



CHAPTER 12

Configuring Cisco EnergyWise

This chapter describes how to configure Cisco EnergyWise on a Catalyst 4500 series switch.

Cisco EnergyWise is an energy-management technology added onto Cisco switching solutions to help you measure, report, and reduce energy consumption across your entire infrastructure. With EnergyWise's management interface, network management applications can communicate with endpoints and each other, using the network as the unifying fabric.

This chapter includes the following sections:

- [About EnergyWise, page 12-1](#)
- [Configuration Guidelines, page 12-5](#)
- [Managing Single Entities, page 12-6](#)
- [Managing Multiple Entities, page 12-15](#)
- [Managing Power in a LAN, page 12-20](#)
- [Managing Power with IP Routing, page 12-20](#)
- [Using CLI Commands, page 12-22](#)



Note

For complete syntax and usage information for the switch commands used in this chapter, look at the *Cisco Catalyst 4500 Series Switch Command Reference* and related publications at this location:

<http://www.cisco.com/en/US/products/hw/switches/ps4324/index.html>

If the command is not found in the Catalyst 4500 Command Reference, it will be found in the larger Cisco IOS library. Refer to the *Cisco IOS Command Reference* and related publications at this location:

<http://www.cisco.com/en/US/products/ps6350/index.html>

For more details on EnergyWise, go to the URL:

http://www.cisco.com/en/US/products/ps10195/tsd_products_support_series_home.html

About EnergyWise

This section defines the key terms associated with EnergyWise. The following topics are included:

- [EnergyWise Entity, page 12-2](#)

- [EnergyWise Domain](#), page 12-2
- [EnergyWise Network](#), page 12-2
- [EnergyWise Power Level](#), page 12-3
- [EnergyWise Query](#), page 12-4
- [EnergyWise Importance](#), page 12-5

EnergyWise Entity

An EnergyWise entity is a physical or logical device on which EnergyWise is enabled, such as a Catalyst switch, a power over Ethernet (PoE) port, or a PoE device. The PoE ports are considered child entities of the switch which is the parent entity.

EnergyWise uses a distributed model to monitor and manage energy usage.

- Switches are grouped in an EnergyWise domain and become domain entities. All entities monitor their own energy usage and potentially monitor the energy usage for their child entities. They can receive, respond to, and forward EnergyWise traffic from other entities in the same domain.
- When an entity is in the EnergyWise domain, it responds to queries. It can also generate queries initiated by the user.
- When an entity participates in EnergyWise, it controls the power usage of connected PoE devices such as an IP phone, an IP camera, or a PoE-enabled device. For example, a Catalyst switch sends a message to an IP phone to power it off.

On an EnergyWise-enabled entity

- The parent entity always participates in EnergyWise.
- PoE ports can participate in EnergyWise.
- Non-PoE ports do not participate in EnergyWise.

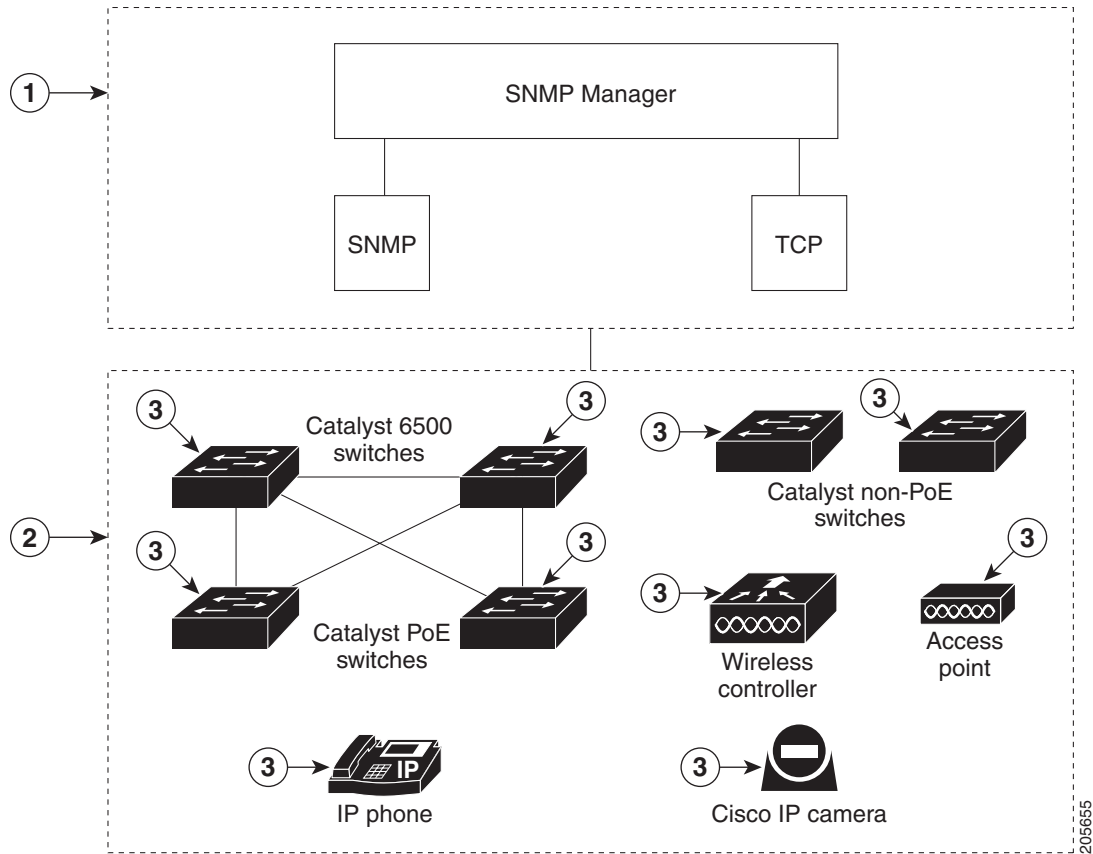
EnergyWise Domain

An EnergyWise domain is a logical group of EnergyWise entities for the purpose of power management. All the entities in a domain can be managed collectively. Each independent domain must be managed independently. There is no default domain for a switch; it must be explicitly configured. A switch can only belong to a single domain. PoE ports belong to the same domain as their parent switch.

