



Power IQ

User Guide
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Chapter 1 Installing the Power IQ Application

If you obtained Power IQ as a VMware application, you must install it on a VMware ESX/ESXi Server.

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Virtual Machine Requirements

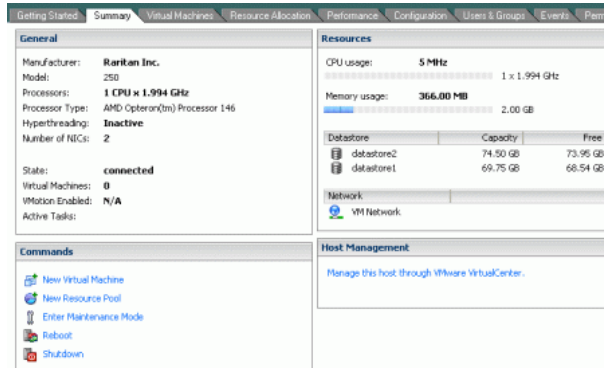
Minimum Configuration (Number of PDUs)	RAM (GB)	Datastore (GB)	CPU (GHz)	OS	VMware
10-20	2	80-160	1	Linux - Other (32-Bit)	ESX/ESXi
50-100	2	80-160	2	Linux - Other (32-Bit)	ESX/ESXi
200-300	3	80-160	2	Linux - Other (32-Bit)	ESX/ESXi
400-5000	4	80-160	4	Linux - Other (32-Bit)	ESX/ESXi

Uploading the Power IQ Image to the VMware Host

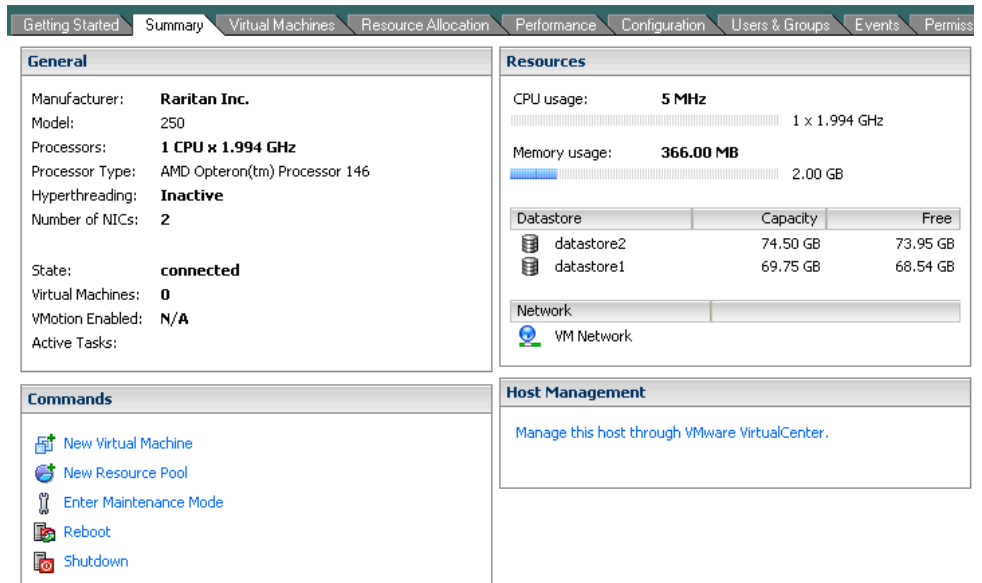
Move the ISO file on the DVD to the server running VMware ESX or VMware ESXi.


1. Insert the DVD into the client computer and verify the DVD contains the Power IQ ISO file.

2. Connect to the host computer using VMware Infrastructure Client. You must log in as a user that has permission to create, start, and stop virtual machines.



3. Connect to the host computer from the client PC using VMware Infrastructure Client. You must log in as a user that has permission to create, start and stop virtual machines.



4. Click the Summary tab and examine the Resources pane. Verify the datastore has 80GB free for a new virtual machine and 800MB free for the PowerIQ installation ISO file.
5. In the resource window, double click the datastore icon where you want to store the Power IQ installation ISO file. The Datastore Browser opens.
6. In the Datastore Browser, click the upload tool  and choose Upload File.

7. In the dialog that appears, navigate to and select the Power IQ ISO file. The Power IQ ISO file appears in the Datastore Browser when the file upload completes.

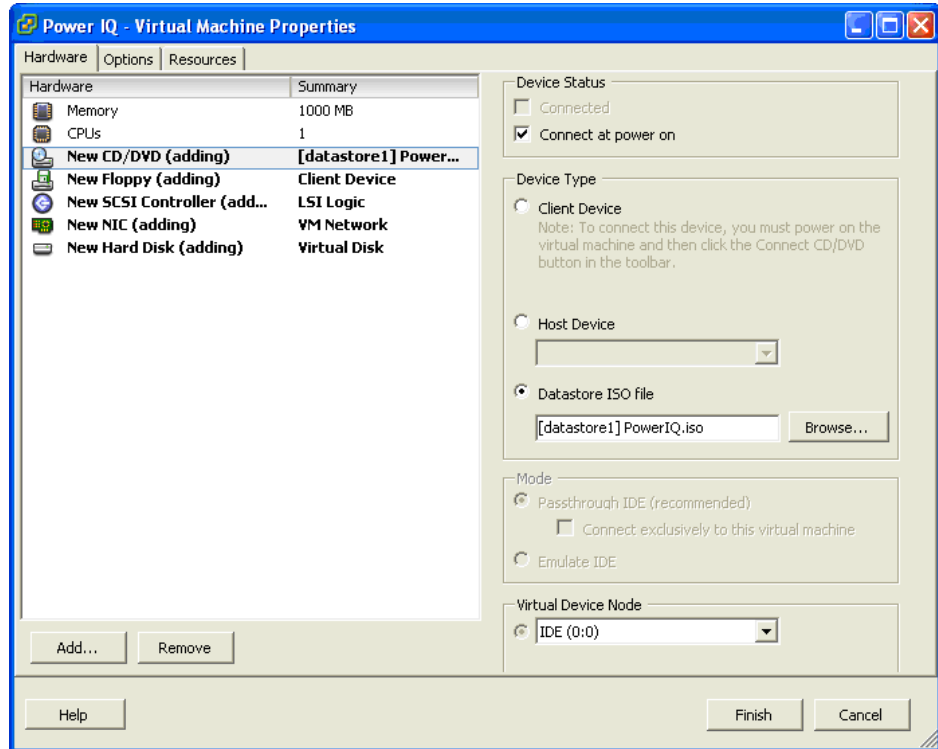
Creating the Power IQ Virtual Machine

1. In the Command pane of the Summary tab, click New Virtual Machine.
2. Choose Custom in the New Virtual Machine wizard.
3. Enter a name for the virtual machine.
4. Choose a Datastore with at least 80GB of free space available.
5. Select Linux for the Guest Operating system, then select Other Linux (32-bit) from the Version drop-down list.
6. Adjust the amount of memory allocated for the virtual machine, using the specifications on the DVD box as a guideline for your license size.
7. Set the number of network adapters to one or two. If there are two network adapters, one can be used for external access to the Web interface and the other can be used as a private LAN for communication with the PDUs and other data center devices.

In either case, make sure the Connect at Power On is checked, and leave all other settings at default.

8. Select LSI Logic for the Storage Adapter Types.
9. When prompted to select a disk, select Create Virtual Disk.
10. Set the Disk Capacity between 80GB and 160GB and select Store with the virtual machine.


11. Leave all advanced options at default. On the Ready to Complete page, check Edit Virtual Machine Settings and click Continue.



12. In the Virtual Machine Properties window, assign the NEW CD/DVD player to the PowerIQ.iso file you copied earlier.
 - a. Select the New CD/DVD (adding) item in the Hardware window.
 - b. Check Connect at power on under the Device Status pane.
 - c. In the Device Type pane, select Datastore ISO file.
 - d. Click Browse, and select the PowerIQ.iso file from the Datastore.
13. Click Finish.

Loading Power IQ onto the Virtual Machine

1. In the left tree pane, select the Power IQ Virtual Machine.
2. Select the Console tab.

3. Click  to power up the virtual machine. After a few moments, the Power IQ kickstart page opens.



4. Type 2 for a VMware installation and press Enter to begin installation.
5. Installation takes 20 minutes. When it completes, press Enter to reboot the Power IQ virtual machine.
6. The virtual machine reboots and displays a console prompt.

Chapter 2 Initial Configuration of Power IQ

After installing the Power IQ, you must configure the system for access over the network.

Hardware versions only: Connect a keyboard, mouse, and monitor to the Power IQ device.

1. Power on Power IQ.
2. When prompted to log in, use the username: *config* and the password: *raritan*. The Power IQ configuration page opens.

```
Network Configuration: Main Menu
-----
- Appliance Configuration -
Networking Setup >>
Security Setup >>
Ping Network Test
Routing Network Test
System Services
Restart Appliance
Shutdown Appliance
Exit

LAN 1: Enabled: no  DHCP: yes
      IP Addr
      Net Mask
      Gateway
LAN 2: Enabled: no  DHCP: yes
      IP Addr
      Net Mask
      Gateway

Domain: raleigh.raritan.com
DNS 1: 192.168.42.1
DNS 2:
DNS 3:

SSH: running

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UP/DOWN ARROW KEYS: highlight menu selection, ENTER: select
```

3. Select Networking Setup, then select Setup LAN 1 to configure the primary Ethernet port.
4. Press the Space bar to select Enable this LAN Port.
5. To manually assign the network settings to Power IQ, leave Use DHCP deselected. Type the IP address, network masks, and gateway into the appropriate fields.
6. Select Accept to reset the network interface with the new values.
7. If you are using a second network interface, select Setup LAN 2 from the Network Configuration menu and configure the secondary Ethernet port in the same manner as the first. **Optional.**
8. Select Ping Network Test to ensure that Power IQ can communicate over the network. **Optional.**
9. To disable SSH remote access to Power IQ, select System Services. Then deselect Enable SSH. By default, the config account has access to Power IQ. SSH is re-enabled if a support connection is created. **Optional.**

Select Exit from the main menu. You can now access Power IQ from any client on the network.

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Open Port Requirements

You must ensure that certain ports are open for Power IQ to work.

Ports Open Between Power IQ and PDUs

- Port 161 (SNMP agent): Required for all PDUs
- Port 443 (HTTPS): Required for Dominion PX PDU firmware upgrades performed through Power IQ
- Port 623 (UDP): Required for Dominion PX PDUs. Standard IPMI communication port.

Ports Open Between Clients and Power IQ

- Port 443 (HTTPS): allows the web interface
- Port 5432 (ODBC): allows ODBC access. **Optional.**
- Port 514 (syslog) outbound from Power IQ: allows Power IQ to send syslog messages to a different server. **Optional.**

Chapter 3 Connecting to Power IQ

Connect to Power IQ using a web browser on any machine on the network.

1. Open a web browser from a computer on the network.
2. In the browser's address bar, enter the IP address you assigned to Power IQ. For example: `http://192.168.1.10`
3. Answer YES to any security alerts and accept all certificates.
If this is your first time connecting to Power IQ, you must upload your license and accept the End User Licensing Agreement before logging in. If this is not your first time connecting to Power IQ, skip to step 8.
4. The Licensing page opens. Click Add, then select your Power IQ license file. If you are using dcTrack, repeat to add the dcTrack license file (Optional). Licenses are .LIC files. Repeat this step to add incremental licenses if needed.

Note: Your license file can be retrieved from the Raritan web site after you have activated your registration. To activate your registration, click the link in the "Thank you for registering" email from Raritan and create your user account. Once you create your account, look for a "Your Raritan software license key is available" email containing a link to your license file download page.

5. Click Continue.
If you see error messages AND the Continue button is disabled, contact Raritan Technical Support. There may be a problem with your license file. See **Licensing** (on page 83) in the Power IQ User Guide for more information.
6. Select YES to the End User License Agreement and click Submit.
7. Log in with the username: `admin` and password: `raritan`.

The Power IQ dashboard opens. The dashboard provides an overview of the power usage and running status of all Power Distribution Units (PDUs) under Power IQ management. Charts on the page remain blank until you add PDUs and configure an Enterprise Data Model.

The dashboard provides links to the following Power IQ features:

- Click the Data Centers tab to edit details of your Enterprise Model.
- Click the PDUs tab to open a page listing all PDU related options.
- Click the IT Devices tab to review the list of IT devices powered by your PDUs.
- Click the Analytics tab to create a custom report of graphs. This requires creating an Enterprise Relationship Model first.
- Click the Settings tab to open a page listing all configuration options for Power IQ.

From the dashboard, you can perform the following Activities:

- Add PDUs to Power IQ.
- View the status of any PDUs under management.
- Upgrade PDUs with new firmware.
- Roll out one PDU's configuration with other PDUs of that model type.
- Outlet Renaming
- Adjust system Settings

Click the Help link to view information on the activities that you can perform on each page.

Chapter 4 Additional Configuration Tasks

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Configuring the System Clock

Power IQ uses the system clock to time-stamp events and data records. Set the system clock as soon as possible to keep an accurate record of events.

Using an NTP server is recommended to keep the system clock synchronized between Power IQ and the PDUs it manages.

Configuring NTP Server Settings

The Configure Time Servers table list the NTP servers Power IQ contacts to get date and time information. NTP must be turned ON for this to happen.

Power IQ attempts to retrieve the date and time from the first server on the list. If this attempt fails, it proceeds down the list and attempts to contact the second server, and then the third, and so on. Several NTP servers on have already been configured.

► **To configure the system clock to use an NTP server:**

1. Click the Settings tab.
2. Click Time Settings.
3. Select Yes from the NTP Enabled? drop-down list and click Save.
4. Click Manage Time Servers to configure settings for the NTP servers.

► **To configure NTP server settings:**

1. Click Add.
2. Type the time server's IP address in the Time Server field.

3. Click Save Changes.

▶ **To edit NTP server settings:**

1. First, select the server on the table and click Edit.
2. Type the time server's IP address in the Time Server field
3. Click Save Changes.

▶ **To remove an NTP server:**

1. First, select the server on the table.
2. Click Remove.
3. Click Yes, when prompted to confirm.

You can enable or disable NTP usage on the main Time Settings page.

Configuring the System Clock Manually

▶ **To configure the system clock manually:**

1. Click the Settings tab.
2. Click Time Settings.
3. Select the Time Zone Power IQ resides in from the Time Zone drop-down menu.
4. Leave or configure NTP Enabled? to No.
5. Next, in the Set Time Manually field enter the Date (in YYYY/MM/DD format) followed by the time (in a 24-hour HH:MM:SS format).

For example: If the current time and date is 3:42:33 PM on October 12, 2008, you would type "2008/10/12 15:42:33".

6. Click Save. Power IQ sets its clock to the provided date and time.

Configuring Logging through Syslog

External Syslog servers can be used to record events occurring on Power IQ. Using a Syslog provides a separate external log of events.

▶ **To configure logging through Syslog:**

1. Click the Settings Tab.
2. Click Syslog Destinations.
3. Type the IP address of a Syslog server in the Add Syslog Destination field. This must be in the form of a numeric address.
4. Click Add. The server appears on the list of Current Syslog Destinations.

All servers listed under Current Syslog Destinations record events on Power IQ. Recorded events include new users, configuration changes, and failed login attempts. To stop a server from recording events, click Remove next to its entry on the list.

Configure Polling Intervals

At each polling interval Power IQ collects data from PDUs under its management.

► **To configure the polling interval:**

1. Click the Settings tab.
2. Click Polling Options.
3. Select a time period from the Polling Interval drop-down list. The time period indicates how much time passes before Power IQ starts a new polling cycle
4. Click Save.

Note: When managing a large number of power distribution units you may need to configure a longer time period for the Polling Interval. Setting a longer time period helps ensure that all PDUs are polled within a given cycle. A warning message appears if Power IQ is unable to poll all PDUs within the configured time period.

Retrieving Buffered Data from Dominion PX 1.2.5 or Higher

Dominion PX PDUs version 1.2.5 and higher have the ability to temporarily buffer power measurements. This allows Power IQ to receive more data with less frequent polling. Check Enable Buffered Data Retrieval to instruct Power IQ to retrieve these buffered measurements instead of collecting a single point of data at the time of polling. This results in increased efficiency when gathering data from Dominion PX PDUs.

