



IBM Systems Director Active Energy Manager

Integration with Eaton Power Xpert Reporting

August 2009

Table of Contents

Prerequisites	3
SQL Server JDBC driver	3
SQL Server Configuration	3
Inventory Discovery	3
Overview	3
System Discovery	4
PXR Reporting Hierarchy Database Discovery	4
PXR Reporting Database Processing	5
Advanced System Discovery	6
Configuration.....	7
Properties File.....	7
Alert Handling	8
SNMP Trap Support	8
Associate I/T equipment to Power Distribution equipment.....	9
Configure Metering Device	9
Trend Data.....	10
Performance and Scalability Considerations	11

Introduction

This document describes the integration of IBM Systems Director Active Energy Manager V4.1.1 (or above) with Eaton Power Xpert Reporting V1.0. The integration of Active Energy Manager (AEM) and Eaton Power Xpert Reporting (PXR) provides the following:

- Sharing of demand and capacity metering data provided by the PXR Branch Circuit Monitoring Report
- IBM Director support for facility alerts generated by Power Xpert Foreseer software
- Association of IT equipment (e.g. servers) managed by IBM Director to power distribution facilities equipment (UPSs, PDUs) managed by Power Xpert.
- Viewing demand and capacity data via trend graphs and resource properties.

Prerequisites

SQL Server JDBC driver

The Microsoft SQL Server JDBC driver is required by AEM to interface with the PXR reporting database. The driver is not deployed as part of the AEM installation process due to redistribution licensing considerations. The driver is freely available from Microsoft; it must be copied to the IBM Systems Director AEM vendor support plugin directory prior to using IBM Director to discover the system containing the PXR database.

Perform the following steps to install the JDBC driver on the IBM Systems Director server:

1. Download the Microsoft SQL Server JDBC Driver from Microsoft Web site.
2. Install the driver according to the instructions provided by Microsoft.
3. Copy the driver jar file (`sqljdbc.jar`) from the Microsoft installed directory to the IBM System Director server AEM vendor plugin root directory:

```
"/sqljdbc_<version>/enu/sqljdbc.jar" à
```

```
"/Director/ActiveEnergyManager/eclipse/plugins/com.ibm.aem.vendor_4.1.1/sqljdbc.jar"
```

4. Restart IBM Systems Director server.

SQL Server Configuration

AEM uses SQL stored procedure calls to access the PXR database. This requires the following SQL Server connection property to be enabled:

- *Allow remote connections to this server*

AEM requires SQL Server authentication mode to access the PXR database, Windows authentication mode is not supported.

Inventory Discovery

Overview

Discovery is the process by which IBM Systems Director Server identifies and establishes connections with managed system resources. The Inventory function of Director provides two discovery functions, *System Discovery* and *Advanced System Discovery*.

System Discovery usually requires multiple actions to fully discover the resource; Initially to discover the resource (such as an operating system on a server) and subsequently to request access to the various services defined for the resource.

Advanced System Discovery provides a wizard to create *discovery profiles*. These profiles contain information collected by the wizard to automate various discovery phases, eliminating additional administrator steps to complete the discovery process.

System Discovery

Use System Discovery to discover a resource by specifying an IP address or host name. For operating system discovery, Remote Service Access Points (RSAPs) are created for various types of services available on the operating system. To access these services, administrators request access by providing the appropriate credentials for each of the RSAPs associated with the resource.

PXR Reporting Hierarchy Database Discovery

When using System Discovery to discover a PXR database on a server, specify *Operating System* for the resource type. When the initial discovery completes, an operating system resource is created. If Director had detected Microsoft SQL Server on the server, an RSAP (with Access Type *Appliance*) is created to represent the SQL Server service.

Once initial discovery is complete, perform the following:

- Use *Security->Configure Access* on the Operating System resource to list the available RSAPs
- Perform the *Request Access* function on the RSAP representing SQL Server
 - Access Type = Appliance
 - Access Information = `jdbc:sqlserver`
- Provide the SQL Server authentication credentials (user and password) that have been given read/execute permission to the PXR Reporting database file.

Figure 1 shows an example of an Appliance RSAP created when Microsoft SQL Server is detected on an operating system resource. **Note:** Access Information field starts with the string '`jdbc:sqlserver`'.

