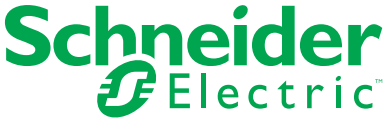
NetShelter® Rack PDU Advanced

User Guide

April 2022



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Introduction

Product Description

The NetShelter Rack PDU Advanced features color-coded circuit breakers and power outlet options to customize the equipment according to your requirements and is available in Metered, Switched, Metered-by-Outlet, and Metered-by-Outlet with Switching models.

Product Features

The NetShelter Rack PDU Advanced may be used as a stand-alone, network manageable power distribution device or up to 32 devices can be connected together using one network connection. You can manage a NetShelter Rack PDU Advanced through its Web User Interface (UI), its Command Line Interface (CLI), Redfish (through an app such as POSTMAN), or from the Rack PDU's display interface.

- Network management and alerting capabilities supporting HTTP, HTTPS, SSH, SNMP, and email.
- Strong encryption, passwords, and advanced authorization options including local permissions, LDAP/S, and Active Directory.
- Cascade the Rack PDUs: Guest Rack PDUs can be connected to a single Host Rack PDU. Up to 32 Rack PDUs of the same SKU can be connected in series.
- Each Rack PDU can support a maximum of eight (8) environmental sensors.
- The Power Sharing feature allows for uninterrupted network communication and sensor function in the event of input power loss.
- Depending on the Rack PDU model, the following features are provided: Inlet Power Measurement, Outlet Power Measurement, Outlet Switching Capability.
- Single Phase Rack PDUs are provided with hydraulic magnetic breakers that are color-coded to match their corresponding outlets.
- Three Phase, 208V, Rack PDUs use circuit breakers color coordinated to correspond to the line connections and include a label of the two connected input phases (L1–L2, L2–L3, L3–L1).
- Three Phase, 400V~415V, Rack PDUs use circuit breakers and outlets color coordinated to the appropriate input phase (L1–N, L2–N, L3–N). The Rack PDU is labeled to indicate the input-phase associated with each circuit breaker and its associated outlets.
- All Three Phase Rack PDUs rated above 16A and 20A use a three (3) color coding system (dark gray, light gray, and white).
- The Rack PDUs are equipped with a Live Swappable NMC Module which eliminates the need to power down the Rack PDU and connected loads during replacement.
- Toolless mounting pegs allow for mounting in most racks from the rear or side of the Rack PDU.
- The USB port on the display panel allows for file downloads to a USB flash drive and for local firmware upgrades.
- Switched Rack PDUs feature individual outlet control and configurable power On or Off delays.
- Multiple login feature which allows up to sixteen (16) users to be logged in simultaneously.
- Configurable alarm thresholds that provide network and visual alarms to help avoid overloaded circuits.
- Email notifications for system events.

Types of User Accounts

A total of sixteen (16) user accounts can be created. All sixteen (16) users can be logged in at the same time but for maximum performance three (3) users are recommended.

The default setting has three (3) accounts: one user, one manager, one admin.

Thirteen (13) additional users can be added.

- admin: has all privileges including Redfish
- manager: has all privileges including Redfish (This user level is intended for management of Redfish API)
- user: read-only access

Establish Network Settings

NOTE: If the Rack PDU is placed within a static network environment, users can configure the Rack PDU to a Static IP address by connecting the Rack PDU by serial cable to your computer or by uploading a configuration file using the USB port on the display interface. See those topics in this manual for more information.

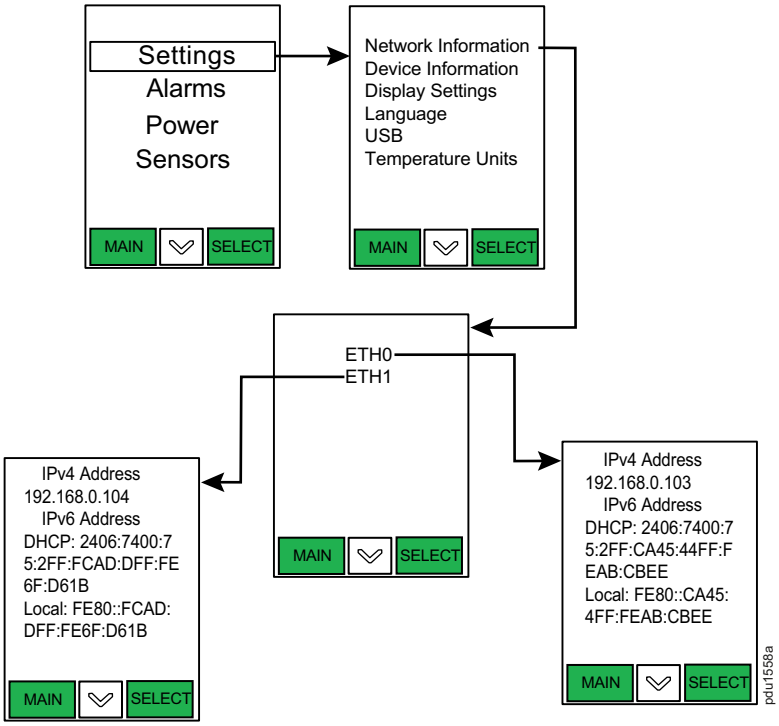
Establish a Network Connection

Rack PDUs are set to obtain an IP address using DHCP by default. When the Rack PDU is connected to a network for the first time, the Rack PDU will automatically obtain an IP address.

1. Connect a standard Ethernet cable to Port 1 or Port 2 on the Rack PDU.
2. Connect the other end of the cable to your Network (LAN).
3. A solid green light on the left side and a flashing yellow light on the right side of the Port will indicate successful connectivity to the network.

Obtain the IP Address from the Rack PDU

On the Rack PDU display, navigate through the menus to obtain the IP address (IPv4 or IPv6 as applicable).



To login to the Web UI, in a standard web browser, enter the IP address you obtained from the Rack PDU:
`https://IP address`

The login page for the Web UI will open.

NOTE: You can also use the IP address to login to the Rack PDU using the CLI.

Local Serial Connection

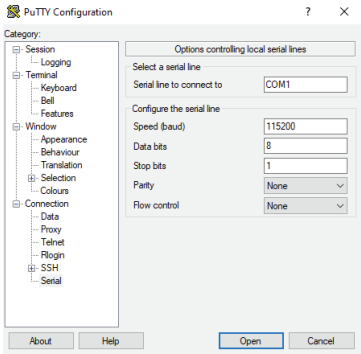
You can configure the network settings using the Command Line Interface (CLI) with a serial connection. You can either connect serially using the optional Schneider Electric RJ45–DB9 Cable, 940–9591 (recommended) or by creating a unique pinout.

1. Connect the RJ45 end of the serial cable into the Port 1 on the Rack PDU.
2. Connect the DB9 end of the cable into the communications (COM) port on your computer.

   NOTE: You can use a DB9–serial-to-USB adapter connected to the Console Cable for this step to connect to the USB if a DB9 serial port is not available on your computer.
3. Open a communications program such as HyperTerminal or PUTTY.

   Select the **COM** port. Set the communications port as follows:

   - Speed (baud) Bits per second: 115200
   - Data bits: 8
   - Stop bits: 1
   - Parity: None
   - Flow Control: None



4. Use the default initial login indicated below.

   NOTE: Username and Password are both case sensitive.

   - Username: admin
   - Password: 12345678

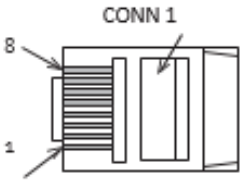
   NOTE: For security, following your initial login, you will be prompted to change your password.
5. The **apc>** prompt appears after you have logged in.
6. To configure network settings, type the appropriate commands in the command prompt and press the Enter key. All commands are case sensitive.

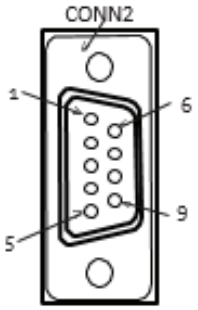
   NOTE: You can type “**?**” to access a list of all available commands.

Creating a Unique Pinout Connection

To create your own pinout connection for the RJ45 to Serial cable, make the wiring connections as shown:

Pin	Description	Pin
1		1
2	RS232 RX	2
3	RS232 TX	3
4		4
5	Ground	5
6		6
7		7
8		8





Assign a Static IP Address

You can assign a static IP address using the CLI.

To assign a static IPv4 address, configure the below parameters:
`net tcpip eth0static x.x.x.x (ipaddress) x.x.x.x (netmask) x.x.x.x (gateway)`
Example: `net tcpip eth0static 192.168.1.100 255.255.255.0 192.168.1.1`

To assign a static IP address to Port 1 of the Rack PDU using the CLI:

```
apc>net tcpip

SUCCESS
eth0 IPv4 Addr: 192.168.0.103
eth0 IPv6 Link Local Addr: fe80::ca45:44ff::feab:cbee
eth0 IPv6 DHCP Addr: 2406:7400:75:2ff:ca45:44ff:feab:cbee
eth1 IPv4 Addr: 192.168.0.104
eth1 IPv6 Link Local Addr: fe00::fcad:dff:fe6f:d61b
eth1 IPv6 DHCP Addr: 2406:7400:75:2ff:fcad:dff:fe6f:d61b

apc>net tcpip eth0static 192.168.0.200 255.255.255.0
192.168.0.1

Reboot required for change to take effect
Network is reconfired, Please reboot to validate
System Reboot now, Are you sure?(Y/N):Y
```

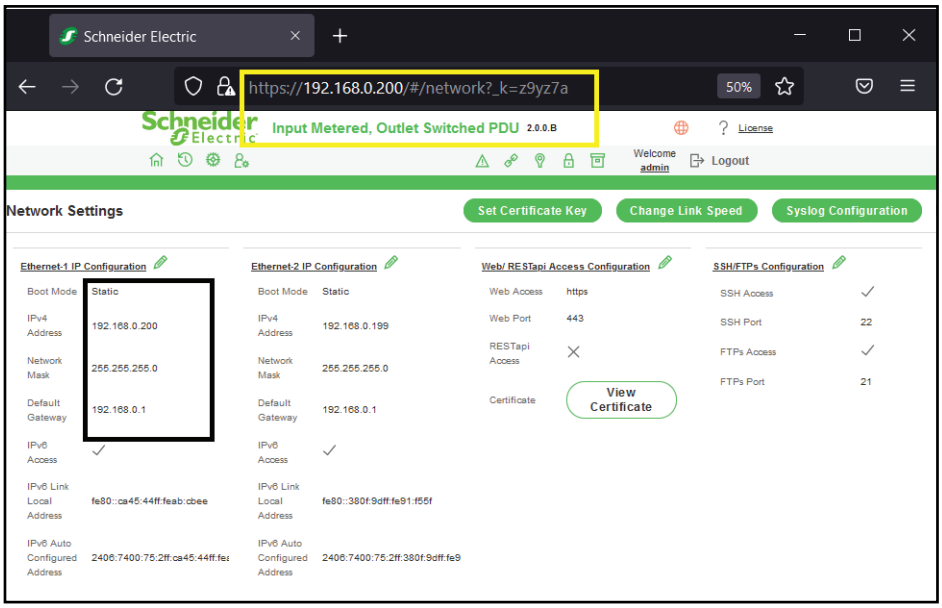
To assign a static IP address to Port 2 of the Rack PDU using the CLI:

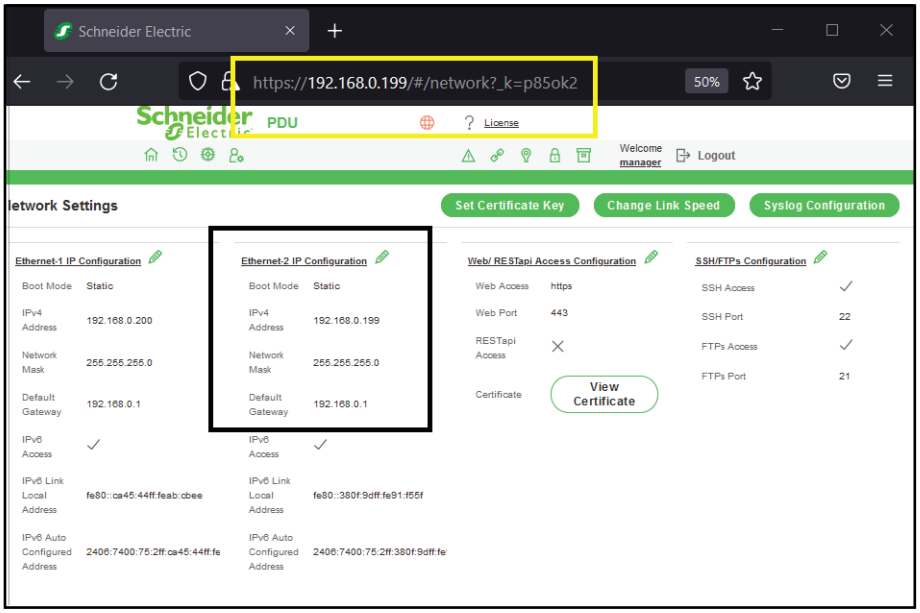
```
apc>net tcpip

SUCCESS
eth0 IPv4 Addr: 192.168.0.200
eth0 IPv6 Link Local Addr: fe80::ca45:44ff::feab:cbee
eth0 IPv6 DHCP Addr: 2406:7400:75:2ff:ca45:44ff:feab:cbee
eth1 IPv4 Addr: 192.168.0.105
eth1 IPv6 Link Local Addr: fe80::6453:31ff:fe36:60e9
eth1 IPv6 DHCP Addr: 2406:7400:75:2ff:6453:31ff:fe36:60e9

apc>net tcpip eth1static 192.168.0.199 255.255.255.0
192.168.0.1

Reboot required for change to take effect
Network is reconfired, Please reboot to validate
System Reboot now, Are you sure?(Y/N):Y
```

After static IP addresses have been assigned to both ports, the CLI response will appear similar to the below example when queried:

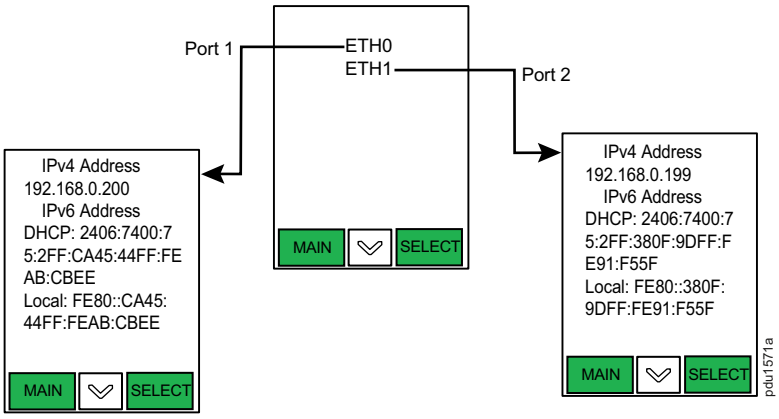
```
apc>net tcpip

SUCCESS
eth0 IPv4 Addr: 192.168.0.200
eth0 IPv6 Link Local Addr: fe80::ca45:44ff:feab:cbee
eth0 IPv6 DHCP Addr: 2406:7400:75:2ff:ca45:44ff:feab:cbee
eth1 IPv4 Addr: 192.168.0.199
eth1 IPv6 DHCP Addr: 2406:7400:75:2ff:380f:9dff:fe91:f55f
apc>
```

The Web UI can now be accessed after the static IP addresses are assigned.





Static IP addresses assigned using CLI for Port 1 and Port 2 will appear on the LCD display of the Rack PDU similar to the below example:



Assign DHCP IP Addresses From Static Mode

You can change from Static mode to DHCP mode using the CLI to assign DHCP IP Addresses for Port 1 and Port 2 of your Rack PDU.

To change to DHCP mode from static mode for Port 1:

Type: `net tcpip eth0dhcp`

The CLI response:

```
Reboot required for change to take effect
Network is reconfigured, Please reboot to validate
System Reboot now, Are you sure?(Y/N):
```

Type: `Y` to confirm.
The Reboot will start.

To change to DHCP mode from static mode for Port 2:

Type: `net tcpip eth1dhcp`

The CLI response:

```
Reboot required for change to take effect
Network is reconfigured, Please reboot to validate
System Reboot now, Are you sure?(Y/N):
```

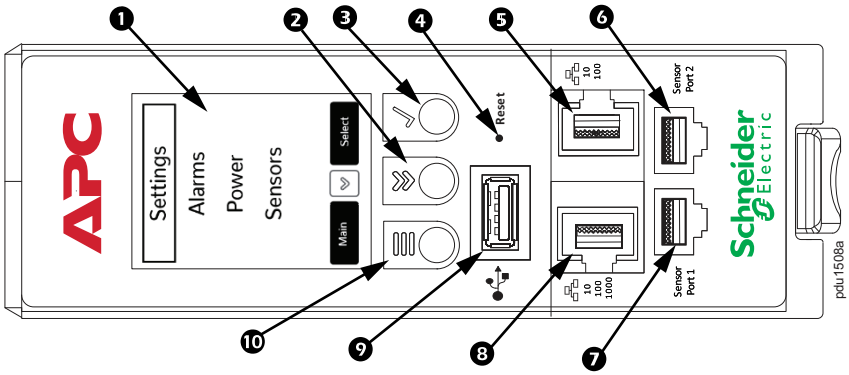
Type: `Y` to confirm.
The Reboot will start.