Enabling this feature creates gaps in graphed data since Power IQ now collects Dominion PX data in batches instead of incrementally.

► **To retrieve buffered data from Dominion PX 1.2.5 or higher:**

1. Click the Settings tab.
2. Click Polling Options.
3. Check Enable buffered data retrieval on Raritan PDUs
4. Select a sample period from the Sample Interval drop-down list. This configures the sample interval that Dominion PX PDUs use to buffer power measurements.

For example: If 15 seconds is selected, every 15 seconds, Dominion PX PDUs takes a power measurement and store it in its internal buffer for retrieval.

5. Check average buffered data collected during each poll. If checked, Power IQ first retrieves the buffered data from a Dominion PX PDU. Rather than store all of the sample points, Power IQ then averages all of the readings across the polling interval and save it as a single value. **Optional.**

It is necessary to set a Sample Interval when using buffered data retrieval. The polling interval controls how often Power IQ requests buffered data from Dominion PX PDUs, the sample interval controls how granular the buffered data is.

For example: With a Polling Interval of "1 hour", and a Sample Interval of "1 minute", Dominion PX PDUs under Power IQ management record their power information every minute. Power IQ then retrieves 60 measurement records from each Dominion PX every hour.

Shorter sample intervals cause Dominion PX PDUs to fill their buffers more quickly. As a result, Power IQ may limit the polling interval to prevent data loss due to filled buffers.

When Buffered Data Retrieval is in use, Power IQ polls other PDUs that do not support this feature at the Sample Interval rate. This helps maintain a consistent granularity of measurements across all readings.

The Buffered Data Retrieval feature may consume the space available for data storage rapidly since it allows Power IQ to retrieve a great deal of data at once. This can be alleviated by checking Average Buffered Data. This functions similar to the data-rollup procedure, and Power IQ stores the retrieved data for each PX as a single average. In this case, a higher Sampling Interval results in a more precise average value being stored.

Note: If you enable Buffered Data Retrieval, Raritan strongly suggests enabling NTP and configuring Power IQ and your Dominion PX PDUs to use the same NTP servers. This ensures that all recorded data is in sync, whether generated by Power IQ or Dominion PX.

Note: In order to configure Dominion PX sampling rates, Power IQ must have SNMP write access to those PDUs. First make sure the Dominion PX SNMP agents are enabled. Then ensure that they have been added to Power IQ management using an SNMP community string that has write access.

Setting the Default SNMP Version for PDUs

► **To set the default SNMP version for PDUs:**

1. Choose Settings > Polling Options.
2. Select 1/2c or 3 as the default SNMP version for new PDUs added to Power IQ.
3. Click Save.

You can change the default value when you add the PDU.

Setting Default Estimated Voltages

Power IQ can estimate Active Power for PDUs that do not directly provide Active Power measurements. When voltage is not available from the PDU, you can enter a default estimated voltage value for each type of PDU.

► **To set the default estimated voltages:**

1. Enter a default estimated voltage for single phase PDUs and a default estimated inlet and outlet voltage for three phase PDUs. **Optional.**
2. Click Save.

You can override the default value for any PDU in the PDU Details page. See **Configure Estimated Voltages** (on page 17).

Adding PDUs to Power IQ Management

Once Power IQ is configured, add Dominion PX or other PDUs to its management. Power IQ can then gather data from these PDUs.

You can also add PDUs to Power IQ by uploading a CSV file containing the information. See **Adding PDUs in Bulk with CSV Files** (on page 17).

► **To add PDUs to Power IQ management:**

1. Click the PDUs tab then click Add.
2. Enter the IP address of the PDU.
3. If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number in the Proxy Index field.

Note: If the PDU is not in this type of configuration, leave the Proxy Index field blank.

4. If the PDU is a Dominion PX, enter a valid Username and Password for the PDU in the Dominion PX Credentials section. Re-enter the password in the Password Confirm field.
5. Select the SNMP Version.
 - For SNMP version 1/2c PDUs, enter an SNMP Community String that has at least READ permissions to this PDU. This enables polling the PDU for data. Enter an SNMP community string that has both READ and WRITE permissions to the PDU to enable power control, outlet renaming, and buffered data retrieval.
 - For SNMP version 3 PDUs, enter the Username and select an Authorization Level. The authorization levels are:
 - noAuthNoPriv - No Authentication Passkey, No Encoding Passkey
 - authNoPriv - Authentication Passkey, No Encoding Passkey
 - authPriv - Authentication Passkey, Encoding Passkey
 - a. Depending on the Authorization Level selected, you must enter additional credentials for Authorization and Privacy.
 - b. Authorization Protocol: Select MD5 or SHA.
 - c. Enter the PDU's Authorization Passkey, then re-enter the passkey in the Authorization Passkey Confirm field.
 - d. Privacy Protocol: Select DES or AES.
 - e. Enter the PDU's Privacy Passkey, then re-enter the passkey in the Privacy Passkey Confirm field.

Note: You must enable the SNMP agent on all PDUs added to Power IQ.

6. Select "Wait for discovery to complete before proceeding" to view the discovery process status as you add this PDU. **Optional.**
7. Click Add.

Note: PDU discovery is complete once the PDU model type is determined. SNMP fields such as contact or location values are not determined until this device is polled for the first time.

Once added, the PDU appears in the PDU list. Power IQ begins polling the PDU for sensor data. You can configure how often Power IQ polls PDU. See **Configure Polling Intervals** (on page 12).

Discovery Progress Status

Viewing the discovery process displays a status result for each PDU. See **PDU Status** (on page 47).

Editing PDUs under Power IQ Management

Editing a PDU allows you to reconfigure the SNMP community string for a PDU, or change the username and password used to access that PDU.

You cannot edit IP address, proxy index or name. If these values have changed, delete the PDU and re-add it.

► **To edit PDUs under Power IQ management:**

1. In the PDUs tab, select a PDU then click Edit.
2. If the PDU is a Dominion PX, enter a valid Username and Password for the PDU in the Dominion PX Credentials section. Re-enter the password in the Password Confirm field. Leave the fields blank to keep using the password already configured. If you want to use a blank password, select the "Delete PX credentials checkbox."
3. Select the SNMP Version.
 - For SNMP version 1/2c PDUs, enter an SNMP Community String that has at least READ permissions to this PDU. Use an SNMP community string that has both READ and WRITE permissions to the PDU to enable power control, outlet renaming, and buffered data retrieval. Re-enter the string in the Community String Confirm field.
 - For SNMP version 3 PDUs, enter the Username and select an Authorization Level. The authorization levels are:
 - noAuthNoPriv - No Authentication Passkey, No Encoding Passkey
 - authNoPriv - Authentication Passkey, No Encoding Passkey
 - authPriv - Authentication Passkey, Encoding Passkey
 - a. Depending on the Authorization Level selected, you must enter additional credentials for Authorization and Privacy.
 - b. Authorization Protocol: Select MD5 or SHA.
 - c. Enter the PDU's Authorization Passkey, then re-enter the passkey in the Authorization Passkey Confirm field.
 - d. Privacy Protocol: Select DES or AES.
 - e. Enter the PDU's Privacy Passkey, then re-enter the passkey in the Privacy Passkey Confirm field.
4. Click Save.

Configure Estimated Voltages

Power IQ can estimate Active Power for PDUs that do not directly provide Active Power measurements. When voltage is not available from the PDU, you can enter an estimated voltage value for the PDU. This value will override the default value configured.

You can change the default inlet and outlet voltage for all new PDUs added to Power IQ. See **Setting Default Estimated Voltages** (on page 14).

► **To configure estimated voltages:**

1. In the PDUs tab, select a PDU then click Edit.
2. For three-phase PDUs, enter the voltages in the Manually Configured Inlet Voltage and Manually Configured Outlet Voltage fields.
3. For single-phase PDUs, enter the inlet voltage in the Manually Configured Voltage field.

If no value is entered, the default value is used.

4. Click Save.

Adding PDUs in Bulk with CSV Files

You can add PDUs in bulk by uploading a CSV file.

Importing more than 100 PDUs at a time causes polling to suspend while the import is in progress.

You can download a step-by-step CSV template file in the Support section of Raritan's website, under Firmware and Documentation. See <http://www.raritan.com/support/power-iq/>.

► **To add PDUs in bulk with CSV files:**

1. Click the PDUs tab.
2. Click Import PDUs from CSV file. The Import PDUs page opens.
3. Click Browse and select the CSV file.
4. Select "Wait for discovery to complete before proceeding" to view the discovery progress and the resulting status. **Optional.**
5. Click Begin Import.

Structure of the Add PDUs CSV File

The structure of the CSV file is as follows:

- One line per PDU to import.
- No header row.
- Each line has only the following value columns, in the following order:
 1. IP address
 2. Proxy index: If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number. See **Proxy Index Details** (on page 19).

Leave blank if the PDU is not in this type of configuration.

3. Dominion PX username
4. Dominion PX password

Leave the Dominion PX username and Dominion PX password fields blank for other PDUs.

5. SNMP Community String

Leave the SNMP Community String blank if it does not apply for a PDU.

6. SNMPv3 enabled: true or false.

Leave columns 7-12 blank if SNMPv3 is set to false.

7. SNMPv3 username
8. SNMPv3 authorization level: noAuthNoPriv, authNoPriv or authPriv.
9. Authorization protocol: MD5 or SHA.
10. Authorization passkey
11. Privacy protocol: DES or AES
12. Privacy passkey

For example:

```
192.168.43.184, , admin, raritan, private
192.168.44.101, , , , PDUread
```

The first line in this example represents a Dominion PX PDU. The second line represents a PDU from another vendor. Uploading this CSV file would instruct Power IQ to add two PDUs to management. The first PDU is located at 192.168.43.184, and uses the login/password combination admin/raritan for authentication. Its SNMP Community String is set to private. The second PDU is located at 192.168.44.101 and does not use a user name and password for authentication. Its SNMP Community String is set to PDUread.

Proxy Index Details

For stand-alone PDUs, the proxy index field should be left blank.

For PDUs acting in a daisy-chain, or for PDUs that are being proxied through another PDU, the proxy index field should contain the number of the PDU's position.

For daisy chained systems, the proxy index field should be set to the PDU's position within the chain. The head-end or master system should have a proxy index value of 1. The second system in the chain would have a proxy address of 2 and so on.

For element managed systems, such as PDUs behind a serial proxy, the proxy index field should contain the serial port number to which the PDU is attached on the management console.

Bulk Configuration of Dominion PX Devices on Power IQ

By leveraging Dominion PX's ability to create a backup of its configuration, Power IQ can configure additional PX devices of the same model type. This is helpful for large scale roll-out situations.

This applies to Dominion PX version 1.2 and later, only.

Requirements for Bulk Configuration

There are a few prerequisites for bulk configuration:

- Each PX must be of the same model type.
- Each PX must have the same firmware version (1.2 or later).
- Each PX must be configured with an IP address and be under Power IQ management.
- A configuration backup file from a configured PX.

Loading a PX Configuration to Power IQ

1. Click the PDUs tab.
2. Click Bulk Configuration to open the Bulk PDU Configuration page.
3. Click Manage PDU Configuration Files. The Managed PDU Configuration files page opens. It contains a table listing all Dominion PX configuration files stored on Power IQ.
4. If the desired configuration file is not available, click Upload PDU Config. The Add a PDU Configuration File window opens.

Upload a PDU configuration file

PDU Configuration file upload

Model name: PCR8-15

C:\Dennis' New Stuff\Documentation Projects' Browse...

Upload

5. Type the model name of the Dominion PX that generated the configuration file. This is necessary in order to apply the configuration to the same Dominion PX models.
6. Click Browse, then select the Dominion PX configuration file.
7. Click Upload.

The Configuration File Details page opens when the configuration file upload completes. Add any comments you have for the uploaded file in the Comments field and click Save Comments. The new configuration file appears in the list of available Dominion PX configurations. You cannot edit or delete uploaded configurations.

Creating a Bulk Configuration Plan

1. Click the PDUs tab.
2. Click Bulk Configuration to open the Bulk PDU Configuration page.
3. Click Plan a New Bulk PDU Configuration roll-out.

4. Select Create a New Plan and click Continue.

Available | Upload

Choose a PDU configuration file

Results: 1 - 2 of 2

PX Model	Uploaded	By	Size
<input checked="" type="radio"/> PCR8-15	08/14/08 10:26:47 AM GMT	admin	3.9 MB
<input type="radio"/> PX20-250	08/14/08 10:27:10 AM GMT	admin	3.9 MB

[Continue](#)

5. The Choose a PDU Configuration Version page opens. Select a Dominion PX configuration based on the model name and date uploaded. This is the configuration applied in the roll-out. After selecting, click Continue.

If the desired Dominion PX Configuration version is not available, click the Upload tab above the table. Upload a configuration file.

Choose PDUs to Configure

Please choose the devices you wish to roll out the configuration file to as part of plan **PX Config Rollout Plan 2**.

Available PDUs

Select: All | None

IP Address	Owner
<input checked="" type="checkbox"/> 192.168.45.248	
<input type="checkbox"/> 192.168.45.252	
<input type="checkbox"/> 192.168.45.250 (px20-250)	
<input type="checkbox"/> 192.168.57.76	
<input type="checkbox"/> 192.168.52.199	

Add Remove

PDUs to Upgrade

Select: All | None

IP Address	Owner
<input type="checkbox"/> 192.168.45.249	
<input type="checkbox"/> 192.168.45.251	
<input type="checkbox"/> 192.168.57.77	

Back Continue

- The Choose PDUs to Configure page opens. The table on the left lists managed PDUs. Select the checkboxes of the PDUs you want to upgrade and click Add. The PDUs move to the upgrade list on the right.
- Click Continue.

Plan options

Plan name:

New Data Room PX Rollout

Abort on failure

Allow simultaneous upgrades

Back Continue

- On the Plan Options page, type a name for plan in the "Plan name" field. This helps you identify the plan.

9. Select the "Abort on failure" checkbox if you want Power IQ to cancel all remaining configuration upgrades in the plan if an upgrade failure occurs. This is useful in an upgrade problem from affecting other Dominion PX PDUs in the plan.
10. Select the "Allow simultaneous upgrades" checkbox if you want Power IQ to upgrade the configuration of multiple Dominion PX PDUs at once. This allows batch upgrades to proceed faster.
11. Click Continue.
12. Review the summary of the plan. Click Add Comment if you want to add notes to the plan. Click Add Devices if you want to edit the list of PDUs to configure.

Plan Summary

Plan Name: New Data Room PX Rollout
Selected config: PCR8-15
Abort on failure? Yes
Simultaneous roll outs? No

Comments

[Add comment](#)

Devices to Roll Out to

There were 3 device selected to roll out to.
 Results: 1 - 3 of 3

Device	Model	Owner	Firmware Version	Messages
192.168.43.154 (NewYork_DOMPX)	DPCR8-15	mike.c	1.2.0-7007	
192.168.43.252 (192.168.43.252)	DPCR20-20		1.1.0-6684	
192.168.45.252 (px12-252)	DPCS12-20	Dave Johnson	1.2.0-7055	

Previous Plan Edits

Name	Modelname	User	On Failure	Installation	Started	Finished
New Data Room PX Rollout	PCR8-15	admin	Abort	Sequential	08/14/08 06:20:32 PM GMT	08/14/08 06:22:10 PM GMT

[Return](#) [Edit](#) [Start Roll Out](#)

13. Click Save. The completed plan summary page opens.
14. Click Start Roll Out to execute the plan immediately, or click Return to return to the Bulk Configuration page.

Executing Saved Configuration Plans

1. Click the PDUs tab.
2. Click Bulk Configuration to open the Bulk PDU Configuration page.

3. Click View saved plans. The Saved PDU Configuration Roll Out Plans page opens.
4. Click a plan name to view the Plan Summary page for that plan.
5. Click Start Roll Out to execute the plan.

Dominion PX Outlet Naming

Naming the outlets of Dominion PX devices under management allows you to filter the graph data on the Power IQ dashboard. Import a CSV file with the outlet name data to name multiple outlets across multiple Dominion PX PDUs. Or, you can change names one at a time manually.

A consistent, organized naming scheme can help you filter outlets quickly. For example, using names such as `Rm2_Rack3_PX1_Exchange1` allows you to find all outlets that power the exchange server, all outlets on PX1 in the third rack, all third rack outlets, or all outlets in Room 2.

Outlet names can be up to 32 characters in length, with no character restrictions.

