Cisco EnergyWise

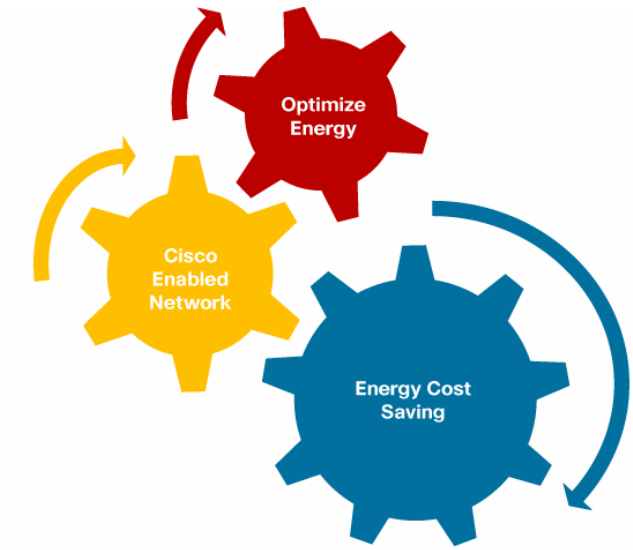
Introduction

In response to energy costs, environmental concerns, and government directives, there is an increased need for sustainable and "green" business IT operations. Methods to measure power consumption and control energy output are now the focus of businesses worldwide, with all customers looking for a method to reduce energy costs and implement increased efficient operation.

Cisco® EnergyWise is a new energy management architecture that will allow IT operations and facilities to measure and fine-tune power usage to realize significant cost savings. Cisco EnergyWise focuses on reducing power utilization on all devices connected to a Cisco network ranging from Power over Ethernet (PoE) devices such as IP phones and wireless access points to IP-enabled building and lighting controllers. It uses an intelligent network-based approach, allowing IT and building facilities operations to understand, optimize, and control power across an entire corporate infrastructure, potentially affecting any powered device.

This white paper illustrates how businesses can utilize Cisco EnergyWise with a network enabled by Cisco to better understand the power footprint of their organization and optimize to reduce energy costs. (See Figure 1.)

Figure 1. Cisco EnergyWise Optimize and Cost Saving



Traditional IT Power Management

Today many customers are focused on reducing costs related to the power consumed by IT devices in the enterprise. Normally this involves the comparison of device efficiency, power consumption, and the total number of devices needed but no other metrics. However, enterprise professionals lack a holistic means to measure the day-to-day power consumed by all network-attached devices. This problem is compounded because responsibility for building systems is

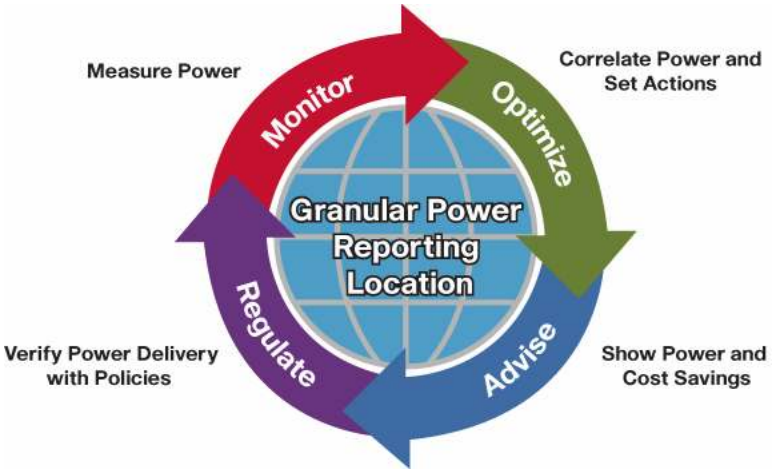
provided by the traditional facilities team, which manages heating, cooling, and lighting resources. Many customers realize the cost of maintaining separate networks for the control of heating, cooling, and lighting is expensive and because of this building control devices are converging to IP and utilizing the Cisco network. The interaction between the two teams typically happens when sizing the network wiring closets or when redundant power systems are implemented. Many times, wiring closets' electrical infrastructure is oversized because real power utilization of the equipment under real operating conditions is not understood. This often leads to installation of oversized uninterruptible power supplies (UPSs) and excessive cooling. This inaccurate engineering of the wiring closet increases initial deployment costs and leads to long-term inefficient operation of systems. Most customers would benefit from realistic information about the amount of power consumed by IT-related devices, including switches, routers, IP phones, PCs, surveillance cameras, and wireless access points. Cisco EnergyWise provides the IT professional a new method to understand power usage and justify energy costs.

