



CHAPTER 2

Configuring EnergyWise

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Configuration Guidelines

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Enabling EnergyWise and Powering Devices

By default, EnergyWise is disabled on the domain member.

If you enter the **no energywise level** interface configuration command, the domain member does not immediately change to the default power level. The power level changes when you restart the domain member or enter the **energywise level level** command.

For a domain member with PoE ports, such as a PoE-capable switch:

- When you add the domain member to a domain, EnergyWise is enabled on the domain member and all the PoE ports.
- When you use the **energywise level 0** interface configuration command, the port does not provide power to connected endpoints.
- You cannot use the **energywise level 0** global configuration command to power off the domain member.

When you use the **energywise level level** global configuration command to set the power level for a parent entity, you can only configure power level **10**. Configuring any other power level has no effect on the parent entity.

If a port is error-disabled:

- It appears as an EnergyWise domain member or endpoint in the **show** command output and in the *collect* query results. The query results show that the port uses 0 watt.
- It does not respond to a *set* query.

Recurrences

- [Time Format and Time Zone, page 2-2](#)
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Time Format and Time Zone

For time format, use the 24-hour clock. The time zone is based on the domain member.

- To set a recurrence at a specific time, enter the **energywise level level recurrence importance importance at minute hour day_of_month month day_of_week** interface configuration command.

For example, to configure a recurrence that occurs every day at 06:34, enter the **energywise level level recurrence importance at 34 6 * * *** command.

- *minute* is 34.
 - *hour* is 6.
 - *day_of_month* is the wildcard (*) for every day in the month.
 - *month* is the wildcard (*) for every month.
 - *day_of_week* is the wildcard (*) for every day in the week.
- To set 06:34 in a time range, enter the **absolute 06:34 * * 2009** and the **periodic 06:34** interface configuration commands.

Day of the Month and Day of the Week Recurrences

When you use the *day_of_month* and the *day_of_week* in the **energywise level level recurrence importance importance at minute hour day_of_month month day_of_week** interface configuration command:

- The recurrence occurs when either the *day_of_month* or the *day_of_week* occurs first (in releases earlier than the EnergyWise Version 2.7 releases). For information about software releases with Cisco EnergyWise Version 2.7, see the *Release Notes for Cisco EnergyWise, EnergyWise Version 2.7* on Cisco.com.
- If you specify both the *day_of_month* and the *day_of_week*, the event occurs when either the *day_of_month* or the *day_of_week* is first.
- If you specify the *day_of_month* and use a wildcard (*) for the *day_of_week*, the event occurs on the *day_of_month*.
- If you use a wildcard for the *day_of_month* and specify the *day_of_week*, the event occurs on the *day_of_week*.
- If you use wildcards for both the *day_of_month* and the *day_of_week*, the event occurs on any day.

PoE and EnergyWise Interactions

You can configure EnergyWise on the port and configure the port power level.

Table 2-1 shows you how to find out if a domain member port participates in EnergyWise. For example, If the PoE port mode is **never**, EnergyWise is not disabled even if the port power is off.

Table 2-1 Domain Member Port Participation in EnergyWise

Port	PoE Mode		
	auto	never	static
PoE	Yes	No	Yes
Non-PoE	No	No	No

When you change the port mode to **auto** or **static**, changes are effective immediately. You do not need to restart the domain member.

If EnergyWise is disabled, the domain member can use PoE to manage the port power usage.

CLI Compatibility



Note

Catalyst 6500 switches do not support EnergyWise Version 1.

To display the EnergyWise version running on your domain member, use the **show energywise version** privileged EXEC command. The EnergyWise version is referred to as the *EnergyWise specification* in the command output.

To display the software version running on your domain member, use the **show version** privileged EXEC command.



Note

If your domain member is running EnergyWise Version 2.6 or later, enter the **no energywise domain** global configuration command to disable EnergyWise before downgrading your software to a release supporting EnergyWise Version 1.

If your domain member is running EnergyWise Version 1 and you upgrade your software to a release supporting EnergyWise Version 2.6 or later:

- The EnergyWise settings in the running configuration are updated. The domain member sets the management password as the same domain password in the **energywise domain** command.
Enter the **copy running-config startup-config** privileged EXEC command to save the EnergyWise settings in the configuration file.
- For EnergyWise to work properly
 - All domain members must run EnergyWise Version 1 or EnergyWise Version 2.6 or later.
 - All domain members must have the same domain name and security mode.
 - If your switch is stacking-capable (for example a Catalyst 3750-X, 3750-E, or 3750 switch) and is a member of a switch stack, all the stack members must run the same EnergyWise version.

In EnergyWise Version 1 these commands were modified:

- **energywise domain** *domain-name* **secret** [0 | 7] *password* global configuration command
We recommend that you reconfigure the EnergyWise domain with the **energywise domain** *domain-name* **security** { **ntp-shared-secret** | **shared-secret** } [0 | 7] *shared-secret* [**protocol udp** **port** *udp-port-number* [**interface** *interface-id* | **ip** *ip-address*]] global configuration command.
If you do not reconfigure the domain, the domain member synchronizes the management password with the the domain password.
- **energywise management** *tcp-port-number* global configuration command
We recommend that you reconfigure the management password for the domain with the **energywise management security shared-secret** [0 | 7] *shared-secret* **port** *tcp-port-number* global configuration command.

