

## The Network: Promoting Green Benefits to Business and IT

Virtually all large enterprises are conscious of the image they project, and corporate responsibility is an important part of that image. Green technologies represent an opportunity for corporations that extends beyond brand reputation and can affect overall profitability. In its 2007 list of “20 Most Admired Companies,” Fortune magazine noted that “many of the Most Admired Companies are busy figuring out ways to think green and garner more greenbacks too.”<sup>1</sup>

Do green practices always have to be about sacrifice, or can they actually contribute to a company’s profitability? Are there significant revenue opportunities or cost savings that can be realized by “going green”?

The answer depends on how broadly you are willing to define the green practices that can be implemented to save energy costs, while reducing carbon footprint. Most discussions about green focus around energy consumption. That is certainly an important part of the overall equation. However, thinking beyond simple power consumption and considering how effectively and efficiently all energy and business resources are being used broadens the range of benefits available through green practices. This document examines several different areas in which a Cisco® network can be used to realize some of those benefits.

### **Energy Savings: Network Energy Management**

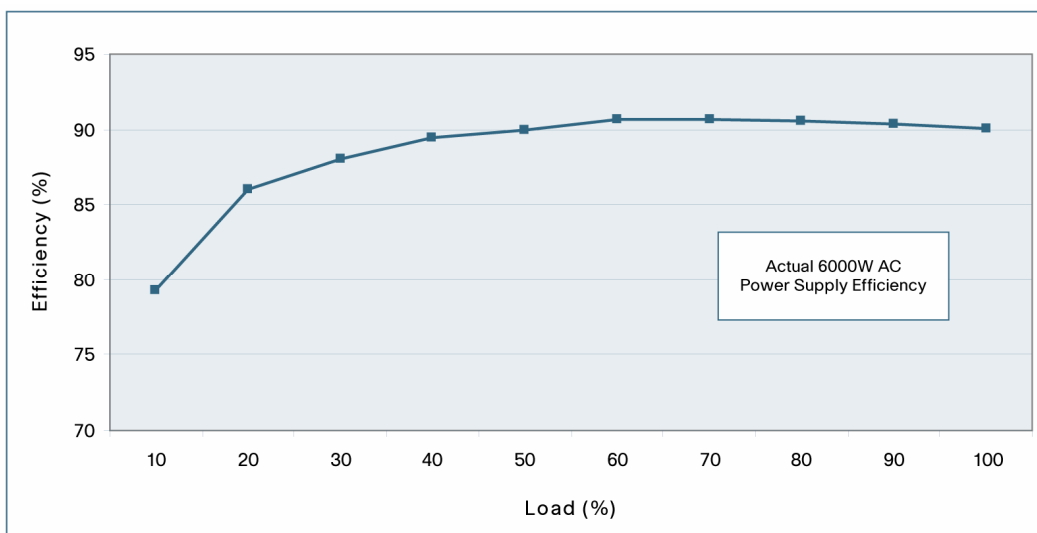
The first, baseline consideration is the energy efficiency of the network infrastructure, including both networking devices and connected devices powered over the network. Here, the right balance is struck when the least amount of power is utilized to deliver the greatest network value.

Internal to the device, Cisco routers and switches use and manage power wisely. Even at less than optimum loads, the power supplies within Cisco routers and switches operate at above 80 percent efficiency, with many exceeding 90 percent efficiency. (See Figure 1.)