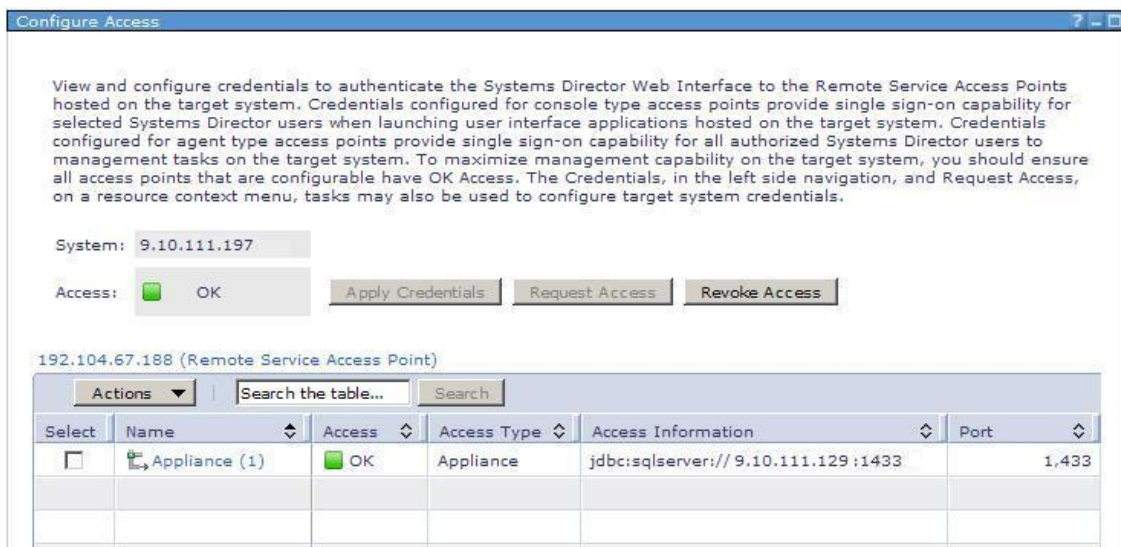


Figure 1: Security -> Configure Access

PXR Reporting Database Processing

Once credentials are validated, AEM reads the PXR reporting database and creates Director resources based on the folders defined in the PXR Reporting hierarchy structure.

For this integration, AEM processes all hierarchy folders under a root folder named 'Power Distribution'. **Note:** This default can be changed via a property setting; see Properties File section later in this document.

For each folder under 'Power Distribution', AEM creates IBM Director *Power Unit* resources for folder names that start with the keyword 'PDU' or 'UPS'. The keyword is not set as part of the Director resource name; but is used by the PXR administrator to indicate the type of power unit being modeled. In addition, the full path of the hierarchy folder is set as the Director resource description.

PDU folders typically have sub-folders that contain panel or circuit breaker level measurements. AEM interprets sub-folders that also contain sub-folders (i.e. child folders) as power distribution panels. For sub-folders that do not contain sub-folders (i.e. leaf folders), AEM interprets the sub-folder as a circuit breaker. For PDU folders modeling enclosure based Power Distribution Units (ePDUs), the leaf folders contain measurements for the load segment (outlet groups), but AEM treats these the same as circuit breaker leaf folders.

The following Director resource types are created for sub-folders under a PDU folder.

- Power Unit: (for panel sub-folders)
- Sensor: (for circuit breaker or outlet group sub-folders)

Circuit breaker and outlet group sub-folders defined in PXR can have one or more *Sides* defined for the associated device attributes, which are used to represent redundant power sources (e.g. UPS backed). When AEM detects more than one side defined for a circuit, it creates a Director 'Sensor' resource for each Side (e.g. typically Side A and Side B).

For UPS device folders that are peer (i.e. share a common parent folder) in the reporting hierarchy to PDU device folders, AEM automatically associates the UPS resource with any peer PDU resources (using the Director *applies to* relationship). Note: This relationship is conceptually a *supplies power to* relationship.

Figure 2 shows an example of Director resources created by AEM as the result of reading a PXR Reporting hierarchy database file.