For Catalyst 4500-specific issues, [Appendix A, “Cisco EnergyWise and Catalyst 4500 Switches.”](#)

For Catalyst 6500-specific issues, see [Appendix B, “Cisco EnergyWise and Catalyst 6500 Switches.”](#)

Manually Managing Power

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Enabling EnergyWise

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	<code>configure terminal</code>	Enters global configuration mode.
Step 2	<code>service password-encryption</code>	(Optional) Enables password encryption. If you set a hidden password in Step 3, enter this command.
Step 3	<code>energywise domain <i>domain-name</i> security {ntp-shared-secret shared-secret} [0 7] <i>domain-password</i> [protocol udp port <i>udp-port-number</i> [interface <i>interface-id</i> ip <i>ip-address</i>]]</code>	<p>Enables EnergyWise on the network device, assigns it to a domain with the specified <i>domain-name</i>, sets the domain security mode, and sets the domain password to authenticate all communication in the domain.</p> <ul style="list-style-type: none"> • ntp-shared-secret—Sets a strong password with NTP. If the time between members varies ± 30 seconds, the domain member drops events. • shared-secret—Sets a strong password without NTP. • (Optional) 0—Uses a plain-text password. This is the default. • (Optional) 7—Uses a hidden password. <p>If you do not enter 0 or 7, the default is 0.</p> <ul style="list-style-type: none"> • (Optional) port <i>udp-port-number</i>—Specifies the UDP port that communicates with the domain. The range is from 1 to 65000. The default is 43440. • (Optional) interface <i>interface-id</i>—Specifies the port that communicates with the domain if the IP address is dynamically assigned. We recommend that you specify the <i>interface-id</i>. You should use this in a bridged network. • (Optional) ip <i>ip-address</i>—Specifies the IP address that communicates with the domain if the interface is a switched virtual interface (SVI) and VLAN trunking protocol (VTP) pruning is enabled. You should use this in a routed network. <p>For the <i>domain-name</i> and <i>domain-password</i></p> <ul style="list-style-type: none"> • You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. • Do not enter an asterisk (*) or a space between the characters or symbols.

	Command	Purpose
Step 4	end	Returns to privileged EXEC mode.
Step 5	show energywise show energywise domain	Verifies your entries.
Step 6	copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring Domain Member or Endpoint Attributes

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	configure terminal	Enters global configuration mode.
Step 2	energywise importance <i>importance</i>	Sets the importance. The range is from 1 to 100. The default is 1.
Step 3	energywise keywords <i>word,word,...</i>	Assigns at least one keyword. When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords. <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. By default, keywords are not defined.
Step 4	service password-encryption	Enables password encryption. If you set a hidden password in Step 5 or Step 10, enter this command.
Step 5	energywise management security shared-secret [0 7] <i>mgmt-password</i> [port <i>tcp-port-number</i>]	Sets the management password on the domain member that the management station uses to communicate with the domain. <ul style="list-style-type: none"> (Optional) 0—Uses a plain-text password. (Optional) 7—Uses a hidden password. If you do not enter 0 or 7, the default is 0. For the <i>mgmt-password</i> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. (Optional) port <i>tcp-port-number</i>—Specifies the TCP port for management access. The range is from 1025 to 65535. The default is 43440. By default, the management password is not set.

	Command	Purpose
Step 6	energywise name <i>name</i>	<p>Specifies the EnergyWise-specific name.</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. <p>The default is the hostname.</p>
Step 7	energywise neighbor { <i>hostname</i> <i>ip-address</i> } <i>udp-port-number</i>	<p>Assigns a static neighbor.</p> <ul style="list-style-type: none"> Domain Name System (DNS) 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 65000. <p>By default, static neighbors are not assigned.</p>
Step 8	energywise role <i>role</i>	<p>Specifies the role in the EnergyWise domain. For example, lobby.b20.</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. <p>The default is the model number.</p>
Step 9	energywise allow query { <i>save</i> <i>set</i> }	<p>Configures the domain member to respond to queries from the managements station or another domain member.</p> <ul style="list-style-type: none"> save—Respond to a query to save the running configuration. set—Respond to a query to change the power level or the EnergyWise attributes. <p>By default, the domain member responds to the set query.</p>
Step 10	energywise endpoint security { <i>none</i> <i>shared-secret</i> [<i>0</i> <i>7</i>] <i>shared-secret</i> }	<p>Sets the security mode for an endpoint.</p> <ul style="list-style-type: none"> none—Disables security. shared-secret—Uses a password for secure communication with the domain member. (Optional) 0—Uses a plain-text password. (Optional) 7—Uses a hidden password. <p>If you do not enter 0 or 7, the default is 0.</p> <ul style="list-style-type: none"> For the <i>shared-secret</i> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. <p>By default, the password is not set.</p>
Step 11	end	Returns to privileged EXEC mode.

	Command	Purpose
Step 12	<code>show energywise</code> <code>show energywise domain</code>	Verifies your entries.
Step 13	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file.

Powering the PoE Port

Beginning in privileged EXEC mode:

	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 level level</code>	Manually powers on the port. <ul style="list-style-type: none"> For a connected PoE endpoint, enter a power level of 10. For a non-PoE-capable endpoint, enter a power level from 1 to 10. The endpoint determines the appropriate action.
Step 4	<code>end</code>	Returns to privileged EXEC mode.
Step 5	<code>show energywise domain</code> <code>show energywise children</code>	Verifies your entries.
Step 6	<code>copy running-config startup-config</code>	(Optional) Saves your entries in the configuration file. Note The power level that you set in Step 3 is the default power level when the domain member restarts.

Configuring Port Attributes



Note See the [“Using Activity Check” section on page 2-12](#) for the switches that support the **energywise activitycheck** command.

Beginning in privileged EXEC mode:

	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>	Sets the importance value of the port. The range is from 1 to 100. The default is 1.