EnergyWise Network

In a typical EnergyWise network, EnergyWise entities comprise a domain, whose power is managed by another entity ([Figure 12-1](#)).

Figure 12-1 Typical Network



In Figure 12-1, the numbers correspond to the following:

1	Entity that can manage power usage
2	Domain
3	Entities

EnergyWise Power Level

You can define EnergyWise power levels for PoE ports and other EnergyWise entities (by using the **energywise level** command).

- The range is from 0 to 10 (default).
- If the power level is 0, the port is powered off.
- If the power level is between 1 to 10, the port is powered. You can enter any value in this range to power the PoE port or the switch.

A Catalyst 4500 series switch does not support level 0. A PoE port supports levels 0 and 10.



Note Because line cards are not EnergyWise entities, you cannot use EnergyWise to power them on and off.

Table 12-1 Power Levels

Level	auto	never
10	Full	Operational
9	High	
8	Reduced	
7	Medium	
6	Frugal	
5	Low	
4	Ready	Standby
3	Standy	
2	Sleep	
1	Hibernate	Nonoperational
0	Shut	

When the power level changes, the port locally determines the action for the new power level.

EnergyWise Names, Roles, and Keywords

You can set an EnergyWise-specific entity name to identify the domain entity.

- For a PoE port, the default is a short version of the port name (for example, "FastEthernet9/10" becomes "Fa9.10").
- For a switch, the default is the hostname.

You can set the role of the domain entity to differentiate it from other entities.

- For a PoE port, the default is interface.
- For a switch, the default is the model number.

You can set at least one keyword that describes an entity to differentiate it from other entities.

EnergyWise Query

You can run EnergyWise queries (with the **energywise query** command) to do the following:

- Collect power usage information.
- Summarize power information from entities.
- Set parameters.

To filter the results of an EnergyWise query, use the following attributes:

- Importance (“[EnergyWise Importance](#)” section on page 12-5)
- Entity name (“[Configuring Entity Attributes](#)” section on page 12-9)
- One or more keywords for a port or for a group of ports

Use EnergyWise importance values to select entities in a query. For example, an office phone is less important than an emergency phone that should never be in sleep mode.

When you run a query, the result has entities (perhaps PoE ports), with importance values less than or equal to the specified value in the query.

When a query is forwarded to all the entities in a domain, the entity that forwarded the query receives the results.

EnergyWise Importance

You can set an EnergyWise importance value on a PoE port or a switch to rank domain entities.

You can select entities in a query through EnergyWise importance values (with the **energywise importance** command). For example, an emergency phone that should never be in sleep mode is more important than an office phone.

When you run a query, the result provides entities with importance values less than or equal to the specified value in the query. The entities can be PoE ports.

The range is from 1 to 100. The default is 1.

Configuration Guidelines

When configuring EnergyWise, follow these guidelines:

- By default, EnergyWise is disabled.
- When you add an EnergyWise entity to a domain, EnergyWise is enabled on both the entity and its PoE ports.
- To power off a PoE port, enter the **energywise level 0** interface configuration command. You cannot use the **energywise level 0** as a global configuration command.
- If you schedule the entity to power the PoE port at 7:00 a.m. (0700), the port powers within 1 minute, between 7:00 a.m.(0700) and 7:01 a.m. (0701) local time.



Note To perform an ISSU downgrade to a previous release, you must first disable EnergyWise in the configuration.

- If a port is err-disabled, it appears as an EnergyWise entity, but it will not respond to EnergyWise queries; a query that sets the level to 10 will not turn on power to the port. The collect query displays the port in the list with 0 Watts usage, but the set query will have no effect as long as the port remains in the err-disable state.
- If EnergyWise is disabled, you cannot configure EnergyWise .and all existing EnergyWise configuration is lost. The entity can use PoE to manage port power.
- After you configure EnergyWise on a port and then configure the port power level, the new level takes effect after you change the port PoE mode to **auto** or **static**.
- On a redundant chassis operating in redundant mode, the **energywise neighbor hostname port-name** command fails. Instead of using **hostname** in the command, specify the **IP address** of the host.
- When running with a redundant supervisor switch operating in redundant mode, the command **energywise neighbor hostname port-name** fails. Instead of using **hostname** in the command, specify the **hostname** of the host.

EnergyWise and PoE work together to manage power usage. [Table 12-2](#) illustrates the conditions when a port participates in EnergyWise.

Table 12-2 Port Participation in EnergyWise

EnergyWise Entity	PoE Mode		
	auto	never	static
PoE port	Yes	No	Yes
Non-PoE port	No	No	No



Note

If the PoE port mode is **never**, port power is off, but EnergyWise is not disabled.

You can do the following:

- Configure EnergyWise on the port.
- Configure the port power level. The new level takes effect after you change the port mode to auto or static.



Note

If a port is errdisabled, it appears as an EnergyWise entity, but it will not respond to EnergyWise queries; a query that sets the level to 10 will not turn on power to the port. The collect query displays the port in the list with 0 Watts usage, but the set query will have no effect as long as the port remains in the errdisable state.

Managing Single Entities

EnergyWise enables you to manage the energy usage of single entities in an EnergyWise network.