To see the DHCP IP addresses, type: `net tcpip`

The CLI response:

```
SUCCESS
eth0 IPv4 Addr: 192.168.0.103
eth0 IPv6 Link Local Addr: fe80::ca45:44ff:feab:cbee
eth0 IPv6 DHCP AddrP 2406:7400:75:2ff:ca45:44ff:feab:cbee
eth1 IPv4 Addr: 192.68.0.107
eth1 IPv6 Link Local Addr: fe80::1ccf:3fff:fe3c:755f
eth1 IPv6 DHCP Addr: 2406:7400:75:2ff:1ccf:3fff:fe3c:755f
```

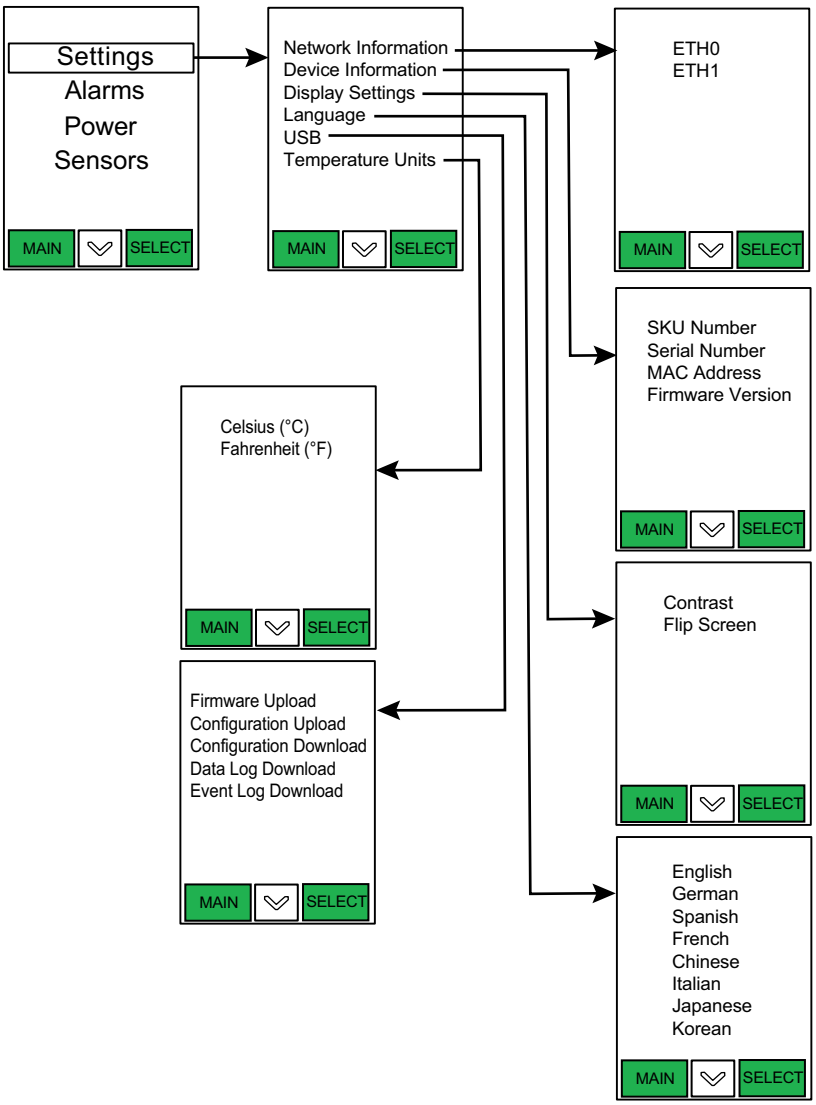
Front Panel Overview



Item	Description	Function
❶	Display Panel	Shows information about the Rack PDU.
❷	Scroll button	Press once to display the menu. Press additional times to move the highlight bar down the menu list until you reach the desired item.
❸	Select button	With the menu item highlighted, press the Select button to display the Rack PDU information.
❹	Reset	Resets the network management interface without affecting outlets of the Rack PDU.
❺	10/100 Network port	Redundant Ethernet and Cascading with DC Power Share. Connects the Rack PDU to the network using a Cat5e network cable.
❻	Sensor port 2	Port for connecting an optional sensor.
❼	Sensor port 1	Port for connecting an optional sensor. This port is also used for the serial port.
❽	10/100/1000 Network port	Gigabit Ethernet port. Connects the Rack PDU to the network. Connects the Rack PDU to another Rack PDU in a cascading group with DC Power Share, using a Cat5e network cable.
❾	USB port	For use with a flash drive for firmware upgrades. Can also be used to download log files to a flash drive.
❿	Menu button	Press to view MENU information or navigate back to the previous screen. The display screen shows MAIN above the MENU button.

Display Tree — Example 1

The display on your Rack PDU provides information about the Rack PDU and its connected devices. The Main Menu and its immediate submenus are shown below.



Display Menus

The display menus provide user configuration options and information regarding Network, Device, Display, Language, USB, and Temperature Units. On the Main Menu screen, scroll down to highlight Settings. Press the Select button to open the submenu. Scroll down to highlight a submenu option. Press the Select button to open that option's screen. You can press the Main Menu button to return to the previous menu screen.

Network Submenu

The Network submenu allows you to view the IP address for IPv4 or IPv6.
Settings>Network>ETH0
Settings>Network>ETH1

On the Settings menu, scroll down to Network. Press Select to enter the Network Submenu. Scroll down to highlight the selected option from the menu. Press Select to display the screens that display the IP address. Press the Main Menu button to return to the previous menu.

Device Information Submenu

The Device Information submenu provides details regarding the SKU, Serial number, MAC address, and firmware version.
Settings>Device Information>SKU Number
Settings>Device Information>Serial Number
Settings>Device Information>MAC Address
Settings>Device Information>Firmware Version

On the Settings menu, scroll down to highlight Device Information. Press Select to open the Device Information submenu. Scroll down to the item you wish to display and press Select. Press the Main Menu button to return to the previous menu.

Display Settings Submenu

The Display Settings submenu allows you to customize settings for the display. The Display Settings options are:
Settings>Display Settings>Contrast
Settings>Display Settings>Flip Screen
On the Settings menu, scroll down to highlight Display Settings. Press Select to select the Display Settings submenu. Press the Main Menu button to return to the previous menu.

Language Submenu

The Language submenu allows the user to view the display in 8 languages.
Settings>Language>English
Settings>Language>German
Settings>Language>Spanish
Settings>Language>French
Settings>Language>Chinese
Settings>Language>Italian
Settings>Language>Japanese
Settings>Language>Korean
On the Settings menu, scroll down to highlight Language. Press Select to display the Language submenu. After you select the language, press Select to set the language as displayed on the screen. Press the Main Menu button to return to the previous menu.

USB Submenu

The USB submenu allows you to upload Firmware and Configuration files. It also enables the user to download an Event or Data Log.
Settings>USB>Firmware Upload
Settings>USB>Configuration Upload
Settings>USB>Configuration Download
Settings>USB>Data Log Download
Settings>USB>Event Log Download
On the Settings menu, scroll down to highlight USB. Press Select to enter the USB submenu. Select the desired function from the USB submenu. The user will be asked to verify the USB operation and Configuration Mode. After you select Yes, the system will reboot into the USB operation and Configuration mode. Press the Main Menu button to return to the previous menu.

NOTE: If a USB drive is not present in the USB slot the PDU will enter normal operation.

NOTE: If you are in USB mode and you want to exit USB mode, you must remove the USB drive before exiting USB mode. Otherwise, the PDU will reboot and re-enter USB mode.

Temperature Units Submenu

The Temperature Units submenu displays the temperature units.
Settings>Temperature Units> Celsius (°C)
Settings>Temperature Units> Fahrenheit (°F)
On the Settings menu, scroll down to highlight the Temperature Units. Press Select to enter the Temperature Units Submenu. After you select the values, press Select to set the values as displayed on the screen. Press the Main Menu button to return to the previous menu.

NOTE: This can only be done locally at the PDU.

Alarms Menu

The Alarms menu displays active alarms of the PDU. On the Main Menu, scroll down to highlight Alarms. Press Select to display the Alarm Screen. When you finish your review, press the Main Menu button to return to the previous screen.

Power Menu

Use the Power menu to view Breaker, Phase and Outlet Information. It allows for management of Guest Device Status.

On the Main Menu, scroll down to highlight Power. Press Select to enter the Power menu. Scroll down to select a submenu and press Select to display the submenu options. Press the Main Menu button to return to the previous menu.

Device Status Submenu

The Device Status submenu displays Current, Voltage, Energy and Power of the respective Rack PDU.
Power>Device Status
On the Power menu, scroll down to highlight Device Status. Press Select to display the information. Press the Main Menu button to return to the previous menu.

Phase Information Submenu

The Phase submenu is to display the status and information of 3–Phase lines.
Power>Phase Information
On the Power menu, scroll down to highlight Phase Information. Press Select to display the Phase Information submenu. Press the Main Menu button to return to the previous menu.

Guest Status Submenu

The Guest Status submenu displays Current, Voltage, Energy and Power of the Guest PDU.
Power>Guest Status
On the Power menu, scroll down to highlight Guest Status. Press Select to display the information. To navigate through the different Guest Rack PDUs, press the Scroll button. Press the Main Menu button to return to the previous menu.

Breaker Information Submenu

The Breaker Information submenu is to display the status and information for the circuit breakers.
Power>Breaker Information
On the Power menu, scroll down to highlight Breaker information. Press Select to display the information. To navigate through the different Circuit Breakers, press the Scroll button. Press the Main Menu button to return to the previous menu.

Outlet Information Submenu

The Outlet submenu is to display Current, Voltage, and Power from Outlet number 1 to number N.
Power>Outlet Information
On the Power menu, scroll down to highlight Outlet Information. Press Select to display the values for the first outlet. To navigate through Outlet number 1 to number n, press the Scroll button. Press the Main Menu button to return to the previous menu.

> **NOTE:** Custom outlet names noted in the Web UI do not make changes to the local display. This is done to make it easier to map to outlet numbers which can be seen locally on the outlets themselves.

Sensors Menu

The Sensor menu displays the information related to the respective Environmental and Security sensor. The display shows temperature, humidity, leaks, etc.

On the Main Menu screen, scroll down to highlight **Sensor** and press Select. This will display the sensor data for the first sensor. Press the Scroll button to see more sensor data, if you have additional sensors installed. Press the Main Menu button to return to the previous menu.

NOTE: A maximum of eight (8) sensors can be configured per Rack PDU.

Web User Interface (Web UI)

Supported Web Browsers

The supported Web browsers are Google Chrome (mobile and desktop), Mozilla, Firefox, and Microsoft Edge on mobile and desktop.

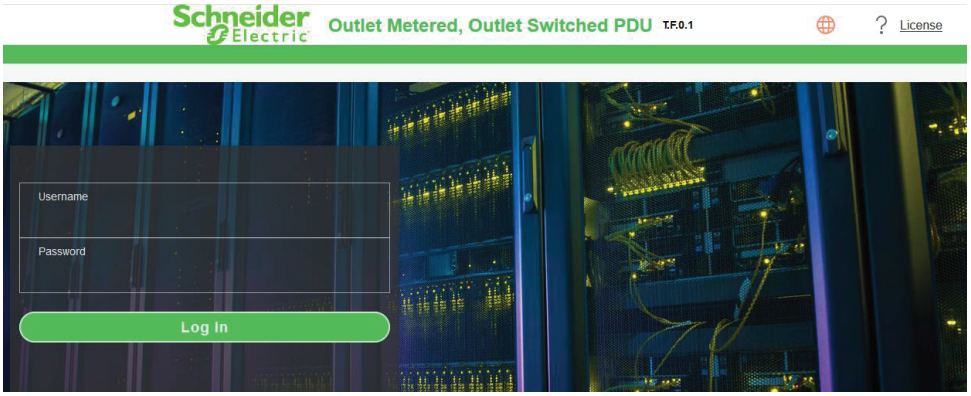
NOTE: If the browser displays a “can’t reach this page” message, check that you are using the **https://** access protocol and not **http://**.

Log On to the Web User Interface

Confirm that the network connection has been established with the Rack PDU and that you have obtained the IP address.

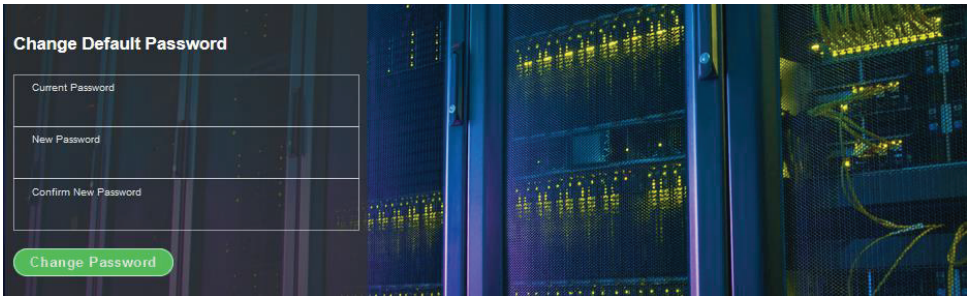
Enter the IP address of the Rack PDU into your Web browser. The Login Page of the Web UI will open.

Log on to the Web UI. The default login is **admin** and the password is **12345678**.

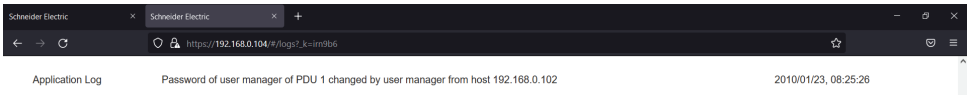


First Log On

When you log on to the Web UI for the first time, following the initial login page, you will be prompted to change the default account password. Type the current password, enter the new password and confirm the new password by entering it again in the appropriate space on the page. Click on the **Change Password** button at the bottom of the page to complete the process.



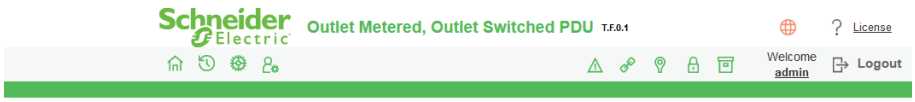
The password change is confirmed when the following window opens:



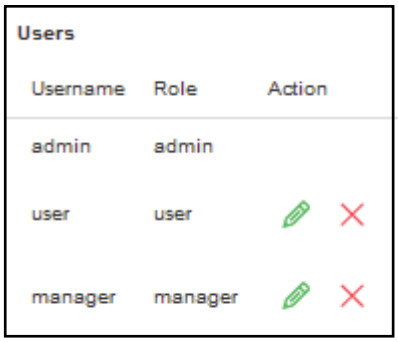
Changing your Password

If you need to change your password at any time following the initial password change requirement, follow the steps below:

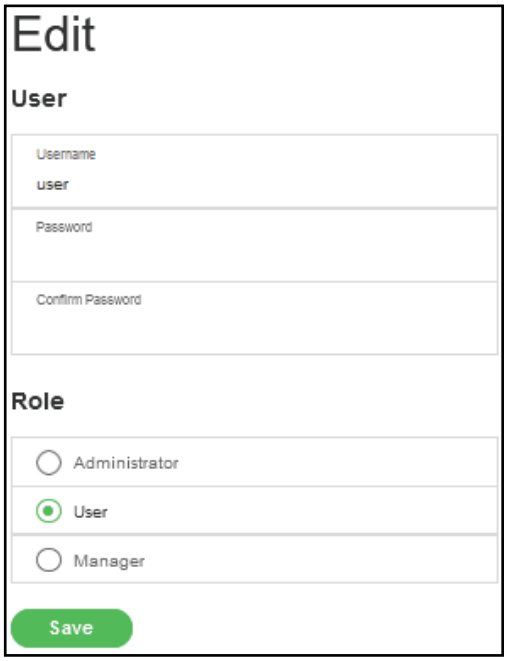
1. Click on the User Settings icon located at the top of the Web UI pages.



The User Settings page will open.



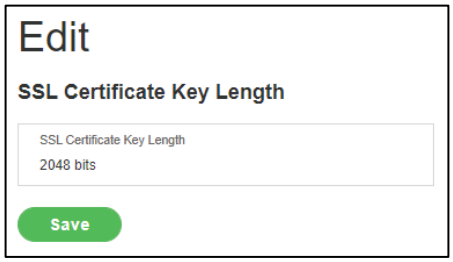
2. In the Users section, click the Edit icon next to your Username and Role to open the Edit dialog box where you can change your password.
3. Type your new password in the **Password** field then, type it in again in the **Confirm Password** field. Click the **Save** button to save your changes.



SSL Certificate

To edit the **SSL Certificate Key Length**, click on the **Set Certificate Key** in the top right corner of the Network Settings page. The **Edit** window for SSL Certificate Key Length will open.

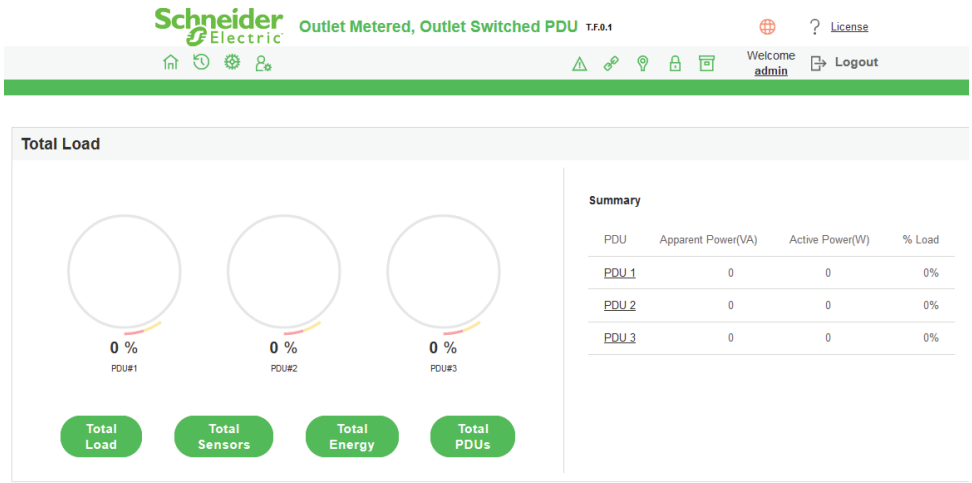
- Click on SSL Certificate Key Length
- Select **bits (1024/2048)** from the dropdown menu.



- Click on the **Save** button at the bottom of the Edit window to save your changes.

Navigating the Web UI

The Landing page (following login):

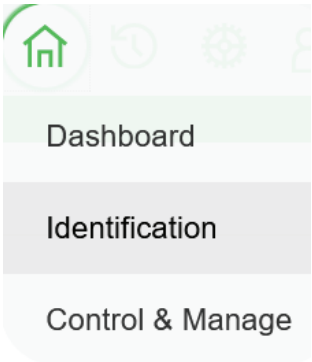


The icons across the top of the Landing page are described in the following table.

Icon	Description
	Home icon: Select the Home icon to open the Home menu which includes: Dashboard, Identification, and Control & Manage.
	Logs icon: Select the Logs icon to view and download the logs and data logs of the PDU.
	Settings icon: The Settings icon allows the user to set the Network Settings, System Management, SNMP Manager, Email Setup, Event Notifications, Trap Receiver, and Thresholds.
	User Settings icon: Select the User Settings icon to view the logged-in user, administrator, or manager. Users can also change account passwords and manage user accounts. Users and Roles can be added (by admin or manager).
	Alarm icon: Select the Alarm icon to view details of the active critical alarms and active warning alarms. Alarms are configured based on Thresholds set by the user on parameters like Power, Voltage, Input Phase, Circuit Breaker and External Sensors. Icon colors are based on alarm status — Red for Critical Alarms and Yellow for Warnings. Critical Alarms have precedence over warnings.
	Link icon: Select the Link icon to view the cascade connection status alarms.
	Sensor icon: Select this icon to view sensor related alarms.
	Security icon: Select this icon to view the Door sensor alarm status.
	Outlet status icon: Select this icon to view Circuit Breaker and Outlet alarm status.
	Language icon: Select this icon to choose a language. Choose from: English, French, Italian, Korean, German, Spanish, Japanese, and Chinese.
?	**Information icon:** Select the Information icon to find information about the Rack PDU. Go to **www.apc.com** to get more information.

The Home Menu

Click the Home icon to see the dropdown menu.