	Command	Purpose
Step 4	energywise keywords <i>word,word,...</i>	<p>Assigns at least one keyword for the port.</p> <p>When assigning multiple keywords, separate the keywords with commas, and do not use spaces between keywords.</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols <p>By default, keywords are not defined.</p>
Step 5	energywise name <i>name</i>	<p>Specifies the EnergyWise-specific port name.</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. <p>The default is a short version of the port name; for example, Gi1.0.2 for Gigabit Ethernet 1/0/2.</p>
Step 6	energywise role <i>role</i>	<p>Specifies the role of the port in the domain, such as <i>lobbyport</i>.</p> <ul style="list-style-type: none"> You can enter alphanumeric characters and symbols such as #, (, \$, !, and &. Do not enter an asterisk (*) or a space between the characters or symbols. <p>By default, the role is <i>interface</i>.</p>
Step 7		<p>(Optional) Before entering the energywise activitycheck command</p> <ul style="list-style-type: none"> Verify that auto quality of service (auto-QoS) is enabled on the port and on the connected IP phone. If the domain member is connected to the IP phones through multiple Cisco devices, verify that they trust the CoS value in incoming packets. <p>To configure auto-QoS, see the “Using Activity Check” section on page 2-12 and the software documentation for your Cisco network device.</p>
Step 8	energywise activitycheck	<p>Configures the domain member to wait until a Cisco IP phone connected to a PoE port is not sending or receiving traffic before the domain member powers off the port.</p> <p>Note The domain member cannot determine if the IP phone is in the hold state.</p>
Step 9	energywise allow query set	<p>If the interface receives a query from the management station or another domain member, configures the interface to respond to a query changing the power level and the EnergyWise attributes.</p> <p>By default, the domain member responds to this query.</p>
Step 10	end	Returns to privileged EXEC mode.
Step 11	show running-config	Verifies your entries.
Step 12	copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Configuring Recurrences

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	show energywise	Verifies that EnergyWise is enabled.
Step 2	configure terminal	Enters global configuration mode.
Step 3	time-range <i>time-range-name</i>	<p>Assigns a name to the time range, and enter time-range configuration mode. If you do not configure a time range, go to Step 6.</p> <p>The time range is based on the system clock.</p> <ul style="list-style-type: none"> • If EnergyWise is not running on the endpoint (for example, a PoE endpoint), the specified times are based on the domain member time zone. • If an agent or client is running on the endpoint, the specified times are based on the endpoint time zone. <p>Use the absolute and the periodic time-range configuration commands to specify times and days for a recurrence. You can use one absolute condition and multiple periodic conditions.</p> <p>If your absolute or periodic condition has an end time and day, the domain member ignores these values.</p>
Step 4	absolute start <i>hh:mm day_of_month month year</i>	<p>Sets the start time and day for the recurrence.</p> <ul style="list-style-type: none"> • <i>hh:mm</i>—Specifies the time (24-hour format) in hours and minutes. • <i>day month year</i>—Specifies the date. <ul style="list-style-type: none"> – <i>day_of_month</i>—The range is from 1 to 31. Use * for the wildcard. – <i>month</i>—The range is from January to December. Use * for the wildcard. – <i>year</i>—The minimum year is 1993.
Step 5	periodic <i>days_of_the_week hh:mm</i>	<p>Sets the weekly start time and day for the recurrence.</p> <ul style="list-style-type: none"> • <i>days_of_the_week</i>—Valid values are <ul style="list-style-type: none"> – Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, or Sunday—Enter a single day, a range of days with a dash between the starting and ending days, or multiple days separated by a comma. – daily—Enter if the recurrence starts from Monday to Sunday. – weekdays—Enter if the recurrence starts from Monday to Friday. – weekend—Enter if the event occurs on Saturday and Sunday. • <i>hh:mm</i>—Specifies the time (24-hour format) in hours and minutes.
Step 6	interface <i>interface-id</i>	Specifies the port or a range of ports to be configured, and enters interface configuration mode.

	Command	Purpose
Step 7	energywise level <i>level</i> recurrence importance <i>importance</i> { at <i>minute hour</i> <i>day_of_month month day_of_week</i> time-range <i>time-range-name</i> }	<p>Schedules a power-on or power-off event.</p> <ul style="list-style-type: none"> • level <i>level</i> —Specifies the power level. <ul style="list-style-type: none"> – To power off the endpoint, enter 0. – To power on the endpoint: <ul style="list-style-type: none"> If it is a PoE endpoint, enter 10. If it is another powered device, enter a power level from 1 to 10. The endpoint determines the appropriate action. • importance <i>importance</i>—The event occurs if the importance value of the endpoint is less than or equal to the importance value. The range is from 1 to 100. • at <i>minute hour day_of_month month day_of_week</i>—Specifies the time (24-hour format) in cron format for the recurrence. <ul style="list-style-type: none"> – <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 (Sunday) to 6 (Saturday). Use * for the wildcard. • time-range <i>time-range-name</i>—Specifies the time range for the recurrence. <p>The event uses the domain member time. Repeat this step to schedule another event.</p>
Step 8	end	Returns to privileged EXEC mode.
Step 9	show energywise recurrence	Verifies your entries.
Step 10	copy running-config startup-config	(Optional) Saves your entries in the configuration file.

Using Activity Check

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Use this feature to ensure that the switch does not power off a phone that is in use.

For example, if you have a Cisco IP phone connected to a PoE port and activity check is enabled, the switch does not power off the phone if it is sending or receiving voice traffic. If the phone is not in use, it powers off within approximately 1 minute. If a PC is connected to the switch port of the phone, the PC loses network connectivity when the phone is powered off.