Note: Dominion PX PDUs must be configured in Power IQ with an SNMP community string that has write-level access to allow outlet naming.

Naming Individual Dominion PX Outlets

► **To name individual Dominion PX outlets:**

1. In the PDUs tab, select a Dominion PX and click View.
2. Scroll down to the Outlets list.
3. Double-click the outlet name, then enter the new name in the field.
4. Press Enter to save the name.

The names are written back to the Dominion PX. If you connect to the Dominion PX directly, the outlets appear there with their new names.

Naming Dominion PX Outlets in Bulk with CSV Files

► **To name Dominion PX outlets in bulk with CSV files:**

1. In the PDUs tab, click Outlet Naming.
2. Click Browse, then select the CSV file.
3. Click Import.

Power IQ names the outlets according to the values in the CSV file. The names are written back to the Dominion PX. If you connect to the Dominion PX directly, the outlets appear there with their new names.

Setting SNMP System Attributes for Dominion PX PDUs

In addition to naming the outlets of Dominion PX PDUs this CSV file can be used to set three SNMP system attributes. These attributes are SYS_CONTACT, SYS_NAME and SYS_LOCATION. These settings are optional values in the CSV file.

This feature requires Dominion PX version 1.3 or higher. Leave these fields blank for Dominion PX PDUs with earlier firmware.

- **SYS_CONTACT:** is used to identify a point of contact regarding this Dominion PX PDU. A good example is an IT administrator.
- **SYS_NAME:** is used to set the name of the Dominion PX.
- **SYS_LOCATION:** is used to quickly describe where this Dominion PX is located. A good example might be "Sales Rack - Server Closet 2"

Structure of the Outlet Name CSV File

The CSV file used for outlet naming uses the following structure. There is one Dominion PX per line/row.

- The first column is an IP address identifying a Dominion PX.
- The second column is the Proxy Index value. Dominion PX does not currently support these configurations. Leave this value blank. See **Proxy Index Details** (on page 19).
- The second column is the SNMP SYS_CONTACT value. **Optional.**
- The third column is for the SNMP SYS_NAME value. **Optional.**
- The fourth column is for the SNMP SYS_LOCATION value. **Optional.**
- Each value/column following the SYS_LOCATION represents an outlet on that PDU. Outlets start at 1 and increase sequentially with each column.

These values indicate only what is changed by the naming operation:

- If an IP address does not appear in the file, no naming operations occur on that Dominion PX.
- If an outlet value is blank, its name does not change.

For example:

192.168.77.102,,Michael,Test PX2,RACK1,KVMSwitch1,KVMSwitch2,,Sales FTP Server

A Dominion PX at 192.168.77.102 would receive the system name "Test PX2". Its first outlet would be renamed to "KVMSwitch1" and its second outlet renamed to "KVMSwitch2." The third outlet would not be renamed. The fourth outlet would be renamed to "Sales FTP Server."

Exporting Outlet Names to a CSV File

You can export the outlet names in Power IQ to a CSV file.

You can edit the file to change outlet names, then import it. See **Naming Dominion PX Outlets in Bulk with CSV Files** (on page 24).

Note: Outlet naming is only for Dominion PX PDU outlets.

► **To export outlet names to a CSV file:**

1. In the PDUs tab, click Outlet Naming.
2. Click the export link.

Change Web User Session Timeouts

You can set Power IQ to log out any web users who have been inactive for a certain period of time.

► **To change web user session timeouts:**

1. In the Settings tab, click Web User Session Timeout.
2. Select a time from the "Log users out after" list. The time indicates how long users can remain idle on the Power IQ web interface before being logged out. Select Never to disable this feature.
3. Click Save.

Restricting Web and Shell Access

To increase security, Power IQ can be configured to restrict web interface and SSH access by IP address. When trusted hosts are specified, Power IQ blocks attempts to connect from addresses not specified. When no hosts are specified, ports 22, 80, 443, 5432 are open to all hosts.

► **To restrict web and shell access:**

1. In the Settings tab, click IP based Access Control. The IP Based Access Control page opens.
2. Identify the hosts to allow access to in the Trusted Hosts fields.

You can enter an IP address, or a subnet using CIDR notation such as 192.168.45.0/24.

3. For each address, select how it is permitted to access Power IQ.
 - Select the Enable SSH to allow SSH access checkbox.
 - Select the Enable HTTP/HTTPS checkbox to enable access through the web interface.
 - Select Enable ODBC to allow third party access.
4. Click Save.

Configuring Data Retention

Power IQ performs periodic roll-ups. During a roll-up, the values over that period are averaged and stored along with the minimum and maximum values that were measured. As time passes, the stored roll-up data itself is rolled up into larger sets of data. Raw data measurements are rolled up every hour, and 24 hourly roll-ups are rolled up every day, and so on.

Data does not have to be purged immediately after a roll-up occurs. For example, raw data is rolled up every hour but a set of raw data can still be made available five hours later. You can configure how long Power IQ retains each level of data.

Ideally, you should adjust the data retention periods before adding PDUs to Power IQ management. You should also revisit these settings after adding a large number of PDUs.

Before making any changes to this configuration, enter your settings in the data storage calculator to ensure adequate database capacity. Improper configuration may result in data loss. Access the data storage calculator by clicking the link on the Settings > Data Rollup Retention page in Power IQ.

► To configure data retention:

1. In the Settings Tab, click Data Rollup Retention.
2. Start with Retain raw data row. Use the drop-down lists in that row to select how long (in hours, days, weeks, etc) Power IQ should keep this raw data.
3. In the Retain hourly averages of data row, configure how long hourly roll-ups are stored.
4. In the Retain daily averages of data row, configure how long daily roll-ups should be stored.
5. In the Retain monthly averages of data row, configure how long monthly roll-ups should be stored by Power IQ.

*Note: Power IQ collects a lot of data. Keeping this data for long periods of time consumes large amounts of storage space and may affect performance. If you need long term access to the raw poll data, you should download daily sensor readings regularly. See **Downloading Daily Sensor Readings** (on page 55).*

Installing an HTTPS Certificate

A PEM file upload is required to replace the current certificate and private key. The PEM file needs to contain both an RSA private key and an X509 certificate.

Note: Power IQ does not provide a Certificate Signing Request (CSR). OpenSSL or any other utility can be used to generate CSR. Power IQ does not use encrypted private keys. You must remove the password from the Private key before it can be used. To remove the encryption from the key, issue a command like: "openssl rsa -in server.key -out server2.key". Use "server2.key" when using openssl utility.

It is not required to provide root certificate of CA signing Power IQ certificate signing request (CSR).

► Step 1: Generate a private key

This example procedure is for generating a private key using OpenSSL on a Linux server.

1. This command creates an RSA key with Triple DES 1024 byte encryption.

```
openssl genrsa -des3 -out server.key 1024
```
2. Remember the key password from this command.
3. Generate a Certificate Signing Request. Be prepared to complete the following information:
 - private key password
 - two character country code
 - full state or province name
 - city name
 - company name
 - organizational unit or leave it blank
 - servers common name or fully qualified domain name
 - admin email address
 - other attributes can be left blank
4. Create the request.

```
openssl req -new -key server.key -out server.csr
```

5. Display the CSR request.

```
cat server.csr
```

6. Copy the CSR request and send it to the certificate authority to be signed. Make sure to copy everything between the first "-----" and the last "-----".

7. Submit CSR to certificate authority and receive signed X.509 certificate.

8. Modify the server key to remove the password

```
cp server.key server.key.secure
```

```
openssl rsa -in server.key.secure -out server.key
```

Warning: The server.key file must be kept private and secure. If this key file is compromised, the certificate should be removed and then reissued.

9. Create PEM file.

- The PEM file should contain both the RSA private key without password and the X.509 certificate.
- Concatenate the unprotected private key to the signed X.509 certificate file from the top level certificate authority.
- Use this file in the upload in Step 2.

► **Step 2: Upload the PEM file to Power IQ:**

1. In the Settings tab, click HTTPS Certificate in the Security and Encryption section.
2. Click Browse and select the PEM file.
3. Click Upload.

Chapter 5 User Configuration Tasks

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Change the Administrator Password

It is important to change the password for the admin account as soon as possible. This helps prevent unauthorized administrator access to Power IQ.

1. Click the Settings tab.
2. Click User Accounts. The User Configuration page opens, displaying a list of all the user accounts created for the system.
3. Click Edit for the admin user.
4. Type a new password for the admin account in the Password field, then type it again in the Confirm Password field.
5. Click Save.

Adding, Editing, and Deleting Users

Add a User

► **To add a user:**

1. In Power IQ, click the Settings tab.
2. Click User Accounts. The User Configuration page opens, displaying a list of all the user accounts created for the system.
3. Click Add. A blank user information page opens.
4. Enter the Common User Information.
 - a. Enter a username. User names must be at least 3 characters, but not more than 40 characters.
 - b. Enter the user's first name.
 - c. Enter the user's last name.
 - d. Enter an email address.

- e. Password and Confirm Password: Enter a password for this user. The password must be at least 8 characters, including one numerical character, one uppercase character, one lowercase character, and one of the following special characters:
~!@#%&^&*()_+{}|:"<>?/.,';[]=-`")
 - f. In the Description field, enter comments about the user.
5. If this user will access dcTrack, complete the Additional Fields for dcTrack. If the user will not access dcTrack, leave the remaining fields blank, and click Add.
 - a. Enter the user's mail server. For example, mail.company.com.
 - b. Enter the mail server's SMTP port. Default is 25.
 - c. If a password is not required to access the SMTP, select the No Password checkbox.
 - d. Select the team this user is on. Teams must be created in dcTrack before you can assign them to users. See Adding, Editing and Deleting Teams in the dcTrack User Guide.
 6. Select the user's access level from the Access Level drop-down list. If the user is a Gatekeeper who should receive request notifications, select the Request Emails checkbox.
 7. Click Add.

Note: dcTrack is an optional module. If you do not have a dcTrack license, you will not see any dcTrack user options.

Edit a User

► To edit a user:

1. In the Settings tab, click User Accounts.
2. Select a user and click Edit. The User Information page opens.
 - Click Edit to change the name information, email, notes, or dcTrack user information, such as Access Level and Team. Click Save after making changes. See **Add a User** (on page 30) for field descriptions.
 - Click Change Password to change the user's password. Enter the password, enter it again to confirm, then click OK.

Note: dcTrack is an optional module. If you do not have a dcTrack license, you will not see any dcTrack user options.

Delete a User

In the user list page, you can delete users who should no longer have access to the system. You cannot delete the admin user.

► **To delete a user:**

1. Click the Settings tab.
2. Click User Accounts. The User Configuration page opens.
3. Click Delete in the row of the user you want to delete.
4. Click OK to delete the user.

Assign Roles to a User

Roles assigned to groups or users in the Settings tab give permissions that apply to all Data Centers, PDUs and Devices in Power IQ. See **Power IQ Role Definitions** (on page 36).

You can also assign the Administrator, Operator, Power Control, and View roles to a user or user group, but limit the role to only a specific level of a data center. To limit the permission, assign the role in the Data Centers tab, in the Permissions section of the data center level the role should cover. See **Assign Roles within a Data Center** (on page 35).

You must be assigned the Site Administrator role to assign roles.

► **To assign roles to a user:**

1. Click Settings.
2. Click User Accounts. Select a user then click Edit.
3. In the User Roles section, select roles in the drop-down list, then click Add to assign the permission to the user. Roles assigned to the user appear in the list.

Users can perform the tasks allowed by the roles assigned.

*These roles apply to permissions within Power IQ. For dcTrack roles, which are called User Access Levels, see **Power IQ User Access Levels** (see "dcTrack User Access Levels" on page 37). dcTrack user access levels can be chosen in the Access Level field on the User Information page. See **Edit a User** (on page 31).*

Note: dcTrack is an optional module. If you do not have a dcTrack license, you will not see any dcTrack user options.

Remove Roles from a User

► **To remove roles from a user:**

1. Click Settings.
2. Click User Accounts.
3. Select a user and click Edit.
4. In the User Roles list, select a role, then click Remove. The user can no longer perform the tasks allowed by the role.

Adding, Editing, and Deleting User Groups

Default User Groups

There are two default user groups, All Users and Site Administrators.

The All Users group contains every user you add to Power IQ, and has the View role assigned to it.

The Site Administrators group contains the Admin user, and has the Site Administrator role assigned to it. The Site Administrator role allows users to do all tasks in Power IQ.

You can change the roles assigned to both groups.

Add a User Group

► **To add a user group:**

1. Click Settings.
2. Click User Groups.
3. Click Add, then enter a name. Click Next. The Group Information page opens.
4. In the Group Members section, select users in the drop-down list, then click Add. Users in the group appear in the list by login, name, and email.
5. In the Group Roles section, select roles in the drop-down list, then click Add to assign the permission to the group. Roles assigned to the group appear in the list. See **Role Definitions** (see "Power IQ Role Definitions" on page 36).

Edit a User Group Name

► **To edit a user group name:**

1. Click Settings.

2. Click User Groups.
3. Select a group then click Edit.
4. Click Edit to change the group name.
5. Click Save.

Delete a User Group

► **To delete a user group:**

1. In the Settings tab, click User Groups.
2. Select a group and click Remove.

Assign Roles to a User Group

Roles assigned to users or user groups in the Settings tab give permissions that apply to all Data Centers, PDUs and Devices in Power IQ. See **Role Definitions** (see "Power IQ Role Definitions" on page 36).

You can also assign the Administrator, Operator, Power Control, and View roles to a user or user group, but limit the role to only a specific level of a data center. To limit the permission, assign the role in the Data Centers tab, in the Permissions section of the data center level the role should cover. See **Assign Roles within a Data Center** (on page 35).

You must be assigned the Site Administrator role to assign roles.

► **To assign roles to a user group:**

1. In the Settings tab, click User Groups.
2. Select a user group, then click Edit.
3. In the Group Roles section, select roles in the drop-down list, then click Add to assign the permission to the group. Roles assigned to the group appear in the list.

Users can perform the tasks allowed by the roles assigned to the group.

Remove Roles from a User Group

► **To remove roles from a user group:**

1. In the Settings tab, click User Groups.
2. Select a user group then click Edit.
3. Select a role, then click Remove. Users in the group can no longer perform the tasks allowed by the role.

► **To remove all roles from a user group:**

1. In the Settings tab, click User Groups.
2. Select a user group then click Edit.
3. In the Group Roles section, click Empty.

Assign Roles within a Data Center

You can control what individual users or user groups can see and do in Power IQ at each level in each data center. Permissions extend to levels nested below the selected level.

You can also assign global permissions for users and user groups for all levels of all data centers in Power IQ, and to PDUs not mapped into a data center. See **Assign Roles to a User** (on page 32) and **Assign Roles to a User Group** (on page 34).

Permissions are included in different roles that you assign. See **Role Definitions** (see "Power IQ Role Definitions" on page 36).

You must be assigned the Site Administrator role to assign roles.

► **To assign roles within a data center:**

1. In the Data Centers tab, select a data center level, such as a rack. The details page opens.
2. In the Permissions section, click Add Role to > Add User Role or Add Role to > Add Group Role. Adding a Group Role will give permissions selected to all users in the group.
3. Select the user or group who needs permission to this level of the data center.
4. Select the role to allow in the Roles list. Click OK.

Roles and User Access Levels

Power IQ Role Definitions

Assign these roles to users or user groups to allow the permissions for operations within Power IQ.

You can assign any role to apply to all of Power IQ, including every level of every data center. See **Assign Roles to a User Group** (on page 34) and **Assign Roles to a User** (on page 32).

Or, you can assign the Administrator, Operator, View, and Power Control roles to apply only to a certain level of a data center, such as a rack. See **Assign Roles within a Data Center** (on page 35). When these roles are assigned to the user or user group via the Data Centers tab, the permission allowed will be limited to the selected level of the data center.

▶ Administrator

Permission to view, add, edit, and delete Data Centers, PDUs, and Devices. Permission to control power to outlets. Permission to create reports and charts. Permission to view Data Centers, PDUs and Devices.

▶ Operator

Permissions are the same as the Administrator role, except that power control and report and chart creation are not permitted.

▶ Power Control

Permission to control power for all outlets. Permission to view Data Centers, PDUs and Devices.

▶ View

Permission to view Data Centers, PDUs and Devices.