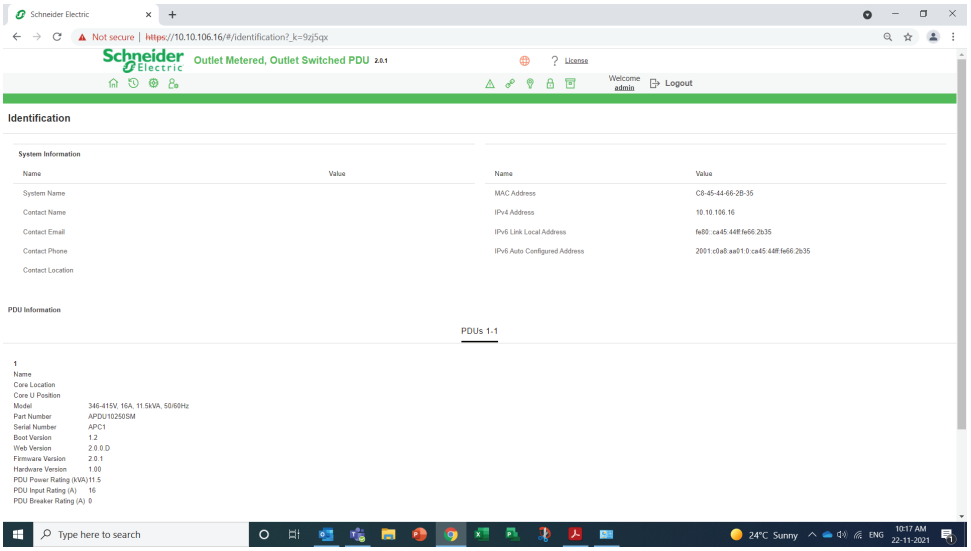


The options are:

- Dashboard: View total load details
- Identification: System information of the Rack PDUs in the network
- Control & Manage: View and edit the Outlets of your Rack PDUs by Circuit Breaker or Bank

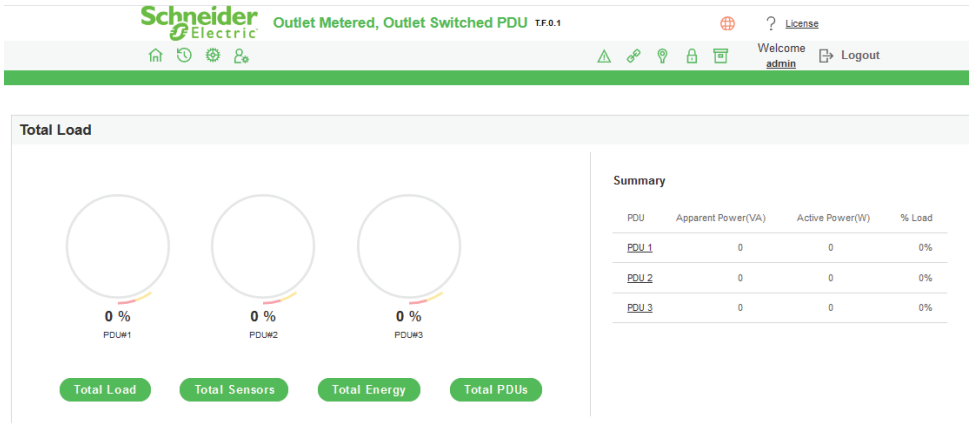
Identification

Select the **Identification** page, to view the **System Information** and individual **PDU Information**.

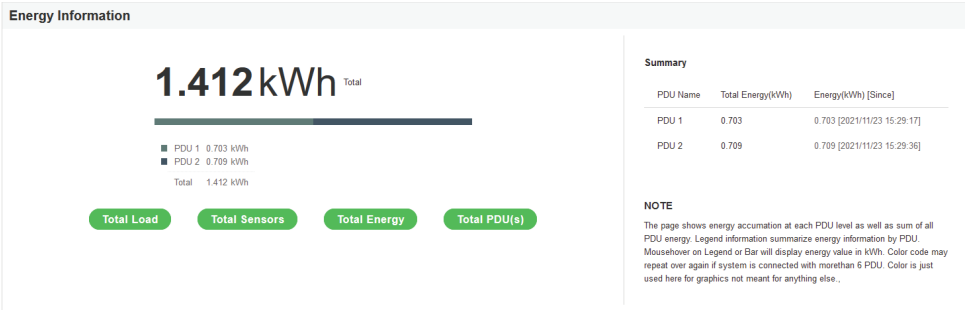


The Dashboard Pages

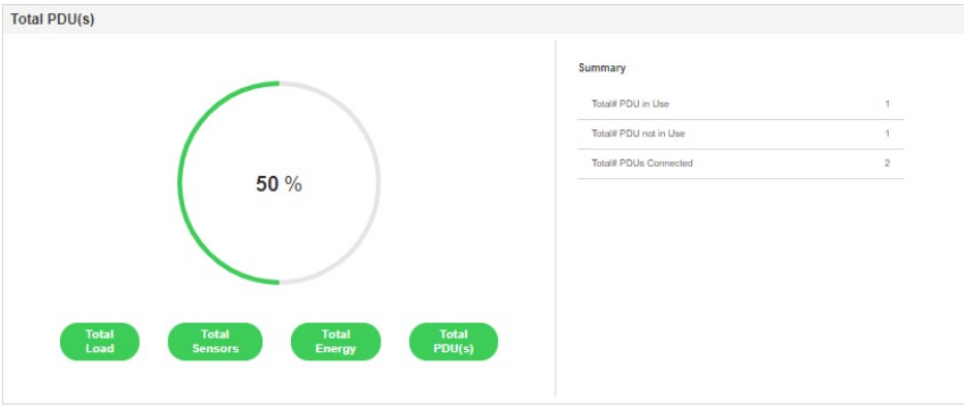
Select Dashboard from the Home menu. The Dashboard page allows the user to view details relating to the Total Load, Total Sensors, Total Energy, and Total Rack PDUs.



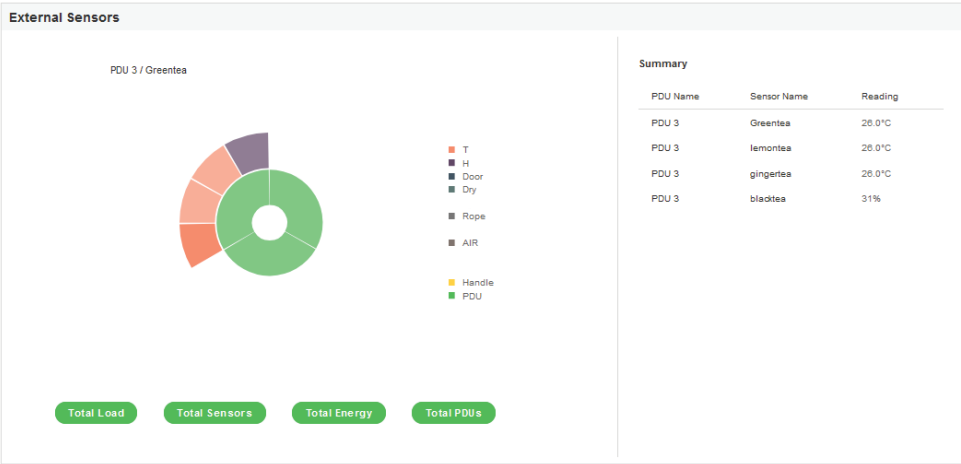
Select the Total Energy button on the opening page of the Dashboard to open the Energy Information page.



View the total number of Rack PDUs connected in your network.

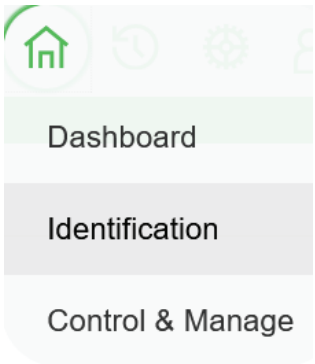


View external sensors, sensor readings, and the Rack PDU (by its number) hosting the sensors.



Control and Manage

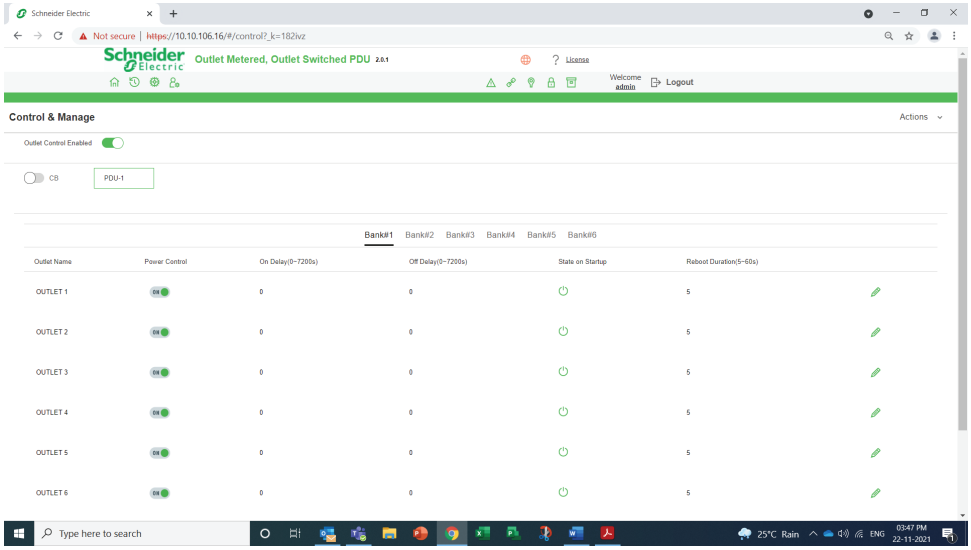
Click the Home icon and select **Control and Manage** from the dropdown menu.



You can view and control the **Power Outlets** of the Rack PDU.

Click the **Outlet Control Enabled** button.

The page can be viewed in two separate modes by selecting either **CB** (to view the circuit breaker information) or **Bank #** mode (to view banks of outlets) to enable.



Click the Edit icon to change the Outlet information.

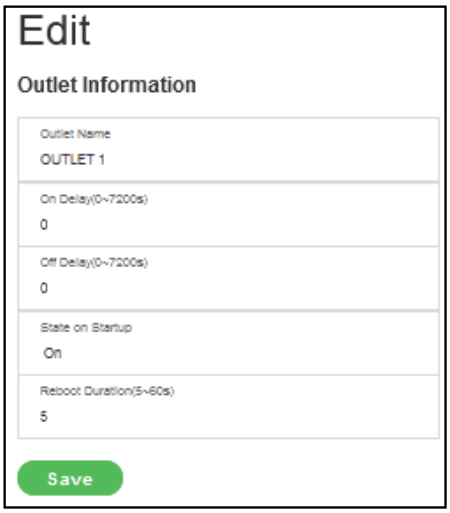
Outlet name: Identify the outlet

On delay time: 0 — 7200 seconds

Off delay time: 0 — 7200 seconds

State on startup: Choices are **On**, **Off**, and **Last Known**

Reboot duration: Configure the time for the reboot duration between 5 to 60 seconds



View Logs

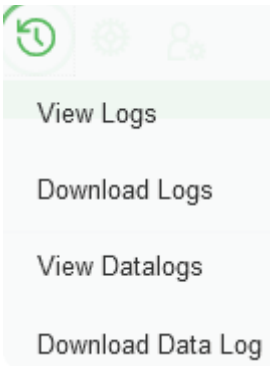
From this page, the user can view, download, or clear logs generated by the activities of the Rack PDU. Click on the Log icon to see the dropdown menu. The available options are:

View Logs

Download Logs

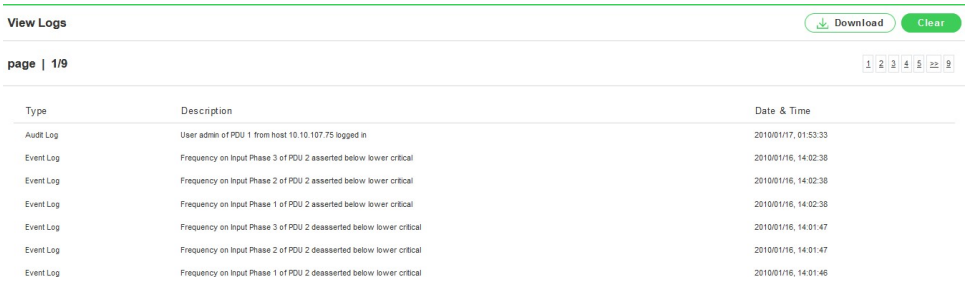
View Datalogs

Download Data Log



Select **View Logs** to view the information.
Some of the actions performed by the Rack PDU are:

- Generating Event, Audit, and Application logs
- Recording Power Share details



Click on the **Download** or **Clear** buttons in the top right corner of the **View Logs** page.

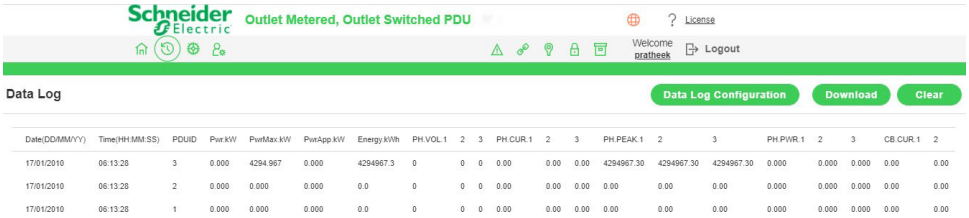
View Data Logs

View, configure, download, and clear the Data recorded by the Rack PDU.

- **Energy** information
- **Power** information
- **Date and Time** information

Click on the **Log** icon to view the dropdown menu.

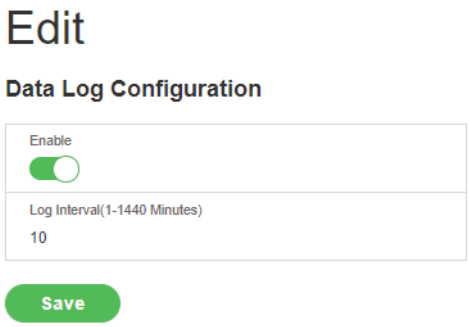
Select **View Data Logs** to open the **Data Log** page.



Date(DD/MM/YY)	Time(HH:MM:SS)	PDUID	Pwr:kW	PwrMax:kW	PwrApp:kW	Energy:kWh	PH.VOL.1	2	3	PH.CUR.1	2	3	PH.PEAK.1	2	3	PH.PWR.1	2	3	CB.CUR.1	2
17/01/2010	06:13:28	3	0.000	4294.967	0.000	4294967.3	0	0	0	0.00	0.00	0.00	4294967.30	4294967.30	4294967.30	0.000	0.000	0.000	0.00	0.00
17/01/2010	06:13:28	2	0.000	0.000	0.000	0.0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.00	0.00
17/01/2010	06:13:28	1	0.000	0.000	0.000	0.0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.00	0.00

At the top right corner of the **Data Log** page, you can select from three buttons, **Data Log Configuration**, **Download**, to download the data logs, and **Clear** to delete the data logs.

To enable log configuration and set the log interval time (in minutes), select the **Data Log Configuration** button to open the **Edit** dialog box.



Settings

Manage the IP Configuration, Web RESTapi Access Configuration, SSH/FTPs Configuration, Network Time Protocol (NTP), Date/Time Settings and Daylight Savings Time.

The Rack PDU supports IPv4 and IPv6 Internet Protocol options with full network management and alerting capabilities. After you select your Internet protocol option, you will be able to communicate using HTTP, HTTPS, SNMP, FTPS and Email for network communications.

Click on the Settings icon to open the dropdown menu.
The menu options are:

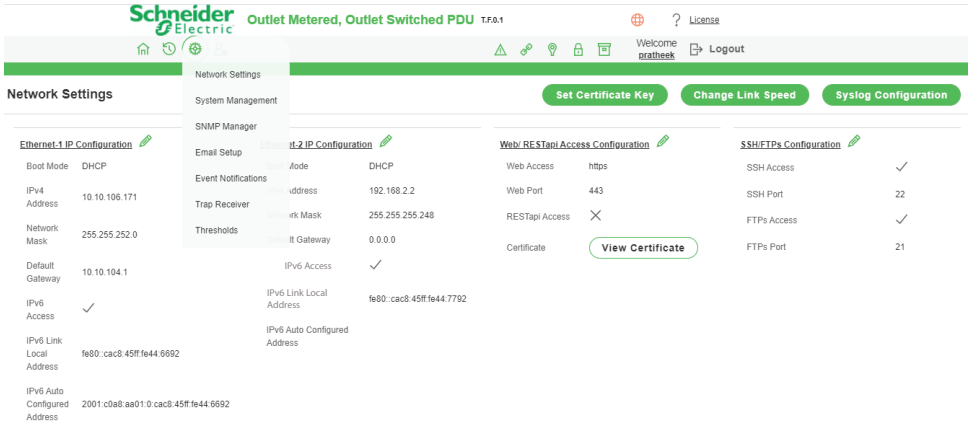
- Network Settings
- System Management
- SNMP Manager
- Email Setup
- Event Notifications
- Trap Receiver
- Thresholds

Network Settings

The Network Settings page allows the management of IP Configuration, Web RESTapi Access Configuration, SSH/FTPS Configuration, Network Time Protocol (NTP), Date/Time Settings and Daylight-Savings Time Settings.

NetShelter Rack PDU Advanced supports IPv4 and IPv6 with full-featured network management and alerting capabilities. After you select your Internet protocol option, you will be able to communicate using HTTP, HTTPS, SNMP, FTPS, and email for network communications.

From the dropdown menu of the Settings icon , select Network Settings to open the Network Settings page.



Click on the Edit icon to open the **Edit IP Configuration** dialog box where you can change the information.

Select **DHCP** to auto-configure the IP Address of the Rack PDU.
Select **Static** to manually configure the IP Address and then fill in the remaining fields of the dialog box.

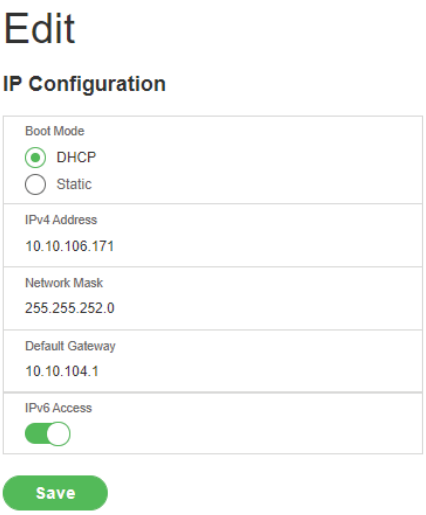
If you are manually configuring the IP Address, enter the following:

IPv4 address

Network Mask

Default Gateway

Once you have configured the settings, click the **Save** button to save your changes.



RESTapi Access Configuration

The Rack PDU is accessed using HTTPS by default.