You can use the **energywise activitycheck** interface configuration command on these Cisco devices:

- Catalyst 6500 switches (see the *Cisco IOS Release Notes for Cisco EnergyWise, EnergyWise Phase 2* for the specific devices).
- Catalyst 4500 switches.



Note Before powering off a PoE port, Catalyst 6500 and Catalyst 4500 switches use interface statistics to determine that a Cisco IP phone connected to the PoE port is not sending or receiving traffic.

- Catalyst 3750-X, 3750-E, 3750, 3560-X, 3650-E, 3560, and 2960 switches.
- Cisco EtherSwitch service modules (NME-16ES-1G, NME-16ES-1G-P, NME-X-23ES-1G, NME-X-23ES-1G-P, NME-XD-24ES-1S-P, NME-XD-48ES-2S-P).
- Cisco enhanced EtherSwitch service modules (SM-D-ES2-48, SM-D-ES3-48-P, SM-D-ES3G-48-P, SM-ES2-16-P, SM-ES2-24, SM-ES2-24-P, SM-ES3-16-P, SM-ES3-24-P, SM-ES3G-16-P, SM-ES3G-24-P).

Prerequisites



Note These prerequisites do not apply to Catalyst 4500 and 6500 switches.

Check these settings before using the **energywise activitycheck** command:

- All packets from the IP phone have the class of service (CoS) value 5.
To verify this, use the **show mls qos maps cos-output-q** privileged EXEC command to display the CoS output queue threshold map.

This example shows that CoS value 5 is mapped to queue 1 and threshold 3 on the Gigabit Ethernet 0/1 port:

```
Cos-outputq-threshold map:
  cos:  0   1   2   3   4   5   6   7
  -----
  queue-threshold: 4-3 4-2 3-3 2-3 3-3 1-3 2-3 2-3
```

This is the configuration for the PoE port:

```
<output truncated>
interface GigabitEthernet0/1
  srr-queue bandwidth share 10 10 60 20
  queue-set 2
  priority-queue out
  mls qos trust device cisco-phone
  mls qos trust cos
  auto qos voip cisco-phone
  service-policy input AutoQoS-Police-CiscoPhone
<output truncated>
```

- Auto quality of service (auto-QoS) for VoIP is enabled on the PoE port.
- Auto-QoS is enabled on the IP phone. The switch does not change the CoS value in the packet that comes from the IP phone.
- If the switch is connected to the IP phone through multiple Cisco devices, you have checked that they trust the CoS value in incoming packets and do not change it.

Testing Activity Check

After you have enabled activity check, test it to make sure that the switch powers off the port only when a connected Cisco IP phone is not sending or receiving voice traffic. While making a phone call:

- Set the port power level to 0. The switch does not power off the IP phone. To set the power level, you can:
 - Run a query (using the CLI or the management application programming interface (MAPI)): The switch performs an activity check before powering off.
 - Use a recurrence: The switch performs an activity check before powering off.
 - Use the CLI: The switch does not perform an activity check and powers off the PoE port immediately.

For information about setting the power level and using recurrences, see the [“Querying to Set Power Levels”](#) section on page 2-23 and the [“Configuring Recurrences”](#) section on page 2-10.

- Use the **show mls qos interface statistics** privileged EXEC command to display the port QoS statistics, including the number of packets in queue 1.

This command does not apply to Catalyst 6500 switches.

This example uses the **show mls qos maps cos-output-q** privileged EXEC command to show which output queue and threshold is mapped to CoS 5 for voice traffic. The example then uses the **show mls qos interface statistics** privileged EXEC command to display the number of packets in the output queue to determine if the domain member (the IP phone) is sending out packets:

```
DomainMember# show mls qos maps cos-output-q
                Cos-outputq-threshold map:
                cos: 0 1 2 3 4 5 6 7
                -----
queue-threshold: 2-1 2-1 3-1 3-1 4-1 1-1 4-1 4-1
<output truncated>
```

CoS 5 is mapped to queue-threshold: 1-1 (queue 1 and threshold 1).

```
DomainMember# show mls qos interface statistics

output queues enqueued:
queue:      threshold1  threshold2  threshold3
-----
queue 0:    0           0           0
queue 1:    0           0           0
queue 2:    0           0           0
queue 3:    0           0           0
<output truncated>
```

The output queue for queue 1 and threshold 1 is 0, which means that the phone is not sending out packets and the switch can power off the phone. If a phone conversation were in-progress, the output queue would have non-zero packets in the output queue.

Configuration Examples

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- [Manually Managing Power, page 2-15](#)
- [Automatically Managing Power, page 2-16](#)



Note

In the examples, the *interface-id* is in this format: *type slot-or-module-number/port-number*, such as gigabitethernet 0/5. To specify an interface, see your device software documentation.

Setting the Domain

```
DomainMember# show energywise
Interface  Role      Name      Usage      Lvl  Imp  Type
-----
fanfare    jsmith    1009.0(W) 5      100 paren

DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# energywise domain cisco security ntp-shared-secret cisco protocol
udp port 43440 ip 2.2.4.30
DomainMember(config)# energywise importance 50
DomainMember(config)# energywise keywords lab1,devlab
DomainMember(config)# energywise name LabSwitch
DomainMember(config)# energywise neighbor member1 43440
DomainMember(config)# energywise role role.labaccess
DomainMember(config)# energywise allow query save
DomainMember(config)# end
DomainMember# show energywise domain
Name      : member1
Domain    : cisco
Protocol  : udp
IP        : 2.2.2.21
Port      : 43440
DomainMember# 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   member-21         2.2.2.21:43440  udp   S I
2   member-31         2.2.4.31:43440  static S I
3   member-22         2.2.2.22:43440  cdp   S I
```