---

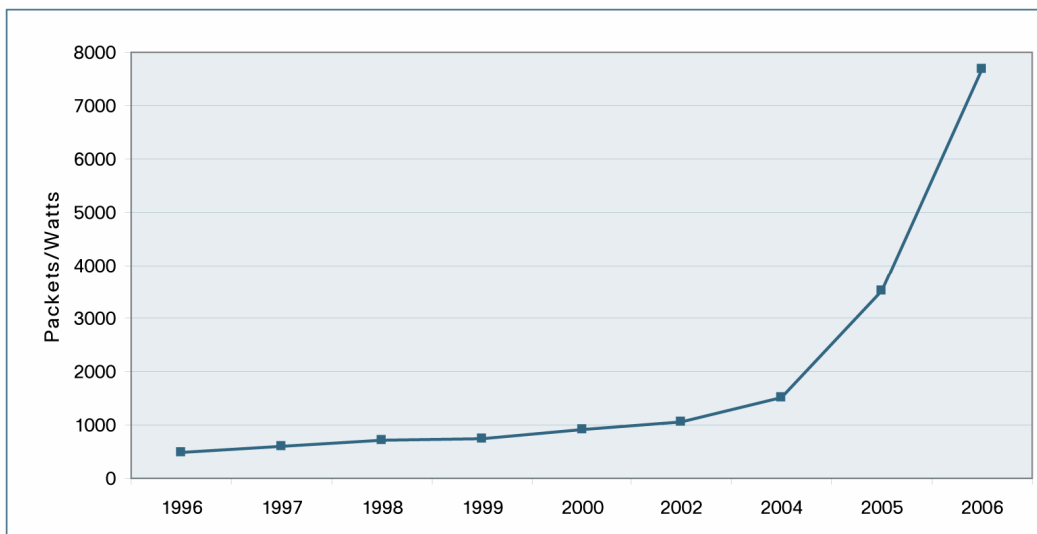
<sup>1</sup> Fortune magazine, “How to Get a Great Reputation”:  
[http://money.cnn.com/magazines/fortune/fortune\\_archive/2007/03/19/8402323/index.htm](http://money.cnn.com/magazines/fortune/fortune_archive/2007/03/19/8402323/index.htm).

**Figure 1.** Cisco Catalyst 6500 Power Supply Efficiency



The latest generation of Cisco routers and switches also uses less power to deliver far greater performance and capabilities than previous generations of networking devices. These gains translate to not only greater network efficiency, but effectiveness as well. (See Figure 2.)

**Figure 2.** Cisco 7200 Series Router Progressive Efficiency Gains



In addition to lowering the power draw of the device itself, Cisco power management capabilities also give you greater control over the power delivered by Power over Ethernet (PoE) to networked devices such as IP phones, wireless LAN access points, and IP surveillance cameras. Power monitoring and rate limiting capabilities make sure that connected devices only draw the power necessary.

Additionally, the time-based PoE capabilities of Cisco Catalyst® Series switches and Cisco integrated services routers enable cost savings by powering down selected devices during off hours through the use of a simple script supplied by Cisco. Here is a sample branch office return on investment calculation using time-based PoE:

- Operate IP phones using 7 watts rather than 15.4 watts = 55 percent energy savings
- Power IP phones 8 a.m. to 6 p.m. only five days per week = 70 percent energy savings

The latter two capabilities (negotiating power with connected devices and selectively limiting power during off hours) begin to illustrate the true capabilities that a network-based solution provides. Because the network, which touches everything, provides the communications fabric for many end devices, it can be extended to provide power management for those devices as well. All of the above contribute to lower energy consumption and costs both within the network itself and for devices connected to the network.

Although the above are all important considerations in evaluating the effects of energy efficiency of your network, note that networking equipment only accounts for 5 percent of all IT energy costs. And broader IT energy costs<sup>2</sup> account for approximately 20 to 30 percent of overall energy costs for any one organization. This is not to say that reduction of energy consumption by networking equipment is not an important and attainable goal. Incremental improvements across all parts of the IT infrastructure lead to a greater aggregate savings. However, combining savings across the IT infrastructure, facilities management, and organizational practices provides for the greatest sustainability gains.

In examining the potential effects of the network across the entire IT infrastructure and organization, it is vitally important to consider the services and capabilities the network delivers. This extends the green benefits of the network beyond energy efficiency and heightens the positive effect the network has on operational efficiency.

One example of how the network can exert a positive influence on overall facilities efficiency is Cisco EnergyWise.