Click the Edit icon to open the **Edit Web/RESTapi Access Configuration** dialog box where you can enter your information.
The available settings are:

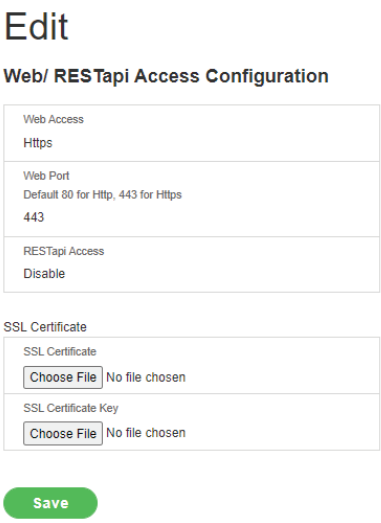
Web Access (**HTTP** or **HTTPS**)

Web Port (Default 80 for HTTP, and 443 for HTTPS)

Enable **RESTapi Access**

To access the HTTPS settings, upload the **SSL Certificate** and **SSL Certificate Key** provided by Schneider Electric.

Click the **Save** button to confirm and save your settings.



Setting the Time and Date

The date and time can be set either by connecting to a Network Time Protocol (NTP) server or by setting the time manually.

Network Time Protocol (NTP)

Link the Rack PDU to a **Network Time Protocol (NTP)** server and let it set the date and time.

Click the Edit icon to open the **Edit NTP** dialog box.

Click on the **Enable** button to enable NTP settings.

To synchronize the Rack PDU time with a selected server:

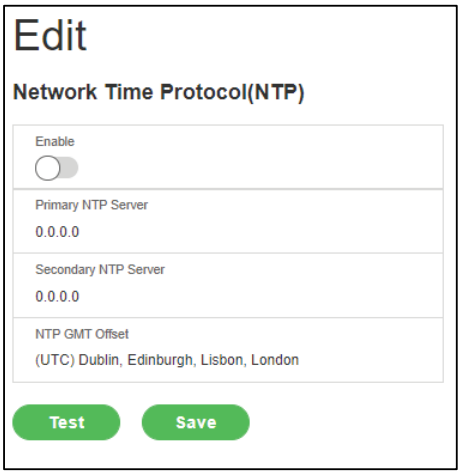
Type the valid **Primary** NTP server address

Type the valid **Secondary** NTP server address

Select the desired **NTP GMT offset** time from the dropdown list.

Click the **Test** button to confirm that the network is valid.

Click the **Save** button to confirm and save your changes.



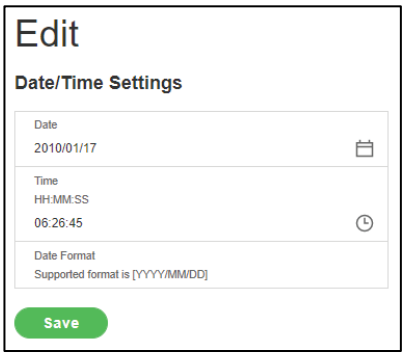
Manually Setting the Date and Time

You can manually set the internal clock on the Rack PDU by clicking on the Edit icon to open the **Edit Date/Time Settings** dialog box.

Type the **Date** in YYYY-MM-DD format or use the calendar icon.

Type the **Time** in HH:MM:SS format and time is measured in 24–hour format.

Click the **Save** button in the bottom of the Edit window to save your changes.



Daylight Saving Time

Click the Edit icon to open the **Edit Daylight Saving Time** dialog box.

Click on the **Enable** button to enable Daylight Saving Time.

Select the specifics of the **Start Month**. The choices are:

Month

Week

Day

Time

Select the specifics of the **End Month**. The choices are:

Month

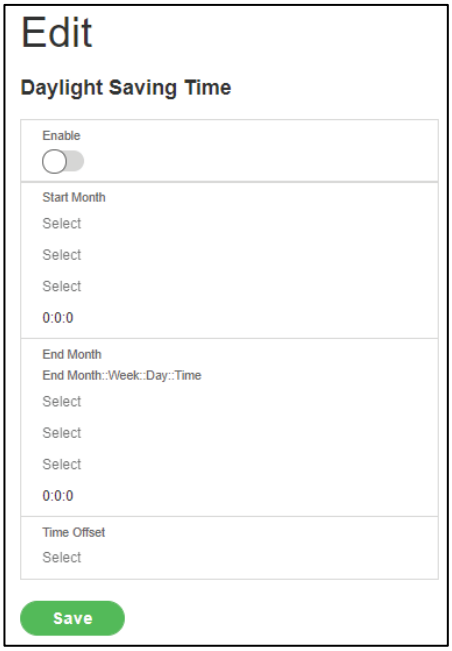
Week

Day

Time

Assign the **Time Offset**.

Click the **Save** button to save your settings.



Ethernet Link Speed

Click on the **Change Link Speed** button in the top right corner of the **Network Settings** page to open the **Ethernet Link Speed** Edit dialog box.

Click on Link Speed to open the dropdown menu.

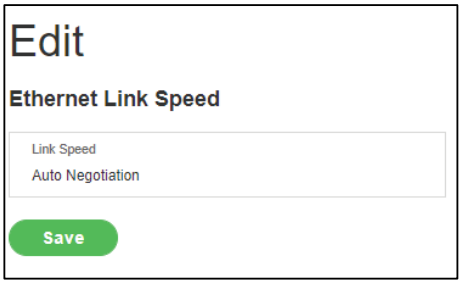
Select from the following options:

Auto Negotiation

10/100 Mbps

1 Gbps

Click on the **Save** button to save your settings.



Syslog Configuration

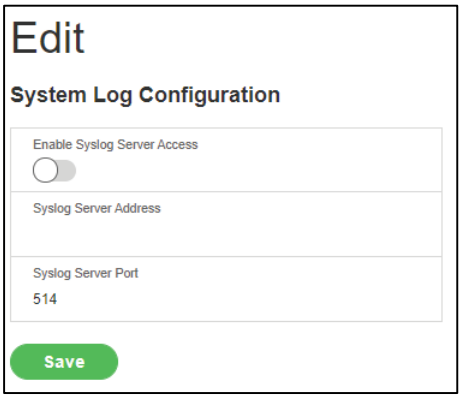
Click on the **Syslog Configuration** button in the top right corner of the Network Settings window to open the **Edit System Log Configuration** window to **Enable Syslog Server Access**.

Click on the **Enable Syslog Server Access** button

Enter the **Syslog Server Address**

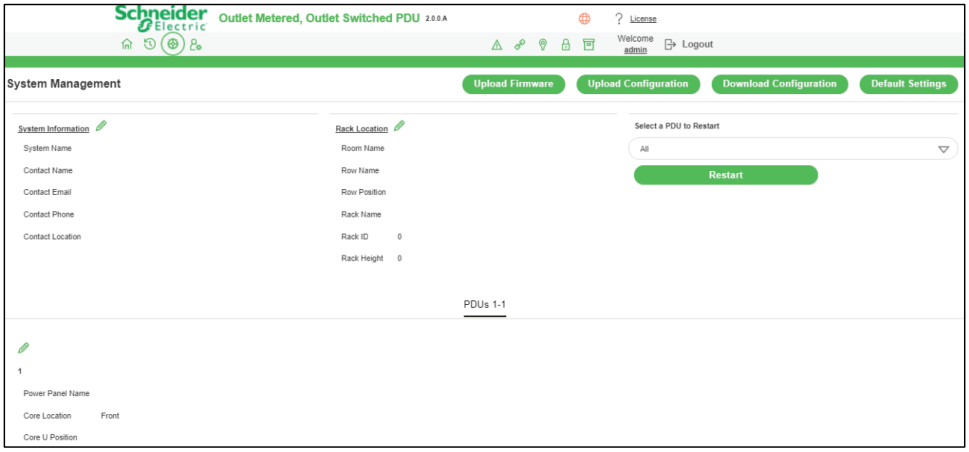
Select the **Syslog Server Port** number

Click the **Save** button to save your settings.



System Management

Click on the Settings icon to open the dropdown menu. Select **System Management** from the menu to open the System Management page.



You can perform functions like **Uploading Firmware**, **Uploading Configuration**, **Downloading Configuration** and returning the settings of the Rack PDU to the **Default Settings** from the System Management page. You can also **Restart** the Rack PDU from the System Management page.

Edit System Information

Click on the Edit icon to open the **Edit System Management** dialog box and make changes to the System Information. You can enter the following information:

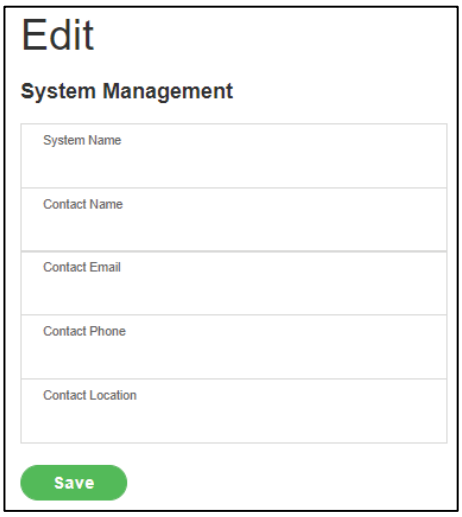
The **System Name** of the Rack PDU for identification.

The **Contact Name** of the contact person.

The **Contact Email** address of the contact person.

The **Contact Location** of the contact person.

Click the **Save** button in the bottom of the window to save your settings.



Edit Rack Location

Click on the Edit icon to open the **Edit Rack Location** dialog box. You can enter the following information:

Room Name: the room where the Rack PDU is located.

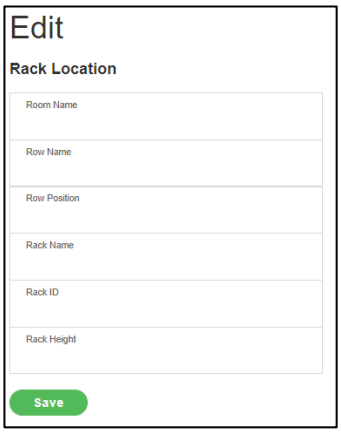
Row Name: the row where the Rack PDU is located.

Rack Name: the rack where the Rack PDU is located.

Rack ID: the identification of the rack.

Rack Height: the height of the Rack where the Rack PDU is located.

Click on the **Save** button to save your changes.



Edit Power Panel and Core Location

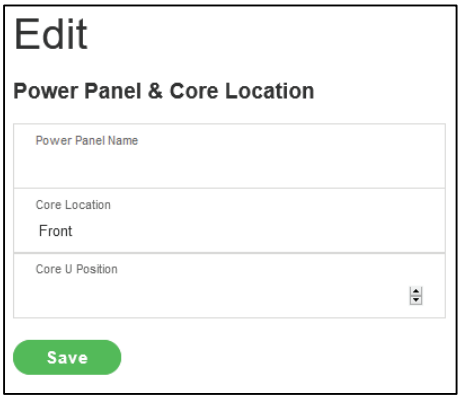
Click on the Edit icon to open the **Edit Power Panel & Core Location** dialog box. You can enter the following information:

Power Panel Name: Name with which you will identify the Rack PDU.

Core Location: location (**Front** or **Back**) of the rack in which the Rack PDU is located.

Core U Position: the U-space location of the Rack PDU within the rack.

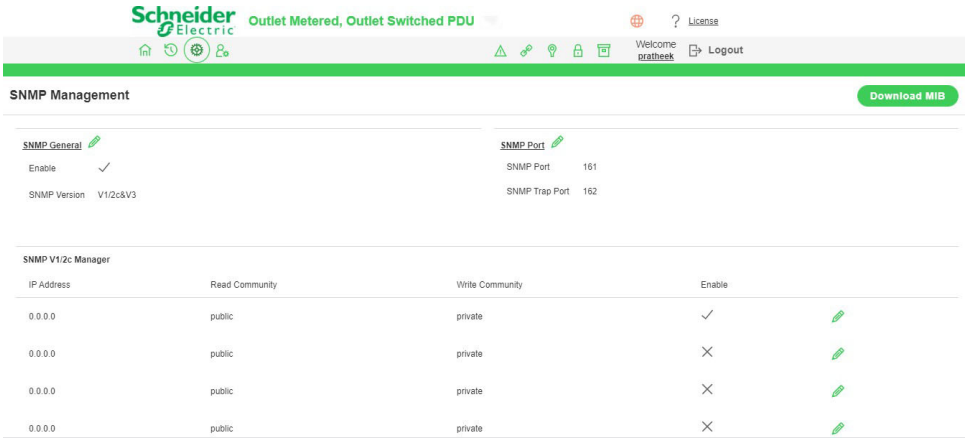
Click the **Save** button to save your settings.



SNMP Management

Simple Network Management Protocol (SNMP) is used to manage the Rack PDU (s) remotely. SNMP allows you to monitor and detect network faults and to configure variable data in the Rack PDU.

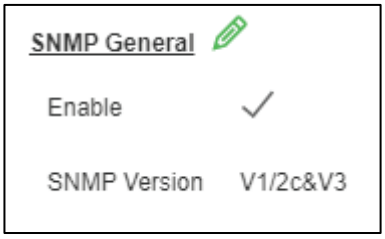
Click on the Settings icon to open the dropdown menu.
Select **SNMP Management** from the menu to open the SNMP Management page. From the **SNMP Management** page, you can manage the transfer of data from the Rack PDU to the MIB Browser.



SNMP General

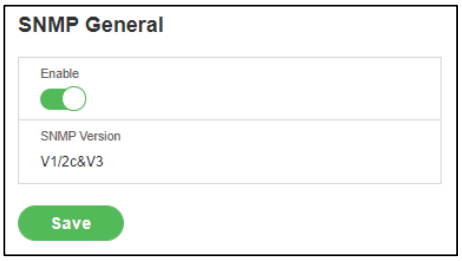
To access the Rack PDU data inside an MIB Browser:

Click on the Edit icon next to **SNMP General** on the **SNMP Management** page.



In the **SNMP General** dialog box, click on the **Enable** button.

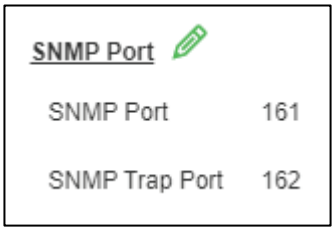
Click on the **Save** button to save the changes.



SNMP Port

To secure the link between the Rack PDU and the MIB Browser:

Click the Edit icon next to **SNMP Port** on the **SNMP Management** page.

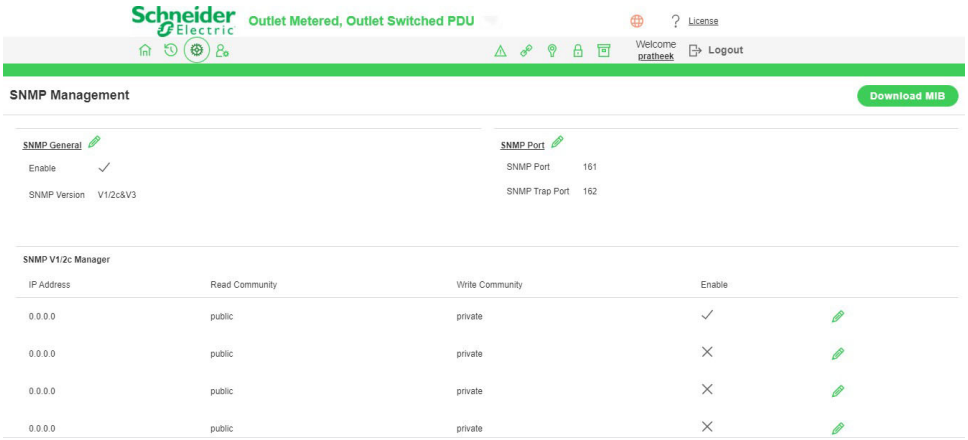


In the dialog box:

- Enter the **SNMP Port** number.
- Enter the **SNMP Trap Port** number.
- Click the **Save** button to save your settings.

Configure Users for SNMP V1/V2c

On the **SNMP Management** page, click the Edit icon next to the chosen address in the **SNMP V1/2c Manager** section of the page.



When the **Edit SNMP V1/V2c Manager** dialog box opens, you can enter the following information:

The **IP Address**

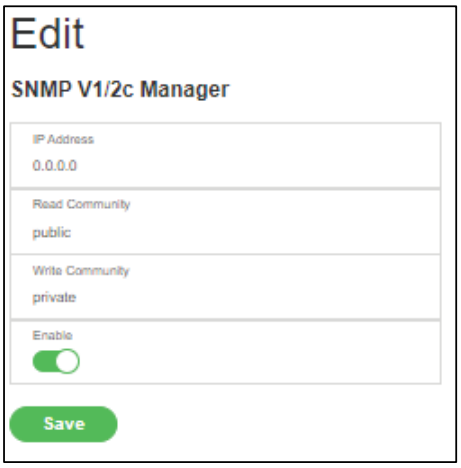
Define the security to **public** or **private** in:

Read Community

Write Community

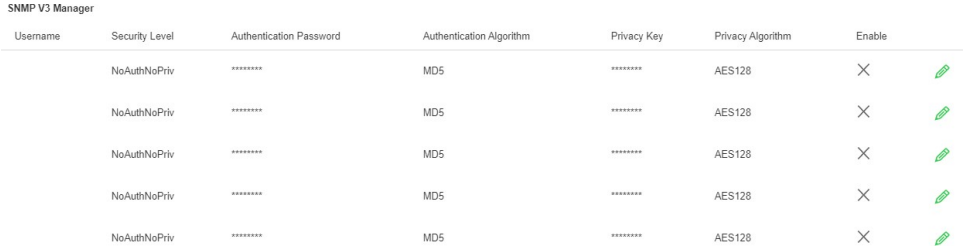
Click on the **Enable** button to enable SNMP V1/V2c.

Click the **Save** button to save your changes.



Configure Users for SNMP V3

Configure users for SNMP V3 to ensure higher security of data transfer to the MIB browser. Click the Edit icon to change the settings of the **SNMP V3 Manager**.



Enter the **Username**.

Click the **Security Level** and assign the level from the dropdown menu:

NoAuthNoPriv: No authentication and no privacy. (The default.)

AuthNoPriv: Authentication and no privacy.

AuthPriv: Authentication and privacy.

Type a new, unique password as the **Authentication Password**.

Select the **Authentication Algorithm**. The options are:

MD5

SHA

Enter a new, unique password as the **Privacy Key**.

Select the **Privacy Algorithm**. The choices are:

DES

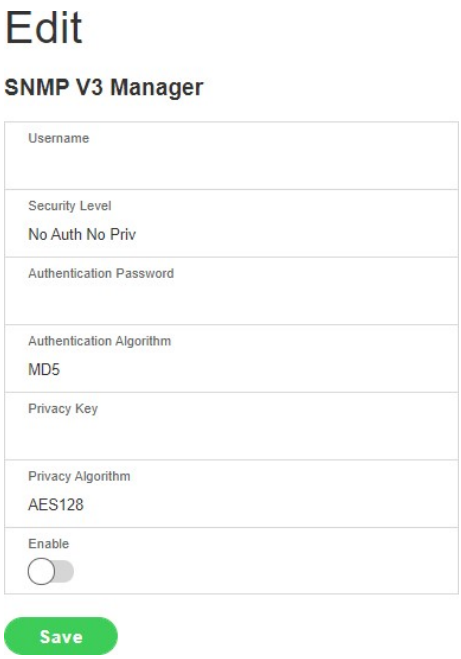
AES-128

AES-192

AES-256

Click the **Enable** button to enable SNMP V3.

