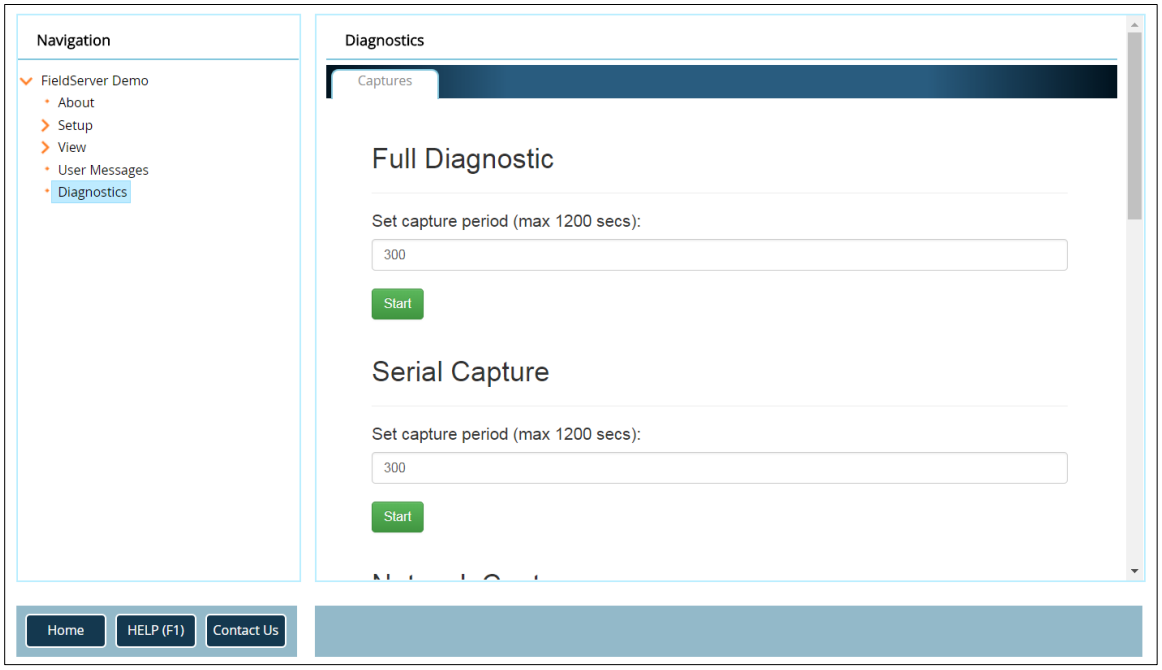
  - Choose “Open” to launch explorer and have it point directly at the correct folder
  - Send the Diagnostic zip file to technical support (info@chiltrix.com)

Appendix A.5.2 Using FS-GUI

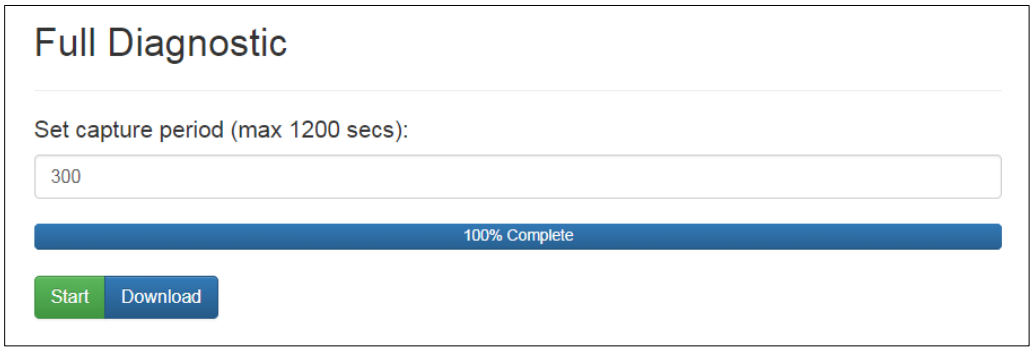
Diagnostic Capture via FS-GUI is only available on FieldServers with a bios updated/released on November 2017 or later. Completing a Diagnostic Capture through the FieldServer allows network connections (such as Ethernet and Wi-Fi) to be captured.

Once the Diagnostic Capture is complete, email it to technical support. The Diagnostic Capture will accelerate diagnosis of the problem.

- Open the FieldServer FS-GUI page.
- Click on Diagnostics in the Navigation panel.