▶ Create Reports and Charts

Permission to create and edit reports and charts in the Dashboard tab and Analytics tab. You must also assign the View role, or another role that contains view permissions, to users or user groups who need to create reports and charts.

▶ Site Administrator

Permission to do every action in Power IQ, no exceptions. Permission to control power to all outlets in Power IQ is included. The Site Administrators group is assigned this role by default, and contains the Admin user.

Roles Information for Upgraded Systems

If you upgraded Power IQ, all users who used to have the Administrator role will now be assigned the Site Administrator role.

dcTrack User Access Levels

dcTrack user access levels are default 'roles' used by the application and applied to users once they are created. These access levels cannot be changed.

Gatekeeper

The Gatekeeper is the administrator of dcTrack. This person is responsible for data center change management and keeping the data in dcTrack in sync with actual conditions.

The Gatekeeper can:


- Edit all items and connections.
- Approve, reject, mark as complete, or archive requests.
- Issue work orders, mark them as complete, and archive them.
- Update drop-down lists.

Users who are Gatekeepers have access the Administration module of dcTrack and the Items & Ports Table page (see Editing Items & Ports). It is on this page that any item can be edited and sorted for data clean up purposes. There are no data integrity checks in this page, which allows the Gatekeeper full access to the data.


Caution: Since data integrity checks are not present in this page, the Gatekeeper must exercise extreme care while editing the data. The Gatekeeper should be aware that changes made here may have an impact on related data.

Manager

Managers can view, add and edit items and connections so long as the team they belong to is listed under the Admin Team field for the currently

selected item. A red lock  icon is displayed when the current selected item is not editable.

Member

Members can view, add and edit items and connections so long as their name is listed under the System Admin field for the currently selected item. A red lock  icon is displayed when the current selected item is not editable.

Viewer

Users with Viewer access level will be able to access the pages in the application but cannot make changes to the data. Viewers can also access Reports they can view or print.

Configuring Power IQ to use LDAP Authentication

Note: The following functions are performed in Power IQ.

As an alternative to using local user account management you can configure Power IQ to use an LDAP server for centralized authentication. An LDAP wizard guides you through this process, checking each configuration option along the way. LDAP configuration proceeds along four basic steps:

- Network connectivity settings
- Search and authentication settings
- Authorizing LDAP user accounts for Power IQ
- Confirmation and enabling LDAP access

Once enabled, all users must have an authorized account on the LDAP server in order to connect to Power IQ. The exception to this is the local account: admin. The admin account always has local access in order to make any necessary configuration changes.

Gathering LDAP Configuration Settings

The following is a list of configuration information you should know before enabling LDAP authentication in Power IQ. If you are not familiar with these settings, ask your LDAP administrator to help you prepare this list.

LDAP configuration settings:

- Type of LDAP Server used: Microsoft Active Directory or other LDAP server
- IP Address of the LDAP server
- Network port used by the LDAP server
 - If using a custom port number, what type of encryption is used: TSL, SSL or No Encryption?
- Base DN of the server (used for searching for users)
- Bind type of the server
 - Anonymous bind or standard binding
 - The bind DN setting, if using standard bind
 - The password, if using standard bind
- User ID attribute or the user attribute prefix for user DN
- User object class (if applicable)
 - Additional object filters
- User ID attribute or the user attribute prefix for user DN
- User object class (if applicable)
- Additional object filters
- LDAP user access level within Power IQ
- User roles

Configuring LDAP: Connectivity

The first part of the LDAP setup is identifying the LDAP server on your network.

► **To configure LDAP connectivity:**

1. Click the Settings Tab.
2. Click LDAP Authentication. The LDAP Connectivity page opens.
3. In section 1, type the IP address or hostname of your LDAP server.
4. Click Check. Power IQ verifies that it can find an LDAP server at the address.
5. In section 2, select the network port used by the LDAP server:

- Port 389 is the standard, unencrypted LDAP communication port.
 - Port 636 is the standard, SSL-encrypted LDAP communication port.
 - If your LDAP server uses a custom port number select Custom Port Number and type the number in the provided field.
Then select whether the server uses TSL Encryption, SSL Encryption or No Encryption.
6. Click Check. Power IQ verifies that it can communicate with the server over the specified port.
 7. If Power IQ can connect successfully with these settings, click Continue, to proceed to the next step.

Configuring LDAP: Search and Authentication

The LDAP server contains a directory of users. This step tells Power IQ where to search for users, and how Power IQ authenticates (or Bind) those users with the LDAP server.

1. In section 1, type the base DN in the Base DN field. The base distinguished name (DN) is the top level of the LDAP directory tree. It indicates where in the LDAP directory you want to begin searching for user credentials.

An example Base Search value might be:
`cn=Users,dc=raritan,dc=com.`

2. Click Check.
3. The options that appear in section 2 depend on the base DN entered.
 - a. If your LDAP server uses anonymous binding, select Searching using anonymous binding.
 - b. If your LDAP server uses a Bind DN and password combination, select Search using the following bind DN and password. Then type the bind DN and password in the provided fields.
 - c. If you bind manually, select Enter the LDAP user parameters manually.
4. Click Check.
5. The user parameter options in section 3 depend on the choices made in section 2.
 - a. If you chose to bind manually, type the user attribute prefix in the field provided.
 - b. Otherwise:

- Select the user ID attribute used by the LDAP server. uid is generally used by Microsoft Active Directory servers, cn by other LDAP servers. You can also specify a custom user ID attribute.
 - Select a user object class to filter by. You can choose between posixAccount, netOrgPerson, a value from the LDAP server, or a custom value. You can also choose "Do not filter by object class".
 - Select the scope of the user credential search. Choose whether to search the entire subtree or just one level. If you are unsure, you can leave this set to subtree.
 - Type any additional object filters in the field provided.
6. Click Check.
 7. A list of LDAP users found using the configured parameters are displayed in section 4. Review the list. If the correct users are present, click Continue. If they are not, adjust the settings and try again.

Note: if you chose to bind manually, no list of users can be displayed. Simply click continue.

Configuring LDAP: Authorizing LDAP Users

Before LDAP users can connect to Power IQ, they must be authorized and given a Power IQ role.

► To authorize LDAP users:

1. Type an LDAP Username string in the provided field. This user name should come from the list provided in the previous page.

An example username might look like this:

```
uid=ben,ou=People,dc=company,dc=com
```

2. Select whether this user should be an Administrator or Operator. Operators have read-only access to Power IQ's sensor readings and are unable to configure any settings.
3. Click Add.
4. Repeat this procedure to add additional users as necessary.
5. When you are done creating the list of users, click Continue.

Configuring LDAP: Confirmation

The final step of the LDAP wizard is to enable LDAP access.

You can click the links for Connectivity, Search Parameters and User Accounts if you must make changes to any of the previous steps.

To proceed, click Enable LDAP Authentication. Once enabled, all non-admin users must have an authorized account on the LDAP server in order to connect to Power IQ.

Disabling LDAP Authentication

Disabling LDAP returns Power IQ to using the local authentication database. Users require an account on Power IQ in order to connect.

► **To disable LDAP authentication:**

1. Click Settings.
2. Click Local User Authentication.
3. Click Enable Local Authentication.

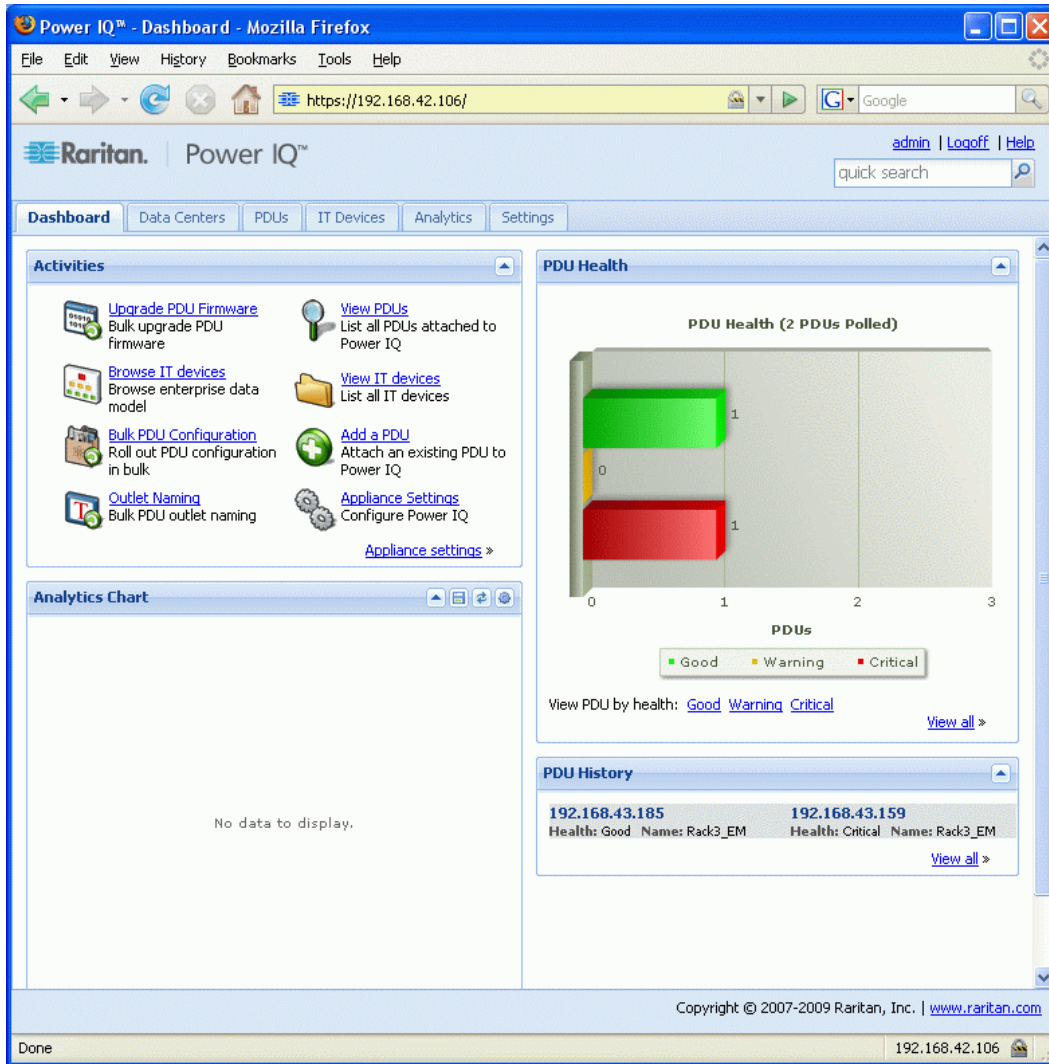
Chapter 6 The Power IQ Dashboard and Viewing PDUs

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The Power IQ Dashboard

The Power IQ Dashboard is the first page that opens after logging into Power IQ. It provides an at-a-glance view of PDU health and power usage. Direct links to common activities and recently viewed PDUs are also available. You can return to the Dashboard at any time by clicking the Dashboard tab.



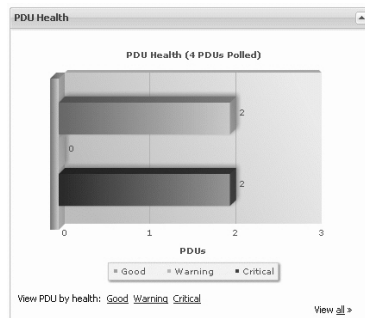
You can display or hide the four dashboard areas by toggling the arrow that appears in each area's title bar.

Power IQ Activities

The Activities area makes common Power IQ activities available from a convenient location on the Dashboard. These activities can also be found by navigating through the PDUs and Settings tab.

PDU Health

The PDU Health area provides an at-a-glance view of all PDUs under Dominion PX Management. The graph shows the number of PDUs polled and categorizes them: Good, Warning, and Critical.



- Good - indicates that the PDU is running at its specified address and is responding to Power IQ queries.
- Warning - indicates that the PDU is running at its specified address, but that something requires attention. Often the PDU may be in a 'degraded' state because its firmware is out of date.
- Critical - indicates that the PDU is not available at its specified address, or is not responding to Power IQ queries.

To investigate, click a status link at the bottom of the PDU Health area. This brings you to the a page listing all PDUs with the selected status.

Analytics Chart

The Analytics Chart area shows a measurement of power consumption or cost, depending on the custom fields you select. See ***Creating and Reviewing Reports with Analytics*** (on page 73) for details on how to configure this chart.

PDU History

The PDU History area lists the last few PDUs viewed or edited by a user. Clicking on a PDU here is a quick way for a user to return to the details page of a previously viewed PDU. The PDU history displayed on the dashboard is specific to each user.

New power distribution units also appear in the PDU History area when they are first added to Power IQ management.

Viewing PDUs

Click the PDUs tab to view the PDUs page. This is the main hub for all activities related to the power distribution units in Power IQ. Look at the PDU Listing table for more details about managed PDUs.

Viewing All PDUs

The PDU Listings table is central to the PDU tab.

By default, it displays all the PDUs under Power IQ management. If there are a large number of PDUs, controls at the bottom of the table allow you to cycle through pages of PDU listings.

The attribute columns at the top of the page can each be clicked to sort the view of PDUs by that attribute, in ascending or descending order. Column widths can be adjusted clicking on the border between each column and dragging to the left or right. Columns can be removed from the PDU listing by clicking the drop-down arrow in any column and selecting the Columns option.

IP	Name	Location	Status	Manufacturer	Model	Firmware
192.168.43.185	Rack3_EM	Unknown	OK	Raritan	DPCR8-15	1.2.5-7221

Viewing a PDU

Click the IP address of a PDU in the list to view details about the PDU.

- **Details:** View information about the PDU, including name, IP address, manufacturer, and firmware revision. The information is based on what Power IQ can discover and is not editable here.
- **Active Power Trending:** A graph displays the power usage of the PDU. Click customize to adjust the graph to show power usage over the previous hour, day, or month.
- **Readings:** View additional metric data. The metrics shown here depend on the PDU, and may include items such as apparent power usage and per-line current.

Note: To fully populate the areas of this page, the PDU must be configured with an SNMP community string that has a minimum of read-level access.

PDU Status

The following values may appear in the status column for each PDU.

Status	Explanation
OK	Most recent poll of the target PDU was successful.
New	The system has not yet completed a successful scan or poll of the PDU. This is typical for systems that have been recently added.
Lost Communication	This indicates a problem with network connectivity between the Power IQ and the PDU, or with the PDU itself. <ul style="list-style-type: none"> ▪ Make sure the required ports are open between Power IQ and the PDU. See Ports Open Between Power IQ and PDUs (on page 7).
Poll incomplete	Certain aspects of the scan or poll failed, such as retrieving the model name, persisting outlet sensor data to CSV file, or retrieving information via SNMP. This can be due to an incompatibility with this version of the PDU or because the SNMP is misconfigured or the agent is disabled on the target PDU. <ul style="list-style-type: none"> ▪ Make sure the PDU's SNMP settings are correct. See Editing PDUs under Power IQ Management (on page 16).
PX version not supported	Certain aspects of the scan or poll failed due to a version conflict with this Dominion PX's firmware. An upgrade to a later version is recommended. The minimum version that is supported is <minimum version>. Note that upgrading this PX to a newer

Status	Explanation
	firmware version through Power IQ is supported.
Application error	This indicates an unexpected application error.
Invalid username	This indicates that the username configured is not valid on the PDU. <ul style="list-style-type: none"> Correct the username configured on the PDU. See <i>Editing PDUs under Power IQ Management</i> (on page 16).
Invalid password	This indicates that the password configured is not valid on the PDU. <ul style="list-style-type: none"> Correct the password configured on the PDU. See <i>Editing PDUs under Power IQ Management</i> (on page 16).
Missing credentials	This indicates invalid or missing credentials. <ul style="list-style-type: none"> Correct the PDU's credentials. See <i>Editing PDUs under Power IQ Management</i> (on page 16).
No contact	This indicates that no successful network contact has ever been carried out with this PDU. This may indicate that the IP address is incorrect. <ul style="list-style-type: none"> Correct the PDU's IP address. See <i>Editing PDUs under Power IQ Management</i> (on page 16).
Unmanageable	This indicates that no plug-in capable of managing the PDU was detected. The target PDU is not supported by this version of Power IQ. <ul style="list-style-type: none"> Make sure Power IQ supports the PDU. See the list of supported PDUs at http://www.raritan.com/resources/power-iq-rack-pdu-support/ Contact Raritan Technical Support.