This section includes the following topics:

- [Single PoE Switch Scenario, page 12-6](#)
- [Manually Managing Power, page 12-7](#)
- [Automatically Managing Power \(Recurrence\), page 12-12](#)
- [Examples, page 12-14](#)

Single PoE Switch Scenario

In a single PoE switch scenario, also termed a *recurrence scenario*, a PoE switch applies an EnergyWise policy to power connected entities (see [Figure 12-2](#)). The specified local times are based on the PoE-entity time zones.

In the following topology, IP phones are powered on at 7:00 a.m. (0700) local time, and powered off at 7:00 p.m. (1900) local time.



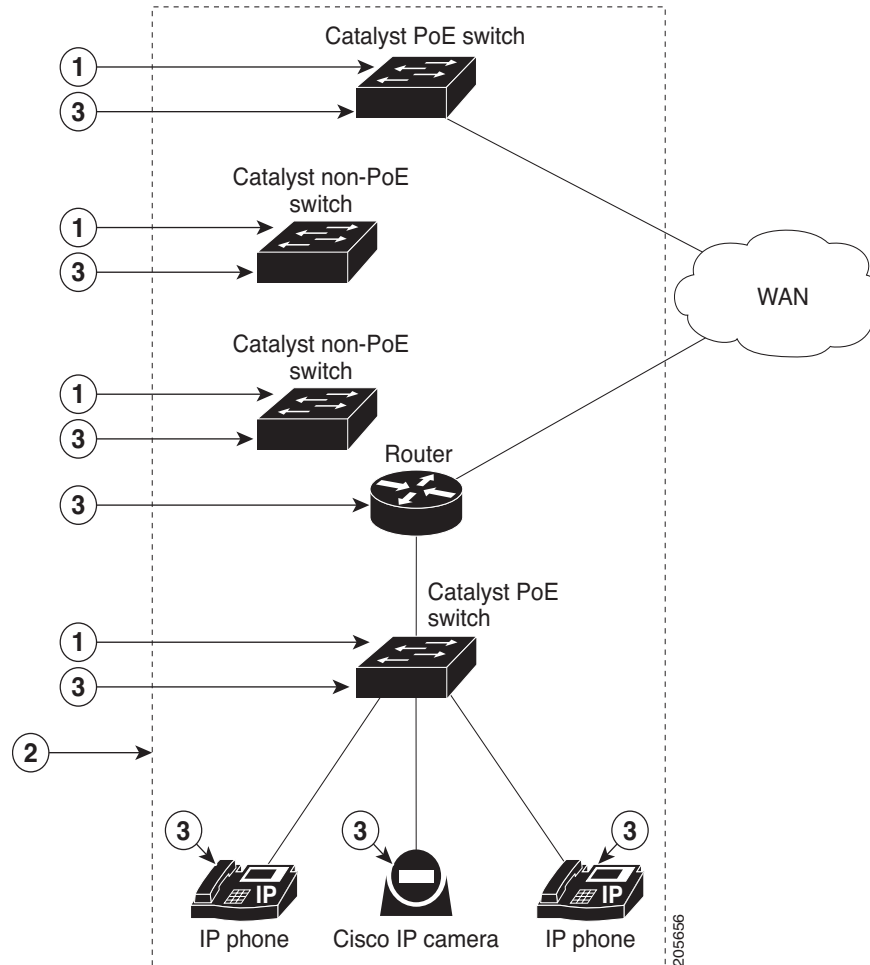
Note

If you schedule the entity to power the PoE port at 7:00 a.m. (0700), the port powers on within 1 minute, between 7:00 a.m.(0700) and 7:01 a.m. (0701) local time.

**Note**

Use the UNIX-based cron field formats when entering the **energywise level recurrence importance at** interface configuration command.

Figure 12-2 Single PoE Switch Example



In [Figure 12-2](#), the numbers correspond to the following:

1	Entity that can manage power usage
2	Domain
3	Entities

Manually Managing Power

The following topics pertain to manually managing power with EnergyWise:

- [Powering the EnergyWise Entity, page 12-8](#)
- [Configuring Entity Attributes, page 12-9](#)

- [Powering the PoE Port, page 12-10](#)
- [Configuring PoE Port Attributes, page 12-11](#)

Powering the EnergyWise Entity

To power an EnergyWise entity, perform this task:

	Command	Purpose
Step 1	Switch# show energywise	(Optional) Verifies that EnergyWise is disabled (the default).
Step 2	Switch# configure terminal	Enters global configuration mode.
Step 3	Switch(config)# energywise domain <i>domain-name</i> secret [0 7] <i>password</i> [protocol udp port <i>udp-port-number</i> [interface <i>interface-id</i> ip <i>ip-address</i>]]	<p>Enables EnergyWise on the entity, assigns the entity to a domain with the specified <i>domain name</i>, and sets the <i>password</i> for secure communication among the entities in the domain.</p> <ul style="list-style-type: none"> • (Optional) 0—Use an unencrypted password. This is the default. • (Optional) 7—Use an hidden password. This requires that you enable "service password-encryption". If you do not enter 0 or 7, the entity uses the default value of 0. • (Optional) port <i>udp-port-number</i>—Specify the UDP port that sends and receives queries. The range is from 1 to 65,000. • (Optional) interface <i>interface-id</i>—In a bridged network, specify the interface which you would prefer for communicating with other EnergyWise switches rather than allowing a switch to select an interface by default. You should have an IP address assigned to that interface. • (Optional) ip <i>ip-address</i>—In a routed network, specify the IP address to be used while communicating with EnergyWise peers instead of allowing the system to choose a default. <p>For the <i>domain name</i> and <i>password</i> values:</p> <ul style="list-style-type: none"> • You can enter alphanumeric characters and symbols such as #, (, %, ! or &. • Do not use an asterisk (*) or a blank space between the characters and symbols. <p>A domain and password are required to enable EnergyWise. There are no defaults. EnergyWise entities cannot communicate with one another unless they share the same domain and password.</p> <p>Note The interface and ip options are mutually exclusive.</p>
Step 4	Switch(config)# end	Returns to privileged EXEC mode.
Step 5	Switch# show energywise Switch# show energywise domain	Verifies your entries.
Step 6	Switch# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring Entity Attributes