- Go to Full Diagnostic and select the capture period.
- Click the Start button under the Full Diagnostic heading to start the capture.
  - When the capture period is finished, a Download button will appear next to the Start button



- Click Download for the capture to be downloaded to the local PC.
- Send the diagnostic zip file to technical support (info@chiltrix.com).

NOTE: Diagnostic captures of BACnet MS/TP communication are output in a ".PCAP" file extension which is compatible with Wireshark.

Appendix A.6 Wi-Fi Signal Strength

Wi-Fi
<60dBm – Excellent
<70dBm – Very good
<80dBm – Good
>80dBm – Weak

Figure 40: Wi-Fi Signal Strength Listing

NOTE: If the signal is weak or spotty, try to improve the signal strength by checking the antenna and the ProtoAir position.

Appendix A.7 Factory Reset Instructions

For instructions on how to reset a FieldServer back to its factory released state, contact Chiltrix

Appendix B Additional Information

Appendix B.1 Updating Firmware

To load a new version of the firmware, follow these instructions:

1. Extract and save the new file onto the local PC.
2. Open a web browser and type the IP Address of the FieldServer in the address bar.
   - Default IP Address is 192.168.1.24
   - Use the FS Toolbox utility if the IP Address is unknown (**Appendix A.1**)
3. Click on the “Diagnostics & Debugging” button.
4. In the Navigation Tree on the left-hand side, do the following:
   a. Click on “Setup”
   b. Click on “File Transfer”
   c. Click on the “General” tab
5. In the General tab, click on “Choose Files” and select the web.img file extracted in step 1.
6. Click on the orange “Submit” button.
7. When the download is complete, click on the “System Restart” button.

Appendix B.2 BACnet: Setting Network_Number for More Than One ProtoAir on the Subnet

For both BACnet MS/TP and BACnet/IP, if more than one ProtoAir is connected to the same subnet, they must be assigned unique Network_Number values.

On the main Web Configuration screen, update the BACnet Network Number field and click submit. The default value is 50.

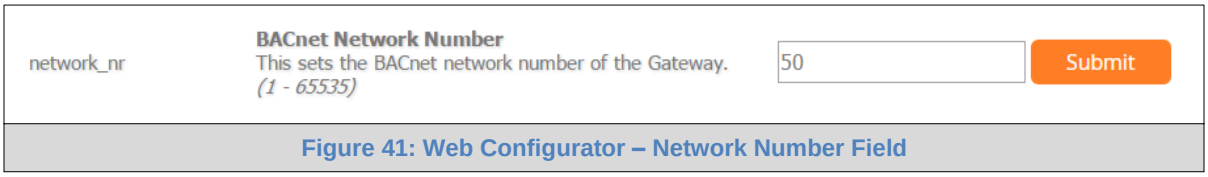


Figure 41: Web Configurator – Network Number Field

Appendix B.3 Securing ProtoAir with Passwords

Access to the ProtoAir can be restricted by enabling a password on the FS-GUI Passwords page – click Setup and then Passwords in the navigation panel. There are 2 access levels defined by 2 account names: Admin and User.

- The Admin account has unrestricted access to the ProtoAir.
- The User account can view any ProtoAir information but cannot make any changes or restart the ProtoAir.

The password needs to be a minimum of eight characters and **is case sensitive**.

If the password is lost, click cancel on the password authentication popup window, and email the password recovery token to technical support to receive a temporary password from the customer support team. Access the ProtoAir to set a new password.

