The necessary convergence of IT and Facilities

Bringing the two groups together under one unified process

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Abstract

Many organizations are seeking to reduce energy consumption to combat rising costs and carbon emissions. The data center, power-hungry as it is, is naturally central to any energy-saving initiatives. However, many organizations are stymied by a disconnect between IT and Facilities—one wholly dependent on the other, both at the mercy of each other's actions, yet rarely working collaboratively for mutual benefit.

Apart, neither group can optimize energy consumption and system availability across the big picture. The data center could be consuming more energy than necessary. Essential IT applications could be at risk from infrastructure weaknesses. Inefficiencies could force premature construction of additional power and cooling infrastructure.

If IT and Facilities could work collaboratively, organizations can operate more efficiently and effectively while still meeting their business objectives. That’s why Eaton® is partnering with organizations that develop IT management systems to create an integrated approach to energy management. A joint solution links IT assets, the data center infrastructure and Facilities assets into a holistic perspective aligned with business processes.

With a real-time, unified view of these interdependent functions, organizations can:

- Dynamically provision servers to respond to changing energy conditions.
- Intelligently balance workloads to optimize energy usage and control costs.
- Identify ways to improve data center energy efficiency and power usage effectiveness.
- Provide charge-backs to users based on the actual energy consumption of their IT services.

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You don't have to own or manage a data center to know that the amount of digital data being stored, shared, manipulated, processed, analyzed, reported, downloaded, uploaded, emailed, backed up and restored is growing fast—as much as 25 to 50 percent a year, by some estimates. In the first decade of the new millennium, we are likely to see a 600 percent increase in server installations and storage expanding nearly 70 times over.

This exuberant growth comes at a price. Many data centers, including most of those built before 2001, are at risk of outstripping their capacity to power and cool all these IT systems. Already, data centers consume 10 to 30 times more energy per square foot than the typical office building—a figure that has doubled in the last five years. Energy costs represent the single largest component of operating expense, and a potential barrier to future expansion.

Does IT really have a handle on this trend?

Ask any data center manager about server utilization, compute capacity and network traffic, and you are going to get specific, accurate figures. This information is known. It is considered fundamental to operating the data center. But ask how much power capacity is available for new equipment, how much battery runtime available to run critical systems during outages, and how much cooling capacity is available, and you are likely to get a blank look. The typical answer may be, “Oh, that’s handled by Facilities.”

In this type of silo organizational structure, critical issues are tossed over the wall between groups, rather than addressed collaboratively. Working separately, neither group is thinking about optimization across both functions, such as how to maximize energy efficiency or strike the optimum balance between cost and reliability. One group’s solution could actually be creating a problem for the other. Potential efficiencies and advantages are missed.

For example, the server that offered the lowest initial price might be so power-hungry that it is the costlier choice over the long term. The deployment strategy that met an immediate need might be cumbersome to change and upgrade later. The power distribution scheme that worked yesterday might be an inflexible hindrance to data center adaptation today. The batch process that runs at utility peak rate hours could be costing more than necessary to run, if it could be shifted to off-peak times instead.

IT leaders need tools that enable them to think more strategically about how Facilities issues affect the data center, answering critical questions such as these:

- How can we reduce energy costs and carbon footprint while meeting business objectives?
- How much power and cooling capacity is remaining in the data center, given the virtualization and expansion plans we are undertaking?
- Can I free stranded power and cooling capacity to forestall the need to build a new data center?
- How energy-efficient is our data center, compared to industry standards? What modifications will bring us the best return on investment?
• What Facilities issues are looming that could threaten the availability of specific applications and business services?

• What are the risks and rewards of various data center strategies, when IT and Facilities issues are considered together?

These questions are particularly pressing as data center requirements escalate and electrical power becomes such a significant component of operating expense.

**Is your data center at risk?**

Probably. Even newer data centers built on prevailing best practices have their Achilles’ heels.

In 2008, Eaton conducted an energy efficiency analysis for a 4-megawatt data center, certified to LEED® Silver status and built in 2005. Designed to Uptime Institute™ Tier III guidelines, the data center was engineered for 99.98 percent reliability. It had redundant utility feeds, backup generators, UPSs and chillers. The staff was well trained, maintained an up-to-date line diagram of the configuration, and included an on-site electrician 24/7. At first inspection, it would seem all bases were covered.

However, a Power Chain™ audit revealed a number of weaknesses. For example:

• There was no monitoring system to analyze, measure and monitor electrical distribution equipment loadings.

• Failure of a unit sub transformer could cascade to the adjacent transformer in the same room.

• Low power factor on UPS and computer room air conditioning (CRAC) systems was reducing power system capacity.

• Harmonics and phase unbalance on the UPS system were placing it at risk.

• A five-minute data center outage would require four to five hours of recovery to restore all critical processes.

• An outage that lasted more than two hours would leave mechanical and electrical rooms in the dark.