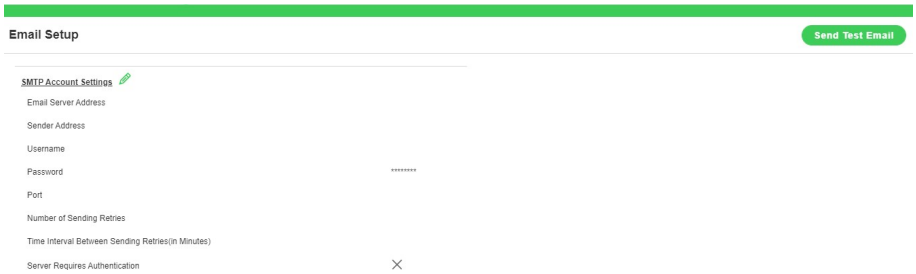
Click the **Save** button to save your settings.



Setup Email

To enable your Rack PDU to send alerts or event messages using Email, you must configure the information about the Simple Mail Transfer Protocol (SMTP).

1. Click the **Settings** icon to open the dropdown menu.
2. Select **Email Setup** from the menu to open the **Email Setup** page.



3. To set SMTP server settings to receive emails and notifications, click the Edit icon to open the **SMTP Account Settings** dialog box where you can configure the settings.

Enter the **Email Server Address**, the IP address of the SMTP for accepting messages.

Enter the Email address from which the recipient will receive mail in the **Sender Address** field.

Configure the **Port** number, which is the communication endpoint on the server. The default is **25**.

Enter the **Username** for SMTP security.

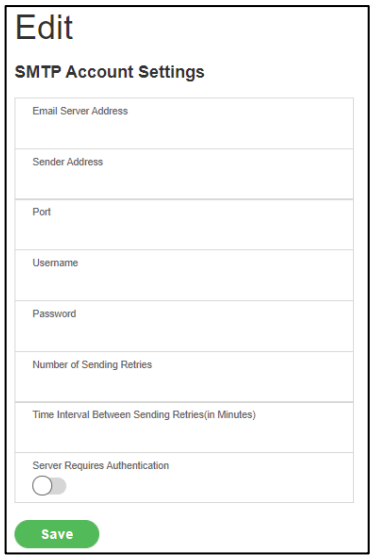
Enter the **Password** for SMTP security.

Assign the **Number of Sending Retries**, which is the number of times the Rack PDU will attempt to resend a message if the message fails. The default is **3**.

Enter the **Time Interval Between Sending Retries** (in minutes). The default is **6** minutes.

Click to Enable **Server Requires Authentication** to password protect the SMTP.

Click the **Save** button to save your settings.

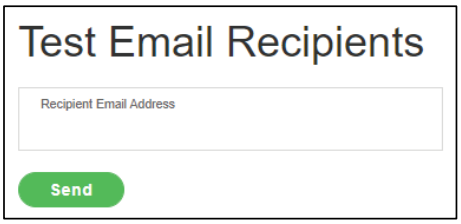


Send a Test Email

Click the **Send Test Email** button in the top right corner of the Email Setup page to open the Test Email Recipients window.

Enter the **Recipient Email Address**.

Click the **Send** button to send the Email.



Event Notifications

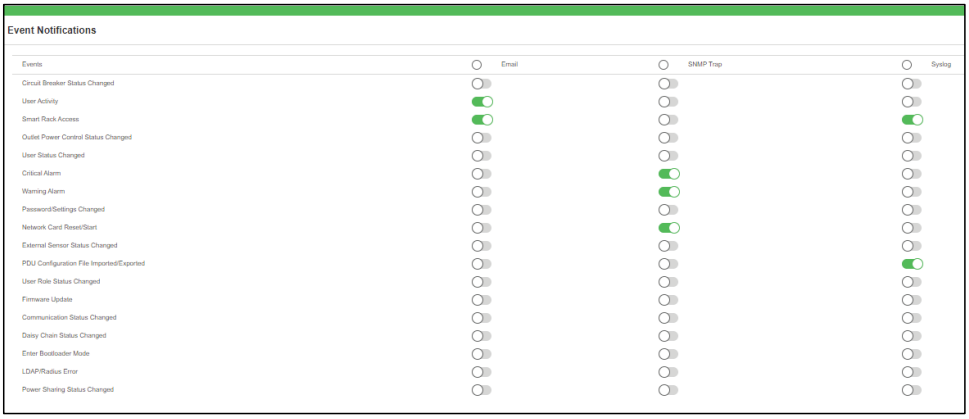
Assign **Event Notifications** from the Rack PDU to the Syslog, SNMP Trap and email. An event notification has two parts:

- **Event**: the situation where the Rack PDU experiences a monitored condition (temperature sensor exceeds a warning limit or circuit breaker status change).
- **Action**: the assigned response to the event (send an SMTP message and SNMP trap).

Click on the **Settings** icon to open the dropdown menu.

Select **Event Notifications** from the menu to open the Event Notification page.

Click on the **Email**, **SNMP Trap** and **Syslog** buttons to enable the respective Events to receive notifications.



NOTE: Critical and Warning alarms are enabled at the SNMP Trap by default. These notifications for the default events can only be received after the **Trap Receiver** (in the following section) is configured.

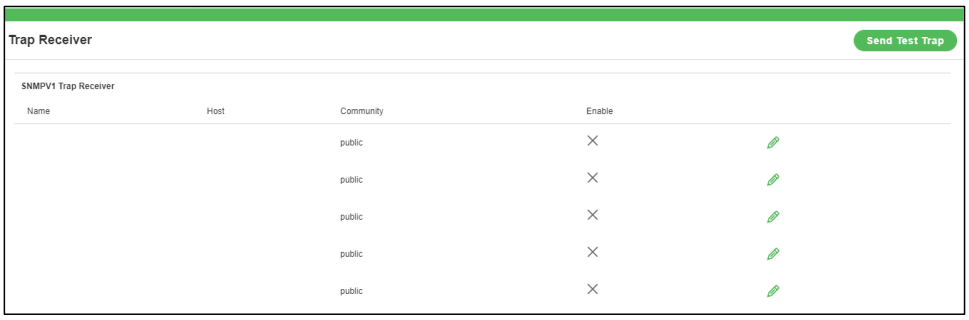
Configure the Trap Receiver

Click on the **Settings** icon to open the dropdown menu.

Select **Trap Receiver** from the menu to open the Trap Receiver page.

SNMP V1 Trap Receiver

Configuring users for SNMP V1 Trap Settings allows communication to the MIB browser.



Click on the Edit icon to open the **Edit SNMPV1 Trap Receiver** dialog box. Enter the following information:

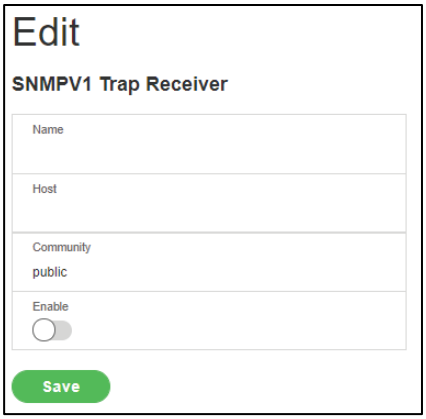
Enter the **Name** to identify the different receivers.

Enter the **Host** IP address to which the traps are sent.

Select from **public** or **private** security status options to assign to the **Community**.

Click on the **Enable** button.

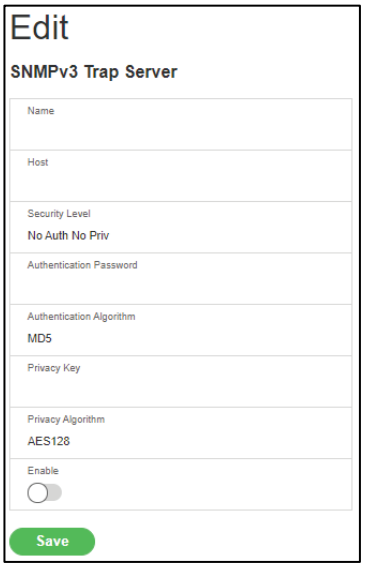
Click the **Save** button to save your settings.



SNMP V3 Trap Receiver

Configuring users for SNMP V3 Trap Settings allows encrypted communication to the MIB browser.

Click on the Edit icon to open the **Edit SNMPV3 Trap Receiver** dialog box.



Enter the **Name** to identify the different receivers.

Enter the **Host** IP address to which the traps are sent.

Click on **Security Level** to open the dropdown menu. Select from the following choices:

NoAuthNoPriv: No authentication and no privacy (the default)

AuthNoPri: Authentication and no privacy

AuthPriv: Authentication and privacy

Enter a new, unique password as the **Authentication Password**.

Select the **Authentication Algorithm** from the following choices:

MD5

SHA

Type a new, unique password as the **Privacy Key**.

Select the **Privacy Algorithm** from the following choices:

DES

AES-128

AES-192

AES-256

Click on the **Enable** button to enable SNMP V3.

Click the **Save** button to save your settings.

Send Test Trap

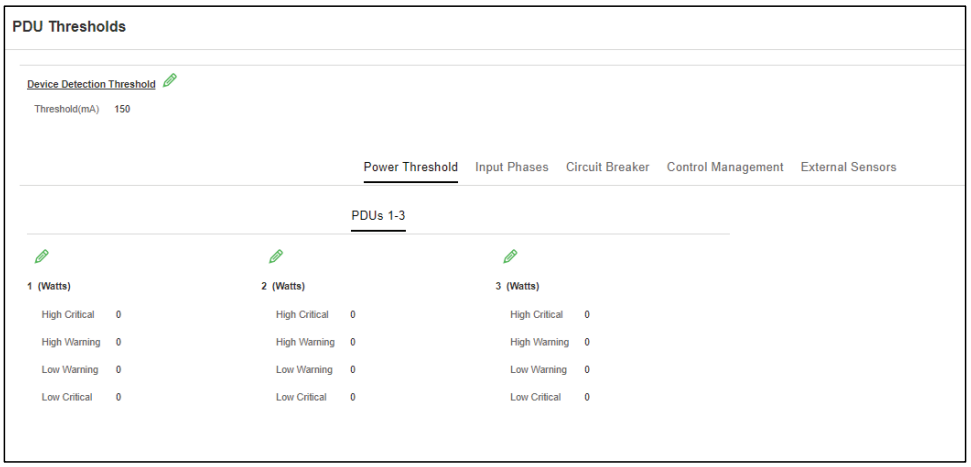
Click on the **Send Test Trap** button located in the top right corner of the **Trap Receiver** page to send a test Trap to check that the feature is active.

Defining Rack PDU Thresholds

Thresholds are the limits you define over Rack PDU parameters (power, phase, circuit breaker and sensors) to send alert notifications when the value crosses above or below the set limit.

Click on the **Settings** icon to open the dropdown menu.

Select **Thresholds** from the menu to open the PDU Thresholds page.



Power Thresholds

The Rack PDU will send alert notifications when a power threshold wattage crosses above or below the settings you specify in **Power Threshold**.

Follow the steps below to change the Power Thresholds settings and alarm notifications:

- Select the **Power Threshold** tab on the PDU Threshold page.
- Click the Edit icon to change the Power Threshold Setting.
- In the **PDU Power Threshold Setting** dialog box, change the fields as needed:

  Low Critical (W)

  Low Warning (W)

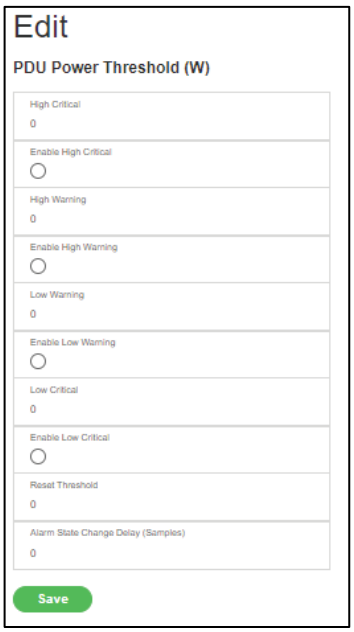
  High Warning (W)

  High Critical (W)

  Reset Threshold (W)

  Alarm State Change Delay (samples)

  Click the **Save** button to save your changes.



NOTE: Repeat the above steps for each Rack PDU in your network.

Input Phase Thresholds

The Rack PDU will send alert notifications when a phase current and voltage alarm crosses above or below the settings you specify in the **Input Phase Threshold** page.

Follow the steps below to change the Input Phase Settings and alarm notifications:

- Select the **Input Phases** tab on the PDU Threshold page.
- Click the Edit icon to change the Phase Current Settings.
- You can change the fields listed below as needed in the **Input Phase Current Alarm Setting** dialog boxes:

  Low Critical (A)

  Low Warning (A)

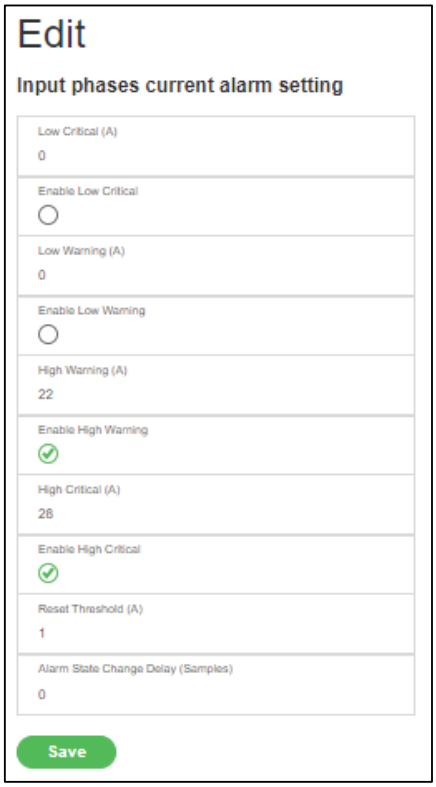
  High Warning (A)

  High Critical (A)

  Reset Threshold (A)

  Alarm State Change Delay (samples)

  Click the **Save** button to save your changes.



NOTE: Repeat the above steps for each Rack PDU in your network.

Phase Voltage Settings

From this page, you can select the Phase settings you want to configure.

Power Threshold | Input Phases | Circuit Breaker | Control Management | External Sensors

1

Phase Current	Reading(A)	Low Critical	Low Warning	High Warning	High Critical
Phase1	0.0	0.0	0.0	41.0	48.0
Phase2	0.0	0.0	0.0	41.0	48.0
Phase3	0.0	0.0	0.0	41.0	48.0

Phase Voltage	Reading(V)	Low Critical	Low Warning	High Warning	High Critical
Phase1	198.7	180.0	190.0	215.0	225.0
Phase2	198.6	180.0	190.0	215.0	225.0
Phase3	198.6	180.0	190.0	215.0	225.0

To edit or change the Phase Voltage Settings, click the Edit icon to open the **Input Phase Voltage Alarm Setting** dialog boxes. The following settings can be accessed here:

Low Critical (V)

Low Warning (V)

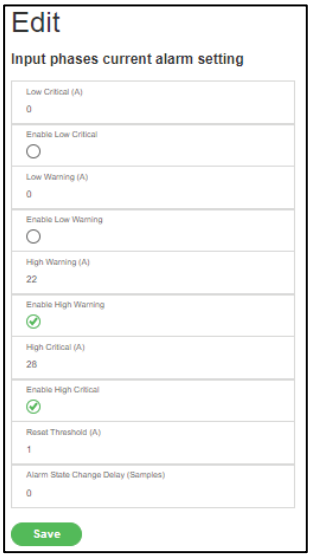
High Warning (V)

High Critical (V)

Reset Threshold (V)

Alarm State Change Delay (samples)

Click the **Save** button to save your settings.



NOTE: Repeat the above steps for each Rack PDU in your network.

Circuit Breaker Thresholds

Set **Circuit Breaker Thresholds** so the Rack PDU will send alert notifications when a circuit breaker amperage crosses above or below the settings you specify.

Below are the steps to change the Circuit Breaker Settings and alarm notifications:

- Choose the **Circuit Breaker** tab in the PDU Threshold page.

- Click the Edit icon for each bank to change the Circuit Breaker Settings. The following settings can be accessed here:

  Low Critical (A)

  Low Warning (A)

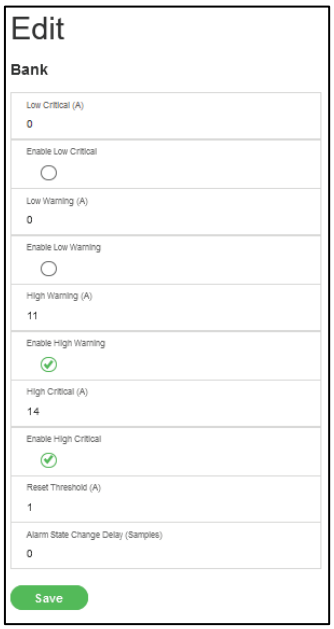
  High Warning (A)

  High Critical (A)

  Reset Threshold (A)

  Alarm State Change Delay (samples)

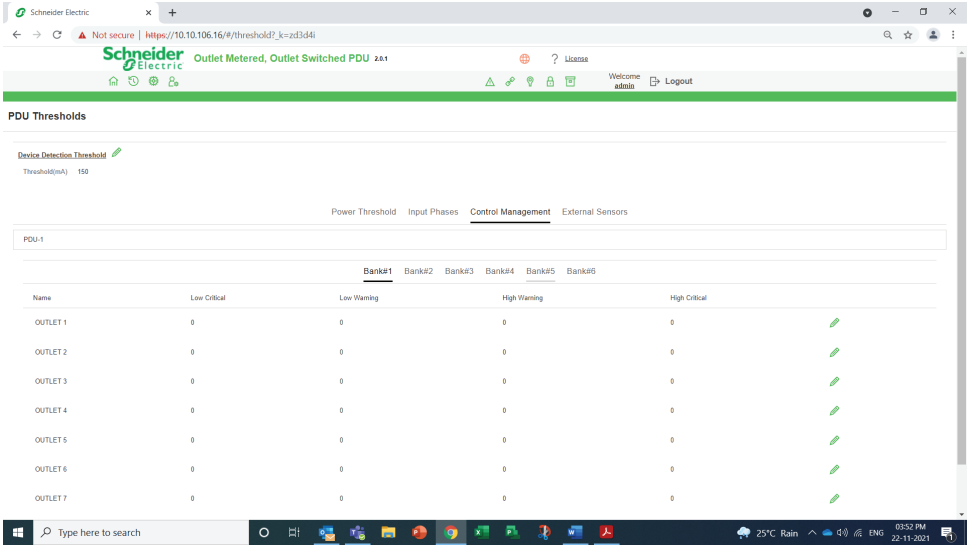
  Click the **Save** button to save your settings.



NOTE: Repeat the above steps for each Rack PDU in your network.