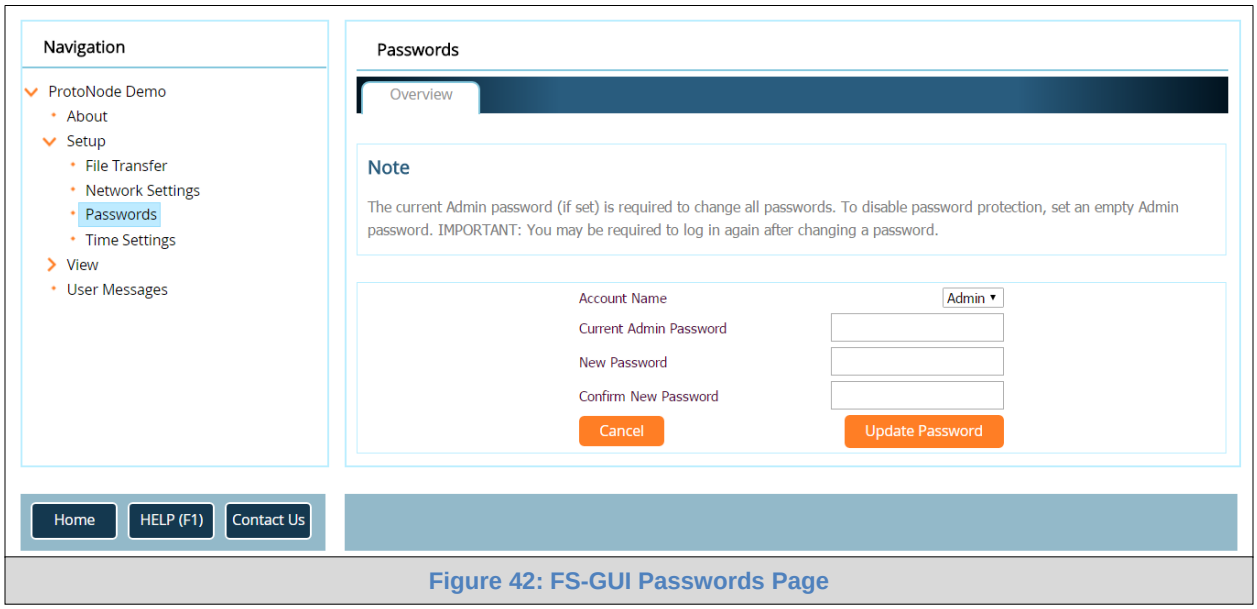


Figure 42: FS-GUI Passwords Page

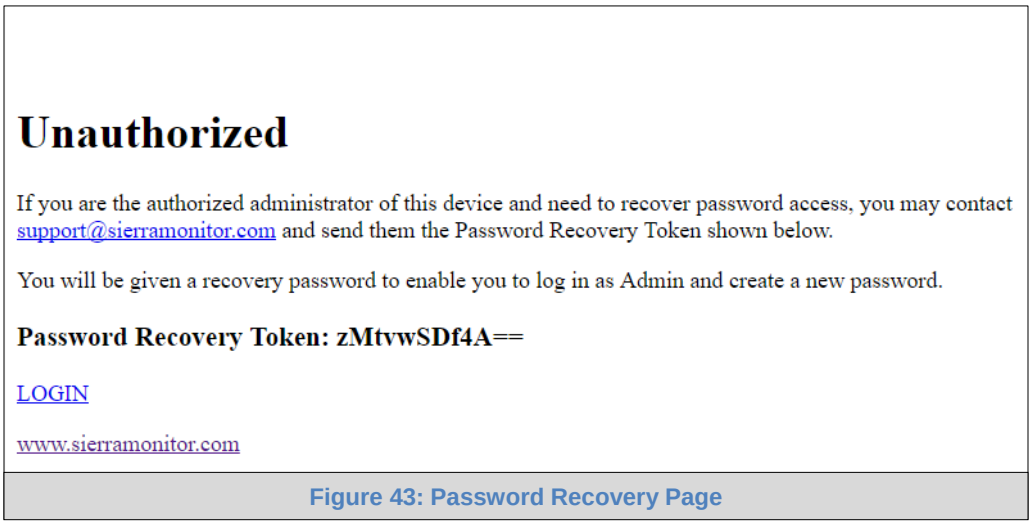


Figure 43: Password Recovery Page

Appendix B.4 Wi-Fi Access Point Network Settings

From the FS-GUI Network Settings landing page, click on the Wi-Fi AP tab. To change the Wi-Fi AP settings, follow these instructions:

- The Access Point Status Field must be ENABLED to allow connecting to the ProtoAir via Wi-Fi.
- Modify the Settings manually as needed, via these fields: Access Point SSID, Access Point Password, SSID Broadcast, and Channel.

NOTE: The default channel is 11.

- Click Update Wi-Fi Settings, then click on the System Restart to restart the Gateway and activate the Wi-Fi settings.

NOTE: If the FS-GUI was open in a browser via Wi-Fi, the browser will need to be updated with the new Wi-Fi details before the ProtoAir FS-GUI will be accessible again.