Select	Name	Type	Description
<input type="checkbox"/>	PDU1	Power Unit	Power Xpert - \\Power Distribution\Zone 1\PDU PDU1
<input type="checkbox"/>	Panel 1	Power Unit	Power Xpert - \\Power Distribution\Zone 1\PDU PDU1\Panel 1
<input type="checkbox"/>	Panel 2	Power Unit	Power Xpert - \\Power Distribution\Zone 1\PDU PDU1\Panel 2
<input type="checkbox"/>	UPS1	Power Unit	Power Xpert - \\Power Distribution\Zone 1\UPS UPS1
<input type="checkbox"/>	ePDU1	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU1
<input type="checkbox"/>	ePDU2	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU2
<input type="checkbox"/>	ePDU3	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU3
<input type="checkbox"/>	ePDU4	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU4
<input type="checkbox"/>	ePDU5	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU5
<input type="checkbox"/>	ePDU6	Power Unit	Power Xpert - \\Power Distribution\Zone 2\PDU ePDU6
<input type="checkbox"/>	UPS1	Power Unit	Power Xpert - \\Power Distribution\Zone 2\UPS UPS1

Figure 2: Example of Director resources created from a PXR Reporting database

Advanced System Discovery

Use Advanced System Discovery to discover specific types of resources using discovery profiles. A discovery profile is a group of discovery settings that are saved on IBM Systems Director Server that indicate the type of resources to discover, specific communication protocols to use, and security credentials for accessing the resource. Discovery profiles provide greater control over the discovery process and can be tailored for specific resources.

When creating a discovery profile for the server containing the PXR database, use a System Type of *Operating System* and Protocol Selection of *Appliance Discovery*. On the *Access Request* page of the profile wizard, specify the SQL Server authentication credentials (user and password) that have been configured on SQL Server to provide read/execute permissions to the PXR database.

Figures 3 and 4 show examples of Advanced Discovery wizard pages related to creating a discovery profile to be used when discovering operating systems resources with Microsoft SQL Server and PXR database files.