Control Management

Select the **Control Management** tab to configure thresholds so the Rack PDU will send alert notifications when an outlet wattage crosses above or below the settings you specify in the Control Management Thresholds.



- Select the Rack PDU by name.
- Click the Edit icon to open the **Edit Outlet Information** dialog box. The following settings can then be accessed:

  Low Critical (W)

  Low Warning (W)

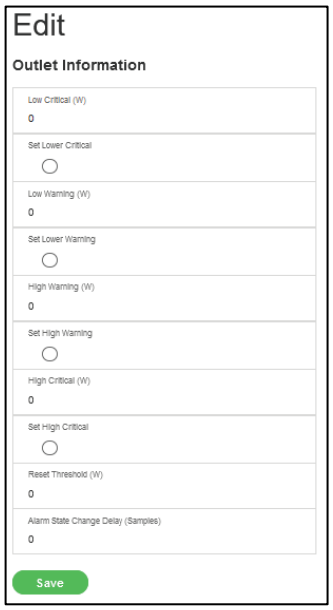
  High Warning (W)

  High Critical (W)

  Reset Threshold (W)

  Alarm State Change Delay (samples)

  Click the **Save** button to save your settings.



NOTE: Repeat the above steps for each Rack PDU in your network.

External Sensors

The **External Sensors** section displays the connected sensors on the Rack PDU. Choose the External Sensors tab on the **PDU Threshold** page to configure the sensor settings so the Rack PDU can communicate the sensor location, alarms, notifications, and details.

- Click the Edit icon to open the **Edit External Sensors(3:1)** dialog box where you can edit the External Sensors Settings. The following settings can then be accessed:

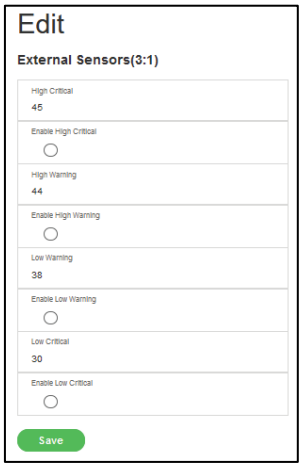
  Low Critical

  Low Warning

  High Warning

  High Critical

  Click the **Save** button to save your settings.



NOTE: Repeat the above steps for each Rack PDU in your network.

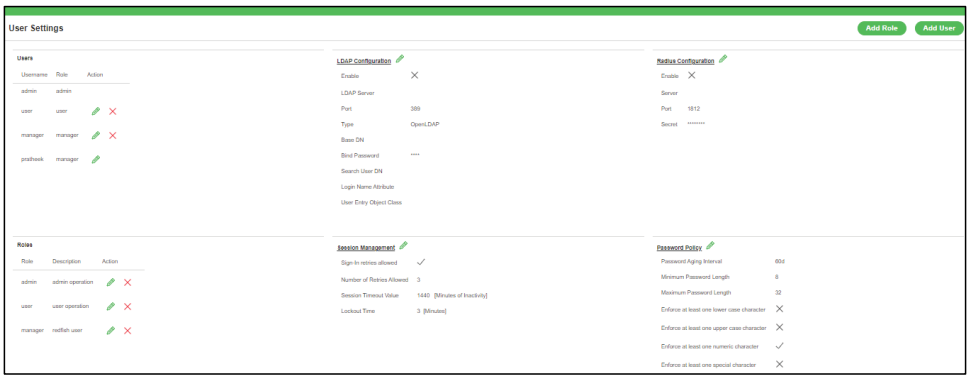
User Settings

The Rack PDU has a standard **Admin** profile and a standard **User** profile.

- The **Admin** profile is typically the system administrator and has the “Admin Role” with full operating permissions.
- The default **User** profile includes the default “User Role” permissions. All other user privileges must be added by the Admin user. Users are defined by their unique login credentials and by their user role.

Before setting up the user profile, determine the roles required. Each user must be given a **Role**. These Roles define the permissions which are granted to the user.

- **Admin**: Complete system permissions
- **User**: By default, the user can change their own password. Other permissions must be granted by Admin.
- **Manager**: Complete system permissions. Primarily the Manager is intended to be the Redfish (RESTapi) user.



On the top right corner of the Rack Access control page, you can choose to **Add User** or **Add Role**.

To add Users or change a user’s password:

- Click on the **Add Users** button to open an Add User dialog box.
- Add the user information and role.
- Click on the **Save** button to save the information.

To modify an existing user profile:

- Click on the Edit icon next to the username you want to modify.
- The **Edit User** dialog box will open.
- Make the changes to the user profile.
- Click on the **Save** button to save the changes.

To delete an existing user profile:

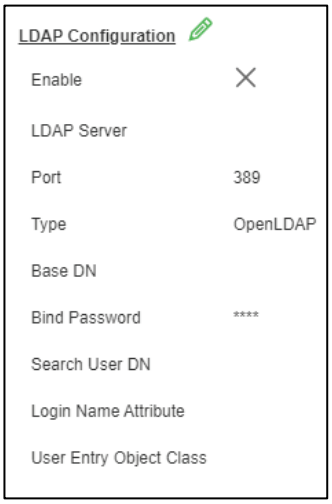
- On the User Settings page, find the username you want to delete.

  Select the X next to the username you want to delete.

LDAP Server Settings

To setup LDAP to access the Active Directory (AD) and provide authentication when logging into the Rack PDU from the Web UI:

1. On the **User Settings** page, go to the LDAP Configuration tab. Click the Edit icon to open the Edit dialog box.



2. In the Edit dialog box, click the **Enable** button to enable LDAP. You can see that LDAP is enabled when the button is colored green. The button will be gray when not enabled.

3. Click in the **Type** (for Type of LDAP Server) field, select **Open LDAP** from the dropdown menu.

4. Type the Port number in the **Port** field.

   NOTE: For Microsoft, this number is typically 389.

5. In the **Base DN** field, type in the account. Example: CN+=myuser, CN=Users, DC=EMEA, DC=mydomain, DC=com

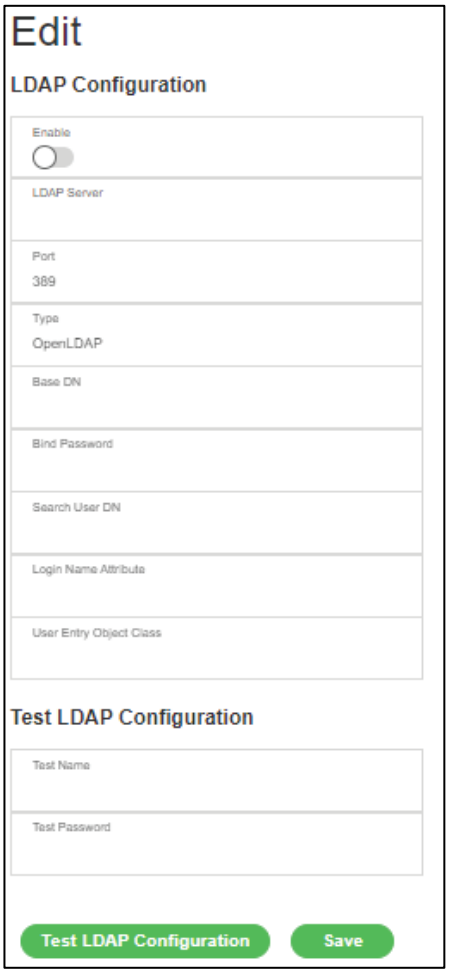
6. In the **Bind Password** field, type in the password. Type the password again in the **Confirm Password** box when it opens, to complete the step.

7. Search User DN. Type in your DN.

8. Type **SAMAccountName** (typically) in the **Login Name Attribute** field.

9. Type **Person Name** in the **User Entry Object Class** field.

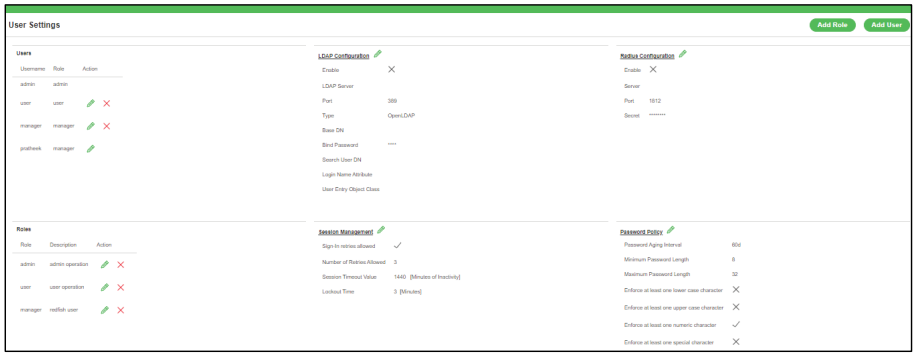
10. Click the **Save** button.



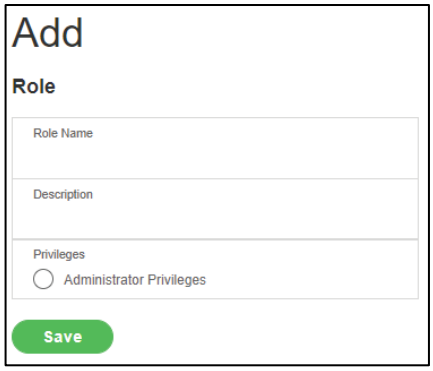
With these LDAP settings configured, the Bind is complete.

Once the LDAP is configured, the Rack PDU must understand for which group authentication occurs. A role must be created on the Rack PDU to reference a group within the Active Directory (AD).

- Within the Web UI, go to **User Settings** and click on the **Add Role** button in the top right corner to open the **Add Role** dialog box.



- Enter the Role Name, which was created in the AD (PDUAdmin), in the **Role Name** field.
- In the **Privileges** field, click on the button to enable **Administrator Privileges**.



- Click the **Save** button.

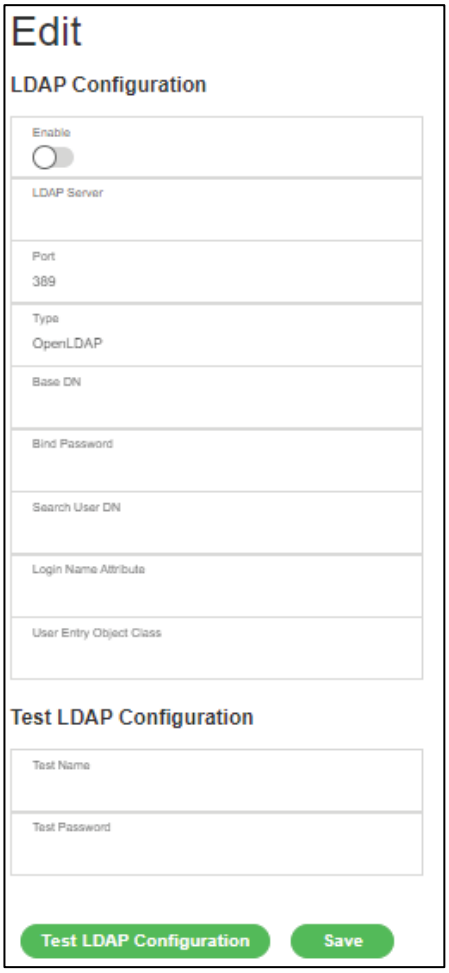
Test LDAP Configuration

Test the setup to determine if LDAP authentication is ready to use.

On the **User Settings** page, click on the **LDAP Configuration**Edit icon to open the Edit dialog box again.

Type the **Active Directory username/ password** into the test box.

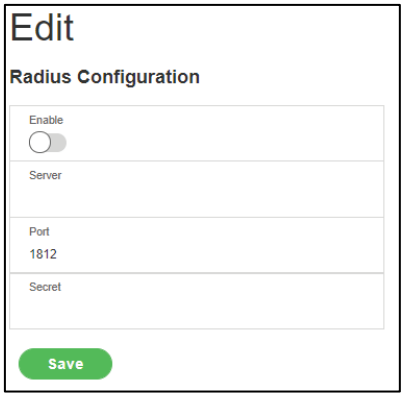
Click the **Test LDAP Configuration** button at the bottom of the dialog box. If a dialog box opens with all green “SUCCEEDED” (and no X’s), the LDAP is successfully configured.



Radius Configuration

On the **User Settings** page, go to the Radius Configuration tab and click on the Edit icon to open the **Edit Radius Configuration** dialog box.

- Type the **Server IP address**, **Port number**, and **Secret** in the corresponding field.
- Click the **Save** button to complete the Radius authentication.

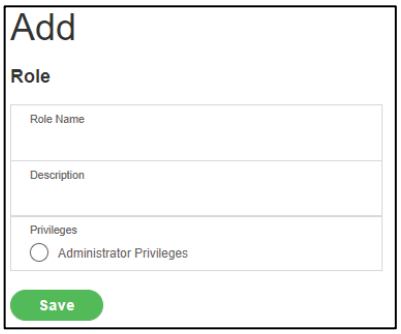


Roles

In User Settings, go to Roles to change the User Roles, privileges, and settings.

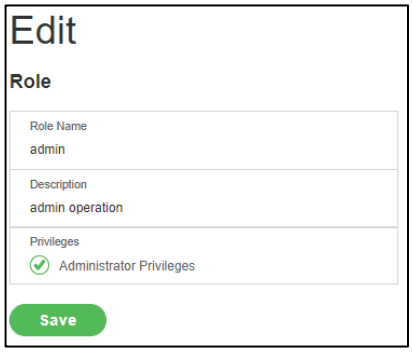
To create a new Role:

- Click the **Add Role** button in the top right corner of the page.
- Type the **Role Name** and **Description**.
- Assign the Privileges.
- Click the **Save** button to save your entry.



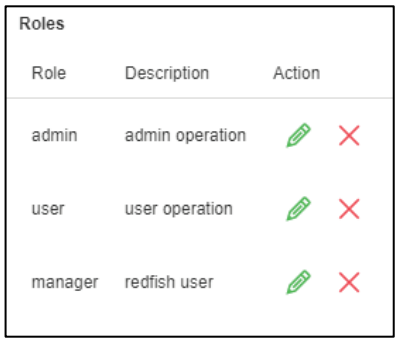
To modify a custom user role:

- Select the Role.
- Click on the Edit icon to open the **Edit role** dialog box.
- Edit the Role name and privileges as needed.
- Click the Save button to save your changes.



To delete a User Role:

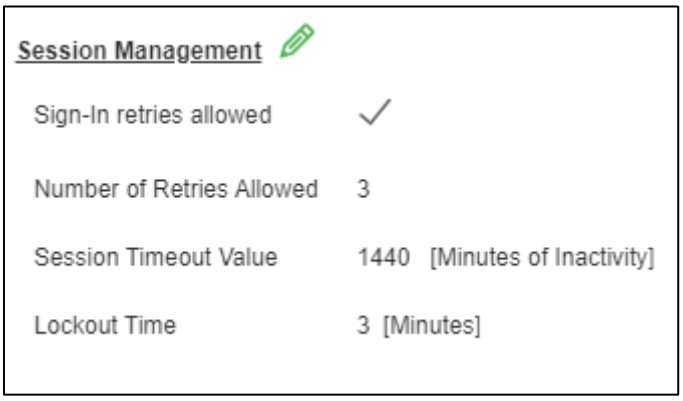
- Select the Role.
- Click the X icon.
- Click **Yes** to confirm the change



Session Management

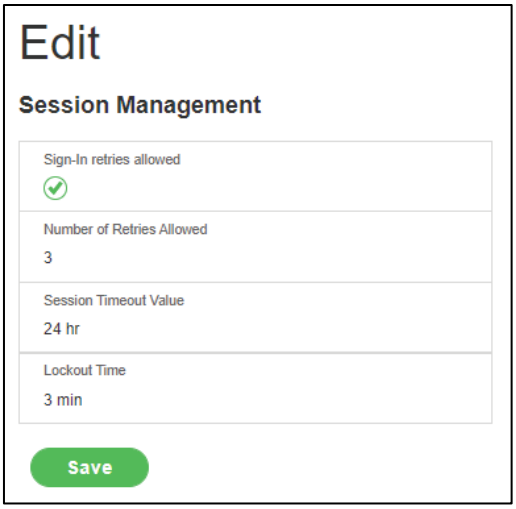
Session Management supports users to manage the Sign-In retries, number of retries allowed, session timeout value, and lockout time.

Click the Edit icon to setup the parameters.



Make your changes in the **Edit Session Management** dialog box.

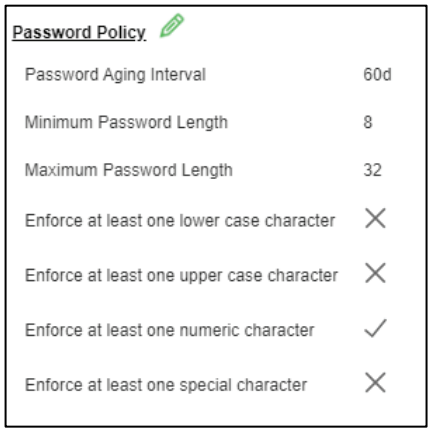
Click the **Save** button to save your changes.



Password Policy

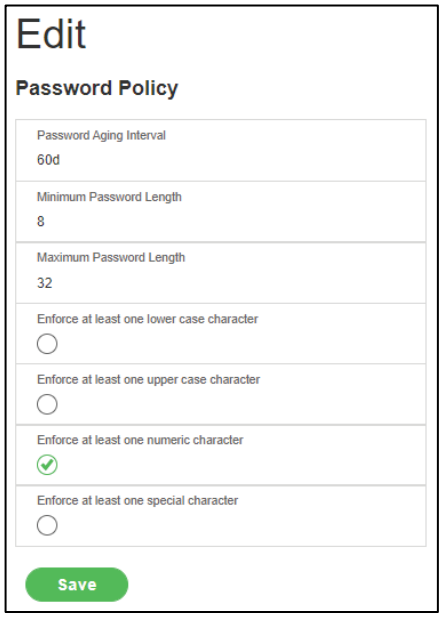
You can set a requirement for users to change their password at set intervals using the Password Aging Interval policy. You can also specify criteria for passwords to ensure that your users enter strong passwords.

- Click on the Edit icon next to **Password Policy** on the User Settings page.



- Choose a password aging interval from the **Password Interval** dropdown menu, if desired.
- If you wish to specify password criteria, click on the **Strong Password** radio button to enable.
- Set the **Minimum password Length** and **Maximum Password Length** from the dropdown menus.

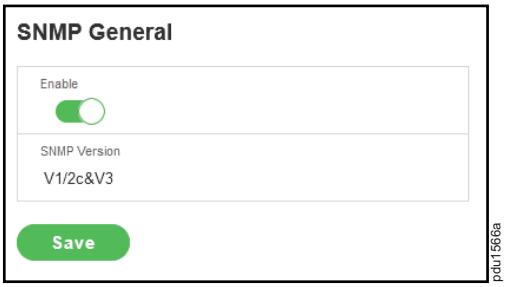
  NOTE: Minimum password length cannot be less than eight (8) characters and the maximum allowed is 32.
- Click the checkboxes to force users to use specific types of characters within the password.
- Click the **Save** button to save your changes.