To configure entity attributes, perform this task:

	Command	Purpose
Step 1	Switch# show energywise	(Optional) Verifies that EnergyWise is enabled.
Step 2	Switch# configure terminal	Enters global configuration mode.
Step 3	Switch(config)# energywise importance importance	(Optional) Sets the importance of the entity. The range is from 1 to 100. The default is 1.
Step 4	Switch(config)# energywise keywords word,word,...	(Optional) Assigns one or more keywords for the entity. You can use one or more keywords in a query to filter the switches that respond to that query. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. For the <i>word</i> value: <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. By default, no keywords are defined.
Step 5	Switch(config)# energywise management tcp-port-number	(Optional) Specifies the TCP port for sending and receiving queries from a management station. The range is from 1 to 65,000.
Step 6	Switch(config)# energywise name name	(Optional) Specifies the EnergyWise-specific entity name. For the <i>name</i> value: <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. The default is the hostname.
Step 7	Switch# energywise neighbor [hostname ip-address] udp-port-number	(Optional) Assigns a static neighbor. <ul style="list-style-type: none"> Hostname (<i>hostname</i>) or IP address (<i>ip-address</i>). UDP port (<i>udp-port-number</i>) that sends and receives queries. The range is from 1 to 65,000. By default, no static neighbors are assigned.

	Command	Purpose
Step 8	Switch# energywise role <i>role</i>	(Optional) Specifies the role of the entity in the EnergyWise domain. For example, lobby.b20. For the <i>role</i> value: <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. The default is the model number of the switch for a fixed configuration switch and the model number of the supervisor engine for a modular switch.
Step 9	Switch(config)# end	Returns to privileged EXEC mode.
Step 10	Switch# show energywise Switch# show energywise domain	Verifies your entries.
Step 11	Switch# copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Powering the PoE Port

To power a PoE port, in privileged EXEC mode, perform this task:

	Command	Purpose
Step 1	configure terminal	Enters global configuration mode.
Step 2	interface <i>interface-id</i>	Specifies the port or the range of ports to be configured, and enters interface configuration mode. <ul style="list-style-type: none"> Go to Step 3 to power off the port. Go to Step 4 to power on the port.
Step 3	energywise level 0	(Optional) Manually powers off the port.
Step 4	energywise level 10	(Optional) Manually powers on the port.
Step 5	end	Returns to privileged EXEC mode.
Step 6	show energywise domain show energywise children	Verifies your entries. In this context, the PoE ports are the child entities and the switch is the parent entity.
Step 7	copy running-config startup-config	(Optional) Saves your entries in the configuration file. Note The power level that you set in Step 3 or Step 4 is the default power level when the switch restarts.

Configuring PoE Port Attributes



Note Use this procedure to configure at least one attribute

To configure PoE-port attributes, in privileged EXEC mode, perform this task:

	Command	Purpose
Step 1	<code>configure terminal</code>	Enters global configuration mode.
Step 2	<code>interface interface-id</code>	Specifies the port or the range of ports to be configured, and enters interface configuration mode.
Step 3	<code>energywise importance importance</code>	(Optional) Sets the importance of the port. The range is from 1 to 100. The default is 1.
Step 4	<code>energywise keywords word,word,...</code>	<p>(Optional) Assigns at least one keyword for the port. You can use keywords in a query to filter the PoE ports that respond to a query.</p> <p>When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords.</p> <p>For the <i>word</i> value:</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. <p>By default, no keywords are defined.</p>
Step 5	<code>energywise name name</code>	<p>(Optional) Specifies the EnergyWise-specific port name.</p> <p>For the <i>name</i> value:</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. <p>The default is a short version of the interface name; for example, Gi3.20.</p>
Step 6	<code>energywise role role</code>	<p>(Optional) Specifies the role of the port in the domain. For example, lobbyport.</p> <p>For the <i>role</i> value:</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. <p>By default, the role is interface.</p>
Step 7	<code>end</code>	Returns to privileged EXEC mode.
Step 8	<code>show energywise domain</code> <code>show energywise children</code>	Verifies your entries.
Step 9	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Automatically Managing Power (Recurrence)

To automatically manage power on EnergyWise entities, in privileged EXEC mode, perform this task:

	Command	Purpose
Step 1	<code>show energywise</code>	(Optional) Verifies that EnergyWise is enabled.
Step 2	<code>configure terminal</code>	Enters global configuration mode.
Step 3	<code>energywise domain domain-name secret [0 7] password [protocol udp port udp-port-number [interface interface-id ip ip-address]]</code>	<p>Enables EnergyWise on the entity, assigns the entity to a domain with the specified <i>domain name</i>, and sets the <i>password</i> for secure communication among the entities in the domain.</p> <ul style="list-style-type: none"> (Optional) 0—Use an unencrypted password. This is the default. (Optional) 7—Use a hidden password. This requires that you enable "service password-encryption". If you do not enter 0 or 7, the entity uses the default value of 0. (Optional) port <i>udp-port-number</i>—Specify the UDP port that sends and receives queries. The range is from 1 to 65000. The default is 43440. (Optional) interface <i>interface-id</i>—In a bridged network, specify the interface that you would prefer for communicating with other EnergyWise switches rather than allowing the switch to select an interface by default. (Optional) ip <i>ip-address</i>—In a routed network, specify the IP address to be used while communicating with EnergyWise peers instead of allowing the system to choose a default. <p>For the <i>domain-name</i> and <i>password</i> value:</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, %, ! or &. Do not use an asterisk (*) or a blank space between the characters and symbols. <p>Note The interface and ip options are mutually exclusive.</p>
Step 4	<code>interface interface-id</code>	Specifies the port or a range of ports to be configured, and enters interface configuration mode.