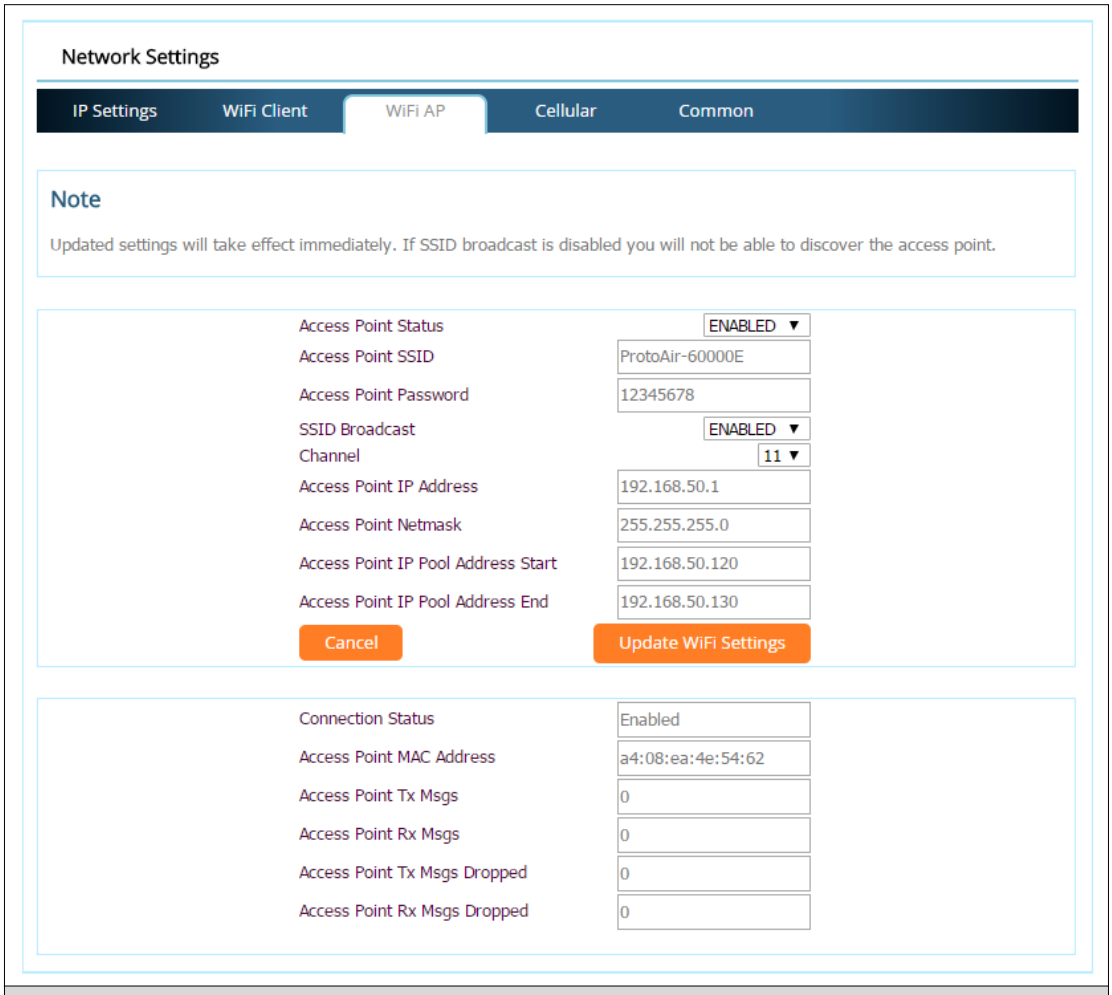


Figure 44: FS-GUI Wi-Fi AP Network Settings

Wi-Fi AP Fields	Definition
Connection Status	Status of connection
MAC Address	Access point's MAC Address
Tx/Rx Msgs	Number of transmitted and received messages
Tx/Rx Msgs Dropped	Number of unanswered Tx or Rx messages

Appendix B.5 Mounting

The ProtoAir can be mounted using the DIN rail mounting bracket on the back of the unit.