Cisco EnergyWise Power Management

Cisco EnergyWise is an energy management architecture designed to measure power consumption and optimize power usage, resulting in effective delivery of power across the enterprise. IT professionals can quickly optimize the power consumed in a building, and the result is immediate cost saving with a clear return on investment.

Cisco EnergyWise measures current power consumption, can automate and take actions to optimize power levels, and can advise how much power is being consumed to demonstrate cost saving. After power consumption is understood, regulation using Cisco Cisco EnergyWise network protocols provides command and control of power usage. Energy consumed per location can easily be found with a realistic view of power consumed per wiring closet, building floor, or campus building. (See Figure 2.)

Figure 2. Cisco EnergyWise Optimized Power Delivery and Verification



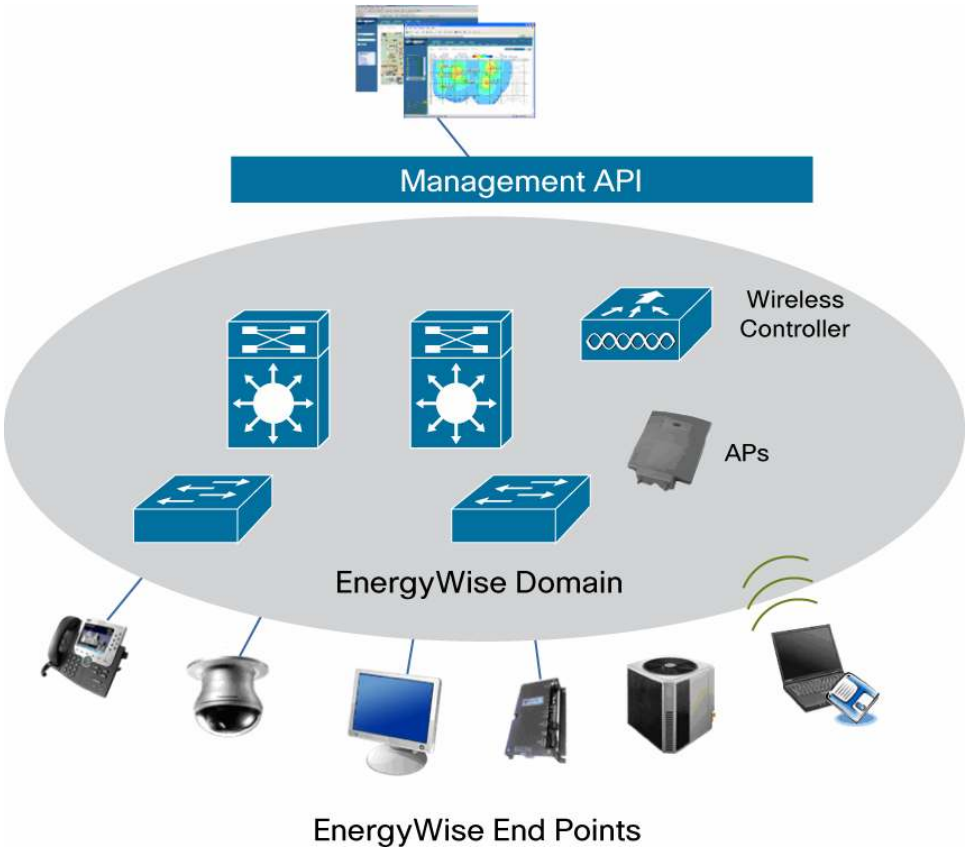
End-to-End Cisco EnergyWise Intelligence

The Cisco EnergyWise network is used to intelligently and proactively manage power consumption and consistently enforce policies to provide lower energy consumption. Cisco EnergyWise has the ability to monitor, manage, and reduce energy use by creating visibility to how electricity is consumed and create the ability to turn devices from always on to always available based on business needs. Cisco EnergyWise offers orchestration and coordinated power management

utilizing the Cisco network for scalability and communication. For example, when an employee enters a building, a series of events can take place enhancing efficient building operation. An employee's badge access might trigger the office phone to power up, wireless access point coverage to be assured, computers to boot up, and temperature of the office to be brought to a proper value. As a result, the user of Cisco EnergyWise is saving energy by powering off components when they are not needed.