	Command	Purpose
Step 5	<code>energywise level 10 recurrence importance importance at minute hour day_of_month month day_of_week</code>	<p>(Optional) Schedules the power-on recurrence.</p> <ul style="list-style-type: none"> • importance <i>importance</i>—Set the importance of the port in the domain. The range is from 1 to 100. • <i>minute</i>—The range is from 0 to 59. Use * for the wildcard. • <i>hour</i>—The range is from 0 to 23. Use * for the wildcard. • <i>day_of_month</i>—The range is from 1 to 31. Use * for the wildcard. • <i>month</i>—The range is from 1 (January) to 12 (December). Use * for the wildcard. • <i>day_of_week</i>—The range is from 0 to 7 (0 and 7 both represent Sunday). Use * for the wildcard. <p>Note The specified time is the local time based on the PoE-entity time zone.</p> <p>Note If the <i>day_of_week</i> and <i>day_of_month</i> are both specified (that is, aren't "*"), the recurrence executed when either field matches the current time.</p>
Step 6	<code>energywise level 0 recurrence importance importance at minute hour day_of_month month day_of_week</code>	<p>(Optional) Schedules the power-off recurrence.</p> <ul style="list-style-type: none"> • importance <i>importance</i>—Set the importance of the port in the domain. The range is from 1 to 100. The default is 1. • <i>minute</i>—The range is from 0 to 59. Use * for the wildcard. • <i>hour</i>—The range is from 0 to 23. Use * for the wildcard. • <i>day_of_month</i>—The range is from 1 to 31. Use * for the wildcard. • <i>month</i>—The range is from 1 (January) to 12 (December). Use * for the wildcard. • <i>day_of_week</i>—The range is from 0 to 7 (0 and 7 both represent Sunday). Use * for the wildcard. <p>Note The specified time is the local time based on the PoE-entity time zone.</p> <p>If the <i>day_of_week</i> and <i>day_of_month</i> are both specified (that is, aren't "*"), then the recurrence executed when either field matches the current time.>>>>this sentence does not make sense<<<<what are trying to say here?</p>
Step 7	<code>end</code>	Returns to privileged EXEC mode.
Step 8	<code>show energywise recurrence</code>	Verifies your entries.
Step 9	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Examples

This section describes how to do the following:

- [Establishing the Domain, page 12-14](#)
- [Manually Managing Power, page 12-14](#)
- [Automatically Managing Power, page 12-15](#)

Establishing the Domain

This examples shows how to set up a domain:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# energywise domain cisco secret cisco protocol udp port 43440 ip 2.2.4.30
Switch(config)# energywise importance 50
Switch(config)# energywise keywords lab1,devlab
Switch(config)# energywise name LabSwitch
Switch(config)# energywise neighbor 4510-21 43440
Switch(config)# energywise role role.labaccess
Switch(config)# end
Switch# show energywise domain
Name      : 4510-41
Domain    : cisco
Protocol  : udp
IP        : 2.2.2.21

Port      : 43440
Switch# show energywise neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

```

Id	Neighbor Name	Ip:Port	Prot	Capability
1	4510-21	2.2.2.21:43440	udp	S I
2	4510-31	2.2.4.31:43440	static	S I
3	4510-22	2.2.2.22:43440	cdp	S I

Manually Managing Power

This examples shows how to power your laboratory Cisco IP phones now:

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# energywise domain cisco secret cisco protocol udp port 43440 ip 2.2.4.30
Switch(config)# interface Gi 2/1
Switch(config-if)# energywise importance 65
Switch(config-if)# energywise level 10
Switch(config-if)# energywise name labphone.5
Switch(config-if)# energywise role role.labphone
Switch(config)# end
```

Automatically Managing Power

This example shows how to automatically power Cisco IP phones at 8:00 a.m. (0800) local time and power off at 8:00 p.m.(2000) local time, perform the following task:

```
Switch# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# energywise domain cisco secret cisco protocol udp port 43440 ip 2.2.4.30
Switch(config)# interface Gi 2/14
Switch(config-if)# energywise level 10 recurrence importance 90 at 0 8 * * *
Switch(config-if)# energywise level 0 recurrence importance 90 at 0 20 * * *
Switch(config-if)# energywise importance 50
Switch(config-if)# energywise name lobbyInterface.3
Switch(config-if)# energywise role role.lobbyaccess
Switch(config-if)# end
Switch# show energywise recurrences
Id      Addr      Class Action Lvl Cron
--      -
5       Gi3/14    QUERY SET    10 minutes: 0 hour: 8 day: * month: * weekday: *
6       Gi3/14    QUERY SET    0  minutes: 0 hour: 20 day: * month: * weekday: *
```

```
Switch# show running-config
<output truncated>
interface GigabitEthernet2/1
 energywise level 10 recurrence at 0 8 * * *
 energywise level 0 recurrence at 0 20 * * *
 energywise importance 50
 energywise role role.lobbyaccess
 energywise name lobbyInterface.3
end
<output truncated>
```

Managing Multiple Entities

EnergyWise enables you to manage the energy usage of multiple entities in an EnergyWise network.