SNMP

Simple Network Management Protocol (SNMP) is used to manage the Rack PDU(s) remotely. SNMP allows the user to monitor and detect network faults and to configure variable data in the Rack PDU.

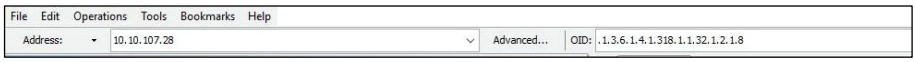
Enable SNMP from the Web UI. See SNMP Management in the Web UI section of this manual.



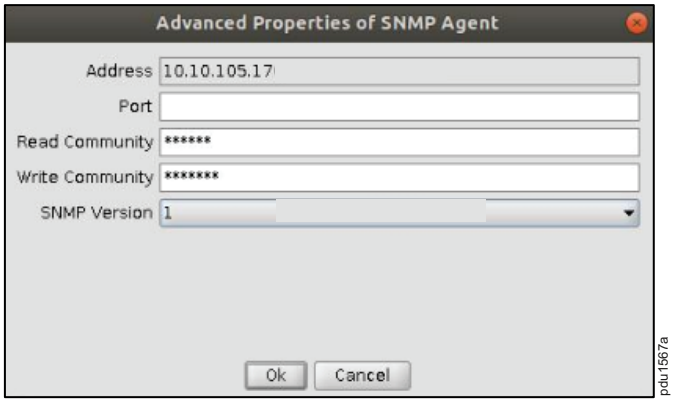
Using an MIB Browser

Download the MIB browser and install it on your computer.

1. Open the MIB browser. Type in the IP address of the Rack PDU.



2. Click the Advanced button to open the Advance Properties of the SNMP Agent window.

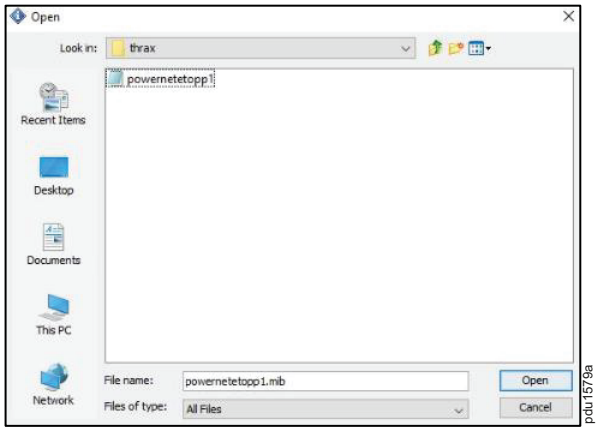


3. In the Advance Properties of the SNMP Agent window, enter the respective Port, Read Community, and Write Community.
4. Select the SNMP manager version: **1**, **2**, or **3**.

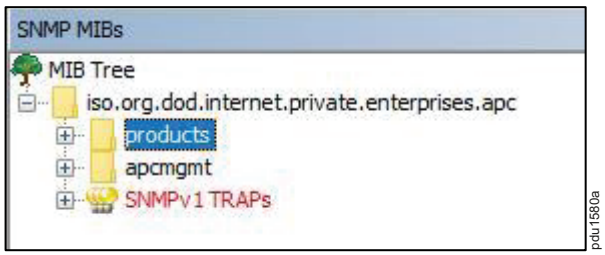
Loading the MIB File

Click on **File**. Select **Load MIBs** to open the window.

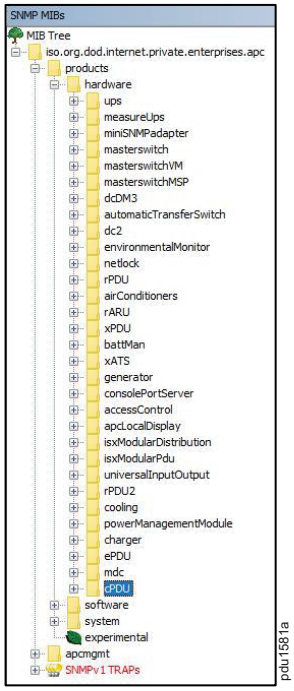
1. Select the latest version of the mib file.
2. Click the Open button to start loading the mib file.



3. A window displaying the MIB Tree will open. Expand the MIB Tree and select the **iso.org.dod.internet.private.enterprises.apc** file.



4. Right click on the **iso.org.dod.internet.private.enterprises.apc** and select **walk** from the dropdown menu to monitor the Rack PDU data.
5. Click on the **+** icon of the **products** folder to open the dropdown menu and select the **dPDU** folder to perform the SNMP functions of the Rack PDU.

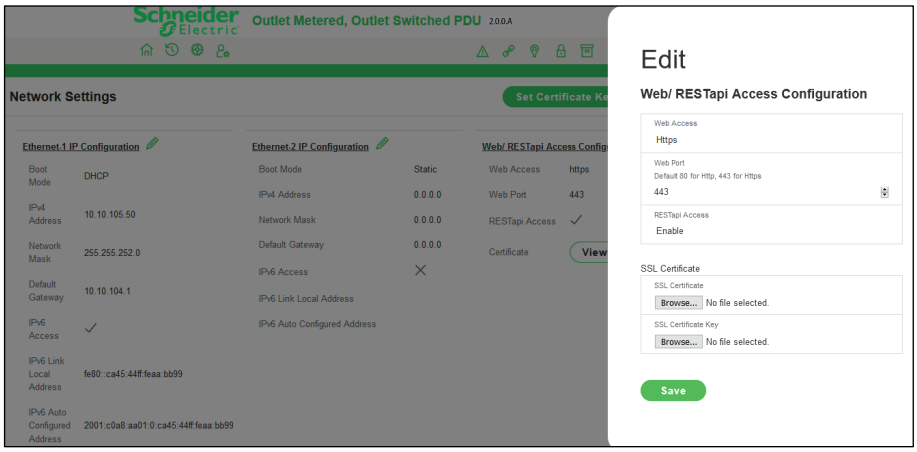


Redfish

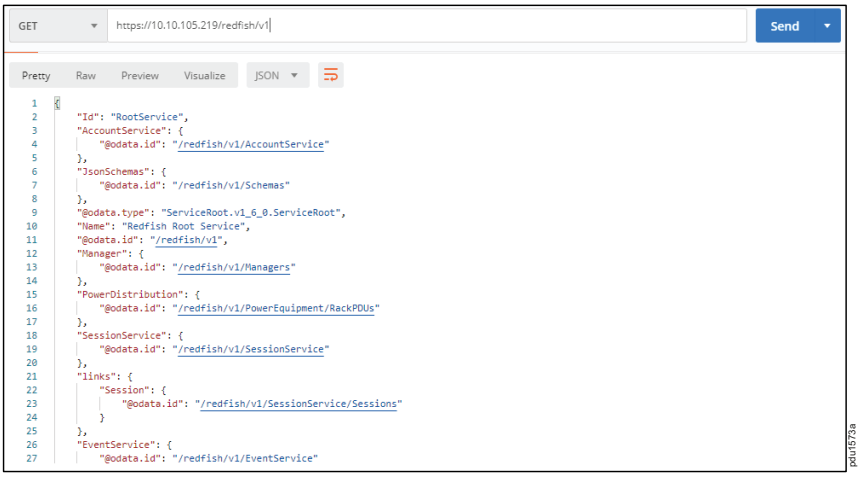
Redfish API can be used to manage your Rack PDUs through an extension app, such as POSTMAN, for GET, POST and DELETE requests. You will need to download the POSTMAN app before performing the task below.

If you use POSTMAN, follow the instructions below to setup Redfish access:

1. To setup Redfish access, type the IP Address of the Rack PDU in a Google Chrome browser to open the login page for the Rack PDU. Login to the Rack PDU using your credentials.
2. Navigate to Network Settings. Enable RESTapi Access Configuration on that page.



3. Click the **Save** button to confirm and apply your changes.
4. Open the POSTMAN app. Add the basic authentication header, which is required for all the query requests.
   - For a GET request, type the URL request, enter the basic authentication header with your username and password to query the request.

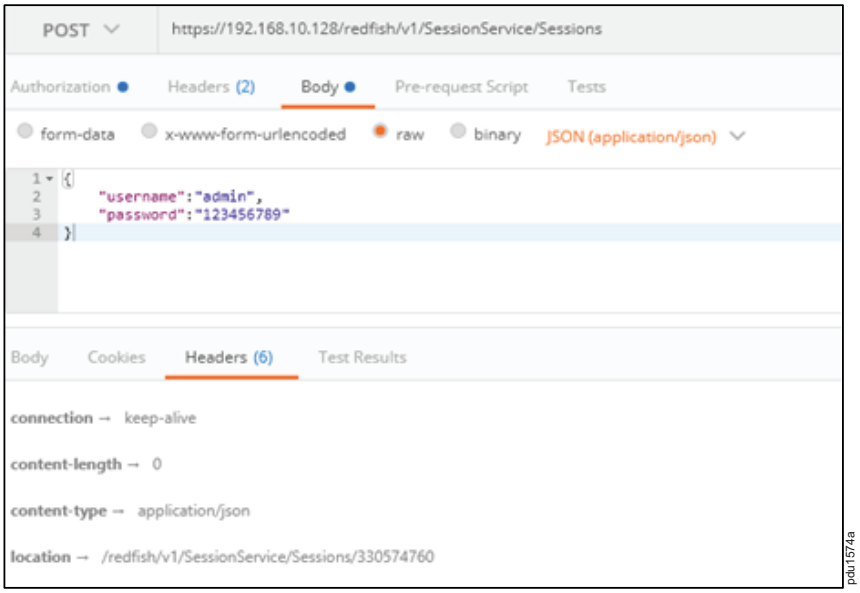


- To make a POST request, you must include the json object type along with the basic authentication header.

  NOTE: See the POSTMAN app Web page if you need more information regarding the json object.

- To create a session using POSTMAN:
  POST query the URL: **http://{pdu_ip}/redfish/v1/SessionsService/Sessions** along with the two headers (basic auth and json object type) and the body:

```
{
"username":"admin",
"password":"123456789"
}
```



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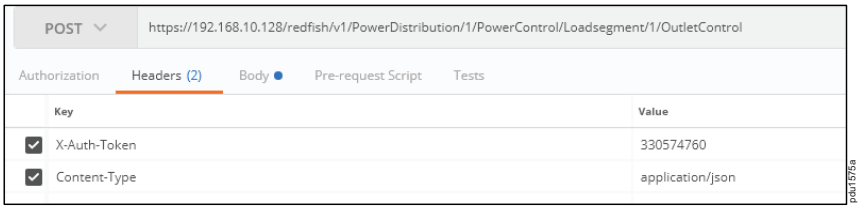
- Use the X-Auth Token from the response body along with the other two headers and basic authentication for any POST requests.



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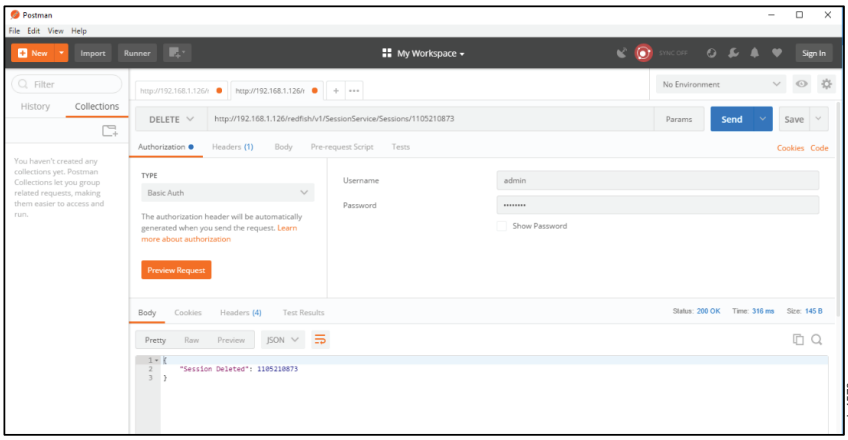
- To complete a DELETE request, type the URL for the session or users you want to delete and enter your basic authentication (username and password).



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Redfish URLs Supported with GET Method

Session Service

S. No	URL
1	https://<ip_addr>/redfish/v1/
2	/redfish/v1/SessionService
3	/redfish/v1/SessionService/Sessions
4	/redfish/v1/SessionService/Sessions/{session_ids}

Account Service

S. No	URL
1	/redfish/v1/AccountService
2	/redfish/v1/AccountService/Accounts
3	/redfish/v1/AccountService/Accounts/{username}
4	/redfish/v1/AccountService/Roles
5	/redfish/v1/AccountService/Roles/{rolename}

Managers

S. No	URL
1	/redfish/v1/Managers
2	/redfish/v1/Managers/manager
3	/redfish/v1//Managers/managers/NetworkProtocol
4	/redfish/v1//Managers/1/LogServices
5	/redfish/v1//Managers/1/LogServices/Log
6	/redfish/v1//Managers/1/LogServices/Log/Entries

Metrics

S. No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Metrics

Power Equipment

S. No	URL
1	/redfish/v1/PowerEquipment
2	/redfish/v1/PowerEquipment/RackPDUs
3	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}

Branches

S. No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Branches
2	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Branches/#cbnumber

Outlets

S. No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Outlets
2	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Outlets/#outletnumber

Sensor

S. No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/Power{cbnum#}
2	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/Current{cbnum}
3	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/VoltageAL1N
4	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/CurrentOUTLET#
5	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/VoltageOUTLET#
6	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Sensors/PowerOUTLET#
7	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/EnergyOUTLET44
8	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/PowerMains1–6
9	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/CurrentMains1–3
10	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/VoltageMains1–6
11	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/FreqMains
12	/redfish/v1/PowerEquipment/RackPDUs/2/Sensors/PDUPower

Mains

S. No	URL
1	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Mains
2	/redfish/v1/PowerEquipment/RackPDUs/{pdu_id}/Mains/AC1

Redfish URLs Supported with POST Method

S. No	URL
1	/redfish/v1/AccountService/Accounts
2	/redfish/v1/PowerDistribution/{pdu_id}/PowerControl/Loadsegment/{loadseg_id}/OutletControl

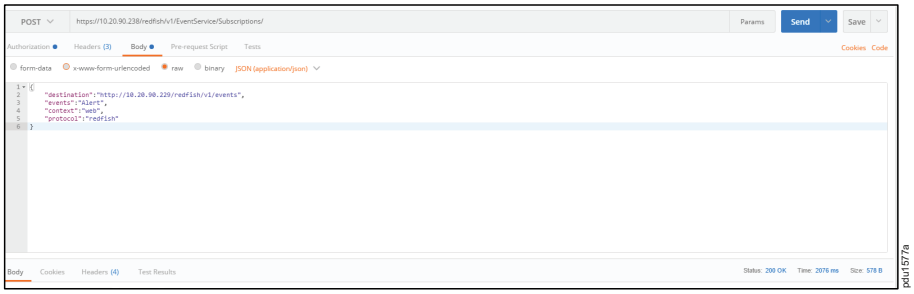
Redfish URLs Supported with DELETE Method

S. No	URL
1	/redfish/v1/AccountService/Accounts/test_user
2	/redfish/v1/SessionService/Sessions/<SessionID>

Event Service

Subscribe to Event Service:

1. Using the POST method, create a session and apply the generated X-auth-token to the headers.
2. Query the URL `http://<pdu_ip_addr>/redfish/v1/EventService/Subscriptions` using POST method with the following body:
```
{
”destination”:”http://<ip_addr>/redfish/v1/events”,
”event”:”Alert”,
”context”:”web”,
”protocol”:”redfish”
}
```



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3. To verify the subscriptions, query the URL using the **GET** method to observe the result of the subscription added: `http://<pdu_ip_addr>/redfish/v1/EventService/Subscriptions/1`

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4. To Delete the Subscription, query the URL using the **DELETE** method to observe the result of the subscription deleted: `http://<pdu_ip_addr>/redfish/v1/EventService/Subscriptions/1`

The Command Line Interface (CLI)

The CLI can be accessed over a serial connection using a program such as HyperTerminal or Putty. See Serial Connection in this manual for more information. You can use the CLI to manage and control the status, parameters, and basic functions of the Rack PDU.
Depending on your access status, you can:

- Reset the Rack PDU
- Display Rack PDU and network properties
- Configure the Rack PDU and network settings
- Switch outlets on or off
- View user information

CLI Commands and Prompts

To display a list of available options in the CLI, type “?” in the command prompt.

The commands are divided into five (5) main categories:

- System setting (sys)
- Network configuration (net)
- User setting (usr)
- Device setting (dev)
- Power (pwr)

CLI Options

To display a list of available menu items in the CLI, type “**?**” in the command prompt. This will display the main categories of the command options available:

```
apc>?
Sys     PDU system configure and setting
Net     PDU net application configure and setting
Usr     PDU user operation
Dev     PDU device setting
Pwr     PDU power setting
```

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To display the options available for a menu item, type the menu command and press the Enter key.

