

Cisco Unified IP Phones: Cisco EnergyWise Deployment Considerations

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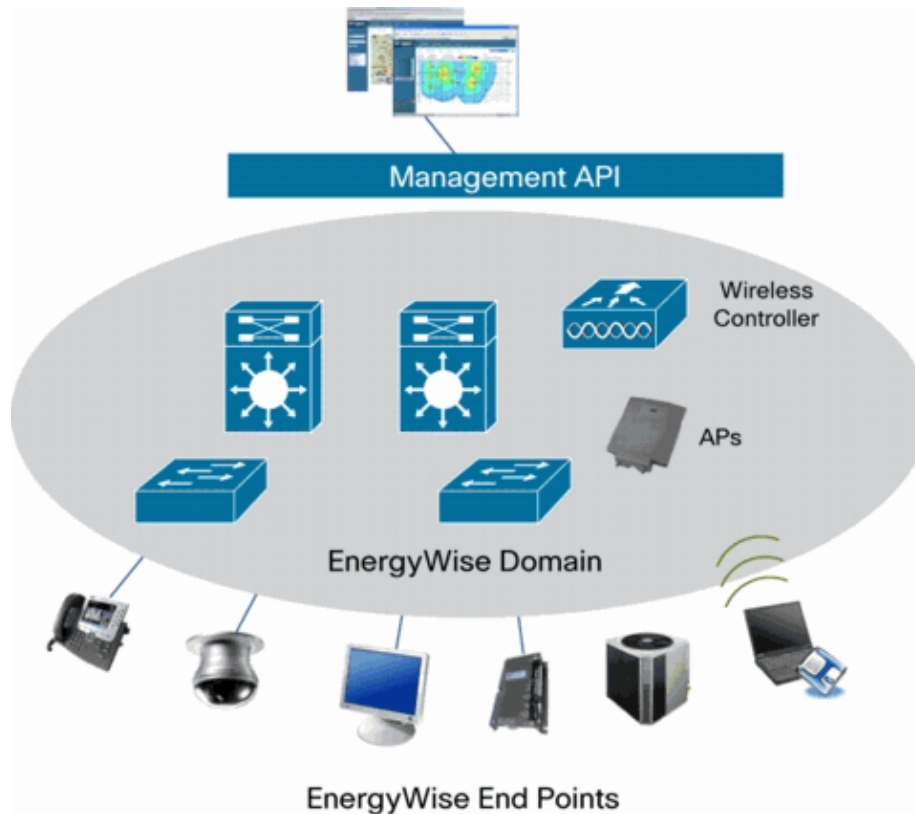
Introduction

Understanding and controlling energy usage is a focus of businesses worldwide. Cisco EnergyWise, an innovative architecture which is added to existing Cisco Catalyst switching portfolio, promotes company–wide sustainability by reducing energy consumption across an entire corporate infrastructure.

Cisco EnergyWise architecture can power off devices powered via Power Over Ethernet (PoE). You can power off devices based on a preconfigured schedule, or based on configurable thresholds if using EnergyWise aware network management software. Devices managed via this technology include Cisco Unified IP Phones, Cisco Aironet Access Points, Cisco Video Surveillance IP Cameras and other PoE–compatible devices.

Because unplanned power outages are a normal occurrence, recovery from such an event has always been a focus of Cisco product testing. Cisco takes great care to ensure the complete and timely restoration of service after the device is powered on. When a phone is powered down using the EnergyWise technology, the event is indistinguishable from an unplanned event from the device perspective, and the devices recover via the normal processes that are in place today.

This document focuses primarily on the Cisco Unified Communications System that EnergyWise impacts. You can see a complete overview of the Cisco EnergyWise architecture at Cisco EnergyWise.



Telephony Services

The phone stays completely powered off during the time that the EnergyWise power conservation is in effect. No mechanism exists for the user of the phone to bring it back online. Because of this powered down state, the user cannot place or receive calls. All applications and call control technologies see the phone as unregistered until power is restored. You can use several alternate technologies for telephony services until the power is reapplied.

Cisco Unified Communications Manager call forwarding rules, Time-of-Day routing, shared lines with powered devices, and application-driven call handling function normally when Cisco Unified IP Phones are not powered. Cisco Unified IP Phones that are powered by an AC adapter do not get managed by the EnergyWise technology and will remain powered on even if the connected switch port is not providing PoE. You should consider these technologies when planning the deployment of the Cisco EnergyWise technology.