Configure the Number of PDUs in the List

You can configure how many PDUs appear at a time in the PDUs list. This preference is set per user.

► **To configure the number of PDUs in the list:**

1. Click your user name hyperlink in the top right corner of the page, next to the Logoff hyperlink.
2. In the User Information page, click the Prefs tab.
3. Enter the number of PDUs to list in the Grid Rows field.

4. Click Save.

Launch the Web Interface for a Dominion PX

You can launch the web interface for a Dominion PX in Power IQ.

Note: To enable single sign-on for Dominion PX PDUs through Power IQ, you must use the same username and password to add the Dominion PX to Power IQ that is used to login to Power IQ.

► **To launch the web interface for a Dominion PX:**

1. In the PDUs tab, select a Dominion PX.
2. Click Launch. If required, login.

Searching for PDUs

Use the Quick Search tool at the top of the Power IQ interface to search for a PDU.



Type the name or IP address of a PDU into the Quick Search field. If a match is found, Power IQ displays that PDU's detail page.

Note: When searching by name, the whole name of the PDU must be entered. Search is case sensitive.

Chapter 7 Power Control

Power control is only available for PDUs that support this feature.

Power IQ must have valid SNMP write access to the PDU for power control to work.

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Enable or Disable Power Control

Only authorized users can control power. See **Role Definitions** (see "Power IQ Role Definitions" on page 36).

1. In the Settings tab, click Power Control Options.
2. Select the "Enable power control" checkbox to enable power control.
3. Click Save.

Configure Power Control Options

1. In the Settings tab, click Power Control Options.
2. Select the "Enable power control" checkbox to enable power control.
3. Select the "Display confirmation for power control operations" checkbox to require users to confirm power control operations before they occur.
4. Select the "Require reason message for power control operations" checkbox to require users to log a reason for all power control operations.
5. Select the "Allow power control for rooms, aisles, rows, and racks" to allow authorized users to control power at the room, aisle, row and rack levels of the data center.
6. Select the "Allow scheduled power control" checkbox to allow authorized users to schedule power control tasks.
7. Click Save.

Control Power to Outlets in a Data Center

You must enable power control. See **Enable or Disable Power Control** (on page 50).

Power control is available at the outlet and IT device outlet group level, unless you also enable higher levels, such as all outlets in a rack, row, aisle, or room. See **Configure Power Control Options** (on page 50).

You must be assigned a role that permits power control. See **Role Definitions** (see "Power IQ Role Definitions" on page 36).

► To control power in the Data Centers tab:

1. In the Data Centers tab, select the data center level, such as a rack, that contains the outlets you want to control.
2. Select the checkboxes of the outlets you want to control in the IT Devices or PDUs section.
3. Click Power Control > On or Power Control > Off.
4. If required, enter a reason message for the power control operation, and click OK to confirm.

► To control power with right-click in the Data Centers tab:

1. In the Data Centers tab, right-click an IT device, or higher level, if enabled, then select On or Off.
2. If required, enter a reason message for the power control operation, and click OK to confirm.

► To control power in the PDUs tab:

1. In the PDUs tab, select a PDU, then click View.
2. Select the checkboxes of the outlets you want to control in the Readings section.
3. Click Power Control > On, Power Control > Off, or Power Control > Cycle.
4. If required, enter a reason message for the power control operation, and click OK to confirm.

► To control power in the Devices tab:

1. In the Devices tab, select a device.
2. Click Power Control > On or Power Control > Off.
3. If required, enter a reason message for the power control operation, and click OK to confirm.

Control Power to Devices in a Group

You can manually control power to devices in a group, or schedule a task to run a power control operation at a specified time.

▶ **To control power to devices in a group manually:**

1. In the Devices tab, click "Device groups."
2. Select a device group.
3. Click Power Control > On or Power Control > Off. All devices in the group are powered on or off using the delays and sequence specified in the group settings. See **Create Device Groups for Power Control** (on page 53).

▶ **To control power to devices in a group via a scheduled task:**

See **Add a Power Control Task** (on page 52).

Scheduling Power Control

You can schedule power control for device groups only.

View Power Control Task Results

View the results of power control tasks that have been scheduled.

▶ **To view power control task results:**

1. In the Dashboard tab, click Power Scheduling. The Power Scheduling Task Results page opens.
2. Select a task, then click View.

Add a Power Control Task

Schedule a power control task to control power to a device group at a specified time. You can schedule a task that runs only once, or that recurs on a regular schedule.

You must create device groups before you add power control tasks. See **Create Device Groups for Power Control** (on page 53).

▶ **To add a power control task:**

1. In the Dashboard tab, click Power Scheduling. The Power Scheduling Task Results page opens.
2. Click "Add new task."
3. Select Power On or Power Off.

4. Select the Device Group for the power control operation.
5. Specify when the task should run.
 - To schedule a task that runs only once, select the Date from the calendar in the Run Once section.
 - To schedule a task that recurs, select the checkboxes for the days of the week the task should run in the Recurring section.
 - For both types, select the time the task should run in the Hour and Minute fields.
6. Select the Active checkbox to allow this task to run. Deselect this checkbox to stop the task from running.
7. Click Save.

Create Device Groups for Power Control

Create a group of devices when you need to perform a power control task on the whole group. You can control power to the group manually, or by scheduling a power control task to run at a certain time. See **Control Power** (see "Control Power to Outlets in a Data Center" on page 51) and **Scheduling Power Control** (on page 52).

► To create device groups for power control:

1. Add a device group.
 - a. In the Devices tab, click "Add device group."
 - b. Enter a name for the device group in the Name field, then click Save.
2. Add devices to the group.
 - a. In the Data Centers tab, select a device to add to the group.
 - b. Expand the Device Groups section of the IT Device details page and click Add. Double-click the field, then click the magnifying glass icon and select the group.
 - c. Click Save.
3. Edit the device group to set the default power control delays and sequence of devices for power control operations.
 - a. In the Devices tab, click "Device groups."
 - b. Select a device group then click Edit.
 - c. Set the Default Power Control Delay, which is the number of seconds that Power IQ delays before powering on or off the sequence of devices in a group. These settings are the default delays for all new devices you add to the group.

- d. Set the sequence for power control operations. Select a device, then click Up, Down, Top, Bottom, and Move To to arrange the device list in the sequence that power control operations should occur.

Remove a Device from a Group

► **To remove a device from a group:**

1. In the Devices tab, click "Device groups."
2. Select a group then click Edit.
3. Select the device you want to remove, then click Remove. The device is removed from the group, but not removed from Power IQ.

Set a Different Power Control Delay for a Device

Power IQ will follow the default delay setting, unless you specify a different delay setting for a device.

1. In the Devices tab, click "Device groups."
2. Select a device group then click Edit.
3. Select the device in the Devices in This Group list, then click the Power On Delay or Power Off Delay value and enter a new value in the field.

Chapter 8 Maintenance Tasks

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Downloading Daily Sensor Readings

The sensor readings gathered by Power IQ are collected into an archive file each day. The sensor readings CSV file includes the state of the circuit breakers for applicable Dominion PX PDUs. The circuit breaker state is recorded to this file only once every polling interval, even if you enable buffered data retrieval under Polling Options.

► **To download daily sensor readings:**

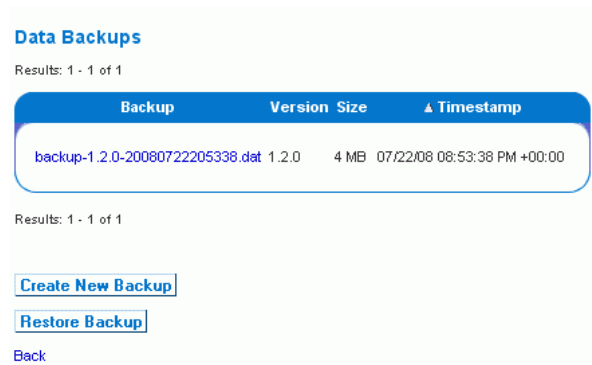
1. Click the PDUs tab.
2. Click Download CSV data files. The Sensor Readings Downloads page opens.
3. Click a day from the Sensor Readings Download to download an archive of the sensor readings taken that day.

Downloading System Configuration Backup Files

The configuration of your Power IQ is backed up and archived once each day.

► **To download the system configuration backup file:**

1. In the Settings tab, click Data Backups. The Data Backups page opens.



2. Select a backup entry for the list and click its name to download the configuration data to your computer.

Administrators should periodically copy these backup files to an external server to for redundancy purposes.

Note: You can also manually create an archive of the system configuration by clicking Create New Backup at any time.

Restoring System Configuration Backups

Restoring a system configuration backup file returns Power IQ's configuration to the settings captured when the backup was made.

► **To restore a system configuration:**

1. Click the Settings tab at the top of the Power IQ interface.
2. Click Data Backups. The Data Backups page opens.
3. Click Restore Backup. A Restore Bundle Selection window opens.
4. Click Browse, then select a backup file from your client PC.
5. Click Upload. This restores the Power IQ to the backup's configuration settings.

Upgrading Power IQ Firmware

When new firmware is released, you can upgrade Power IQ to receive the latest in features and functionality.

► **To upgrade Power IQ firmware:**

1. In the Settings tab, click Software Upgrades. The Upgrade page opens.
2. Click Browse, select the firmware file (usually a *.bin file) you want to load from your PC.
3. Click Upload. The new firmware uploads to Power IQ.

Power IQ processes the file and updates itself to the selected firmware revision.

Shutting Down and Restarting Power IQ

You can shut down and power off or restart Power IQ.

► **To shut down and power off Power IQ:**

1. Click the Settings tab.

2. Click System Shutdown. The Power IQ shuts down and powers off.

▶ **To restart Power IQ:**

1. Click the Settings tab.
2. Click System Restart.

Chapter 9 Configuring the Enterprise Model

One of Power IQ's advanced features is the ability to model your IT equipment infrastructure. Power IQ can model something as simple as a single rack, or as large as a building with multiple server rooms. This model then forms the basis for generating an Analytics report that can show such measurements as the total power usage of a server rack.

You can download a sample Enterprise Data Model CSV file from the Support section of Raritan's web site, under Firmware and Documentation. See the "CSV Import Template" at <http://www.raritan.com/support/power-iq/>

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Overview of the Enterprise Model

The model is a representation of your IT equipment infrastructure. This model is composed of objects and the relationships between them. Power IQ builds its understanding of your infrastructure based on the relationships between these objects.

For example: a model might describe the following: "I have a Data Center in New York. That Data Center has 1 Room. That room contains 3 Rows of racks. Each Row contains 4 Racks of Devices. The first rack is powered by PDU A1. The first rack contains these 20 devices."

What is an Enterprise Model Object?

An object is an item that is a part of your Data Center.

The lowest level objects are called Devices. Devices are items such as servers, KVM drawers, network switches, or other equipment commonly installed in server racks. Generally speaking, these are items you provide power to.

Larger objects contain and organize smaller objects. For example: a Rack is an object that contains Devices, a Row is an object that can contain Racks, and an Aisle is an object that can contain Rows.

Additionally, some objects such as Data Center or Device have optional attributes that further describe them.

What are Mappings and Relationships?

All objects, except for the Data Center, must have a larger object as a parent. Generally speaking, a parent object is a larger object that contains a smaller object.

The Data Center object is the largest object. It has no parent object.

This ability to identify an object's parent is a single mapping. Mapping each object to its parent describes a model of equipment and how it is organized to Power IQ.

Two objects have special relationships:

- **Outlet:** When using a Dominion PX PDU with per-outlet metering, an outlet object is a single outlet on that PDU. Its parent object is an IT Device (a Device Object). This IT Device is the item this outlet provides power to. Using Dominion PX PDUs therefore allows Power IQ to measure the amount of power individual devices consume.
- **PDU:** For PDUs other than Dominion PX, a PDU object is a single power distribution unit without per-outlet metering. Its parent object is a larger, organizing object such as a Rack, Row, Aisle or Room, and so on. The PDU provides power to this "parent" object, and by extension, at least some of the Devices contained within. Power IQ can only measure the power consumption at the PDU or parent-object's level.

Object Types and their Hierarchy

There are nine types of objects used. From largest to smallest they are:

- DATA_CENTER - The data center object type. This object has no parent.
- FLOOR - The floor object type. This object can only have a DATA_CENTER as a parent.
- ROOM - The room object type. This object can have a DATA_CENTER or FLOOR as a parent.
- AISLE - The aisle object type. This object can have a DATA_CENTER, ROOM, or FLOOR as a parent.
- ROW - The row object type. This object can have a DATA_CENTER, ROOM, FLOOR, or AISLE as a parent.
- RACK - The rack object type. This object can have a DATA_CENTER, ROOM, FLOOR, AISLE, or ROW as a parent.
- DEVICE - The IT Device object type. This object can only have a RACK as a parent.

Two objects represent outlets and Power Distribution Units:

- OUTLET - The outlet object type. This object can only have a DEVICE as a parent.
- PDU - The PDU object type. This object represents PDUs that do not have outlet level metering and are unable of communicating device-specific data to the system.

A model does not necessarily have to contain all object levels. For example, a model could include: Device "Exchange Server" has a Rack "IT Rack #1" as its parent object. Rack "IT Rack #1" has a Data Center "IT Data Center" as its parent object.

Room "Server Closet" could never have Rack "IT Rack#1" as a parent. An object can only be mapped to a larger parent object.

Importing Object Mappings

The most efficient way to create or add to an enterprise model is to import the objects and their mappings. These mappings are imported as one or more Comma Separated Value (CSV) files. Additional CSV files append to the Enterprise Data Model, except when objects are duplicated in the CSV files. In the case of duplicates, the last uploaded object updates the previous entries.

If an Enterprise Data Model already exists, you can click Export Relationships under CSV Data Mapping Actions to export the entire model as a single CSV file. This file can then be edited to make additions, or used as a template to create a new file. See **Exporting Object Mappings as CSV Data** (on page 66).

► **To import object mappings:**

1. In the Settings tab, click Enterprise Relationships. The Enterprise Relationship page opens.
2. In the CSV Data Mapping Actions area, click Browse, and select the CSV file.
3. Click Import.

A status window indicates any issues that occurred when the upload completes. If any errors have occurred, none of the objects in the file are added. Edit the CSV file to correct any issues and try again.

Note: Uploading this CSV file only describes the relationship between objects (including PDUs and outlets). It cannot be used to add PDUs to Power IQ management. You should place all PDUs under Power IQ management first, before associating them into the Enterprise Model. Importing a CSV file that lists a PDU not under management results in an error.

Structure of the Enterprise Model CSV File

The object mapping CSV files have the following general structure:

- One Object per line.
- All Objects (except for a Data Center) list another valid object as a parent.
- All Objects have a unique "key" for their type.
- The CSV file has a maximum length of 2500 lines (objects).
- Within a single CSV file, object order is not important. All objects are processed at the same time.

An object's unique identity is a combination of its object type and its object key, which is called an external key. This means you could have two objects with the same name, as long as they are different types of objects.

However, if two lines are both type "DEVICE" and both have an external key "Sales1", Power IQ sees only one device object with the key "Sales1". In this case, it uses the last DEVICE object identified as "Sales1" as the description for that device.

The columns required for each object varies, depending on the object type.

All columns are separated by a comma.

- Most columns containing text information can be up to 64 characters long. These columns can contain any character except for a comma.
- The custom_field_1, custom_field_2, external_key and parent_external_key fields can be up to 255 characters long. These columns can contain any character except for a comma.

Note: If you have an enterprise model with more than 2500 objects, you must upload the mapping as multiple CSV files. In this case, file order is important. All objects except for Data Center must have a valid parent when added. Thus, placing a child object in file #1, and the parent object in file #2 results in an error if file #1 is imported first. To avoid this, put all Data Centers and other large organizational objects in the first CSV file to be uploaded.

CSV Columns for DATA_CENTER Objects

A line that describes a Data Center object has the following attribute columns in this order:

- object_type - this value is always "DATA_CENTER"
- external_key - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- name - The name of the data center.
- contact_name - The name of the contact for this data center.
- contact_phone - The phone number for the contact for this data center.
- contact_email - The email address of the contact for this data center.
- company_name - The name of the company that owns this datacenter
- city - The city where the data center resides.
- state - The state/province where the data center resides.
- country - The country where the data center resides.
- peak_kwh_rate - The cost per kilowatt hour during peak hours
- off_peak_kwh_rate - The cost per kilowatt hour during off-peak hours
- peak_begin - The time the peak hours begin.
- peak_end - The time the peak hours end.
- co2_factor - The co2 factor for this site. This indicates the amount of carbon dioxide produced per kWh.
- cooling_factor - The cooling factor per kw energy used. This the energy used for cooling, or how many kilowatts of energy are used to cool 100 kilowatts of power consumption.
- custom_field_1 - A custom field for the user.
- custom_field_2 - A second custom field for the user.