In many cases individual management systems are dedicated to each type of device in a building, with management systems for building controls, another for phones and another for access points. Today a large number of systems need to be integrated together to perform orchestration of events for power management. Disparate system integration is difficult to achieve and not always used. Cisco EnergyWise networkwide policies can control device power management, eliminating the need for a myriad of systems to integrate and coordinate with each other. Orchestration is a primary benefit for the above scenarios, and it is the Cisco network acting as a proxy of information that allows systems to communicate in a synchronized fashion that reduces complexity and costs, assuring power saving. Figure 3 depicts a typical Cisco network enabled by Cisco EnergyWise, including the management layer and endpoints.

Figure 3. Network Enabled by Cisco EnergyWise



Cisco EnergyWise Cost Savings

The cost savings realized by using Cisco EnergyWise are significant. In many countries saving energy for the business is mandated by the government, and proof of saving energy can provide financial incentives. As compared to today's typical campus building or branch, the savings realized by just controlling IT power devices is significant. Details on cost saving calculations

related to enterprise IT DS will be available using the Cisco Green Calculator on Cisco.com starting January 27, 2009.

How Does Cisco EnergyWise Work?

Cisco EnergyWise gives the user a network-based framework process to discover, monitor, optimize, advise, and regulate energy needs for the business. Cisco EnergyWise encompasses a highly intelligent network-based approach to communicate messages that control energy between network devices and endpoints.

Discover

The network discovers devices that Cisco EnergyWise can manage, monitors the power consumed, and then takes actions to control the power consumption behavior. Endpoints enabled by Cisco EnergyWise can speak directly with Cisco switches and routers, communicate power utilized, and also be controlled by time-of-day policies to shed loads at certain times. The Cisco EnergyWise network protocols use a unique neighbor relationship capability to locate and inventory power consumed by devices attached to the Cisco network. The Cisco EnergyWise network protocol is similar to IP routing protocols, allowing the network to quickly find the power consumed using a networkwide approach and query mechanism. There is a parent and child relationship among devices in which one device can relay the power consumed by its neighbors. This mechanism might be useful for a heating, venting, and air conditioning (HVAC) controller reporting the power consumed by attached air handlers.

Monitor

Cisco EnergyWise uses a unique domain-naming system to query information from a set of devices, making it much simpler than traditional network management capabilities available today. There is a management interface within Cisco switches so an IT or facilities application can communicate in an intelligent manner through the network. The management interface uses standard command-line interface (CLI), Simple Network Management Protocol (SNMP), or TCP to allow Cisco and third-party management systems a method to monitor, optimize, and regulate power of both the network infrastructure and attached devices.

Optimize

Cisco EnergyWise has the ability to apply time policies to control the power consumed. These policies can be implemented by device type, device location, priority of the device, and other parameters. A scheme of priority and power levels is available within the Cisco EnergyWise protocols, allowing fine-grained control of how endpoints react to network-based signals. The priority of the devices tells the Cisco EnergyWise system if a device should be affected by a signal to optimize the power. Highest priority devices will not shed load, and lower priority devices can be shut down or have power reduced. Power levels allow the Cisco EnergyWise system to tell the device which power state it needs to achieve. For example, the message sent by the Cisco EnergyWise management system will change low-priority devices to a level of sleep state, while IP phones with high priority may not be shut. Optimization can provide cost savings by saving energy but also by sizing wiring closets and building resources to appropriate values, giving customers long-term and short-term cost reduction.