Emergency Services

EnergyWise presents some implications about Emergency calling. In its initial phase, EnergyWise shuts down inline power on the port that connects to IP phones and does so at a preprogrammed time, or based on commands from network management tools. While the ports are denied inline power, no provisions exist to detect any user action on the powered-down phone, such as a wake-up command. At the pre-programmed time or measured threshold, inline power will get reapplied to the port.

Power Disconnection

When power is removed, no verification occurs to determine whether a phone is engaged in a call. The power gets removed, and any active call is torn down. If the call in question was an emergency call, it will get interrupted, and any attempts by a public safety agency to contact the caller will not ring on the now powered-down phone. Cisco Unified Mobility functionality, such as Single Number Reach, should be enabled to allow contact with a remote destination associated with the powered-down phone in case of a

callback from the public safety authorities. Alternatively, the provisioning of Automatic Location Identification (ALI) records that are associated with the enterprise can feature an alternate contact number, such as the number for the reception area of the building. These alternate contact numbers should be provisioned to ring phones that are not connected to EnergyWise-enabled ports.

Disconnected Power

While the phone is denied power, no phone-based feature remains available to re-establish power. Administrators should anticipate the potential emergency calling needs of users and plan the deployment of EnergyWise functionality accordingly. If after-hours activity warrant emergency calling, you should exempt select phones from participation in EnergyWise, and you should clearly identify these phones on the phone and in the switch port configuration description.

Powering Up

When inline power is re-established, Cisco Unified IP Phones initiate the registration process with Cisco Unified Communications Manager (CUCM). Once registered, the phones will allow emergency calls to be placed. In systems that are using Cisco Emergency Responder (ER) to track phone locations, the system's emergency call handling for a phone that was previously powered down will depend on the time at which the call is placed after phone registration. Cisco ER directs emergency calls based on the location of the phone from which the call is placed. The location of the phone gets determined by these methods, in order of precedence:

- IP phones tracked behind a switch port – The MAC address of the IP phone gets tracked behind a switch port that is assigned to an ERL.
- IP phones tracked using IP subnet – The IP address of an IP phone belongs to an IP subnet that is assigned to an ERL.
- IP phones tracked by another (remote) Cisco ER server group in the same Cisco ER cluster – The remote server group tracks an IP phone behind a switch port or by IP subnet. When an emergency call is received, it gets forwarded to the Cisco Unified Communications Manager cluster that is served by the remote Cisco ER server group.
- Manually configured phones – The line number of the phone gets manually assigned to an ERL.
- Unlocated Phones – The MAC address of an IP phone gets assigned to an ERL.
- Default ERL – None of the preceding criteria gets used to determine the phone location. The call gets routed to the default ERL.

At phone power-up, the phone's switchport location might be unknown to CER if a CER Major Discovery was performed while the phone was powered down. In such cases, emergency calls placed during the time period between the phone's registration with CUCM and the next CER incremental discovery (which by default occurs every 30 minutes) will be processed according to the next available method as per the precedence list above. Once the switchport location of the phone is re-discovered by CER, the phone's emergency calls will be directed based on the switchport's ERL assignment.

In order to increase the precision of the phone's emergency call routing while the phone's switchport-based location is being reestablished by CER, you should configure IP subnets for phone location in CER. This configuration helps avoid misrouting emergency calls to a vastly different PSAP than is required. For instance, a system with sites in San Francisco and New York can simply configure the supernatted IP addresses of each site in CER (for example, 10.1.0.0/16 for San Francisco, 10.2.0.0 for New York). Therefore, emergency calls originating in San Francisco get directed to a San Francisco PSAP and do not get mis-routed to New York, if the call occurs during a time when CER has not yet acquired the phone's switchport-based location, after EnergyWise power-up. After the switchport location is re-acquired, emergency call routing will proceed with the originally configured granularity that switchport assignment provides.

Network Services

When power is removed from an EnergyWise managed port, the network services will still function. However, because the Cisco Unified IP Phone is unpowered, the PC Port on the phone will not provide network services to any attached device.

Loss of PC Port Network Services

The network connection will get abruptly terminated and any existing network connections are dropped. This includes network-based activities such as backups, upgrades, web applications or other transactional applications. Network connectivity will not be restored until the power is reapplied to the Cisco Unified IP Phone. When the EnergyWise technology is deployed, consider the loss of network connectivity to devices when planning automated tasks such as backups and PC software upgrades. EnergyWise compatible network management software can be used to apply power to the phones during scheduled PC maintenance windows.

