The Greening of Federal Data Centers

Federal data centers are prime candidates for greener energy practices. “More efficient power usage in federal data centers is not only environmentally responsible, it also reduces costs and can support federal initiatives such as information sharing,” says Robert Aldrich, senior manager for Cisco® Data Center Solutions.

What is a Green Data Center?

Green data centers use technology and practices that minimize power consumption. One of the main incentives is the impending data center crisis, according to Aldrich. Today’s blade servers have higher power densities than most data centers are designed to accommodate. For example, powering and cooling a fully populated 42-unit rack with six blade-server chassis can require 15 to 18 kilowatts – far more than today’s data centers were designed to deliver. Indeed, Gartner forecasts that by 2008, half of all data centers will need a major overhaul due to higher cooling and power requirements.

The Role of the Network

Much of the discussion about greener data center practices to date has centered on power-efficient server chassis designs. However, the network architecture also plays a significant role. “Although the network infrastructure accounts for a small percentage of overall data center power consumption, it can enable significant power savings in other areas,” says Aldrich. Federal agencies can take advantage of the following network technologies to make their data centers greener.

Approach #1: Storage Virtualization

Power needs decrease when data center managers implement network-based virtualization to reduce the number of physical storage and network devices they need. Rather than deploying a separate device for each department or application, the agency deploys one device that can behave as if it were multiple devices – but uses less power. For example, each department or application traditionally has had its own storage area network (SAN) that required its own switch. Using a Cisco MDS 9500 Series director-class switch, agencies can build a single physical SAN fabric, and then build virtual SANs (VSANs) on top of it for individual departments or applications. More energy savings accrue when agencies use inter-VSAN routing (IVR) to share storage resources across VSANs, further reducing the number of devices requiring power and cooling.

The power and costs savings are significant: If an agency consolidates five departmental SANs with an average utilization of 40 percent into three SANs with 70 percent utilization, it frees up 50 kW of power capacity, saving $38,000 annually, based on $0.10 per kW/hour.

Approach #2: Branch IT Infrastructure Consolidation

Federal agencies also build greener data centers when they consolidate the servers used for departmental application, print, and file services into a centralized data center. One benefit is lower power consumption because cooling is more efficient in a data center environment. In addition, the agency strengthens its continuity of operations (COOP) plan by implementing consistent practices for security, business continuance, and backup. The prerequisite for branch IT infrastructure
consolidation is LAN-like performance over the WAN. “Employees need the ability to access applications, print, and file services over the LAN just as quickly as if the services were hosted locally,” Aldrich explains. Cisco wide-area application services (WAAS) technology provides LAN-like performance over the WAN, using a variety of application-acceleration techniques.

Approach #3: Less Juice for Server Farms

Many government server farms use separate appliances for firewall, intrusion prevention, server load balancing, content security, and VPN access. “A large federal data center with 200 server groups might have as many as 1200 appliances dedicated to these services,” says Aldrich. If each appliance consumes 100 watts, power consumption for appliances adds up to 120 kW. Providing security functions on service modules within a single chassis instead of standalone appliances decreases power per work unit performed, frees up rack space, and reduces cabling and cooling expense. Agencies can start by replacing their separate firewall and application control engine appliances with Cisco Firewall Services Modules and Cisco Application Control Engine Modules, which fit into a single Cisco Catalyst® 6500 Series chassis. The service modules require only 392W for each logical server group and provide N+1 availability with support for up to 200 contexts, cumulatively saving 42 kW.

“Choosing intelligent and energy-efficient products is an important step toward building a greener data center,” says Aldrich. “However, it is up to the data center manager and systems integrator to build efficiency into the architecture to get the most from these products. It is important to choose a certified integrator who can apply best practices when developing the architecture.”

Getting Started Today

Aldrich recommends the following practices for using power more efficiently:

- Conduct regular audits of IT equipment utilization and facilities to reveal simple conversion losses from low-value assets.
- When writing requests for proposals, specify power supplies with 90 percent or greater efficiencies
- Increase the AC voltage to mitigate losses through power distribution.
- Assess the computer room air conditioning – typically the biggest power consumer – and bring it onto the network, which is the biggest power consumer. Cisco and its partners in the facilities industry provide assessment services.

To read more about Cisco SAN consolidation solutions, visit: www.cisco.com/go/san

To read more about Cisco Wide-Area Application Services, visit: www.cisco.com/go/waas

To read more about services modules for the Cisco Catalyst 6500 Series Switch, visit: www.cisco.com/en/US/products/hw/modules/ps2706/prod_module_series_home.html