Figure 45: DIN Rail

Appendix B.6 Physical Dimension Drawing

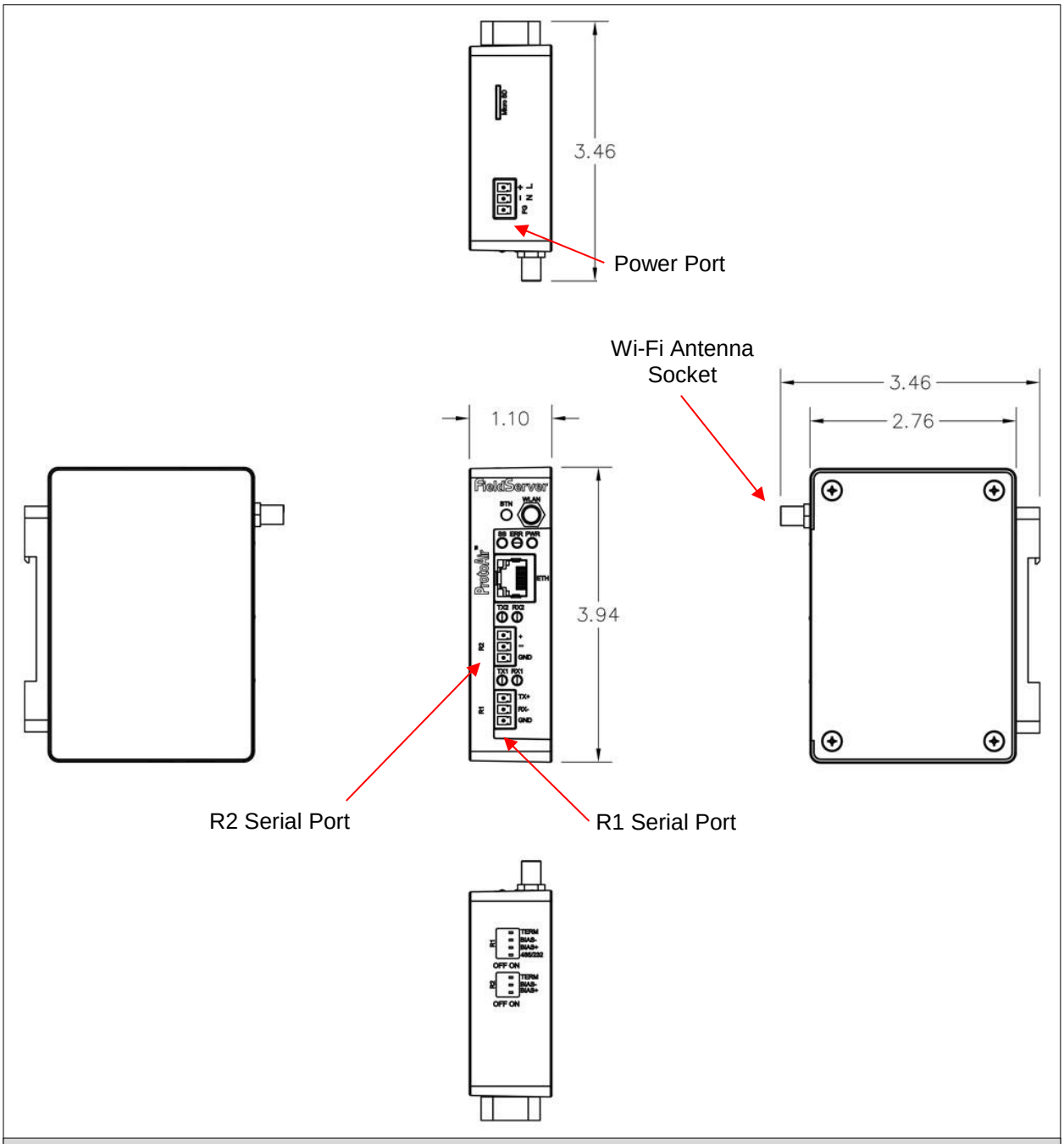


Figure 46: ProtoAir FPA-W44 Dimensions

Appendix C Vendor Information – Chiltrix

NOTE: All field Modbus TCP/IP or Modbus RTU registers are the same as the Modbus RTU registers for the serial device. If this point list is needed, contact technical support. The Modbus node address of the device is also the same as the Modbus RTU node address.