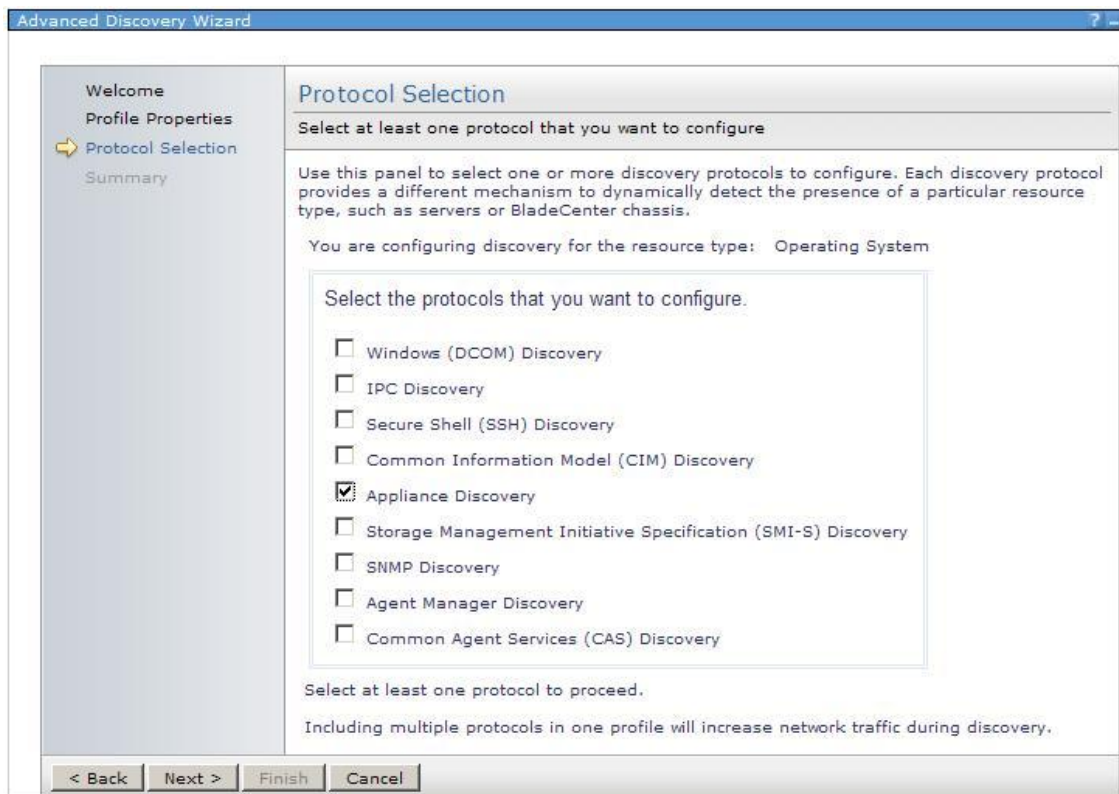


Figure 3: Advanced Discovery Wizard - Protocol Selection

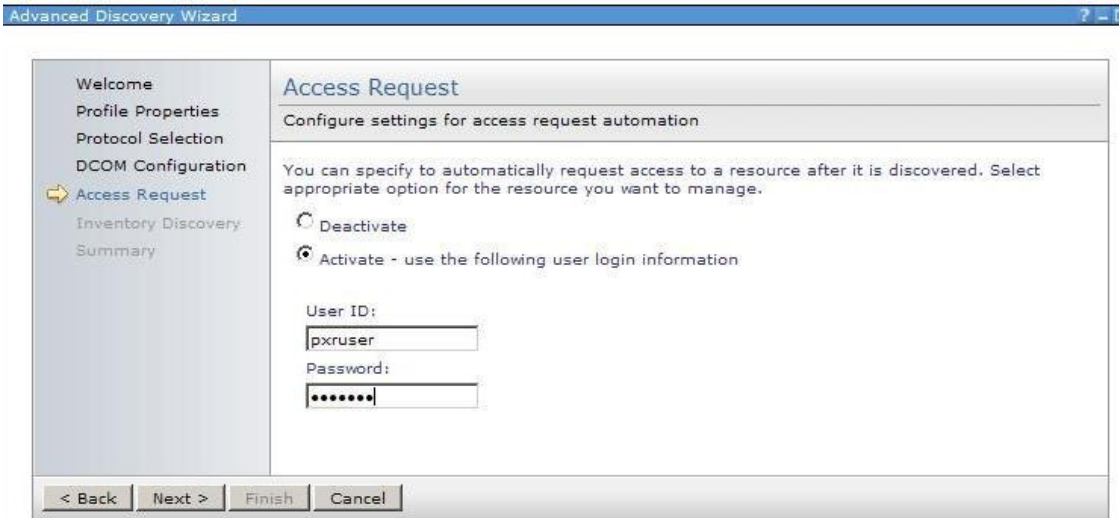


Figure 4: Advanced Discovery Wizard - Access Request

Configuration

Properties File

When AEM is installed on IBM Systems Director, a Power Xpert Reporting specific properties file is created in the following directory:

```
/ibm/Director/lwi/conf/aem_powerxpert.properties
```

The properties file can be modified to control the behavior of AEM during the discovery process of PXR database files.

```
com.ibm.aem.powerxpert.database.serverName
```

By default, AEM dynamically determines whether a PXR database exists during operating system discovery. To limit this discovery processing to a specific server, the `serverName` property can be set to a specific server name or IP address.

Note: When the PXR database file is located on a specific instance (non-default instance) of SQL Server, the server and instance name *must be* specified with the `serverName` property, specified as `serverName/instanceName`.

```
com.ibm.aem.powerxpert.database.powerRootFolder
```

By default, AEM looks for PDU and UPS resources defined under the PXR root folder “Power Distribution”. To limit this discovery processing to a subset under this root folder, the `powerRootFolder` property can be set to a specific folder under the “Power Distribution” root folder.

Documentation notes for all the available properties are embedded as comments in the properties file.

The contents of the installed properties file should not be modified directly; Instead, the file should be copied to the following directory and modified in the overrides directory.

```
/ibm/Director/lwi/conf/overrides/aem_powerxpert.properties
```

Alert Handing

SNMP Trap Support

IBM Systems Director support was added to recognize SNMP traps generated by the Foreseer version of the Power Xpert software. The Foreseer SNMP agent should be configured to add IBM Systems Director server a trap recipient to take advantage of this support.