### **Cisco EnergyWise: Extending the Network Beyond IT**

Cisco EnergyWise is a new Cisco energy management architecture available for the Cisco Catalyst switching portfolio that will allow IT operations and facilities to measure and fine-tune power usage to realize significant cost savings. EnergyWise focuses on reducing power utilization on all devices connected to a Cisco network ranging from PoE devices such as IP phones and wireless access points to integration with IP-enabled building and lighting controllers. It uses an intelligent network-based approach, allowing IT and building facilities operations to understand,

---

<sup>2</sup> "Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431," U.S. Environmental Protection Agency ENERGY STAR Program, August 2007. The largest energy consumers in IT are site infrastructure and data center volume servers, according to the same report. For more discussion of data center efficiency, go to [http://www.cisco.com/en/US/solutions/ns708/networking\\_solutions\\_products\\_genericcontent0900aecd806fd493.html](http://www.cisco.com/en/US/solutions/ns708/networking_solutions_products_genericcontent0900aecd806fd493.html).

optimize, and control power across an entire corporate infrastructure, potentially affecting any powered device.

The tangible benefits associated with EnergyWise include:

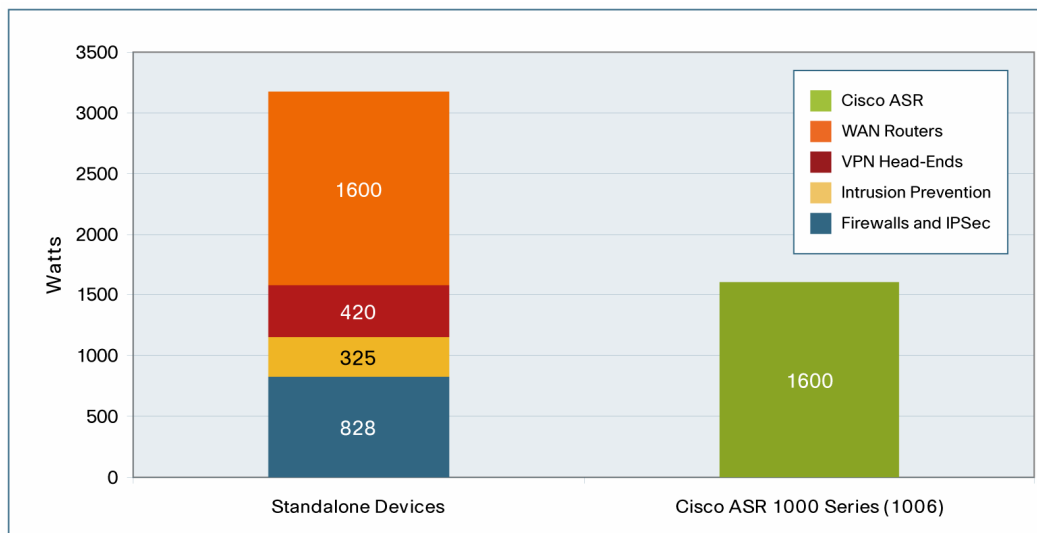
- The network discovers EnergyWise manageable devices, monitors the power consumed, and takes action to reduce power consumption while maintaining business productivity.
- EnergyWise can promote companywide sustainability by reducing energy consumption across an entire corporate infrastructure and affecting more than 50 percent of global greenhouse gas emissions created by worldwide building infrastructure, a much greater impact than the 2 percent generated by the IT industry.
- Power levels and priority levels provide fine-grained control of how network infrastructure and endpoints react to network-based control signals. High-priority devices do not shed load, while lower priority devices can shut down or reduce power.
- Network security is maintained by using authentication between management systems and the network, between clients, and between network devices.
- Device location enables customers to understand power by device type, device label, and device location. For example, a management station can ask the Cisco EnergyWise network to summarize the power of desktop IP phones within a single building. EnergyWise understands which devices are IP phones, where the IP phones reside, and which ones are designated with the desktop label.
- Network intelligence acts as a proxy, allowing easy communication with diverse endpoints and enhanced scalability.

Cisco EnergyWise converges disparate networks, services, and network-attached devices into a common view and set of policies for measuring and optimizing organizational power consumption. Furthermore, Cisco EnergyWise is designed to integrate future devices, network applications, and management tools to accommodate evolving organizational requirements.

### **Infrastructure Consolidation: Service and Network Integration**

Across the network, integrated services eliminate the need for multiple standalone devices for services such as security, wireless control, unified communications, and application networking. This simplifies your network infrastructure and further reduces power, cooling, and space requirements. (See Figure 3.)