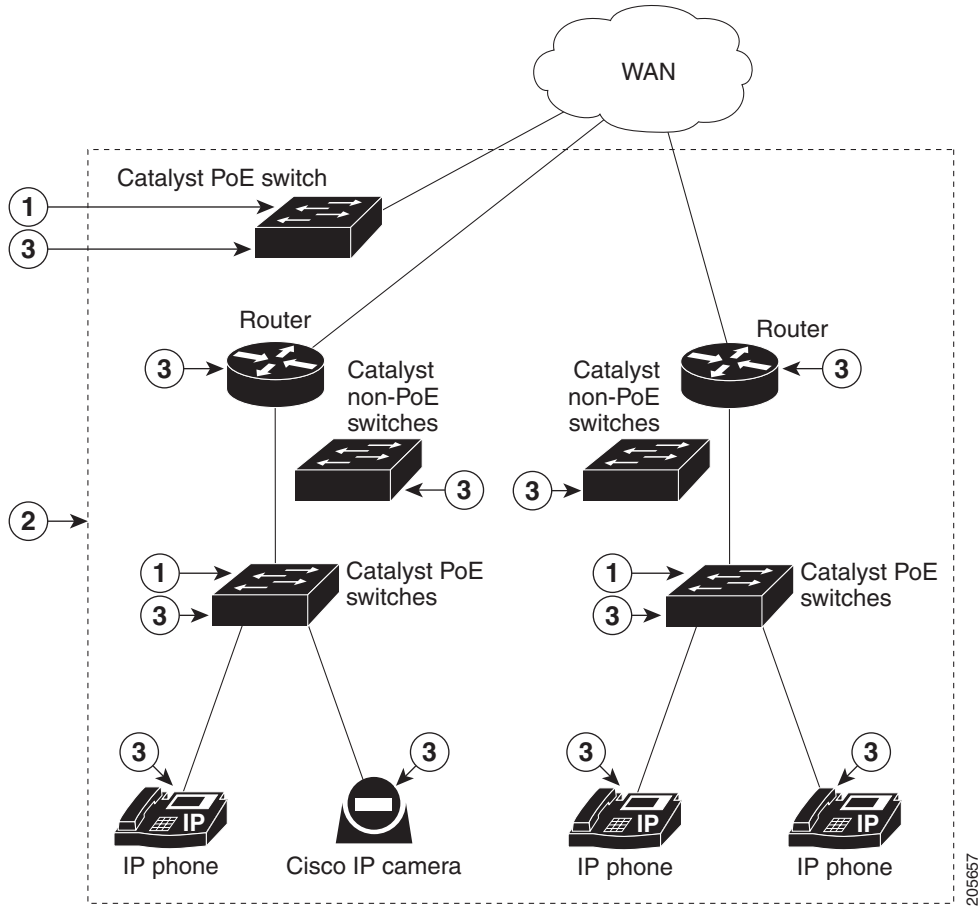
This section includes the following topics:

- [Multiple PoE Switch Scenario, page 12-15](#)
- [Managing Power in a Domain with Queries, page 12-17](#)
- [Examples of Managing Multiple Entities, page 12-18](#)

Multiple PoE Switch Scenario

Figure 12-3 shows a typical scenario where you manage multiple PoE switch entities.

Figure 12-3 Multiple PoE Switches Example




In Figure 12-3, the numbers correspond to the following:

1	An entity that can manage power usage
2	A domain
3	Entities

Managing Power in a Domain with Queries

To manage the power in a domain with queries, in privileged EXEC mode, perform this task:

	Command	Purpose
Step 1	<pre>energywise query importance importance {keywords word,word,... name name} collect {delta usage} or energywise query importance importance {keywords word,word,... name name} sum {delta usage}</pre>	<p>(Optional) Runs a query to display power information for the entities and PoE ports in the domain.</p> <ul style="list-style-type: none"> • importance <i>importance</i>—Filter the results based on the importance value. Only entities with values less than or equal to the specified value appear. The importance range is from 1 to 100. • (Optional) keywords <i>word,word,...</i>—Filter the results based on one or more of the specified keywords. • (Optional) name <i>name</i> —Filter the results based on the name. For the wildcard, use * or name* with the asterisk at the end of the name phrase. • collect {delta usage}—Display the delta or usage values for the entity or PoE ports. <ul style="list-style-type: none"> – delta—Display only the differences between the current and available power usage. – usage—Display only the current power usage. • sum {delta usage}—Display the sum of the delta or usage values for the entity or PoE ports. <ul style="list-style-type: none"> – delta—Display only the sum of the differences between the current and available power levels. – usage—Display the sum of the current power usage. <p>Note In the results with the sum keyword, the Responded total is inaccurate. Instead, the Queried total is accurate and is the total number of entities that respond to the query.</p> <p>Note In the results with the collect keyword, the Queried total is the number of entities that received the query. The Responded total is the total number of entities that responded to the query. Some entities may not have responded because they were not selected by the filters in the query.</p> <p>Repeat this step to run another query.</p>

Command	Purpose
Step 2 <code>energywise query importance importance</code> <code>{keywords word,word,... name name} set</code> <code>level level</code>	<p>(Optional) Runs a query to power the entities or PoE ports in a domain.</p> <hr/>  <p>Caution Use this query with care because it affects the entity on which you enter the command and other entities in the domain that match the query criteria.</p> <hr/> <ul style="list-style-type: none"> • importance importance—Filter the results based on the importance value. Only entities with values less than or equal to the specified value appear. The importance range is from 1 to 100. • (Optional) keywords word,word,...—Filter the results based on one or more of the specified keywords. • (Optional) name name —Filter the results based on the name. For the wildcard, use * or name* with the asterisk at the end of the name phrase. • set level level—Set the power level of the entities or PoE ports. For switches, the only valid value is 10. For the ports, the valid values are 0 to 10. <p>Repeat this step to run another query.</p>

Examples of Managing Multiple Entities

This section includes the following examples of running EW queries:

- [Querying with the Name Attribute, page 12-18](#)
- [Querying with Keywords, page 12-19](#)
- [Querying to Set Power Levels, page 12-19](#)

In these examples, Switch 1 and Switch 2 are in the same domain. The entity called **shipping.1** is a PoE port on Switch 1, and the entity called **shipping.2** is a poE port on Switch 2.