All columns are separated by a comma.

Note the attribute columns toward the end. For example: by providing the cost of energy for the data center, Power IQ can calculate the cost of running the data center in an Analytics report. By extension, such a report can be tailored down to a smaller object, such as a Rack, as long as it was contained within this data center.

CSV Columns for FLOOR, ROOM, AISLE, and ROW Objects

Lines that describe a Floor, Room, Aisle, or Row have the following attribute columns in this order:

- `object_type` - One of the following values: FLOOR, ROOM, AISLE, ROW
- `external_key` - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- `name` - The name of the object.
- `parent_object_type` - One of DATA_CENTER, FLOOR, ROOM, or AISLE, as described previously.
- `parent_external_key` - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object (however, many "child" objects may have the same parent).

CSV Columns for RACK Objects

A line that describes a Rack has the following attribute columns in this order:

- `object_type` - RACK
- `external_key` - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- `name` - The name of the object.
- `parent_object_type` - One of DATA_CENTER, FLOOR, ROOM, AISLE, or ROW, as described previously.
- `parent_external_key` - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object (however, many "child" objects may have the same parent).
- `location` - an optional field that can be used to identify where rack sits in a row or aisle.

The Rack model object is similar to the Floor, Room, Aisle and Row objects. The exception is the location value. This value is intended to make the rack easier to identify, and can be given a location value. For example: "3rd Rack" to indicate the third rack in a particular row.

It can also use some other identifying trait. For example: "Yellow" if the rack has a yellow color.

CSV Columns for DEVICE Objects

A line that describes a Device object has the following attribute columns in this order:

- object_type - this value is always "DEVICE"
- external_key - The unique identifier for this object. It can be a name, number, or any other kind of text. This field must be unique.
- name - The name of the data center.
- parent_object_type - this value is always "RACK"
- parent_external_key - The unique identifier for the parent rack.
- customer - The customer using this device.
- device_type - The type of device. For example: "exchange server" or "test unit".
- power_rating - The power rating of this device in watts or VA.
- decommissioned - Indicates whether this device has been decommissioned or not (this value is either "true" or "false")
- custom_field_1 - A custom field for the user.
- custom_field_2 - A second custom field for the user.

CSV Columns for PDU Objects

A line that describes an PDU object has the following attribute columns in this order:

- object_type - This value is always PDU.
- pdu_ip - The IP address of the PDU.
- pdu_proxy_address - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- parent_object_type - One of DATA_CENTER, FLOOR, ROOM, AISLE, ROW, RACK as described previously.
- parent_external_key - The unique identifier for the parent object. It can be a name, number, or any other kind of text. This field must be unique to that parent object (however, many "child" objects may have the same parent).

You must add all PDUs to Power IQ before you can map them to the Enterprise Data Model.

CSV Columns for OUTLET Objects

A line that describes an Outlet object has the following attribute columns in this order:

- `object_type` - this value is always "OUTLET"
- `pdu_ip` - The IP address of the PDU that this is attached to.
- `pdu_proxy_address` - If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number.
- `outlet_number` - The outlet number on the side of the PDU for this outlet.
- `parent_object_type` - This value is always "DEVICE"
- `parent_external_key` - The unique identifier for the DEVICE that this outlet serves.

Power IQ automatically creates Outlet objects when Dominion PX PDUs are placed under its management. If you create an Outlet object with a `pdu_ip` not under Power IQ management, the CSV file generates an error.

Recommended Number of Objects Per Level

In the EDM hierarchy, a maximum of 350 "child" objects per parent is recommended.

For example, a Data Center should not have more than 350 Racks under it.

Exporting Object Mappings as CSV Data

Power IQ can export the existing enterprise model as a CSV file. You can edit this file to make additions to your enterprise infrastructure, then Import the edited file to update the enterprise model. The CSV file can also be used as a template to create additional import files.

► To export object mappings as CSV data:

1. Click the Settings tab.
2. Click Enterprise Relationships. The Enterprise Relationship page opens.
3. In the CSV Data Mapping Actions area, click Export Relationships.

Power IQ exports the Enterprise Model as a single CSV file, regardless of how many object it contains. However, if you want to re-import a file that contains more than 2500 objects, separate them into multiple CSV files.

Clearing Object Mappings

Clearing the mappings erases all enterprise objects and their mappings from the database.

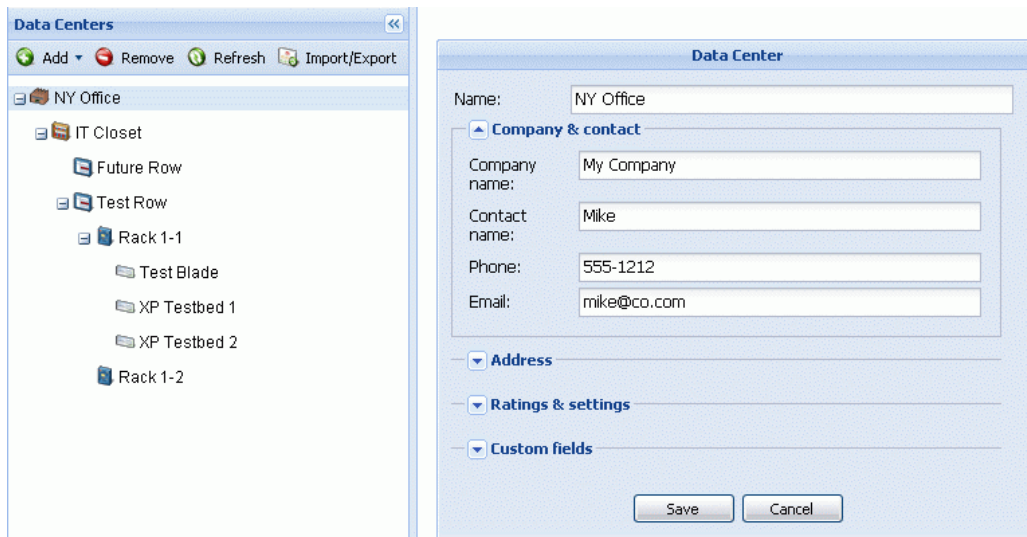
► To clear object mappings:

1. Click the Settings tab.
2. Click Enterprise Relationships. The Enterprise Relationship page opens.
3. In the CSV Data Mapping Actions area, click Clear Enterprise Relationships.

Viewing the Enterprise Model

The Data Centers view is a hierarchical view of your Enterprise Relationship objects. To view this display, click the Data Centers tab.

Power IQ displays its model of IT devices as a tree of objects. From there you can view and change individual objects, their mappings, and their individual attributes.



► To view the enterprise model:

1. Expand each Data Center in the left-hand column to view the next level of objects it contains. If these objects contain smaller objects, they can also be expanded.
2. Select an object from the resulting tree to view and adjust its details in the main section of the page.

▶ **To add an object to the enterprise model:**

- Click the Add button at the top of the column. This adds a new object below (if the new object is smaller) or after the currently selected object.

▶ **To remove or rename an object in the enterprise model:**

- Right-click an object in the left-hand column to rename it, refresh the view, or remove it from the tree.

About Object Values

Objects shown in the main section display most of their values. A specific object's parent is not displayed here, but can be determined by the object they are nested under in the tree to the left.

The rest of the object's values can be adjusted from this main display. These object values are the same values described by the columns in the CSV file. Any changes that are saved here appear in the CSV file the next time Power IQ exports the relationship model.

You can change the names of "Custom Field 1" and "Custom Field 2" for the Data Center and Device objects the Enterprise Relationships page.

Note: You cannot use this page to change the parent of an object. Changing the relationship of an object must be done through the CSV file.

For example: If a Rack called "Test Rack 1" mistakenly has a Row called "Sales Row" as its parent you cannot use the Data Center view to move it to the row "Testing Row". "Test Rack 1" 's parent object type and parent external key values must be adjusted in the CSV file to make this change.

Viewing Enterprise Relationship Summaries

This page provides an overview of the Enterprise Model configured in Power IQ. From this page you can see how many objects Power IQ is tracking. You can also see if any of those objects are not mapped for reporting.

The screenshot displays four panels from the Enterprise Relationship Summaries page:

- Summary of Enterprise Mappings:**

1 PDU total	1 IT Device	0 Rooms
8 Total Outlets	1 Rack	0 Floors
0 Mapped PDUs	0 Rows	1 Data Center
0 Mapped Outlets	0 Aisles	
- Orphaned Systems:**

To be properly included in all analytics reports, PDUs need to be mapped to a data center object that contains them and their outlets need to be mapped to attached IT Devices. The categories highlighted in red will not be included in all analytics reports.

	Outlets mapped	Outlets not mapped
PDU mapped	0	0
PDU not mapped	0	1
- CSV Data Mapping Actions:**

Includes a file upload field with 'Browse...', 'Import', and 'Cancel' buttons. Below are several actions:

 - Generate Default Enterprise Relationships:** Create a generic enterprise relationship mapping to allow immediate use of graphing functionality.
 - Export Relationships:** Export the enterprise relationships to a CSV file. This file can be used for editing and reimport or for backup.
 - Clear Enterprise Relationships:** Delete all Data Centers, Floors, Rooms, Aisles, Rows, Racks, and IT Devices.
 - Browse IT Devices:** Browse the list of IT Devices.
- Configure Custom Fields:**

Fields for Data Center and IT Device are configured as follows:

 - Data Center Custom Field 1: Custom Field 1
 - Data Center Custom Field 2: Custom Field 2
 - IT Device Custom Field 1: Department
 - IT Device Custom Field 2: Custom Field 2
 - Currency Symbol: \$

A 'Save' button is located at the bottom.

► To view enterprise relationship summaries:

1. Click the Settings tab.
2. Click Enterprise Relationships. The Enterprise Relationship page opens.

In addition to providing options to Import, Export and Clear object mappings, the page provides two status tables: Summary and Orphaned Systems. The Summary table provides a count each object type currently in the Enterprise Model. The Orphaned Systems table indicates how many PDUs and outlets are not mapped. Any PDU or outlet that are not mapped are unable to provide power data to an Analytics report.

View Orphaned Systems Information

The Orphaned Systems information shows whether there are any PDUs in Power IQ that are not properly mapped to a parent object. PDUs that are not properly mapped cannot be included in Analytics charts.

► To view orphaned systems information:

- In the Settings tab, click Enterprise Relationships in the Data Management section of the page.

The Orphaned Systems information is in the top right section of the page that opens.

See the table for explanations and possible action required.

	Outlets Mapped	Outlets Not Mapped
PDU Mapped	<p>The number of PDUs that are mapped to a parent object such as a rack, and have at least one outlet mapped to an IT device.</p> <p>No action is required.</p>	<p>The number of PDUs that are mapped to a parent object such as a rack, but do not have any outlets mapped to IT devices.</p> <p>No action is required.</p>
PDU Not Mapped	<p>The number of PDUs that are not mapped to a parent object such as a rack, but have 1 or more outlets mapped to IT devices.</p> <p>Action required!</p> <p>If you have unmapped PDUs, you must assign them to a parent object for analytics to perform correctly.</p> <p>See Find and Map Unmapped PDUs (on page 70).</p>	<p>The number of PDUs that are not mapped to a parent object such as a rack, and have zero outlets mapped to a device.</p> <p>Action required!</p> <p>If you have unmapped PDUs, you must assign them to a parent object for analytics to perform correctly.</p> <p>See Find and Map Unmapped PDUs (on page 70).</p>

Find and Map Unmapped PDUs

There are several ways to find unmapped PDUs so that you can map them to parent objects in the Enterprise Data Model.

All PDUs must be mapped to a parent object, such as a rack. PDUs that are not properly mapped cannot be included in Analytics charts.

► **To view the number of unmapped PDUs:**

See **View Orphaned Systems Information** (on page 69).

► **To find unmapped PDUs in CSV file export:**

1. In the Settings tab, click Enterprise Relationships.
2. Click Export Relationships.
3. In the CSV file, find the section labeled "# The following section contains the current list of PDUs and the PDU column headers for use during import."
4. In that section, find the "parent_object_type" column. Rows without data in the "parent_object_type" column are unmapped PDUs.

5. Map the unmapped PDUs to parent objects in a data center.

► **To find unmapped PDUs in a default Enterprise Data Model:**

This method maps unmapped PDUs to an "Unassigned Data Center" parent object so that you can view the PDUs in the Data Centers tab. Then, you can drag and drop the PDUs to the correct position beneath a parent object, such as a rack.

1. In the Settings tab, click Enterprise Relationships.
2. Click Generate Default Enterprise Relationships.
3. When the generation completes successfully, click the Data Centers tab and find the Unassigned Data Center.
4. Expand the Unassigned Data Center. All the previously unmapped PDUs are assigned to this data center object.
5. Drag and drop the PDU objects to assign them to the correct parent objects, such as racks, within the correct data center.

► **To manually assign PDUs to a parent object:**

When you attempt to manually assign PDUs to a parent object in the Data Centers tab, only unmapped PDUs will be available for assignment.

1. In the Data Centers tab, select the parent object, such as a rack, that you want to assign an unmapped PDU to.
2. Click Add > PDU Association.
3. In the Associate a PDU dialog, select an unmapped PDU in the PDU IP Address field, and click OK. The PDU is mapped to the data center parent object.

Configuring Custom Fields

The Data Center and the Device objects both contain two custom field values. By default, these are named Custom Field 1 and Custom Field 2. These values can be used to describe Data Center and Device objects by additional means.

By entering new names for these fields, you can define what their values are used for.

For example: if you want to use the first Custom Field to associate IT Devices by the department that owns them, then on this page you can type *Department* next to IT Device Custom Field 1. Power IQ then displays Department instead of Custom Field 1 as a type of Device object value in the Data Center View.

Use the Currency Symbol drop-down list to select the type of currency you use. Power IQ uses the selected symbol when displaying all cost-related graphs and value fields.

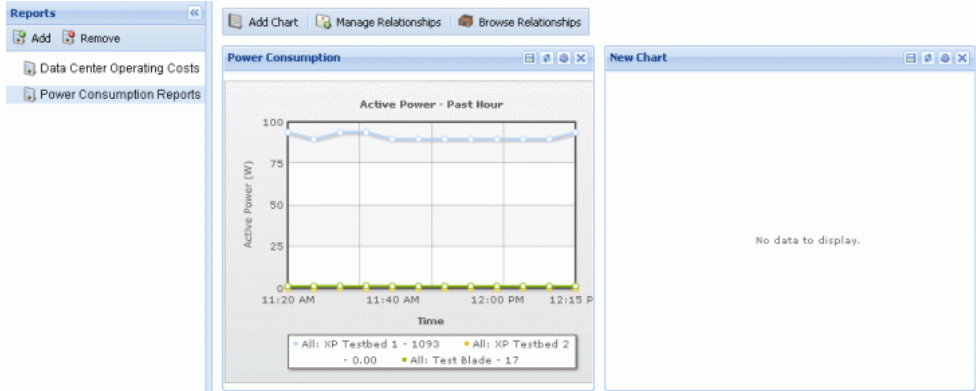
Chapter 10 Creating and Reviewing Reports with Analytics

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What are Power IQ Analytics?

Analytics allow you to view custom reports based on Power IQ's knowledge of your data center and the power measurements it takes.



Some examples of the types of reports Power IQ can generate are:

- The Active Power consumed by Test Rack #2 over the past hour.
- How many Kilowatt Hours were used by Rows A, B and C in the Data Center last month.
- If power costs \$0.062 per kWh, what did the IT server room cost to power last year?

You must first create a description of your data center under the Enterprise Relationship page to use Analytics. See **Configuring the Enterprise Model** (on page 58).

Adding Reports to the Analytics Page

The analytics page can include multiple report pages. A report page is a collection of one or more charts. Creating multiple reports is a good way to organize the Analytics information by category or specific need.

Reports are customized. Each user only sees the reports they have created.

▶ **To add a report to the Analytics page:**

- Click Add in the Reports column and enter a name for the report.