Appendix C.1 Chiller Modbus RTU Mappings to BACnet/IP and BACnet MS/TP

Point Name	BACnet Object Type	BACnet Object ID
Power-Down Recovery Function	BV	1
Single / Three Phase Selection	BV	2
Power Frequency	AV	3
Heat Source Selection	BV	4
Heating Temp Control Method	BV	5
Defrost Method Selections	BV	6
Freecooling Validation	BV	7
Frequency Control Method	BV	8
DHW Validation	BV	9
Air Cond And Heating Validation	BV	10
Air Cond And Cooling Validation	BV	11
DHW Hot Water Temp Hysteresis	AV	12
AC Temp Hysteresis	AV	13
Fan Motor Category	AV	14
Maximum Speed Of The Fan	AV	15
Heating Fan Speed Control Temp Diff	AV	16
Cooling Fan Speed Control Temp Diff	AV	17
Defrost Method	BV	18
Defrost Starting Temp	AV	19
Defrost Interval Time Multiple Rate	AV	20
The First Defrost Interval	AV	21
Defrost Exist Temp	AV	22
Hot Water Frequency Limitation	AV	23
AC Heating Au Mode Highest Temp	AV	24
AC Heating Au Mode Offset Temp	AV	25
Solenoid Valve Function Parameters	BV	26
C4 Water Pump Type Selection	BV	27
Water Pump Working Mode	MV	28
EC Water Pump C4 Minimum Speed	AV	29
C5 Water Pump Type Selection	BV	30
DHW E-Heater Activated Ambient Temp	AV	31
Electric Heating Function	BV	32
AC E-Heater Activated Ambient Temp	AV	33
2nd Heat Source Starting Air Temp	AV	34
AC Anti-Freezing Temp	AV	35
Virus Killing Interval Days	AV	36
Start Virus Killing Time	AV	37
Virus Killing Holding Time	AV	38
Target Temp Of Virus Killing	AV	39
AC Water Flow Switch Type Selection	BV	40
AC Minimum Water Flow	AV	41
Water Src Water Flow Switch Type Sel	BV	42
Lowest Water Flow Of Water Source	AV	43
Air Src Heat Pump Freecooling Func	AV	44
Air Src Freecooling Function	AV	45
Cooling Maximum Set Temp	AV	46
Heating Maximum Set Temp	AV	47
DHW The Highest Set Temp	AV	48
Debugging Fixed Operating Frequency	AV	49
Run Setting Frequency	BV	50
EEV Manually Open Degree (Heating)	AV	51
EEV Manually Open Degree (Cooling)	AV	52
EEV Control Mode	MV	53
Target Overheat Degree (Heating)	AV	54
Target Overheat Degree (Cooling)	AV	55
Night Mode Validation	AV	56
Night Mode Starting Point	AV	57
Night Mode Ending Point	AV	58
Model Selection	AV	59
Use High And Low Pressure Transmitter	AV	60
Temp Diff To Ctrl C4 Water Pump Speed	AV	61

Compressor Manufacturer	AV	62
Forced Sterilization	BV	63
System Parameter Recovery	BV	64
Compressor Manufacturer 2	AV	65
Virus Killing Function Validation	BV	66
EEV Max Manual Open	AV	67
Defrosting EEV Manual Open	AV	68
AC Electric Heater Power W	AV	69
C Or F Degree	BV	70
Heat Recovery Function Validation	BV	71
AC Rated Voltage	AV	72
AC Heat Transfer Coefficient	AV	73
AC Voltage Compensation	AV	74
Cooling Inlet Target Temp Range	BV	75
AC Heating Minimum Frequency	AV	76
Own 485 Address	AV	77
Error Recovery	AV	78
Switch On/Off	BV	79
Operating Mode	MV	80
AC Cooling Target Temp	AV	81
AC heating Target Temp	AV	82
Hot Water Target Temp	AV	83
AC Heating Au Mode	BV	84
Hot Water Au Mode	BV	85
Out Pipe Temp	AI	86
Compressor Discharge Temp	AI	87
Ambient Temp	AI	88
Suction Temp	AI	89
Plate Heat Exchanger Inlet Temp	AI	90
AC Outlet Water Temp	AI	91
Solar Temp	AI	92
Compressor Current Value	AI	93
Usage Side Water Flow Volume	AI	94
P03 Status	BI	95
P04 Status	AI	96
P05 Status	AI	97
P06 Status	AI	98
P07 Status	AI	99
P08 Status	AI	100
P09 Status	BI	101
P10 Status	BI	102
High Pressure Switch Status	BI	103
Low Pressure Switch Status	BI	104
Second High Pressure Switch Status	BI	105
Inner Water Flow Switch	BI	106
Compressor Frequency	AI	107
Overheat Switch Status	BI	108
Outdoor Fan Motor	BI	109
Electrical Valve 1	BI	110
Electrical Valve 2	BI	111
Electrical Valve 3	BI	112
Electrical Valve 4	BI	113
C4Water Pump	BI	114
C5Water Pump	BI	115
C6Water Pump	BI	116
Accum Days After Last Virus Killing	AI	117
Outdoor Modular Temp	AI	118
Expansion Valve 1 Opening Degree	AI	119
Expansion Valve 2 Opening Degree	AI	120
Inner Pipe Temp Display	AI	121
Heating Method 2 Target Temp	AI	122
Run Returning Lubrication Oil Func	BI	123
Fan Type	BI	124
EC Fan Motor 1 Speed	AI	125
EC Fan Motor 2 Speed	AI	126
Water Pump Types	BI	127
Water Pump1 Speed	AI	128
Water Pump2 Speed	AI	129
Inductor AC Current Value	AI	130
Driver Working Status Value	AI	131
Compressor Shut Down Code	AI	132