Querying with the Name Attribute

To display the power usage of the domain entities with names beginning with *shipping* and with importance values less than or equal to 80, enter the following command on Switch 1:

```
Switch# energywise query importance 80 name shipping.* collect usage
EnergyWise query, timeout is 3 seconds:
```

Host	Name	Usage
----	----	-----
192.168.20.1	shipping.1	6.3 (W)
192.168.20.2	shipping.2	8.5 (W)

```
Queried: 2    Responded: 2    Time: 0.4 seconds
```

The first row (shipping.1) is from Switch 1. The second row (shipping.2) is from Switch 2, a neighbor of Switch 1.

Querying with Keywords

To display the power usage of Cisco IP phones with different names, different roles, and importance values less than or equal to 80, but all with the Admin keyword, run this query on Switch 1:

```
Switch# energywise query importance 80 keyword Admin collect usage
EnergyWise query, timeout is 3 seconds:
```

Host	Name	Usage
192.168.40.2	shipping.1	6.3 (W)
192.168.50.2	orders.1	10.3 (W)

```
Queried: 2    Responded: 2    Time: 0.5 seconds
```

Switch 1 reports two phones are connected to Switch 2, a neighbor of Switch 1.

Querying to Set Power Levels

Enter the following commands on Switch 1 to set power levels:

- Set the power level of the shipping.2 entity to 0:

```
Switch# energywise query importance 80 name shipping.2 set level 0
```

- Manually set the power level of the shipping.1 entity and the shipping.2 entity to 0:

```
Switch# energywise query importance 90 name shipping.* set level 0
```

- Set the power level of entities with the keyword Admin to 10:

```
Switch# energywise query importance 60 keyword Admin set level 10
EnergyWise query, timeout is 3 seconds:
!!!!
Success rate is (2/2) setting entities
```

```
Queried: 2    Responded: 2    Time: 0.15 seconds
```

- Verify the power levels:

```
Switch# energywise query importance 85 keyword Admin collect usage
EnergyWise query, timeout is 3 seconds:
```

Host	Name	Usage
192.168.40.2	shipping.1	0.0 (W)
192.168.50.2	orders.1	0.0 (W)

```
Queried: 2    Responded: 2    Time: 0.9 seconds
```

You can also use the **show energywise usage** privileged EXEC command on Switch 1 and Switch 2 to verify the power levels.

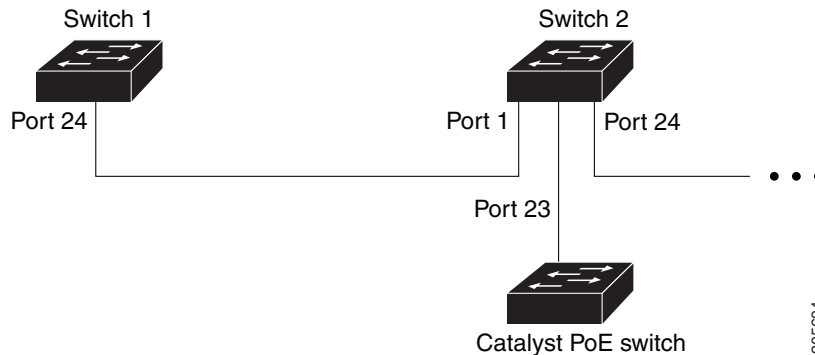
Managing Power in a LAN

In this scenario, you connect multiple switches in the same LAN and in the same EnergyWise domain.

In this example, the domain configuration includes the following:

- UDP default port (43440)
- Gigabit Ethernet port 1/0/23 on Switch 2 to which a Catalyst PoE switch is connected

Figure 12-4 EnergyWise with LANs



On Switch 1, configure the domain with the following command:

```
Switch(config)# energywise domain cisco secret 0 cisco protocol udp port 43440 interface
gigabitethernet1/0/24
```

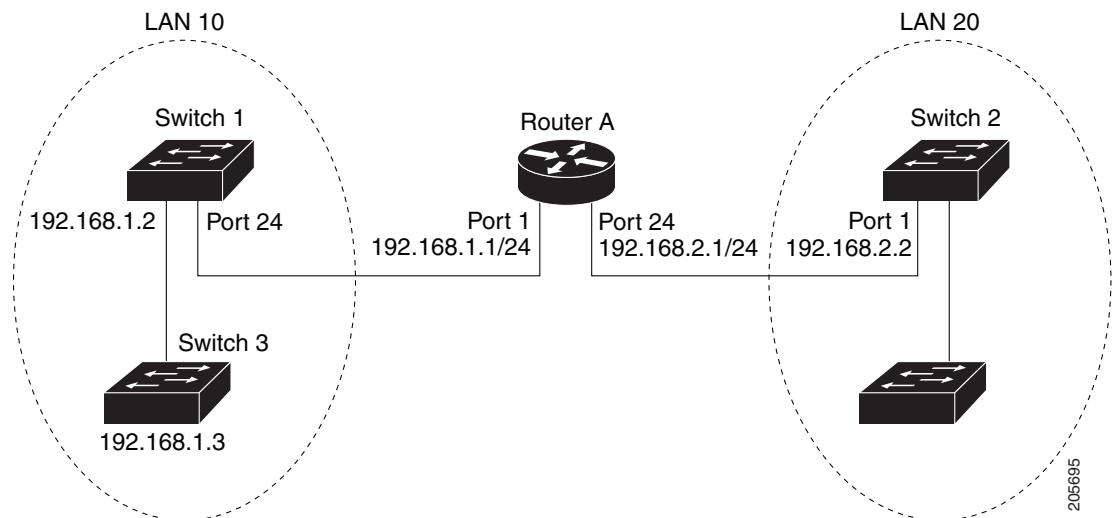
On Switch 1, verify that the neighbors discovered by the EnergyWise protocols with the following command:

```
Switch# show energywise neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Id   Neighbor Name      Ip:Port          Prot  Capability
--   -
4    Switch-2           192.168.20.2:43440  udp   S I
```