When IBM Systems Director receives a Foreseer trap, it generates and logs an event to the Director event log. AEM is notified of the event and interrogates the trap, specifically the monitored parameter, trap number, alarm values and limits. The monitored parameter (server and channel name) is used to map the trap to it's associated Director resource (e.g. UPS resource). The trap number is used to indicate whether a warning or critical event should be generated. The alarm value/limits indicate whether a high or low alarm condition should be reported.

In addition, an event is displayed on the AEM Trend Data chart for the associated Director resource, indicating the date and time of the trap event. **Note:** If the monitored parameter cannot be mapped to an associated Director resource, the trap event is still written to the Director event log.

Figure 5 shows an example of an event details page for a Director event generated from a Foreseer SNMP trap. The source of the trap (e.g. UPS1) is logged along with it's associated hierarchy path in the PXR reporting system. The alarm value and limits are also reported.

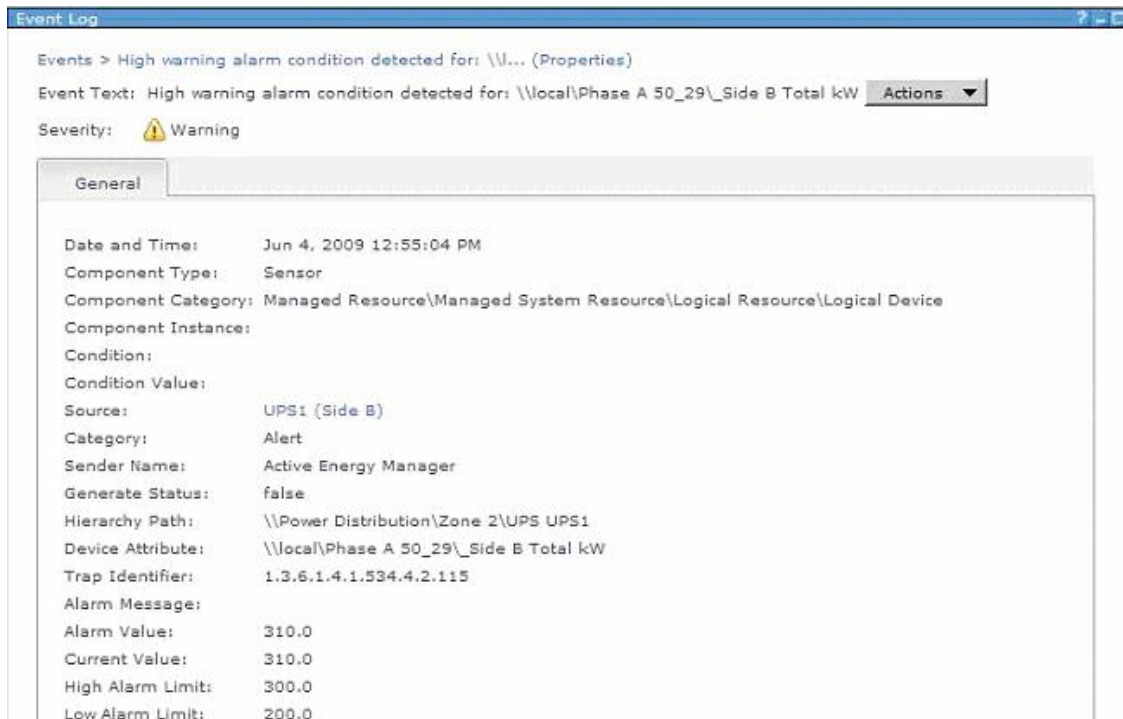


Figure 5: Event details for Foreseer SNMP trap event

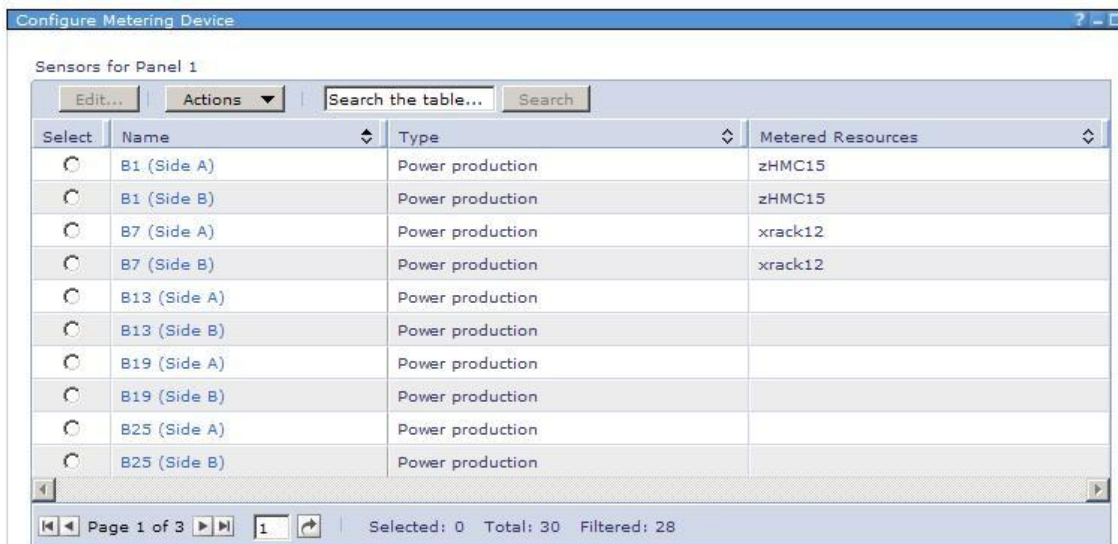
Associate I/T equipment to Power Distribution equipment

Configure Metering Device

The Configure Metering Device function is used to associate IBM Systems Director managed resources (i.e. IT equipment such rack, blade and System z servers) with PDU devices defined in a PXR reporting hierarchy. This function enables administrators to configure the servers that are connected to circuit breakers on a PDU power distribution panel or the servers plugged into outlets on an ePDU.

Typically, when PDU devices are defined in the PXR reporting hierarchy for use with AEM, sub-folders are created for the panel and circuit breaker level information. For ePDUs, sub-folders are created to represent the outlet groups.