**Figure 3.** Potential Power Savings Available Using a Cisco Aggregation Services Router



The data center also benefits from infrastructure consolidation. Increasingly, customers are looking to build a single network-based data center infrastructure that unifies and consolidates server, storage, and network operations into a unified fabric. A unified fabric also meets IT's requirements for operational continuity, transport flexibility, and scalability. A primary component of Cisco's Data Center 3.0 Strategy, and delivered on Cisco Nexus™ Series switches, a unified fabric acts as the “glue” of the data center, consolidating and clustering traffic onto a single network. By eliminating the need for parallel data and storage networks, a unified fabric design can consolidate resources and significantly reduce energy requirements in the data center.

### Operational Efficiency: Extended Product Lifecycle

Longevity of platform life is an important consideration when selecting a networking vendor. Longer-lived platforms forestall the creation of electronic waste. But, as seen from a business benefit point of view, they also provide significant investment protection.

Cisco routers and switches are designed to operate efficiently well into the future. Extensible hardware designs, Cisco IOS® Software services, and platform scalability all extend the service life of Cisco routers and switches.

Witness the length of service of the Cisco Catalyst 6500 Series Switches, first shipped in 1999. These switches have been updated over time through more powerful and capable supervisor engines, modular Cisco IOS Software updates, more efficient power supply and fan assemblies, and an ever-lengthening list of available service modules. Similar incremental upgrades have been applied to the widely adopted modular Cisco Catalyst 4500 Series Switches and stackable Cisco Catalyst 3750 Series Switches.

While not modular, the Cisco Catalyst 3750 and 3750-E fixed switch families can also offer investment protection. The ability to add a fixed switch into an existing stack of fixed switches allows for network connectivity growth as demand grows. A stackable switch is a single management entity, and adding additional fixed switches to an existing stack does not require additional management devices on the network. The Cisco TwinGig converter module for the Cisco Catalyst 4500, 3560-E, and 3750-E Series Switches offers further investment protection by enabling migration from Gigabit Ethernet to 10 Gigabit Ethernet uplinks based on business needs, without having to upgrade or replace the switches.

Cisco routing systems -- Cisco integrated services routers; Cisco ASR 1000 Series Aggregation Services Routers; and Cisco 7200, 7600, and 12000 Series Routers—also take full advantage of software and hardware components that not only prolong the effective service life of the devices themselves, but also help ensure that existing components can be reused and common components can be shared. This high-value, low-effect upgrade approach not only protects the existing investment in networking devices. It also protects the environment through resource savings and reduction of electronics waste.

All platforms, though, will eventually come to the end of their useful lifespan. Here again Cisco provides programs that combine environmental consciousness with tangible business benefits. The Cisco Technology Migration Program encourages Cisco customers to trade in their outdated equipment, allowing for responsible disposal by Cisco. In turn, customers receive credits toward the purchase of the newest generation of Cisco networking equipment.

### **Simplified Architectures: Promoting Green Benefits**

While most organizations are interested in pursuing environmental responsibility and the business benefits associated with it, many are hesitant about where to start.

Cisco and our certified partners offer expertise and technology innovation to help you control energy consumption and costs, improve resource utilization, and reduce your organization's environmental impact. We provide leadership and guidance as you prioritize your business initiatives, understand your current state, align solutions to enhance your network environment, and assess and adapt as your business evolves. Our services help you to:

- Prepare your network to support new applications
- Optimize your network to use and manage power wisely, make the best use of integrated services, and extend the useful life of installed systems
- Create, evolve, and maintain a more energy-efficient and cost-effective data center architecture
- Build sustainable communications platforms, collaborate across any workspace, and accelerate green business advantage

### **Innovative Business Practices: Resource Virtualization**

Cisco network solutions also facilitate business process improvements that deliver both business and green rewards. It is here that the greatest green benefits can be achieved, as the network infrastructure becomes the enabler for business practices that can provide both cost savings and environmental benefits.

When thinking about virtualization, most enterprises associate it with the data center. Certainly, this is where the need is the greatest. By virtualizing data center servers, companies can significantly reduce both power and space requirements. Although VMware is the predominant technology used here, innovations such as the Cisco Nexus 7000 Series switch, the Cisco Nexus 1000V distributed virtual software switch, and virtualized services on service modules for the Cisco Catalyst 6500 Series Switches all work to support a virtualized data center architecture.