Manually Managing Power

To power on the lab IP phones:

```
DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# energywise domain cisco security shared-secret cisco protocol udp
port 43440 ip 2.2.4.44
DomainMember(config)# interface gigabitethernet0/3
DomainMember(config-if)# energywise importance 65
DomainMember(config-if)# energywise name labphone.5
DomainMember(config-if)# energywise role role.labphone
DomainMember(config-if)# end
```

To power off an IP phone connected to a PoE port:

```
DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# energywise domain cisco security shared-secret cisco protocol udp
port 43440 ip 2.2.4.44
DomainMember(config)# interface gigabitethernet0/2
DomainMember(config-if)# energywise importance 65
DomainMember(config-if)# energywise name labphone.5
DomainMember(config-if)# energywise role role.labphone
DomainMember(config-if)# energywise level 0
DomainMember(config-if)# end
```

The domain member powers the IP phone whether EnergyWise is enabled or not.

Automatically Managing Power

The lab IP phones automatically power on at 08:00 and power off at 20:00.

```
DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# energywise domain cisco security shared-secret cisco protocol udp
port 43440 ip 2.2.4.30
DomainMember(config)# interface gigabitethernet1/0/3
DomainMember(config-if)# energywise level 10 recurrence importance 90 at 0 8 * * *
DomainMember(config-if)# energywise level 0 recurrence importance 90 at 0 20 * * *
DomainMember(config-if)# energywise importance 50
DomainMember(config-if)# energywise name labInterface.3
DomainMember(config-if)# energywise role role.labphone
DomainMember(config-if)# end
```

```
DomainMember# show energywise recurrences
```

Id	Addr	Class	Action	Lvl	Cron
1	Gi0/3	QUERY	SET	10	minutes: 0 hour: 8 day: * month: * weekday: *
2	Gi0/3	QUERY	SET	0	minutes: 0 hour: 20 day: * month: * weekday: *

```
DomainMember# show running-config
```

```
<output truncated>
interface GigabitEthernet0/3
energywise level 10 recurrence at 0 8 * * *
energywise level 0 recurrence at 0 20 *
energywise importance 50
energywise role role.labphone
energywise name labInterface.3
end
<output truncated>
```


The PCs on the first floor automatically power on at 06:00 and power off at 20:00.

```

DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# energywise domain cisco security shared-secret cisco protocol udp
port 43440 ip 2.2.4.30
DomainMember(config)# time-range onfirstfloor
DomainMember(config-time-range)# absolute start 0:00 1 August 2009
DomainMember(config-time-range)# periodic weekdays 6:11
DomainMember(config-time-range)# periodic weekend 9:37
DomainMember(config)# time-range offfirstfloor
DomainMember(config-time-range)# absolute start 0:00 1 August 2009
DomainMember(config-time-range)# periodic weekdays 20:19
DomainMember(config-time-range)# periodic weekend 18:59
DomainMember(config)# interface gigabitethernet0/3
DomainMember(config-if)# energywise level 10 recurrence importance 70 time-range
onfirstfloor
DomainMember(config-if)# energywise level 0 recurrence importance 70 time offfirstfloor
DomainMember(config-if)# energywise name floor.1
DomainMember(config-if)# energywise role pc-mgr
DomainMember(config-if)# end

DomainMember# show energywise recurrences
Id      Addr      Class Action Lvl Cron
--      ---      -
1       Gi0/3     QUERY SET    10 onfirstfloor
2       Gi0/3     QUERY SET    0  offfirstfloor

DomainMember# show running-config
<output truncated>
interface GigabitEthernet0/3
energywise level 10 recurrence importance 70 time-range onfirstfloor
energywise level 0 recurrence importance 70 time-range offfirstfloor
energywise role pc-mgr
energywise name floor.1
end
<output truncated>

```

The time range has end times and days such as:

```

DomainMember(config)# time-range offfirstfloor
DomainMember(config-time-range)# absolute start 0:00 1 August 2009 23:58 31 December
2011
DomainMember(config-time-range)# periodic monday 20:01 friday 23:55
DomainMember(config-time-range)# periodic saturday 18:05 sunday 23:30

```



Note

EnergyWise uses only the start time in the time range. EnergyWise ignores any configured end time.

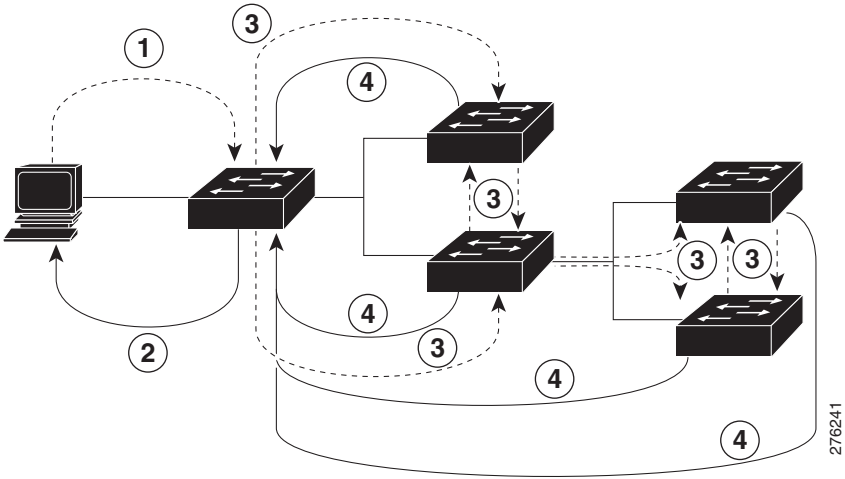
Queries

- [Using Queries to Manage Power in the Domain, page 2-19](#)
- [Query Examples, page 2-22](#)

The management station sending a query receives all the power-usage responses from the EnergyWise domain. The domain members use neighbor relationships to forward the query.