Figure 6 shows an example of the Configure Metering Device user interface for associating circuits to servers for an IBM Director Power Unit resource called Panel 1. Sensor resources B1 and B7 are associated with Director resources zHMC15 and xrack12, respectively. **Note:** This example that Sides were defined for the device attributes of the circuit breakers, so AEM created a Sensor resource for each side during the discovery process.



The screenshot shows the 'Configure Metering Device' window with the title 'Sensors for Panel 1'. It features a table with columns for 'Select', 'Name', 'Type', and 'Metered Resources'. The table lists 10 sensor resources, each with a radio button in the 'Select' column. The 'Name' column contains entries like 'B1 (Side A)', 'B1 (Side B)', 'B7 (Side A)', 'B7 (Side B)', 'B13 (Side A)', 'B13 (Side B)', 'B19 (Side A)', 'B19 (Side B)', 'B25 (Side A)', and 'B25 (Side B)'. The 'Type' column for all entries is 'Power production'. The 'Metered Resources' column shows 'zHMC15' for B1 (Side A) and B1 (Side B), 'xrack12' for B7 (Side A) and B7 (Side B), and is empty for the remaining sensors. The interface includes an 'Edit...' button, an 'Actions' dropdown, a search bar, and a status bar at the bottom indicating 'Page 1 of 3', 'Selected: 0', 'Total: 30', and 'Filtered: 28'.

Select	Name	Type	Metered Resources
<input type="radio"/>	B1 (Side A)	Power production	zHMC15
<input type="radio"/>	B1 (Side B)	Power production	zHMC15
<input type="radio"/>	B7 (Side A)	Power production	xrack12
<input type="radio"/>	B7 (Side B)	Power production	xrack12
<input type="radio"/>	B13 (Side A)	Power production	
<input type="radio"/>	B13 (Side B)	Power production	
<input type="radio"/>	B19 (Side A)	Power production	
<input type="radio"/>	B19 (Side B)	Power production	
<input type="radio"/>	B25 (Side A)	Power production	
<input type="radio"/>	B25 (Side B)	Power production	

Figure 6: Configure Metering Device

To associate a Sensor to a Director resource(s), select the Sensor and click **Edit**.