Cisco Unified IP Phone-Based Features

The Cisco Unified IP Phone acts as the primary user interface for managing several features such as Do Not Disturb, Call Forward All, Group Login, and so on. You cannot make changes to these features from the phone while the power is off. Alternate user interfaces can exist via the Cisco Unified Communications Manager User Pages or via an application interface. The Cisco Unified IP Phone also provides an interface to other application and features such as Cisco Voice Messaging, Cisco Unified Presence, call histories and phone-based directories. Consider alternate user interfaces in deployments where access to these capabilities is required while the phones are powered off. When the phone is powered off, calls will not get delivered to the phone and the missed calls directory will not be updated. You can use Cisco Unified Mobility Remote Destination Profiles to simultaneously ring alternate devices while the Cisco IP Phone is powered off.

Call Handling

The EnergyWise technology does not affect the call processing capabilities of the Cisco Unified Communications Manager. The normal Call Forward Unregistered feature will get used for calls that are placed to a directory number for which all associated endpoints are powered off or otherwise unregistered. In deployments where Call Forward Unregistered is currently unused, use it to properly route calls during the time when the EnergyWise technology is in use. In deployments where the Cisco Unified Communications SRND recommendations are being followed, this feature might already be configured in multisite environments as an alternate call-routing path during temporary WAN failures. In this case, configuration changes may be required to properly route calls during the time that the phones are without power. The necessity and type of changes that are required will differ based on the specific customer deployment.

Call Interruption

When the power is removed from a phone, any active or held call will get interrupted. The impact on the remaining parties depends on the current state of the call. For normal, two party active and held calls, the remaining party will receive no immediate indication that the other party has lost power other than the lack of inbound audio. After the unregistered phone is detected by the Cisco Unified Communications Manager, the call will get cleared, and the call will either end silently, or the user will receive a re-order tone, depending on the specific scenario. Conference calls can get affected if the `Drop Ad Hoc Conference` setting in the Cisco Unified Communications Manager service parameter is set to a value other than **Never**. This setting affects the behavior if the conference controller drops or if only external parties remain in the conference.

Serviceability Impact

When the Cisco Unified IP Phones enter the power off state, the Real Time Monitoring Tool (RTMT) will report a decrease in the number of registered phones via the NumberOfRegisteredPhonesDropped Alert in the Alert Central tool. The default configuration will alert if the number of registered phones drops by 10 percent or more. By default, this alert gets set to trigger 24 hours a day, every day. If this alert is monitored Cisco recommends that the alert be changed to only operate during the times that the EnergyWise feature is not in use.

Recovery

After power is restored, the devices will recover by using the normal recovery sequence. This can include requesting a new IP address, downloading a configuration file, applying any new configuration parameters, downloading new firmware or locales, and registering with the Cisco Unified Communications Manager. The time that it will take for each individual phone to re-register and the time it takes for the combination of all phones to re-register are dependent on the specific customer deployment. You should perform testing, and you should establish best practices before EnergyWise is deployed on a large scale.

Security Status of an EnergyWise Phone

While the phones are powered off, the security that is based within the network for other devices or users is not affected. The network security at the switch port that is running EnergyWise for the phone stays prepared for a phone with security when the power state returns to normal. If a user plugs a device into the network, the state of the port on the switch would reflect that there is no phone, and all other security is ready for a device to connect to the port. While the phone is in a powered down state with EnergyWise, the PC port on the back of the phone gets powered down. In this state, if a PC is plugged into the phone, that PC will not have Ethernet access to the network. The security that would get applied at the phone port will not be available because no connectivity exists through the phone to the network.

Administration and Configuration

While the phone is powered down, all Cisco Unified Communications Manager Administration and Configuration services will continue to function normally. If phone affecting configuration changes are made via the web user interface, Bulk Administration Tool, AXL, or any other interface while the phones are powered off, the combination of all changes are applied to the phones when they are powered on. Because phone-affecting changes cannot be tested or validated while the phones are powered off, Cisco recommends that all maintenance windows are scheduled at times when the phones are in a powered on-state.

Related Information

- [Cisco EnergyWise](#)
- [Cisco EnergyWise Overview](#)
- [Voice Technology Support](#)
- [Voice and Unified Communications Product Support](#)
- [Technical Support & Documentation – Cisco Systems](#)