For secure communication, the domain members use a *shared secret* and send only authenticated queries to the endpoints.

Figure 2-1 Query Requests and Replies



1	Sends queries and messages to the domain	3	Sends queries and messages from domain members and endpoints
2	Replies to queries and messages from the domain	4	Replies to queries and messages from domain members and endpoints

EnergyWise-supported query types:

- Collect—Receive power-usage information from the domain members and endpoints in watts (W).
- Save—Save the running configuration of a domain member. Use the **energywise allow query save** global configuration command.
- Set—Change the power level of a domain member or endpoint in the running configuration.
- Sum—Summarize the information from domain members and endpoints.

You can use these attributes to filter the results:

- Importance—Rate your devices based on the business or deployment context. The range is from 1 (least important) to 100 (most important). The default is 1. For example, a desk phone has a lower importance than a business-critical emergency phone.
- Keywords—Device descriptions (other than the name or role).
- Name—Device identity.
- Role—Device function based on the business or deployment context.
- Usage—Specifies the energy usage type of the EnergyWise device. The default is consumer.
 - All—Devices of all usage types.
 - Consumer—A device that consumes power, such as a switch.
 - Meter—A device that measures the pass-through power, such as a power distribution unit (PDU) that sends power from a source to a connected device.
 - Producer—A device that generates power, such as a solar panel.

The query results show domain members and endpoints with importance values less than or equal to the specified value in the query.

Using Queries to Manage Power in the Domain




Note If the *timeout* value in the **energywise query importance** privileged EXEC command is too short, the management station does not receive query results even if the domain members and endpoints respond to the query. For example, if you want to power off a specific phone but the *timeout* value in the **energywise query importance** command is too short, the phone is not powered off. When configuring the *timeout*, configure a minimum of 6 seconds to display correct output.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	energywise query analyze domain <i>domain-name</i>	Runs a query to analyze and display information about the domain, including the domain size and the number of members and endpoints.

Command	Purpose
<p>Step 2 <code>energywise query importance importance {keywords word,word,... name name} collect {delta usage} [all [timeout timeout] consumer [timeout timeout] meter [timeout timeout] producer [timeout timeout] timeout timeout]</code></p> <p>or</p> <p><code>energywise query importance importance {keywords word,word,... name name} sum {delta usage} [all [timeout timeout] consumer [timeout timeout] meter [timeout timeout] producer [timeout timeout] timeout timeout]</code></p>	<p>Runs a query to display power information for the domain members and endpoints. Runs a query to change the power level and to power on or off the domain members, PoE ports, or endpoints.</p> <ul style="list-style-type: none"> • importance <i>importance</i>—Filters the results based on the importance value. Only domain members and endpoints with importance values less than or equal to the specified value respond to the query. The <i>importance</i> range is from 1 to 100. • keywords <i>word,word</i>—Filters the results based on one or more keywords. <p>Note Do not run a query with keywords *. No results are generated.</p> <ul style="list-style-type: none"> • name <i>name</i>—Filters the results based on the name. For the wildcard, use * or <i>name*</i> with the asterisk at the end of the name phrase. • collect {delta usage}—Displays power-usage information in watts (W) from the domain members and endpoints. <ul style="list-style-type: none"> – delta—Displays the <i>delta vector</i> with the <i>difference</i> between the actual power usage and the maximum power usage for each power level for what-if calculations. – usage—Displays the actual power usage. • sum {delta usage}—Displays the summary of the power-usage information from domain members and endpoints. <ul style="list-style-type: none"> – delta—Displays the delta vector. – usage—Displays the actual power usage. • (Optional) all—Displays EnergyWise devices of all usage types. • (Optional) consumer—Filters the results to display devices that consume power, such as a switch. This is the default usage type. • (Optional) meter—Filters the results to display devices that measure the pass-through power, such as a PDU that sends power from a source to a connected device. • (Optional) producer—Filters the results to display devices that generate power, such as a solar panel. • (Optional) timeout <i>timeout</i>—Sets the time in seconds that the management station waits for query results. When configuring the <i>timeout</i>, configure a minimum of 6 seconds to display correct output. <p>The default timeout is 6 seconds. The range is from 1 to 180.</p> <p>Repeat this step to run another query.</p>

Command	Purpose
Step 3 energywise query importance <i>importance</i> { keywords <i>word,word,...</i> name <i>name</i> } set level <i>level</i> [all [timeout <i>timeout</i>] consumer [timeout <i>timeout</i>] meter [timeout <i>timeout</i>] producer [timeout <i>timeout</i>] timeout <i>timeout</i>]	<p>(Optional) Runs a query to change the power level and to power on or off the domain members, PoE ports, or endpoints.</p> <hr/>  <p>Caution Use this query with care. It affects <i>both</i> the domain member on which you enter the command <i>and</i> other domain members and endpoints that match the query criteria.</p> <hr/> <ul style="list-style-type: none"> • importance <i>importance</i>—Filters the results based on the importance value. Only domain members and endpoints with values less than or equal to the specified value appear. The <i>importance</i> range is from 1 to 100. • keywords <i>word,word,...</i>—Filters the results based on one or more keywords. <p>Note Do not run a query with keywords *. No results are generated.</p> <ul style="list-style-type: none"> • name <i>name</i>—Filters the results based on the name. For the wildcard, use * or <i>name*</i> with the asterisk at the end of the name phrase. • set level <i>level</i>—Sets the power level of the domain members, endpoints, or PoE ports. The range is from 0 to 10. • (Optional) all—Displays EnergyWise devices of all usage types. • (Optional) consumer—Filters the results to display devices that consume power, such as a switch. This is the default usage type. • (Optional) meter—Filters the results to display devices that measure the pass-through power, such as a PDU that sends power from a source to a connected device. • (Optional) producer—Filters the results to display devices that generate power, such as a solar panel. • (Optional) timeout <i>timeout</i>—Sets the time in seconds that the management station waits for query results. When configuring the <i>timeout</i>, configure a minimum of 6 seconds to display correct output. <p>The default is 6 seconds. The range is from 1 to 180.</p> <p>Repeat this step to run another query.</p>