Advise

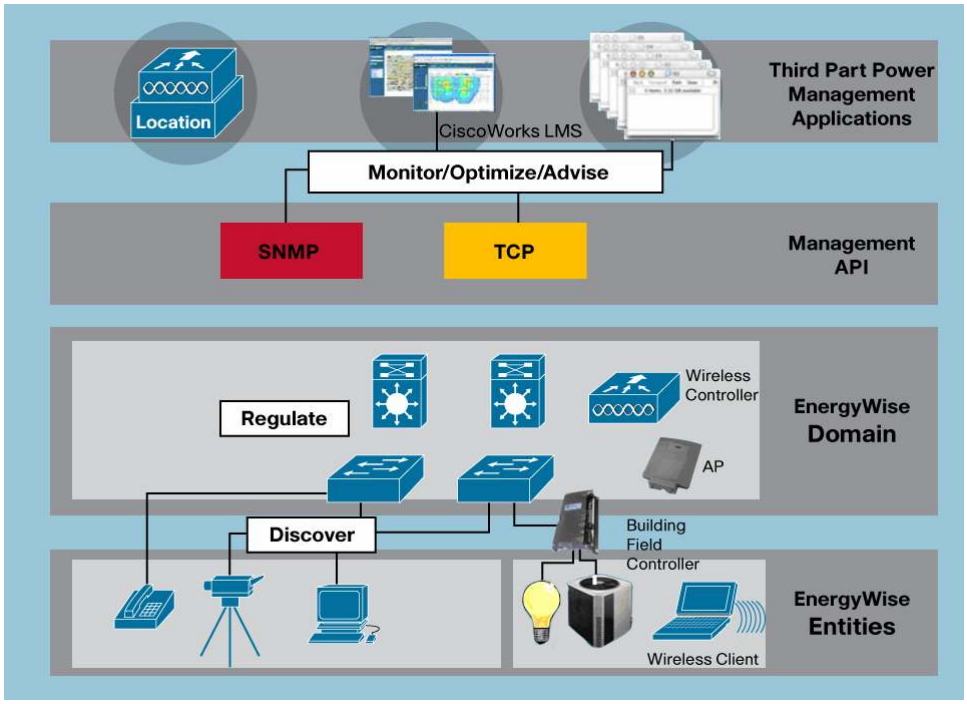
At any given time Cisco EnergyWise query mechanisms can advise customers of power consumption or changes in power consumption within a building. The query mechanisms include

the ability to summarize the power for a set of devices or retrieve individual device power based on a device location. For example, Cisco EnergyWise can provide the power consumed by all lobby-located phones across a series of campus buildings. Cisco EnergyWise has the ability to let users understand what the power savings would be if the power level of certain devices were changed in the network without actually implementing the change to the network. Alarms are available if power exceeds power expectations wanted by the customer.

Regulate

The user has the ability to verify and change Cisco EnergyWise policies over time to make sure the power-saving goals for the enterprise are being achieved. Regulation is made easy within Cisco EnergyWise using the scalable framework. A network enabled by Cisco Cisco EnergyWise has the intelligence to allow a single switch in a domain to query power consumption for a group of devices in a network. This network-based query mechanism provides scalability without having a management system contact all endpoints directly. For example, a single query to one Cisco switch can change the priority or retrieve the consumption of all IP phones in a Cisco EnergyWise domain. This intelligence is produced by the network knowing which devices are connected and where they are located, allowing a query result to be sent back to the switch originating the query and up to a management station. A common message format is used by all devices enabled by Cisco EnergyWise to communicate, simplifying energy management. Cisco EnergyWise maintains network security by using authentication between management systems and the network, between clients, and between network devices. (See Figure 4.)

Figure 4. Cisco EnergyWise Intelligent Network Framework



Cisco EnergyWise: Beyond IT

Cisco EnergyWise in conjunction with other Cisco products and partner products will ultimately extend into a common architecture that includes control and optimization of all energy-using equipment within buildings. These converged systems include heating and air conditioning, lighting, security, and others.

Cisco EnergyWise enables intelligent load management; it makes intelligent dynamic load shedding possible. With Cisco EnergyWise, customers can monitor and control power during periods of electric grid instability and peak power events. Cisco EnergyWise is the first step to instrument network equipment, making use of “smart loads.” This is valuable because buildings consume about one-third of the energy used in the United States. Electricity accounts for almost 80 percent of the energy costs in buildings.

Cisco EnergyWise is an innovative solution that helps customers actively manage and reduce power consumption by using the network intelligently, promoting companywide sustainability by reducing energy consumption across an entire corporate infrastructure. Cisco EnergyWise harnesses the power of the network to identify, manage, and reduce energy consumption and lower energy costs.

If you want more information regarding Cisco EnergyWise, contact your Cisco partner or representative.

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