Managing Power with IP Routing

In this scenario, your switches (Switch 1 and Switch 2) are in a *disjointed domain*. Neighbors might not be discovered automatically (Figure 12-5).

Figure 12-5 EnergyWise with IP Routing



On Switch 1, to prevent a disjointed domain, manually assign Switch 2 as a static neighbor, or the reverse:

```
Switch(config)# energywise neighbor 192.168.2.2 43440
```

Switch 1 discovers Switch 3 as a neighbor because they are in the same LAN.

On Switch 1, verify that neighbors are discovered:

```
Switch# show energywise neighbors
Capability Codes: R-Router, T-Trans Bridge, B-Source Route Bridge
                  S-Switch, H-Host, I-IGMP, r-Repeater, P-Phone

Id   Neighbor Name      Ip:Port          Prot   Capability
--   -
6    Switch-2           192.168.2.2:43440  static S I
9    Switch-3           192.168.1.3:43440   cdp   S I
```

Switch 1 uses both static and dynamic protocols to detect neighbors.

Verify that switches are in the same domain:

```
Switch# energywise query name * collect usage
EnergyWise query, timeout is 3 seconds:
Host          Name           Usage
----          -
192.168.1.2   Switch-1       96.0 (W)
192.168.40.2  shipping.1     6.3 (W)
192.168.40.2  guest.1        10.3 (W)
192.168.50.2  shipping.2     8.5 (W)
192.168.50.2  lobby.1        10.3 (W)

Queried: 72   Responded: 72   Time: 0.65 second
```

In a routed network, a switch port assigned to a VLAN can be connected to a router interface. The IP address of the VLAN SVI is 192.168.1.2, and the IP address of the router interface is 192.168.1.1.

Configure the domain as follows:

```
Switch(config)# energywise domain cisco secret 0 cisco protocol udp port 43440 ip 192.168.1.2
```

**Note**

To prevent a disjointed domain, you can also configure a helper address on Router A and specify that the router use UDP to forward broadcast packets with these commands

ip helper-address *address* interface configuration command

ip forward-protocol udp [*port*] global configuration command

Command Usage to Verify CLI Functioning

Topics include:

- [Using CLI Commands, page 12-22](#)
- [Verifying the Power Usage, page 12-23](#)

Using CLI Commands

To delete the EnergyWise neighbor tables on an entity, use the **clear energywise neighbors** command. A table is automatically repopulated when the neighbors are rediscovered.

To disable EnergyWise, use the **no energywise** command as follows ([Table 12-3](#)).

Table 12-3 *Disabling EnergyWise*

Device	Command	Command Mode
Entity	no energywise domain	global configuration
PoE port	no energywise	interface configuration

To display critical information about your network, use the following **show** commands ([Table 12-4](#)).

Table 12-4 *show Privileged EXEC Commands*

Command	Purpose
show cdp neighbors	Displays the neighbors discovered by CDP. Note This is not an EnergyWise command but may still be useful for troubleshooting.
show energywise	Displays the settings and status for the entity.
show energywise children	Display the status of the entity and the PoE ports in the domain.
show energywise domain	Displays the domain to which the entity belongs.
show energywise events	Displays the last ten events (messages) sent to other entities in the domain.
show energywise neighbors	Displays the neighbor tables for the domains to which the entity belongs.
show energywise recurrences	Displays the EnergyWise settings and status for recurrence.

Table 12-4 *show Privileged EXEC Commands (continued)*

Command	Purpose
<code>show energywise statistics</code>	Displays the counters for events and errors.
<code>show energywise usage</code>	Displays the current power usage on the entity.
<code>show energywise version</code>	Displays the current EnergyWise version.
<code>show power inline</code>	Displays the PoE status.

Verifying the Power Usage

This example shows that the Cisco 7960 IP Phone uses 6.3 watts and that the Cisco 7970G IP Phone uses 10.3 watts:

```
Switch# show energywise usage children
Interface  Name           Usage           Caliber
-----
Switch    Switch         144.0 (W)      max
Gi4/1     Gi4.1          7.5 (W)        trusted
Gi4/2     Gi4.2          12.9 (W)       trusted
Gi4/3     Gi4.3          12.9 (W)       trusted
Gi4/4     Gi4.4          16.6 (W)       trusted
Gi4/5     Gi4.5          6.3 (W)        trusted
Gi4/6     Gi4.6          10.3 (W)       trusted

Switch# show power inline
Available:210(w)  Used:69(w)  Remaining:141(w)

Interface Admin  Oper           Power(Watts)   Device           Class
-----
From PS   To Device
-----
Gi4/1     auto  on            7.5            7.0             Ieee PD          2
Gi4/2     auto  on            13.9           12.9            IP Phone 7961    3
Gi4/3     auto  on            13.9           12.9            IP Phone 7961    3
Gi4/4     auto  on            16.6           15.4            Ieee PD          0
Gi4/5     auto  on            6.8            6.3             IP Phone 7906    2
Gi4/6     auto  on            11.0           10.3            IP Phone 7970    3
```