▶ **To view a report:**

- In the Analytics tab, select a report in the Reports column. The report opens in the main section of the page.


Creating Report Charts

To add chart information to a report, click Add Chart and a New Chart appears. You can change the location of any created chart by clicking on the title bar of the chart and dragging it to its new position.

Configuring Charts

Charts initially have no data to display. Configure a chart to select the data you want to analyze.

▶ **To configure a chart:**

1. In the Analytics tab, select a Report.
2. The charts contained in the Report open. Click the Settings icon .
3. Select the information you want to analyze in the settings.
 - **Basics** (on page 74)
 - **Date Selection** (on page 75)
 - **Data Criteria** (on page 75)

Basics

Assign the chart a Title and Description using the fields in the Basics area.

Date Selection

The Date Selection represents the x-axis of the chart.

- Select Period if you want the chart to show constantly updated measurement; for example, if you want to see power consumption over the Past hour, Past week, Past month, and so on.
- Select Range If you want to show data measurements from a custom Start Date and End Date.

► **What's the difference between "Past" measurement and "Last" time periods?**

- A Past measurement indicates the selected period of time up to the current moment.
For example: If you view an Analytics report on Tuesday, and the period is set to Past Week, you will view a graph displaying data from last Tuesday through This Tuesday.
- A Last measurement indicates the most recent completed period of time.
For example: If you view an Analytics report on Tuesday, and the period is set to Last Week, you will view a graph displaying data from last Sunday through last Saturday. It will show the data for the last full week to pass.

Data Criteria

The data criteria selection is used to select what to measure and control which devices are included in the measurement.

- Measurement: Select the type of measurement you want to graph from the drop-down list. The measurement is represented along the y-axis of the chart.
- Min/Max/Average: For some measurements, you can set the chart to display the minimum, maximum, or average values of a measurement.
- Devices From: Restrict the devices included by selecting only those devices that fit within a specific object type of the enterprise data model. You can also chart data from humidity and temperature sensors. If you chose a specific object type, be sure to select the name of a specific object in the Line tabs.

For example: Chart the active power used by each data center, by each floor, or by each rack. These infrastructure levels must be created and associated with PDUs on the Enterprise Relationships page.

- Lines: Each chart can graph eight lines of data. Use the tabs to select which line you want to configure, then use the attribute fields to further restrict which devices are included.

For example: Set Devices From to "Racks" in the drop-down list above, then set the Contained In field to "IT Equipment Rack 1" to show the power consumption of all devices in that rack for Line #1. You could then set Contained In to "Sales Equipment Rack 1" to show the power consumption of all devices in the sales equipment rack for Line #2.

Note: The values that appear in the Contained In field depend on the names you have assigned to objects in your Enterprise Relationship model. You must create an enterprise model and associate PDUs or Outlets with objects in that model before you can select any data to display in the chart.

Likewise, the ability to filter on such fields as Name, Type, Customer, and so on, depend on the additional attribute values you assign each object. Associating PDUs and Outlets, as well as configuring attribute values can be performed from the Enterprise Relationships page.

Create Humidity or Temperature Sensor Charts

If a PDU has a humidity or temperature sensor attached, you can create a chart to analyze the sensor data. Humidity and temperature charts can help you identify temperature and humidity trends within a data center or across data centers, and to help you find hot and cool spots.

► **To create humidity or temperature sensor charts:**

1. Create a chart. See **Creating Report Charts** (on page 74).
2. Configure the chart settings. See **Configuring Charts** (on page 74).
3. Use the following settings to create a chart of sensor data:

Data Criteria Field	Select:
Measurement	Select Humidity (%) to chart Humidity sensor data. Select Temperature (C) to chart Temperature sensor data. Note:
Period	Choose the time period of the data you want to analyze.
Data From	Select Humidity Sensors or Temperature Sensors.
Line # Contained In	Select the sensor you want to chart. <ul style="list-style-type: none"> ▪ Tip: Use a naming system that includes information about location or other details to help you identify the items in this list.

1. Click OK. When enough data has been collected, it appears in the chart.

Create Current Charts

Current charts calculate current in amps from PDUs managed by Power IQ.

For single phase PDUs, the line current is charted.

For three phase PDUs, the line with the highest current reading at each measurement point is charted.

► **To create current charts:**

1. Create a chart. See **Creating Report Charts** (on page 74).
2. Configure the chart settings. See **Configuring Charts** (on page 74).
3. Use the following settings to create a chart of current data for PDUs:


Data Criteria Field	Select:
Measurement	Select Current (amp)
Period	Choose the time period of the data you want to analyze.
Data From	Select PDUs.
Line # Contained In	Select the PDU you want to chart. <ul style="list-style-type: none"> ▪ Tip: Use a naming system that includes information about location or other details to help you identify the items in this list.

1. Click OK. When enough data has been collected, it appears in the chart.

Exporting Charts

Export a chart to save the chart data to a .CSV file.

► **To export a chart:**

1. In the Analytics tab, select a Report.
2. The charts contained in the Report open. Click the Export icon  in the chart.
3. Use the dialog that appears to save the file.

Chapter 11 Upgrading Dominion PX PDUs

Upgrading Dominion PX PDUs managed by Power IQ consists of three steps.

- Uploading Dominion PX firmware to Power IQ
- Creating an upgrade plan to distribute the firmware to Dominion PX PDUs.
- Executing the plan.

You can use the plans immediately or save them for later.

In This Chapter

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Creating an Upgrade Plan.....	78
Executing Saved Plans.....	81

Uploading New Firmware

1. Click the PDUs tab.
2. Click Upgrade Firmware to open the PDU Firmware Upgrade page.
3. Click Manage Firmware Versions. The Manage Firmware Versions page opens. This page contains a table listing all firmware versions available on this Power IQ.
4. If the desired firmware version is not available, click Upload Firmware. The Upload Firmware window opens.



5. Click Browse, then select a firmware file from your client PC.
6. Click Upload.
7. The Firmware Details page opens when the firmware upload completes. Add any comments you have for the firmware in the Comments field and click Save Comments. The new firmware file now appears in the list of available firmware versions.

Creating an Upgrade Plan

1. Click the PDUs tab.
2. Click Upgrade Firmware to open the PDU Firmware Upgrade page.

- Click Plan a new upgrade to create a new plan.
- Select Create a New Plan and click Continue.

Available | Upload

Choose firmware version

Results: 1 - 3 of 3

Version	Uploaded	By	Size
<input type="radio"/> 1.1.0-6662	04/28/08 04:10:56 PM GMT	admin	3.9 MB
<input type="radio"/> 1.1.0-6674	04/28/08 04:13:44 PM GMT	admin	3.9 MB
<input checked="" type="radio"/> 1.1.0-6684	04/28/08 04:03:31 PM GMT	admin	3.9 MB

[Continue](#)

- On the Choose Firmware Version page, select the firmware update you want to apply from the table and click Continue.

If the desired firmware version is not available, click the Upload tab just above the table. Then upload the firmware.

Choose PDUs to Upgrade

Please choose the devices you wish to upgrade as part of the upgrade plan **Upgrade Plan 2**.

Available PDUs

Select: All | None

IP Address	Owner
<input checked="" type="checkbox"/> 192.168.44.6	

[Add](#) [Remove](#)

PDUs to Upgrade

Select: All | None

IP Address	Owner

[Back](#) [Continue](#)

- The Choose PDUs to Upgrade page opens. A table lists the managed PDUs on the left. Select the checkboxes of the PDUs you want to upgrade and click Add. The PDUs move to the upgrade list on the right.

7. Click Continue.

Plan options

Plan name:

Abort on failure

Allow simultaneous upgrades

8. On the Plan Options page, type a name for plan in the Plan name field. This helps you identify the plan.
9. Select the "Abort on failure" checkbox if you want Power IQ to cancel all remaining upgrades in the plan if an upgrade failure occurs. This is useful in preventing an upgrade problem from affecting other Dominion PX PDUs in the plan.
10. Select the Allow simultaneous upgrades checkbox if you want Power IQ to upgrade the firmware of multiple Dominion PX PDUs at once. This makes batch upgrades faster by allowing up to five upgrades to run at the same time.
11. Click Continue.

- Review the summary of the plan. Click Add Comments if you want add notes to the plan. Click Add Devices if you want to edit the list of PDUs to upgrade.

Plan Summary

Plan Name: PX 1.1 Upgrade Plan #1
Selected firmware: 1.1.0-6684
Abort on failure? Yes
Simultaneous upgrades? No

Comments

[Add comment](#)

Device upgrade selections

There is one device selected for upgrade.
 Results: 1 - 1 of 1

Device	Owner	Firmware	Messages
192.168.44.6			

Previous Plan Edits

Name	Firmware	User	On Failure	Installation	Started	Finished
PX 1.1 Upgrade Plan #1	1.1.0-6684	admin	Abort	Sequential	04/28/08 04:41:40 PM GMT	04/28/08 04:46:26 PM GMT

- Click Save. The completed plan summary page opens.
- Click Start Upgrade to execute the plan immediately, or click Return to return to the PDU Upgrade page.

Executing Saved Plans

- Click the PDUs tab.
- Click Upgrade Firmware to open the PDU Firmware Upgrade page.
- Click View saved plans. The Saved PDU Firmware Upgrade Plans page opens.
- Click a plan name to view the Plan Summary page for that plan.
- Click Start Upgrade to execute the plan.

Chapter 12 Support and Licensing

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Support Connections

A support connection allows Raritan technical support to access your Power IQ to diagnose a problem.

You should open a support connection only when Raritan technical support requests one.

Prerequisites for Support Connections

1. The Power IQ device must be able to use DNS to resolve `poweriq-access.raritan.com`. The DNS server must be able to do name resolution for external host names.
2. The Power IQ device must be able to make an outbound HTTPS request on port 443 to `poweriq-access.raritan.com`. You may have to require your firewall to allow this connection.
3. The Power IQ device must be able to make an outbound SSH request on port 22 to `poweriq-access.raritan.com`. You may have to require your firewall to allow this connection.

Create a Support Connection

Make sure your Power IQ device meets the prerequisites before creating a support connection. See ***Prerequisites for Support Connections*** (on page 82).

► **To create a support connection:**

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Click Start. A log appears.
3. Make sure the final line of the log includes this text: `support connection initialization complete`.
4. Contact Raritan Technical Support with your Appliance ID number. The Appliance ID number is on the Settings tab, in the Appliance Information section. For example:
`e3b123f8-669e-4007-97bf-ca9d85c431f8`. Raritan Technical Support uses his number to identify your support connection.

Stop a Support Connection

Once Raritan technical support has finished using the support connection, you can stop it. Stopping the support connection will close the SSH connection from your Power IQ device to `poweriq-access.raritan.com`.

▶ **Stop a support connection:**

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Click Stop.

Save Support Logs

If you have trouble creating a support connection, the support logs may help Technical Support find the problem.

▶ **To save support logs:**

1. In the Settings tab, click Get Support in the Appliance Services section.
2. Click Save, then save the file using the dialog that appears.

Licensing

Power IQ requires a license. Licenses allow you to add a certain number of PDUs to Power IQ. You may need more than one license file to be allowed to add your full number of PDUs.

View Licenses

The licenses that you have uploaded to Power IQ are available to view.

▶ **To view licenses:**

- In the Settings tab, click Product Licensing in the Appliance Administration section.

The Licenses list contains all license files that you have uploaded to Power IQ.

Feature	The feature that is allowed by this license.
Type	Initial: A required license to activate Power IQ and set the initial PDU capacity allowed. Incremental: A secondary license type that allows you to add to the initial license's PDU capacity.
Count	The number of PDUs that you can add to Power IQ under this license.
Licensee	Your company name.

► **To view licensing summary:**

- Licensing Summary contains information about how many PDUs your combined licenses allow you to add to Power IQ

Customer Name	Your company name.
PDU License Capacity	The total number of PDUs allowed by all your licenses.
PDU Licenses Available	The number of PDUs remaining that you are allowed to add.

Add a License File

If this is your first time logging in and you need to add a license file, see **Connecting to Power IQ** (on page 8). Once you add a license file and log in for the first time, you can follow the instructions in this topic to add or remove license files as needed.

► **To add a license file:**

1. In the Settings tab, click Product Licensing in the Appliance Administration section.
2. The Licensing page opens. Click Add, then select your Power IQ license file. If you are using dcTrack, repeat to add the dcTrack license file (Optional). Licenses are .LIC files. Repeat this step to add incremental licenses if needed.
3. Note: Your license file can be retrieved from the Raritan web site after you have activated your registration. To activate your registration, click the link in the "Thank you for registering" email from Raritan and create your user account. Once you create your account, look for a "Your Raritan software license key is available" email containing a link to your license file download page.

4. If you see error messages AND you're unable to use Power IQ or to add the total licensed number of PDUs, contact Raritan Technical Support. There may be a problem with your license file.

Appendix A Accessing Power IQ Data From Third Party Clients

Power IQ's ODBC interface allows ODBC compliant applications access to the power data of managed devices. For example, an ODBC compliant reporting application like Crystal Reports can access Power IQ data to create customized reports.

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Notes on ODBC Access

- The Power IQ ODBC server listens on TCP Port 5432
- Roll-up tables summarize data over one hour, twenty four hours, and one month. Upon summarization, detailed readings are purged. For example, when you create a daily roll-up, the hourly poll data is purged from the database. You can configure the data retention settings. See **Configuring Data Retention** (on page 27).
- Power IQ ODBC Interface is backed by an PostgreSQL database.

Configuring ODBC Access to Power IQ

Specify the IP addresses that you authorize to make connections to the database.

► **To enable ODBC access to Power IQ:**

1. In the Settings tab, click ODBC Access. The ODBC Access page opens.
2. Click Add, then double-click the 0.0.0.0 addresses to enter edit mode and type a Network Address and a Network Mask into the fields. Repeat to add new addresses as needed. Select an address and click Remove to remove authorization from the address.
 - The Network Mask value can be used to specify a single address or a range of addresses.
 - Use netmask 0.0.0.0 to allow access from all IP addresses.
3. Click Save when all authorized addresses have been added. The Power IQ database restarts

After the restart, ODBC compliant applications are allowed to access the database from the authorized IP addresses.

ODBC Client Configuration

1. ODBC Client must install and configure a suitable PostgreSQL driver. PostgreSQL drivers are available at <http://www.postgresql.org/ftp/odbc/versions/msi/>.
2. ODBC Client must configure Power IQ as a ODBC Data Source with the following credentials.

Database Name	raritan
User ID	odbcuser
Password	raritan
Port Number	5432
Server	Power IQ IP Address

Power IQ ODBC Schema

Power IQ makes a number of its data views available through the ODBC interface.

PDU's

The PDU's view contains information about the PDU device.

Field	Type	Notes
ID	Integer	Unique PDU number
Caption	VarChar (64)	PDU Name
Description	TEXT	MIB II SysDescr
IPAddress	inet	IP Address
NameFormat	VarChar (64)	
ModelName	TEXT	PDU Model
Manufacturer	VarChar (64)	PDU Manufacturer
Location	TEXT	MIB II SysLocation
Contact	Char (256)	Contact name
PDUName	TEXT	PDU Name
Firmware	TEXT	PDU Firmware version

Field	Type	Notes
Serial Number	TEXT	PDU Serial Number
CurrentStatus	Char (10)	PDU Communication status
PrimaryOwnerName	Char (64)	Owner name
PrimaryOwnerContact	VarChar (64)	MIB II SysContact

PDUOutlets

The PDUOutlets view shows the outlets associated with a PDU.

Field	Type	Notes
PDUOutletsID	Integer	Unique outlet number
PDUID	Integer	Foreign key reference to PDUs table
OutletID	Integer	Foreign key reference to Outlets table
OutletName	VarChar(64)	Outlet name
OutletState	VarChar(64)	Outlet state
ITDeviceID	Integer	Associated IT Device ID foreign key

PDUCircuitBreakers

The PDUCircuitBreakers view shows the circuit breakers associated with a PDU.

Field	Type	Notes
PDUCircuitBreakersID	Integer	Unique CB Number
PDUID	Integer	Foreign key reference to PDUs table
CircuitBreakersOrdinal	Integer	Circuit breaker number on the PDU
CircuitBreakerState	Integer	0 (closed) 1 (open) 3 (unknown)
CircuitBreakerLabel	VarChar(64)	Label assigned to a CB
CircuitBreakerRating	Integer	0.01 Amps Units

PDUReadings

The PDUReadings view shows the raw power data collected from PDUs. A data record is added for each PDU polled. This data is summarized hourly in a PDUReadingsRollup view, and the readings in this view are purged.