Driver Allowed Highest Frequency	AI	133
Reduce Frequency Temp Setting	AI	134
Input AC Voltage Value	AI	135
Input AC Current Value	AI	136
Compressor Phase Current Value	AI	137
Bus Line Voltage	AI	138
Fan Shutdown Code	AI	139
Ipm Temp	AI	140
Compressor Total Running Time	AI	141
E-Heater Compensation Power	AI	142
Din6 Ac Heating Mode Switch	BI	143
Din7 AC Cooling Mode Switch	BI	144
DHW Current Temp	AI	145
AC Heating Current Temp	AI	146
AC Cooling Current Temp	AI	147
Error Unit1 Err1	AI	148
Error Unit2 Err2	AI	149
Error Unit3 Err3	AI	150
Error Unit4 Err4	AI	151
Error Unit5 Err5	AI	152
Error Unit5 Err6	AI	153
Comp Discharge High Temp Protection	BI	154
Outdoor Air Temp Sen Error	BI	155
Outer Coil Pipe Temp Sen Error	BI	156
Pipe Returned Gas Sen Error	BI	157
Indoor Refrigerant Pipe Temp Sen Err	BI	158
Coil High Temp Protection	BI	159
Solar Water Temp Sen Error	BI	160
AC Inlet Water Temp Sen Error	BI	161
AC Outlet Water Temp Sen Error	BI	162
DHW Temp Sen Error	BI	163
Indoor Ambient Sen Error	BI	164
Water Src Inlet Water Temp Sen Error	BI	165
Water Src Outlet Temp Sen	BI	166
System Anti Freeze Twice	BI	167
DHW Anti Freeze Twice	BI	168
Discharge Probe Error	BI	169
High Pressure Protection	BI	170
Low Pressure Protection	BI	171
Comp Overheat Protection	BI	172
Over Current Protection	BI	173
Indoor Unit Water Flow Error	BI	174
Outdoor Water Flow Error	BI	175
Miss Phase	BI	176
Wrong Phase	BI	177
Com Error	BI	178
Water Src Anti Freeze	BI	179
Water Src Water Flow Not Enough	BI	180
Voltage Protection	BI	181
Ipm Fault	BI	182
Comp Drive Fault	BI	183
Comp Over Current Protection 1	BI	184
ERR3.0	BI	185
Ipm Overheat	BI	186
PFC Fault	BI	187
DC Bus Overvoltage	BI	188
DC Bus Undervoltage	BI	189
AC Input Over Or Under Voltage	BI	190
AC Input Current Protection	BI	191
Temperature Sen Fault	BI	192
DSO And Mainboard Com Fault	BI	193
Control Board And Inverter Com Fault	BI	194
Inlet/Outlet Wtr Temp Diff Is Too Big	BI	195
AC System Antifreeze Twice	BI	196
ERR3.12	BI	197
ERR3.13	BI	198
Ctrl Panel Param Are Not Initialized	BI	199
ERR3.15	BI	200
EC Fan 1 Fault	BI	201
EC Fsn 2 Fault	BI	202
Heat Recovery Warning	BI	203