Figure 7 shows the Edit dialog. The **Browse** button is used to find the Director resource(s) associated with the Sensor from the list of resources being managed by the IBM Director server.



Figure 7: Configure Metering Device (Associate resource to Sensor)

Trend Data

For PXR reporting hierarchy sub-folders that have power related device attributes added (i.e. reporting units is watts or kilowatts), AEM is able to provide a power trend data graph for the associated Director resource. This chart provides data similar in function to the Power Trend section of a PXR Branch Circuit Monitoring Report.

Figure 8 shows an example Trend Data power chart for a UPS resource.

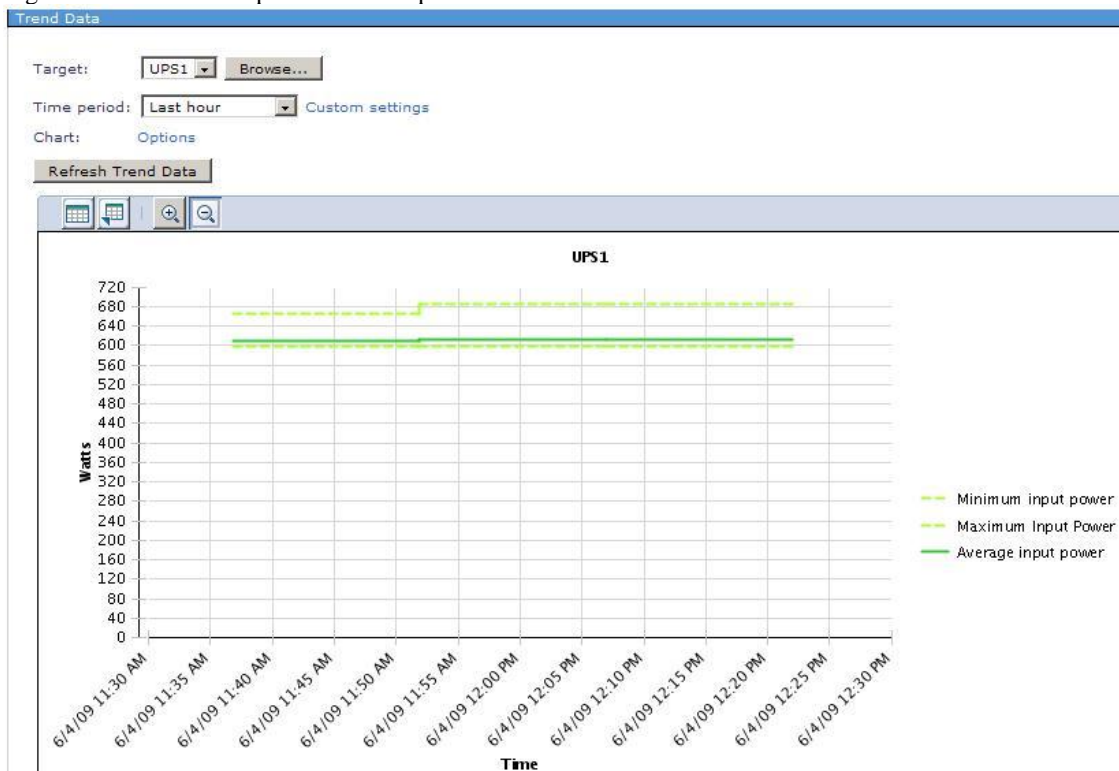


Figure 8: Trend Data chart showing power demand (in watts)

Performance and Scalability Considerations

Refer to the Active Energy Manager Information Center “Planning->Requirements->Hardware Requirements” topic for information on AEM scalability considerations. Specifically, AEM has a limit of managing a total of 2000 IBM Systems Director managed resources. Managed resources include power distribution equipment such as PDUs and UPSs as well as the I/T servers being powered by (associated with) the power equipment. Managed resources do not include the individual circuits or outlets defined for a PDU or UPS.

To handle large scale PXR Reporting database hierarchies, multiple IBM Systems Director / AEM instances would need to be deployed; with each instance configured to process a subset of the PXR Power Distribution hierarchy.