Networks themselves can also be integrated through virtualization technologies such as Virtual Routing and Forwarding (VRF) and Multiprotocol Label Switching (MPLS). Virtualizing networks eliminates the need for parallel standalone networks dedicated to different purposes. This saves on both capital outlay for equipment costs as well as reducing the operational costs found in

managing multiple networks. And, as multiple networks are consolidated on fewer devices, the energy required to power the infrastructure is also reduced.

### **New Business Models: Collaboration**

For the single telecommuter or mobile worker, high-performance secure networking allows for full productivity and protection away from the office. This boosts not only worker effectiveness, but also worker satisfaction and retention. From an environmental point of view, it reduces carbon emissions through less commuting, and, to the extent that telecommuting is adopted as a business practice, reduces facilities requirements for both space and power.

For the organization as a whole, high-quality, stable IP telephony, web conferencing, and Cisco TelePresence™ sessions transform remote interaction and collaboration. Here, primary networking services such as deep packet inspection, advanced multicast, high-performance quality of service (QoS), integrated call management, and instant failover make sure that these collaborative applications deliver on their promise of productivity gains, cost savings, and reduced environmental effects.

To ease the transition to these new business models, Cisco has developed a series of comprehensive solutions that integrate product and architectural considerations as well as best business practices. These solutions include:

- Cisco Virtual Office
- Cisco Connected Workplace
- Cisco Connected Real Estate
- Cisco Connected Urban Development

These solutions examine the role that technology can play in society, from the day-to-day activities of an individual teleworker up to advanced city planning.

### **The Road Ahead: Sustainability and Network Innovation**

Cisco technology and product innovation is aimed at both customer business needs as well as the demands of an environment under increasing pressure. In today's world, these business and environmental requirements often overlap. Energy consumption, resource utilization and location, and regulatory compliance are all critical overlapping concerns. Cisco is committed to responding to these concerns through continued innovation.

Heightened service intelligence within the network boosts IT and business efficiencies. Progressive product designs reduce power and resource consumption, while increasing the effectiveness of the network infrastructure in enabling green IT and business practices.

On the regulatory side, Cisco adheres to existing industry and governmental regulations and is working actively on future directives relating to sustainable products (for example, safer materials and component reuse) and practices (for example, eco-friendly manufacturing, packaging, delivery, and recycling).

### **The Network Is the Platform for Green Business Practices**

At the infrastructure level, how effectively the network supports business applications while decreasing the total cost of ownership is the key. Power efficiency at the individual device level is less important than the infrastructure level, because customers are looking for a network platform through which to conduct business operations, improve productivities, and generate profits.

Certainly, individual devices should be energy efficient, but they should also work to help ensure further green benefits through service integration, application enablement, and system longevity. These further green benefits include:

- Device consolidation and elimination
- Resource virtualization enabling optimum utilization and location
- Enablement of advanced remote collaboration tools such as Cisco TelePresence
- Enabling worker mobility through secure wireless connections
- Helping ensure telecommuter productivity through secure unrestricted access
- Energy monitoring and management

Overall, Cisco endeavors to be a responsible corporate citizen in its own business practices and to extend that responsibility to helping its customers achieve their own green goals.



**Americas Headquarters**  
Cisco Systems, Inc.  
San Jose, CA

**Asia Pacific Headquarters**  
Cisco Systems (USA) Pte. Ltd.  
Singapore

**Europe Headquarters**  
Cisco Systems International BV  
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at [www.cisco.com/go/offices](http://www.cisco.com/go/offices).

CCDE, CCENT, Cisco Eos, Cisco HealthPresence, the Cisco logo, Cisco Lumin, Cisco Nexus, Cisco StadiumVision, Cisco TelePresence, Cisco WebEx, DCE, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn and Cisco Store are service marks; and Access Registrar, Aironet, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, EtherFast, EtherSwitch, Event Center, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, iQuick Study, IronPort, the IronPort logo, LightStream, Linksys, MediaTone, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, Network Registrar, PCNow, PIX, PowerPanels, ProConnect, ScriptShare, SenderBase, SMARTnet, Spectrum Expert, StackWise, The Fastest Way to Increase Your Internet Quotient, TransPath, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0812R)