NOTE: you can also type the menu command with “**?**” to show a list of available commands.

```
parameter Error
sys: system setting
usage:
        sys [date/time/ntp] [2012-09-11/14:16:20/133.100.11.8 133.100.11.9 (serv
erl server2)]
        sys [ver/def/rst]
   sys upd [pduid] [conf/all]
        sys log [del|edit] [event|data] [on|off] [interval]
        sys ledcolor [pduid]/all] [dark/red/green/yellow/blue/pink/cyan/white]
        sys dualinput get
        sys dualinput set [NA/EMEA]
```

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CLI System Commands

The commands are divided into five (5) main categories:

Sys Commands	Description	Example
`sys date [yyyy-mm-dd]`	Sets the user input date	`apc:sys date 2021-08-12` `SUCCESS`

`sys date`	Query on the Rack PDU date	`apc>sys date`
		`SUCCESS`
		`Date:2021-08-12`
		`Time:04:58:16`

`sys time [hh:mm:ss]`	Sets the user input time	`apc>sys time 09:20:50` `SUCCESS`

`sys time`	Query on Rack PDU time	`apc>sys time`
		`SUCCESS`
		`Date:2021:08:12`
		`Time:09:20:53`

`sys ntp [primary_ip] [secondary_ip]`	Sets the NTP	`apc>sys ntp`
		`129.6.15.28.129.6.15.29`
		`SUCCESS`

`sys ver`	Query on the system versions — firmware, web, boot loader, and language version	`apc>sys ver`
		`SUCCESS`
		`Firmware Version: 1.0.6.0`
		`Boot loader Version: 1.1`
		`LANGUAGE Version: 1.01`
		`Web Version: 1.0.5.8`

`sys def`	Set the Rack PDU system to default settings	`apc>sys def`
		`Reboot required for change to take effect`
		`System Reboot now, Are you sure? (Y/N):`

`sys rst`	Resets the Rack PDU system	`apc>sys rst`
		`Reboot required for change to take effect`
		`System Reboot now, Are you sure? (Y/N):`

`sys upd [pduid] [conf/all]`	Updates the configuration file	`apc>sys upd`

`sys log [del|edit] [event|data] [on|off] [interval]`	Edits the data log configuration interval	`apc>sys log edit data on 5`
		`SUCCESS`
		
		`apc>sys log edit data off`
		`SUCCESS`

CLI Network Commands

Net Commands	Description	Example
net ssh [on/off]	Sets SSH On or Off	apc>net ssh SUCCESS SSH Port: 22 SSH server is running
net ftps [on/off]	Sets FTPS On or Off	apc>net ftps SUCCESS FTPS Port: 21 Service is running Is Ftp
net http [on/off]	Sets HTTP On or Off	apc>net http SUCCESS HTTPS Port: 80 Status: ON apc>net https on Reboot required for change to take effect WEB protocol is changed, reboot to validate System Reboot now, Are you sure? (Y/N):
net https [on/off]	Sets HTTPS On or Off	apc>net https SUCCESS HTTPS Port: 443 Status: OFF apc>net https on Reboot required for change to take effect WEB protocol is changed, reboot to validate System Reboot now, Are you sure? (Y/N):
net redfish [on/off]	Sets Redfish On or Off	apc>net redfish SUCCESS Status: ON apc>net redfish off SUCCESS Status: OFF
net [snmp] [v1v2c/v3/trap] [on/off]	Sets SNMP On or Off	apc>net snmp SUCCESS v1v2c: ON v3: ON trap: ON apc>net snmp v1v2c off SUCCESS
net [mac/tcpip]	Displays the MAC address, IPv4	apc>net mac SUCCESS MAC Addr: C8-45-44-66-2B-65 MAC Addr: C8-45-44-66-2B-67 apc>net tcpip SUCCESS eth0 IPv4 Addr: 10.10.105.37 eth0 IPv6 Link Local Addr: fe80:ca45:44ff:fe66:2b65 eth0 IPv6 DHCP Addr: 2001:c0a8:aa01:0:ca45:44ff:fe66:2b65 eth1 IPv4 Addr: 192.168.2.2
net tcpip [eth0dhcp/eth1dhcp/eth0static/eth1static ip nm gw]	Changes the network to DHCP or Static mode	apc>net tcpip dhcp eth0dhcp Reboot required for change to take effect. Network is reconfigured, reboot to validate System Reboot now, Are you sure? (Y/N):Y
net ip [v4] [v4v6]	Sets IPv4	apc>net ip SUCCESS IPV4 apc>net ipv4

		Reboot required for change to take effect. IP protocol is changed, rboot to validate System Reboot now, Are you sure?(Y/N):
net phy [auto/ 10100mnbps]	Set the link speed to auto negotiation/10100mbps	apc>net phy SUCCESS link speed: auto negotiation apc>net phy 10100mbps Reboot required for change to take effect Phy speed is changed, reboot to validate System Reboot now, Are you sure?(Y/N):
net cert [def]	Updates the certificate file	apc>net cert SUCCESS Custom certificate key file active, in /cert/cert.key Custom certificate cert file active, in /cert/cert.crt apc>net cert def Removing custom certificate key file, in/cert/cert.key Removing custom certificate key file, in /cert/cert.crt Reboot required for change to take effect Certificate Setting changed, reboot to validate System Reboot now, Are you sure>(Y/N):

CLI User Commands

Usr Commands	Description	Example
usr list	Lists the Rack PDU users	apc>usr list SUCCESS Usr Role Privilege Role id ==========-=== admin admin Administrator 1 user user User 2 manager manager Administrator 3
usr login	Displays the logged in user details	apc>usr login SUCCESS username: admin ip address: 10.10.94.211 client type: SSH
us unlock [username]	Unlocks the blocked user	apc>usr unlock en_user SUCCESS

CLI Device Commands

Dev Commands	Description	Example
dev cascade [rna] [init] [create]	Setting the Rack PDU Cascade to RNA mode.	apc>dev cascade SUCCESS Cascade unit number: 1 Cascade address list: 0 0 0 Cascade Mode: RNA apc>dev cascade qna create Reboot required for change to take effect System Reboot now, Are you sure?(Y/N):
dev outlet pdu ID [status/ outlet index] [on/off]	Displays outlet status. Turn On or Off the outlet power.	apc>dev outlet 1 status SUCCESS Relay Outlet Status Outlet# 1: Open Outlet# 2: Open Outlet# 3: Open Outlet#4: Open Outlet# 5: Open Outlet#6: Open Outlet# 7: Open Outlet# 8: Open apc>dev outlet 11 on SUCCESS
dev [sensor/usb] [on/off]	Lists out the connected sensors on the Rack PDU. Turn the USB On or Off	apc>dev sensor SUCCESS apc>dev usb on SUCCESS
dev ledstrip [on/off]	Turn the ledstrip On or Off	apc>ledstrip on SUCCESS
dev powershare	Displays the status of the Rack PDU power share.	apc>dev power share SUCCESS PDU 1: Downstream: 0 Upstream: 1 Mains: 1 PDU 2: Downstream: 1 Upstream: 1 Mains: 1 PDU 3: Downstream: 1 Upstream: 1 Mains: 1

CLI Power Commands

Dev Commands	Description	Example
pwr [unit/phase/ cb/outlet] [idx]	Displays the power readings	apc>pwr unit 1 SUCCESS UNIT power Feature voltage: 0V current: 0.0A active power: 0W power factor: 1.00 energy: 0.000kWh apc>pwr outlet 3 SUCCESS OUTLET 3 power Feature voltage:0V current: 0.0A active power: 0W apparent power: 0W

Cascading Rack PDUs and Redundant Network Access (RNA)

In cascade mode, up to 32 Rack PDUs can be connected using one (1) IP address. Information and data from all Guest Rack PDUs is gathered from the Host Rack PDU.

Cascade functionality reduces the network services cost for Rack PDUs. For example, a standard network switch is used in a data center can contain 24 ports. Without using the cascade function each port supplies network services to one (1) Rack PDU. Using the cascade features, a typical network switch with 24 ports can supply network services for up to 768 Rack PDUs.

Setup the Rack PDUs

Connect up to 32 Rack PDUs of the same SKU from a single IP address:

1. Configure the Rack PDU which will be the first in line (the Host).

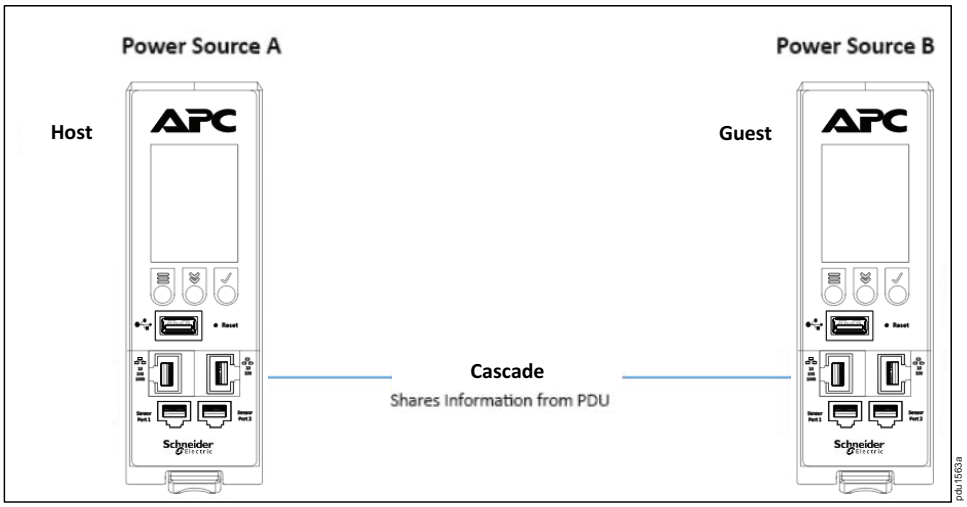
   NOTE: Refer to Establish Network Settings in this manual for more information.

2. After the Host Rack PDU is configured, connect the Ethernet cable from the 10/100 port on the Host Rack PDU to the 10/100/1000 port on the Rack PDU which will be the next in line.
3. Continue connect your Rack PDUs from the 10/100 port to the 10/100/1000 port for up to 32 Rack PDUs.

   NOTE: The length of the Ethernet cables connecting the Rack PDUs must be less than 6m (20 ft).

4. By default, the Cascade command is enabled in the Rack PDU configuration file and default mode of the Rack PDU is RNA. Go to the Web UI (or your management software) to manage and control the Rack PDUs in the Cascade.

Redundant Network Access (RNA) Functionality



The Redundant Network Access allows secure access of Rack PDU data and statistics on two (2) separate private networks. RNA is used with a redundant power delivery design including two (2) Rack PDUs for each IT rack. The Rack PDUs must be the same SKUs when used in RNA applications.

How RNA Works

- RNA maintains two separate private networks (Landlord and Tenant) that do not overlap.
- RNA works using a redundant power delivery design (that is, two Rack PDUs for each IT rack).
- Each Rack PDU is separately connected to the Landlord or Tenant's private communications network.
- The two Rack PDUs are connected with a data communications bus to allow the Rack PDUs to share user-defined information.
- Each Rack PDU acts like a Host Rack PDU to report Rack PDU data to both networks.

Setup RNA on the Rack PDUs

To setup RNA on cascaded Rack PDUs, the user must:

1. Configure the Rack PDU for RNA using the CLI.
   - Login to the CLI and type: `dev cascade rna` on the last Rack PDU in the cascade.
   - The response will be:
     ```
     SUCCESS
     System Reboot now, Are you Sure?(Y/N):
     ```
   - Type `Y` to confirm the reboot.
   - After the reboot is complete, the Rack PDU will be set to RNA mode.

     NOTE: Do not place RNA enabled Rack PDUs in among Rack PDUs in a cascaded system.
2. Connect the LAN Network cables and Ethernet cables between the Rack PDUs.

After the Rack PDUs are configured for RNA:

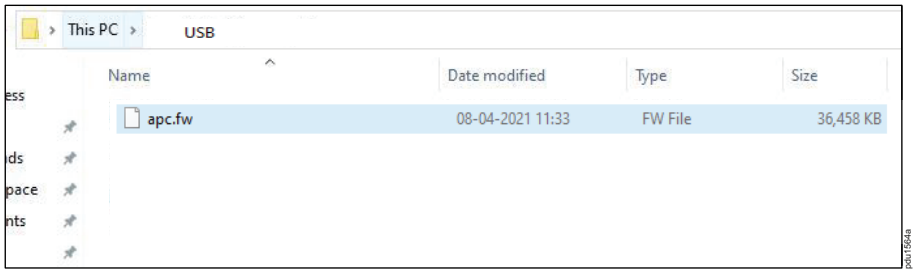
1. Connect the LAN network cable from the network switch to the 10/100/1000 port (GB port) on Rack PDU #1.
2. Connect an Ethernet cable from the 10/100 port (MB port) of Rack PDU #1 to the 10/100/1000 port (GB port) to the next Rack PDU to cascade.
3. Connect another LAN network cable from the network switch to the 10/100 port (MB port) to the **n**th (last) Rack PDU in the cascade.

Firmware Update Procedures

Update Using USB

NOTICE
The USB method for updating firmware is for standalone Rack PDUs **ONLY**. **Failure to follow these instructions can result in equipment damage.**

1. Go to www.apc.com and download the most recent firmware version, **apc.fw**.
2. Extract the **apc.fw** and copy its contents to the USB.

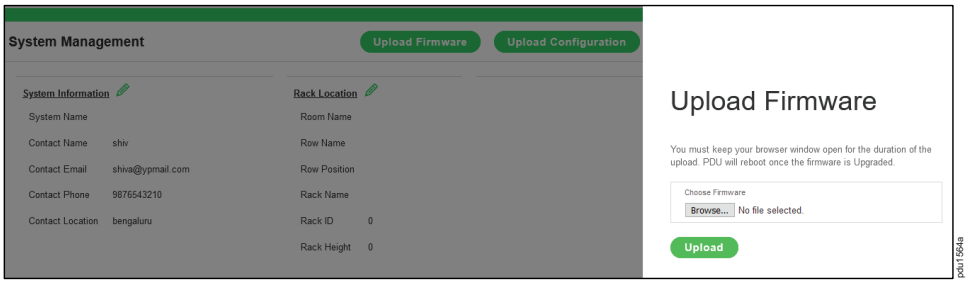


3. Insert the USB drive into the USB port on the Rack PDU.
4. Go to Settings>USB on the LCD display of the Rack PDU.
5. Select Firmware Upload from the menu and select Yes to confirm.

   NOTE: The LCD display will show the Firmware update progress. When the update is complete, the Rack PDU will automatically reboot.
6. Remove the USB drive from the Rack PDU.
7. Go to Settings>Device>Firmware to confirm that the firmware uploaded successfully.

Update Using the Web UI

1. Go to **www.apc.com** and download the most recent firmware version, **apc.fw**. Save the file to a folder located on your computer.
2. Go to the System management page in the Web UI and select the Upload Firmware option.
3. Select the Rack PDU to which you want to upload the firmware and upload the **apc.fw** file.



NOTE:

- If you have standalone Rack PDUs: The Rack PDU will reboot and the firmware upgrade will complete automatically.
- If you have a system of cascaded Rack PDUs: A window will open to prompt you to restart your system when the firmware has been updated on all the Rack PDUs.

Update Using FTPS

To access the Rack PDU using an FTPS program, FTPS must be enabled through the Web UI, the CLI or through SSH.

1. In the Web UI, go to Network Settings > FTPS.
2. Select the check box **Enable FTPS Access**.
3. Login to an FTP program. You must have a role with administration privileges.
4. Download the **apc.fw** firmware file from **www.apc.com**. Transfer the firmware file to an **fw** folder accessible by the FTP program.
5. Connect to the Rack PDU using an SSH program such as HyperTerm or PUTTY.
6. Login using a role with administration privileges.
7. Type the command `sys upd <pduid> all` to start the upload. After you receive the reboot message, type `sys upd <pduid> rst` in the console window. (In Cascade for the guest device.)

   NOTE: For a Host Rack PDU or standalone configuration, type the command `sys upd <pduid> all`
   The `(Y/N)` prompt will appear for the Rack PDU to reboot. Type `Y`. When the upload is finished, the system will reboot automatically.

Security Considerations

Overview

As network security continues to change, user requirements for security solutions are a requirement. When you are configuring the settings for the NetShelter Rack PDU Advanced, you should select the settings that provide the necessary security for your installation.

Review the information in this chapter to determine an appropriate secure deployment based on your specific security requirements.

Physical Security

Physical security must be in place to control physical access to the device.

- Secure your equipment from unauthorized physical access
- Clearly mark restricted areas for authorized personnel only
- Lock doors of restricted areas
- Ensure that a physical or electronic trail exists to document access to restricted areas.

A password protected NetShelter Rack PDU Advanced installed in a rack that is locked with a secured key, will prevent physical access to the device.

Device Security

- Make sure your devices are updated with the latest firmware versions.
- Do not use admin accounts for non-administrator activities.
- Configure your device to use certificates either from a reputable Certificate of Authority (CA) or appropriate certificates from your enterprise CA.
- Limit the number of users to the minimum required.
- Edit the Password Policy, under User Settings, in the Web User Interface to ensure strong passwords by requiring the use of at least one special characters, capital letters, numerals, and a minimum length (between 8 and 32 characters).
  Force users to change their passwords at set intervals. See Password Policy, page 54, in this manual for instructions.
- Keep assigned privileges of user Roles to the minimum. See Roles, page 52, for more information.

Network Security

- Deploy the device behind an appropriate firewall. Do not expose the device to the public Internet.
- Create a custom certificate to help strengthen authentication.
- Disable File Transfer Protocol (FTP) when it is not in use to help harden security on your device.
- Configure your device to use SNMPv3 protocol to ensure higher security of data transfer.
- Disable unused network addressing protocols such as IPv4 and IPv6 to help secure your device.

Web Interface Access and Security

HTTP or HTTPS protocols can be used to access the Web User Interface. For better security, enable HTTPS when configuring your device.
In the Web User Interface, Web access can be configured on the Network Settings page.
.

- A digital certificate is required when using HTTPS.
- You can choose your Internet protocol option on the Network Settings page of the Web UI. See page 29 for more information.
- From the CLI, use the command:`net https [on/off]` to set the Internet protocol to HTTPS. See page 64 in this manual for more information

Command Line Interface and Security

Users can access the Command Line Interface through Secure Shell (SSH). To use SSH, you must first configure SSH and have an SSH client program installed on your computer.

- You can configure the SSH options on the Network Settings page of the Web User Interface. See page 29 in this manual for Network Settings information.
- You can set SSH on or off in the CLI. The command is: `net ssh [on/off]`

RADIUS

The NetShelter Rack PDU Advanced supports the authentication and authorization functions of Remote Authentication Dial-In User Service (RADIUS). Use RADIUS to administer remote access for each network-enabled device centrally. When a user accesses the device, an authentication request is sent to the RADIUS server to determine the permission level of the user.

- Edit the RADIUS Configuration from the User Settings page of the Web User Interface. See page 51.

Logging

APC recommends enabling the generation of Syslog messages for events that have Syslog configured as a notification method. See Syslog Configuration on page 32.

Vulnerability Reporting

Cybersecurity incidents and potential vulnerabilities can be reported on either the APC website or the Schneider Electric website. In the search bar enter: Reporting a vulnerability.

Secure Disposal Guidelines

Set the device to its default properties prior to disposal.

- In the CLI, enter the command `sys def` to return the device to default settings. A reboot is required. Enter `Y` to reboot the device.

Troubleshooting

Rack PDU Access Problems

For problems that persist or are not described here, contact APC Customer Support at **www.apc.com**.

Problem	Solution
Cannot allocate the communications port through a terminal program	Before you can use a terminal program to configure the Rack PDU, you must shut down any application, service, or program using the communications port.
Cannot access the Command Line Interface remotely	Make sure you are using the correct access method.
Cannot access the Web UI	• Verify that HTTP or HTTPS access is enabled. • Verify that you are using a Web browser supported for the Rack PDU. **NOTE:** Check the specific error message reported by the browser. It may indicate the specific problem.

SNMP Issues

Problem	Solution
Unable to perform a GET	Verify the read (GET) community name (SNMPv1) or the user profile configuration (SNMPv3).
Unable to perform a SET	• Verify that SNMP is enabled. • Verify the read/write (SET) community name (SNMPv1) or the user profile configuration (SNMPv3). • Use the CLI or Web UI to ensure that write (SET) access (SNMPv1) has been enabled or access is granted to the target IP address through the access control list (SNMPv3).
Unable to receive traps	• Make sure the trap type (SNMPv1 or SNMPv3) is correctly configured as a trap receiver. • For SNMPv1, query the MIB OID to verify that the IP address is listed correctly and that the community name defined matches the community name in the table. If either is not correct, use SETs to the OIDS, or use the CLI or Web UI to correct the trap receiver definition. • For SNMPv3, check the user profile configuration and run a trap test.
Traps received are not identified	Verify that the traps are properly integrated in the alarm/trap database.

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As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

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