Appendix C.2 Fan_Coils Modbus RTU Mappings to BACnet/IP and BACnet MS/TP

Point Name	BACnet Object Type	BACnet Object ID
Start/Stop	BV	1
On/Off	BV	1
Mode	AV	2
Fanspeed	AV	3
Key Lock	AV	4
Sleep	AV	5
Timer Off	AV	6
Timer On	AV	7
Max Set Temp	AV	8
Min Set Temp	AV	9
Cooling Set Temp	AV	10
Heating Set Temp	AV	11
Cooling Set Temp At Auto Mode	AV	12
Heating Set Temp At Auto Mode	AV	13
Anti-Cooling Wind Setting Temp	AV	14
Start Anti-Hot Wind Function	BV	15
Min Fan Speed Setpoint	AV	16
Use Valve	BV	17
Use Floor Heating	BV	18
Use Fahrenheit	BV	19
Master/Slave	BV	20
Unit Address	AV	21
Start Keyboard Lock Function	BV	22
Start RC Func When Keyboard Locked	BV	23
Input Password When Keyboard Locked	BV	24
Keyboard Lock Password	AV	25
Reconfirm Keyboard Lock Password	AV	26
Working Fan Status	MV	27
Room Temp	AI	28
Coil Temp	AI	29
Current Fan Speed	AI	30
Pulse Flow Of Fan	AI	31
Electromagnetic Valve	BI	32
Remote On/Off	BI	33
Simulation Signal	AI	34
Fan Speed Signal Feedback Fault	BI	35
Room Temp Sensor Fault	BI	36
Coil Temp Sensor Fault	BI	37

Appendix C.3 Fan_Coils_Prior Modbus RTU Mappings to BACnet/IP and BACnet MS/TP

Point Name	BACnet Object Type	BACnet Object ID
Start/Stop	BV	1
On/Off	BV	1
Mode	MV	2
Fanspeed	MV	3
Timer Off	AV	4
Timer Off	AV	5
Max Set Temp	AV	6
Min Set Temp	AV	7
Cooling Set Temp	AV	8
Heating Set Temp	AV	9
Cooling Set Temp At Auto Mode	AV	10
Heating Set Temp At Auto Mode	AV	11
Anti-Cooling Wind Setting Temp	AV	12
Start Anti-Hot Wind Function	BV	13
Start Ultra-Low Wind Function	BV	14
Use Vavle	BV	15
Use Floor Heating	BV	16
Use Fahrenheit	BV	17
Master/Slave	BV	18
Unit Address	AV	19
Room Temp	AI	20
Coil Temp	AI	21
Current Fan Speed	MI	22
Fan Revolution	AI	23

Electromagnetic Valve	BI	24
Remote On/Off	BI	25
Simulation Signal	AI	26
Fan Speed Signal Feedback Fault	BI	27
Room Temp Sensor Fault	BI	28
Coil Temp Sensor Fault	BI	29

Appendix D Reference

Appendix D.1 Specifications

	ProtoAir FPA-W44[2]
Electrical Connections	One 3-pin Phoenix connector with: RS-485/RS-232 port (TX+/RX-/gnd) One 3-pin Phoenix connector with: RS-485 (Tx+/Rx-/gnd) One 3-pin Phoenix connector with: Power port (+/-/Frame-gnd) One Ethernet 10/100 BaseT port
Power Requirements	*Input Voltage:* 12-24VDC or 24VAC *Current draw:* 24VAC 125mA *Max Power:* 3 Watts 12-24VDC 250mA @12VDC
Approvals	CE and FCC Class B & C Part 15, UL 60950, WEEE compliant, IC Canada, RoHS compliant
Physical Dimensions	4 x 1.1 x 2.7 in (10.16 x 2.8 x 6.8 cm)
Weight	0.4 lbs (0.2 Kg)
Operating Temperature	-20°C to 70°C (-4°F to158°F)
Humidity	10-95% RH non-condensing
Wi-Fi 802.11 b/g/n	*Frequency:* 2.4 GHz *Channels:* 1 to 11 (inclusive) *Antenna Type:* SMA *Encryption:* TKIP, WPA & AES

Figure 47: Specifications

Appendix D.1.1 Compliance with UL Regulations

For UL compliance, the following instructions must be met when operating ProtoAir.

- The units shall be powered by listed LPS or Class 2 power supply suited to the expected operating temperature range.
- The interconnecting power connector and power cable shall:
  - Comply with local electrical code
  - Be suited to the expected operating temperature range
  - Meet the current and voltage rating for ProtoAir
- Furthermore, the interconnecting power cable shall:
  - Be of length not exceeding 3.05m (118.3”)
  - Be constructed of materials rated VW-1, FT-1 or better
- If the unit is to be installed in an operating environment with a temperature above 65 °C, it should be installed in a Restricted Access Area requiring a key or a special tool to gain access.
- This device must not be connected to a LAN segment with outdoor wiring.

[2] Specifications subject to change without notice.

Appendix E Limited 2 Year Warranty

The manufacturer warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. The manufacturer will repair or replace any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by the manufacturer personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without the manufacturers approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables or to any damage resulting from battery leakage.

In all cases the manufacturers responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, the manufacturer disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of the Chiltrix, HotSpot Energy or the manufacturer for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.