Query Examples

- [Querying to Analyze Domains, page 2-22](#)
- [Querying with the Name Attribute, page 2-22](#)
- [Querying with Keywords, page 2-23](#)
- [Querying to Set Power Levels, page 2-23](#)

Querying to Analyze Domains

This example shows how to display information about the domain, such as the number of members, endpoints and the domain size.

```
DomainMember# energywise query analyze domain
EnergyWise is currently analyzing the domain, please wait...
EnergyWise Domain Statistics
-----
Querying from HW Model: WS-C3560G-48PS
Number of Domain Members: 3
Number of Endpoints: 1
```

Querying with the Name Attribute

In this example, Switch 1 and Switch 2 are in the same domain. *shipping.1* is a PoE port on Switch 1, and *shipping.2* is a PoE port on Switch 2.

The example shows the power usage of the domain members and endpoints with names beginning with *shipping* and with importance values less than or equal to 80. Run this query on Switch 1:

```
DomainMember# energywise query importance 80 name shipping.* collect usage
EnergyWise query, timeout is 6 seconds:
```

Host	Name	Usage	Level	Imp
192.168.20.1	shipping.1	6.3 (W)	10	1
192.168.20.2	shipping.2	8.5 (W)	10	1

```
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

In this example, Switch 1 and Switch 2 are in the same domain. *shipping.1* is a PoE port on Switch 1, and *shipping.2* is a PoE port on Switch 2.

The example shows the power usage of IP phones with different names, different roles, and importance values less than or equal to 80, but all that have the *Admin* keyword. Run this query on Switch 1:

```
DomainMember# energywise query importance 80 keyword Admin collect usage
EnergyWise query, timeout is 6 seconds:
```

Host	Name	Usage	Level	Imp
192.168.40.2	shipping.1	6.3 (W)	10	1
192.168.50.2	orders.1	10.3 (W)	10	1
192.168.60.3	pc.1	200.0 (W)	8	75

```
Queried: 3   Responded: 3   Time: 0.5 seconds
```

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



Note Do not run a query with **keywords ***. No results are generated.

Querying to Set Power Levels

Run these queries on Switch 1:

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

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

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

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

- Set the power level of devices that have the keyword *Admin* to 10:

```
DomainMember# energywise query importance 60 keyword Admin set level 10
EnergyWise query, timeout is 6 seconds:
!!!!
Success rate is (2/2) setting entities
```

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

To show the power usage of EnergyWise devices with usage type **all**:

```
DomainMember# energywise query importance 100 name * collect usage all
EnergyWise query, timeout is 6 seconds:
```

Host	Name	Usage	Level	Imp
10.1.2.83	SEP5475d0db0dcb	3.8 (W)	10	5
10.1.2.71	SEP1C17D340834E	8.8 (W)	10	1
10.1.2.68	SEP3037A61748E2	8.8 (W)	10	1
10.1.2.211	Local_InfeedA_Outlet1	0.0 (W)	0	50
10.1.2.211	Local_InfeedA_Outlet2	0.0 (W)	0	50
10.1.2.211	Local_InfeedA_Outlet3	0.0 (W)	0	50
10.1.2.211	Local_InfeedA_Outlet4	0.0 (W)	0	50
10.1.2.211	Local_InfeedA_Outlet5	0.0 (W)	0	50
10.1.2.211	Local_InfeedA_Outlet6	34.0 (W)	0	50

To show the power usage of an IP phone with usage type **consumer**:

```
DomainMember# energywise query importance 100 name * collect usage consumer
EnergyWise query, timeout is 6 seconds:
Host          Name          Usage          Level  Imp
-----
10.1.2.83     SEP5475d0db0dcb  3.8 (W)  10    5
10.1.2.71     SEP1C17D340834E  8.8 (W)  10    1
10.1.2.68     SEP3037A61748E2  8.8 (W)  10    1
```

To show the power usage of a PDU outlet with usage type **meter**:

```
Switch#energywise query importance 100 name * collect usage meter
EnergyWise query, timeout is 6 seconds:
Host          Name          Usage          Level  Imp
-----
10.1.2.211    Local_InfeedA_Outlet1  0.0 (W)  0    50
10.1.2.211    Local_InfeedA_Outlet2  0.0 (W)  0    50
10.1.2.211    Local_InfeedA_Outlet3  0.0 (W)  0    50
10.1.2.211    Local_InfeedA_Outlet4  0.0 (W)  0    50
10.1.2.211    Local_InfeedA_Outlet5  0.0 (W)  0    50
10.1.2.211    Local_InfeedA_Outlet6  34.0 (W)  0    50
```

Wake on LAN

- [Understanding Wake on LAN, page 2-24](#)
- [WoL with Cisco EnergyWise, page 2-24](#)
- [Configuring WoL, page 2-25](#)

Understanding Wake on LAN

Wake-on-LAN (WoL) is an Ethernet computer networking standard, where you can use a network message to wake up a computer. WoL is implemented on the motherboard (BIOS) and the network interface. It is operating-system independent. WoL could be disabled by default on some PCs.

You send a WoL magic packet to the PC that you want to wake up. The packet contains the PC MAC address that helps uniquely identify the recipient PC.

Certain network interface cards (NICs) have a *SecureOn* feature that you can use to store a hexadecimal password within the NIC. When you send WoL packets to NICs with *SecureOn*, the NICs store this password as part of the packet, making the wake up secure.

WoL with Cisco EnergyWise

Use this feature to remotely power on a WoL-capable PC. The power level of the PC changes from nonoperational to operational.

The domain member sends a WoL magic packet to the PC. If the PC has an NIC that supports *SecureOn*, the domain member must send a magic packet with the same password to power on the PC.

Configuring WoL

When a WOL-enabled PC is connected to the domain member, you can configure the domain member to send a WoL magic packet to a specific device or to all devices in the EnergyWise network.

Beginning in privileged EXEC mode:

	Command	Purpose
Step 1	energywise query importance <i>importance</i> { keywords <i>word,word,...</i> name <i>name</i> } wol mac <i>mac-address</i> [password <i>password</i> port <i>tcp-port-number</i> [password <i>password</i>]]	<p>Sends a Wake on LAN (WoL) magic packet to a specific device or to all devices in the EnergyWise network.</p> <ul style="list-style-type: none"> • importance <i>importance</i>—Only domain members and endpoints with importance values less than or equal to the specified value respond to the query. The range is from 1 to 100. • keywords <i>word,word...</i>—Filters the results based on one or more keywords. <p>Note If you know that the PC that you want to power on is connected to an interface with the keyword <i>PC</i>, use the energywise query importance 100 keyword PC wol mac mac-address command. You can also use a name qualifier.</p> <ul style="list-style-type: none"> • name <i>name</i>—Filters the results based on the name. For the wildcard, use * or <i>name*</i> with the asterisk at the end of the name phrase. • wol mac <i>mac-address</i>—Filters the results based on the MAC address and powers on only the device with the matching MAC address. <p>Note If you do not know where the device is located, use the energywise query importance 100 name * wol mac mac-address command to send the WoL packet to all the domain members.</p> <ul style="list-style-type: none"> • (Optional) password <i>password</i>—Sets the password for the WoL-enabled endpoint. • (Optional) port <i>port-number</i>—Specifies a port number to communicate with the EnergyWise domain. The default is 7.

Best practices and guidelines for configuring WoL:

- WoL packets are sent as Layer 2 broadcast packets. To prevent broadcast storms, remove loops by using the Spanning Tree Protocol (STP).
- The **importance**, **name**, and **keyword** fields in the WoL query packet refer to attributes set on the interface that the PC connects to. For example, beginning in privileged EXEC mode:

```
DomainMember# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
DomainMember(config)# interface gigabitethernet 0/1
DomainMember(config-if)# energywise name PC-1
DomainMember(config-if)# end
DomainMember(config)# end
DomainMember# energywise query importance 100 name PC-1 wol mac <mac-address>
```

- Check that an EnergyWise WoL query always has a **name** or **keyword** attribute associated with it. WoL packets are sent only from those interfaces, thus preventing broadcast storms.
- Before using WoL, check that you have enabled it in the BIOS and the NIC of the PC you want to wake up.

Disabling EnergyWise

Table 2-2 Disabling EnergyWise Interface Configuration Commands

Command	Mode	Purpose
no energywise	Interface configuration	Disables EnergyWise on the PoE port or on the endpoint.
no energywise activitycheck	Interface configuration	Configures the domain member not to wait until a Cisco IP phone connected to a PoE port is not sending or receiving voice traffic before the domain member powers off the port.
no energywise allow query set	Interface configuration	Configures the interface to drop all <i>set</i> queries for the interface and children. If configured you cannot change the power level or EnergyWise attributes of connected devices on the interface. To prevent power levels on all interfaces from being changed, apply the command to all interfaces.
no energywise [importance keywords [<i>word,word,...</i>] level name [<i>name</i>] role [<i>role</i>]]	Interface configuration	Removes the EnergyWise configuration on a domain member port. If you enter the no energywise level command, the domain member changes the power level to the default only when you restart the domain member or you enter the energywise level level command.
no energywise level level recurrence importance <i>importance</i> { <i>at minute hour</i> <i>day_of_month month day_of_week</i> <i>timerange timerange-name</i> }	Interface configuration	Removes the recurrence configuration on a domain member port.

Table 2-3 Disabling EnergyWise Global Configuration Commands

Command	Mode	Purpose
no energywise allow query save	Global configuration	Configures the domain member not to respond to a query that saves the running configuration.
no energywise allow query set	Global configuration	Configures the domain member to drop all <i>set</i> queries for the parent entity. If configured, you cannot change the power level or EnergyWise attributes of the domain member. This configuration does not apply to the interfaces or endpoints connected to any interfaces.
no energywise domain	Global configuration	Disables EnergyWise on the domain member.
no energywise endpoint	Global configuration	Configures the domain member not to establish parent-child relationships with connected EnergyWise-compatible endpoints. The endpoints cannot receive queries or messages from the domain member.

Table 2-3 Disabling EnergyWise Global Configuration Commands

Command	Mode	Purpose
no energywise { <i>importance</i> keywords [<i>word,word,...</i>] name neighbor [<i>hostname</i> <i>ip-address</i>] <i>udp-port-number</i> role }	Global configuration	Removes the EnergyWise configuration on the domain member.
no energywise management	Global configuration	Configures the domain member to not communicate with a connected management station that sends queries.