Field	Type	Notes
PDUReadingsID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDU
Time	Timestamp with Timezone	Local timestamp
ActivePower	Real	Active power drawn by PDU
ApparentPower	Real	Apparent power drawn by PDU

PDUOutletReadings

The PDUOutletReadings view shows the raw power data collected from PDU outlets. A data record is added for each outlet polled. This data is summarized hourly in a PDUOutletReadingsRollup view, and the outlet records in this view are purged.

Field	Type	Notes
PDUOutletReadingsID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDUs table
OutletID	Integer	Foreign key reference to PDUOutlets table
OutletNumber	Integer	PDU outlet number
Time	Timestamp with Timezone	Local timestamp
CurrentAmps	Real	Amps drawn by the outlet
ActivePower	Real	Active power drawn by the outlet
ApparentPower	Real	Apparent power drawn by

Field	Type	Notes
		the outlet

PDULineReadings

The PDULineReadings view shows the power data collected from PDU current-carrying lines. A data record is added for each line polled. Single-phase PDUs have 1 line. Three-phase PDUs have 3 lines. This data is summarized hourly in a PDULineReadingsRollup view, and the line readings in this view are purged.

Field	Type	Notes
PDULineReadingsID	Integer	Unique ID for each reading
PDUID	Integer	Foreign Key Reference To PDUs table
LineNumber	Integer	Line number on this PDU
Time	Timestamp with Timezone	Local timestamp
CurrentAmps	Real	Amps drawn on this line
UnutilizedCapacity	Real	Available amps remaining on this line

PDUCircuitBreakersReadings

The PDUCircuitBreakerReadings view shows the power data collected from circuit breakers on the PDU. This view does not contain any data for PDUs that do not have circuit breakers. A data record is added for each circuit breaker polled. This data is summarized hourly in a PDUCircuitBreakerReadingsRollup view, and the circuit breaker readings in this view are purged.

Field	Type	Notes
PDUCircuitBreakerReadingsID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDUs table
CircuitBreakersNumber	Integer	Circuit breaker number on the PDU
CircuitBreakersID	Integer	Foreign key reference to

Field	Type	Notes
		PDUCircuitBreakers table
Time	Timestamp with Timezone	Local timestamp
CurrentAmps	Real	0.01 Amps Units
UnutilizedCapacity	Real	

PDUSensorReadings

The PDUSensorReadings view shows the data collected from PDU sensors. A data record is added for each sensor polled. This data is summarized hourly in a PDUSensorReadingsRollup view and the sensor readings in this view are purged.

Field	Type	Notes
PDUSensorReadingsID	Integer	Unique ID for each reading
SensorID	Integer	Database ID of the sensor as seen in PDUSensors
Time	Timestamp with Timezone	Local timestamp when the reading occurred
Value	Real	Sensor value

PDUOutletReadingsRollup

The PDUOutletReadingsRollup view summarizes the outlet readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUOutletReadingsRollup view are purged.

Field	Type	Notes
PDUOutletReadingsRollup ID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDUs table
OutletID	Integer	Foreign key reference to PDUOutlets table
OutletNumber	Integer	Outlet number on the

Appendix A: Accessing Power IQ Data From Third Party Clients

Field	Type	Notes
		PDU
RollupInterval	Integer	1: one hour 2: one day 3: one month
Time	Timestamp with Timezone	Timestamp when rollup was created
MinimumCurrent	Real	Lowest current (Amps) reading during rollup interval
MaximumCurrent	Real	Maximum current (Amps) reading during rollup interval
AverageCurrent	Real	Average current (Amps) reading during rollup interval
MinimumActivePower	Real	Lowest active power (Watts) reading during rollup interval
MaximumActivePower	Real	Maximum active power (Watts) reading during rollup interval
AverageActivePower	Real	Average active power (Watts) reading during rollup interval
MinimumApparentPower	Real	Lowest apparent power (VA) reading during rollup interval
MaximumApparentPower	Real	Maximum apparent power (VA) reading during rollup interval
AverageApparentPower	Real	Average apparent power (VA) reading during rollup interval

PDUReadingsRollup

The PDUReadingsRollup view summarizes the PDU readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUReadingsRollup are purged.

Field	Type	Notes
PDUReadingsRollup	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDU
RollupInterval	Integer	1: one hour 2: one day 3: one month
Time	Timestamp with Timezone	Timestamp when rollup was created
MinimumActivePower	Real	Lowest active power (Watts) reading during rollup interval
MaximumActivePower	Real	Maximum active power (Watts) reading during rollup interval
AverageActivePower	Real	Average active power (Watts) reading during rollup interval
MinimumApparentPower	Real	Lowest apparent power (VA) reading during rollup interval
MaximumApparentPower	Real	Maximum apparent power (VA) reading during rollup interval
AverageApparentPower	Real	Average apparent power (VA) reading during rollup interval

PDULineReadingsRollup

The PDULineReadingsRollup view summarizes the line readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDULineReadingsRollup is purged.

Field	Type	Notes
PDULineReadingsRollupID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDU
LineNumber	Integer	Line number on the PDU
RollupInterval	Integer	1: one hour 2: one day 3: one month
Time	Timestamp with Timezone	Timestamp when rollup was created
MinimumCurrent	Real	Lowest current (Amps) reading during rollup interval
MaximumCurrent	Real	Maximum current (Amps) reading during rollup interval
AverageCurrent	Real	Average current (Amps) reading during rollup interval
MinimumUnutilizedCapacity	Real	Lowest unutilized capacity (Amps) during rollup interval
MaximumUnutilizedCapacity	Real	Maximum unutilized capacity (Amps) during rollup interval
AverageUnutilizedCapacity	Real	Average unutilized capacity (Amps) during rollup interval

PDUCircuitBreakerReadingsRollup

The PDUCircuitBreakerReadingsRollup view summarizes the circuit breaker readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUCircuitBreakerReadingsRollup view are purged.

Field	Type	Notes
PDUCircuitBreakerReadingsRollup ID	Integer	Unique ID for each reading
PDUID	Integer	Foreign key reference to PDU
CircuitBreakerNumber	Integer	Circuit breaker number on the PDU
CircuitBreakerID	Integer	Foreign key reference to PDUCircuitBreakers table
RollupInterval	Integer	1: one hour 2: one day 3: one month
Time	Timestamp with Timezone	Timestamp when rollup was created
MinimumCurrent	Real	Lowest current (Amps) reading during rollup interval
MaximumCurrent	Real	Maximum current (Amps) reading during rollup interval
AverageCurrent	Real	Average current (Amps) reading during rollup interval
MinimumUnutilizedCapacity	Real	Lowest unutilized capacity (Amps) during rollup interval
MaximumUnutilizedCapacity	Real	Maximum unutilized capacity (Amps) during rollup interval
AverageUnutilizedCapacity	Real	Average unutilized capacity (Amps) during rollup interval

PDUSensorReadingsRollup

The PDUSensorReadingsRollup view summarizes the sensor readings power data over the roll-up interval. Hourly roll-ups are rolled up once a day. Daily roll-ups are rolled up once a month. When data is rolled up, shorter interval roll-up entries in the PDUSensorReadingsRollup view are purged.

Field	Type	Notes
PDUSensorReadingsRollupID	Integer	Unique ID for each reading
SensorID	Integer	Database ID of the sensor as seen in PDUSensors
RollupInterval	Integer	1: one hour 2: one day 3: one month
Time	Timestamp with Timezone	Timestamp when rollup was created
MinimumValue	Real	Lowest sensor reading during rollup interval
MaximumValue	Real	Maximum sensor reading during rollup interval
AverageValue	Real	Average sensor reading during rollup interval

PDUSensors

The PDUSensors view contains information about sensors attached to PDUs that Power IQ manages.

Field	Type	Notes
SensorID	Integer	Auto-generated ID
PDUID	Integer	Foreign key reference to PDUs table
PDUSensorID	Integer	ID of the sensor on the PDU, as gathered from the pdu
AttributeName	VarChar(64)	Type of sensor
Label	VarChar(64)	Sensor's label as gathered from the PDU

Field	Type	Notes
Removed	VarChar(64)	When the sensor was removed from the system, or null for current sensors

DataCenters

The DataCenters view contains information about data center objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
DataCenterID	Integer	Auto-generated ID
Name	VarChar(255)	Human-assigned name for this data center object
CompanyName	VarChar(255)	Name of the company that owns this data center
ContactName	VarChar(255)	Name of the person to contact regarding data center
ContactPhone	VarChar(255)	Phone number for contact
ContactEmail	VarChar(255)	Email for contact
City	VarChar(255)	City location of data center
State	VarChar(255)	State location of data center
Country	VarChar(255)	Country location of data center
PeakKWHRate	Double	Energy cost per Kilowatt Hour during peak hours
OffPeakKWHRate	Double	Energy cost per Kilowatt Hour during off-peak hours
PeakBegin	Double	Time of day peak hours begin For example 19.5 = 19:30 hours
PeakEnd	Double	Time of day peak hours end

Field	Type	Notes
CO2Factor	Double	CO2 computational factor
CoolingFactor	Double	Cooling factor for data center
CustomField1	VarChar(255)	A user-defined field
CustomField2	VarChar(255)	A user-defined field
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this data center

Floors

The Floors view contains information about Floor objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
FloorID	Integer	Auto-generated ID
Name	VarChar(255)	Human-assigned name for this Floor object.
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this Floor.

Rooms

The Rooms view contains information about Room objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
RoomID	Integer	Auto-generated ID
Name	VarChar(255)	Human-assigned name for this Room object.
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this Room.

Aisles

The Aisles view contains information about Aisle objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
AisleID	Integer	Auto-generated ID
Name	VarChar(255)	Human-assigned name for this Aisle object.
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this Aisle.

Rows

The Rows view contains information about Row objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
RowID	Integer	Auto-generated ID
Name	VarChar(64)	Human-assigned name for this Row object.
ExternalKey	VarChar(256)	The unique code used by the Enterprise Model to identify this Row.

Racks

The Racks view contains information about Rack objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
RackID	Integer	Auto-generated ID
Name	VarChar (255)	Human-assigned name for this Rack object.
SpaceIdentifier	VarChar(255)	Optional human-assigned value to identify this rack.
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this Rack.

ITDevices

The ITDevices view contains information about IT Device objects as part of the Enterprise Relationship Model. The fields in this view correspond to the item attributes in the model.

Field	Type	Notes
ITDeviceID	Integer	Auto-generated ID
Name	VarChar(255)	Human-assigned name for this IT Device object
Customer	VarChar(255)	Name of the customer that owns this object
DeviceType	VarChar(255)	Type of device
PowerRating	Integer	Power in watts that this device is rated for
Decommissioned	Boolean	Whether this device should be considered decommissioned
CustomField1	VarChar(255)	A user-defined field
CustomField2	VarChar(255)	A user-defined field
ExternalKey	VarChar(255)	The unique code used by the Enterprise Model to identify this IT Device

EDMNodes

The EDMNodes view captures the relationship between EDM entities arranged as nested sets. EDM entities are part of a data hierarchy. Hierarchical data can be efficiently searched when arranged as a Nested set tree structure. EDMNodes represent each EDM Entity arranged as a nested set tree structure.

Field	Type	Notes
ID	Integer	Auto-generated EDMNodes ID
Lft	Integer	Auto-generated EDMNode Left ID
Rgt	Integer	Auto-generated EDMNode Right ID
edm_entity_type	VarChar(40)	Entity Type. For example, DataCenter, Floor, Rack, Device,

Field	Type	Notes
		ComputerSystem. Entity Type ComputerSystem represents a PDU system.
edm_entity_id	Integer	Entity ID of the entity.
create_at	Timestamp	Create time stamp.
Updated_at	Timestamp	Update time stamp.

Sample ODBC Queries

This section contains sample ODBC queries that can be used to generate custom reports.

Obtain Active Power and Apparent Power Data for a PDU With IP Address 66.214.208.92

```
Select "PDUs"."IPAddress", "PDUs"."PDUName",
"PDUReadings"."ActivePower", "PDUReadings"."ApparentPower" ,
"PDUReadings"."Time" from "PDUs", "PDUReadings" where
"PDUs"."IPAddress"='66.214.208.91' AND
"PDUs"."ID"="PDUReadings"."PDUID";
```

The table shows a sample custom report.

IP Address	PDU Name	Active Power	Apparent Power	Time
66.214.208.91	Sentry3_511c 15	8	8	2009-12-08 12:46:21.753-05
66.214.208.91	Sentry3_511c 15	8	8	2009-12-08 12:58:23.871-05
66.214.208.91	Sentry3_511c 15	8	8	2009-12-08 16:29:26.032-05
66.214.208.91	Sentry3_511c 15	8	8	2009-12-08 16:32:36.868-05

Obtain Active Power and Apparent Power for an IT Device With Name “DBServer”

raritan

```
Select "ITDevices"."Name", "PDUOutletReadings"."Time",
"PDUOutletReadings"."ActivePower",
"PDUOutletReadings"."ApparentPower",
"PDUOutletReadings"."CurrentAmps" from "ITDevices", "PDUOutlets",
"PDUOutletReadings" where "ITDevices"."Name"='DBServer' AND
"PDUOutletReadings"."OutletID" = "PDUOutlets"."PDUOutletsID" AND
"PDUOutlets"."ITDeviceID" = "ITDevices"."ITDeviceID";
```

The table shows a sample custom report.

Name	Time	Active Power	Apparent Power	Current Amps
DBServer	2009-12-08 14:16:31.759-05	0	0	0
DBServer	2009-12-08 16:11:27.017-05	0	0	0

Finding All Entities in a Rack

The following query shows all the entities, such as IT Devices and PDUs, contained in a specific rack. The example uses "Rack 4."

- Retrieve the EDMNodes id for a rack with RackId=4.
 - oculan=> select id from "EDMNodes" where edm_entity_type='Rack' and edm_entity_id=4;

```
id
----
14
(1 row)
```
- Use the EDMNodes id =14 to retrieve entities contained under this rack.
 - oculan=> select "EDMNodes".* FROM "EDMNodes", "EDMNodes" AS parent where (("EDMNodes".id != parent.id) AND ("EDMNodes".lft >parent.lft AND "EDMNodes".rgt <=parent.rgt AND parent.id=14)) ORDER BY "EDMNodes".lft;

The table shows a sample custom report.

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ID	Lft	Rgt	EDM_Entity_Type	EDM_Entity_ID	Created_at	Updated_at
1	4	5	Device	3	2009-06-19 11:16:48.257348-0	2009-06-19 11:16:48.257348-04
2	6	7	Device	4	2009-06-19 11:16:48.274988-0	2009-06-19 11:16:48.274988-04
3	8	9	Device	5	2009-06-19 11:16:48.276324-0	2009-06-19 11:16:48.276324-04

Appendix B Frequently Asked Questions

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Security Questions

Question	Answer
Are failed login attempts recorded?	The audit log records all login attempts. You can also configure Power to send syslog notifications for entries in the audit log.
Does Power IQ support LDAP lock-out settings?	Power IQ respects the lock-out settings of an LDAP server. If a user attempts multiple invalid logins, and the LDAP server set the account to be blocked, Power IQ no longer allows access.
Do session timeouts work in an LDAP setting?	Session timeouts are applicable to LDAP users and local users.

PDU Questions

Question	Answer
The status of my PDU says "Degraded."	<ul style="list-style-type: none">▪ Check to see if the SNMP agent is enabled on the PDU.▪ If enabled, check to see if the matching SNMP read strings are configured for the PDU and Power IQ.▪ Check to see if you are running the latest PX firmware. For Dominion PX PDUs.▪ If you have enabled Buffered Data Collection, make sure the PX has been configured with an SNMP write string. For Dominion PX PDUs.▪ Reduce the poll rate or increase the number of CPUs (VMWare).
How do I configure my MRV PDU so that it will work with Power IQ's power control feature?	<ul style="list-style-type: none">▪ Make sure that the SNMP community string you use to configure the MRV PDU in Power IQ supports both SNMP v1 and v2c Gets and Sets. The community string must be configured for v1 and v2c access in both the Get Clients section and the Set Clients section on the MRV PDU.

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