The point is, even a well-designed, up-to-date data center depends heavily on Facilities systems over which the IT team rarely has much visibility or control.

The challenges are intensifying as virtualization becomes more prevalent. In a virtualized environment, IT applications, their processing loads—and the power resources they require—can shift at will, on a moment by moment basis, stressing the power system in ways never before imagined.

This reality dramatizes the need for IT and Facilities to have collaborative, real-time visibility over issues that affect them both: the IT demands and Facilities support systems that impact service level agreements (SLAs), reliability, costs and carbon footprint.
Unified monitoring—the essential foundation for convergence

In times past, monitoring systems were isolated by proprietary protocols, not speaking to each other. That time is over. Now you can have a unified view of IT and Facilities across the enterprise. IT and Facilities gain a common language to address their mutual issues. Organizations can better understand the health of the IT and Facilities infrastructure, optimize it as a cohesive unit, and proactively address issues or opportunities on the horizon.

For example, with an end-to-end view of IT and facilities resources, services and assets—aligned with business objectives—an organization can:

- Dynamically provision servers to respond to energy situations, such as unexpected spikes in usage that could affect the load on the underlying infrastructure.
- Give the IT team visibility into its energy consumption and the status and capacity of the power chain devices that provide this energy, to intelligently balance workloads, optimize energy usage and control costs.
- Identify ways to improve energy efficiency along with data center infrastructure efficiency (DCIE) and power usage effectiveness (PUE) metrics.
- Provide charge-backs to users based on the actual energy consumption of their IT services, instead of blanket figures based on square footage or other imprecise measures.

An integrated approach enables IT and Facilities to optimize for energy efficiency.
A single pane of glass for IT and Facilities

Eaton Power Xpert® meters and software provide a real-time view of power, infrastructure and environmental conditions for Facilities and IT groups, based on the following components:

- **Eaton metered power distribution units (PDUs) and branch circuit monitoring systems** monitor power at the panel, subfeed breaker and branch circuit levels, and can also support building automation systems.

- **Eaton UPSs** monitor and deliver data about power quality, time-stamped power events, and the status of optional environmental probes and dry contact sensors. UPSs also provide Modbus TCP/IP and Simple Network Management Protocol (SNMP) support for building automation systems.

- **Eaton Power Xpert Gateway cards** (series 1000 cards for PDUs and series 2000 cards for UPSs) deliver power quality and utilization data to a monitoring server.

- **Eaton Power Xpert Software** makes it possible to gather disparate data from multiple metering and monitoring systems, even if they use different protocols.

- **The Eaton Power Xpert Reporting Module** gathers data from across the enterprise and stores it in SQL data bases, ready to be analyzed by IT, Facilities or business managers.

These components can be integrated with IT management systems to link IT assets, the data center infrastructure and facilities assets in a holistic view. This converged perspective increases visibility into power consumption, enables more efficient use of existing resources and minimizes risk.

![Diagram](image)

**Figure 1.** Through a single, Web-based portal, IT and Facilities can visualize power consumption and thermal signatures, proactively alert operators and facility managers to energy and temperature thresholds, and automate and control data center energy usage.
Figure 2. View real-time and historical power and thermal metrics for your key server infrastructure.

Source: IBM

Figure 3. View real-time and historical power and thermal details, physical characteristics, state, alarms, and battery for Eaton PDUs, UPSs and rack power panels (RPPs).

Source: IBM
Link IT and Facilities with business processes and risk.

As applications become more critical—and high-density servers place more importance within a single rack—it becomes more challenging to ensure that the infrastructure performs up to service level agreements. Assurance requires visibility, and traditional methods have not shown the relationships between power and IT resources, especially in virtualized environments.

The converged monitoring solution gives IT and Facilities real-time visibility into power conditions, with power circuits correlated to IT resources and linked to business services. With such a converged perspective, IT and Facilities can easily see when abnormal conditions threaten the IT infrastructure—and exactly which business services are at risk.

For example, the branch circuit monitoring system could sense a usage spike that threatens to overload a circuit, send an alert notification to IT and Facilities, and trigger the dynamic re-provisioning of workloads to run on other systems. Strategic planning can be based on the actual power consumed by business services, as well as the assessment of risk as a result of power system issues.

The converged perspective also enables you to compare current power utilization and costs to an optimal configuration, and to perform powerful ‘what-if’ analyses to understand the potential impact of changing the data center environment.

Figure 4. Energy optimization reports enable you to track energy trends over time, determine the optimal configurations, and provide the information needed to qualify for rebates and incentives.
Closing thoughts

In the typical organization, IT and Facilities teams operate independently, each with their separate monitoring and management systems. Working in silos, neither group can optimize its function in holistic context, and neither can perform in ways that are truly strategic to the enterprise at large.

Eaton has taken dramatic steps to bridge this chasm by working with third-party software organizations—vendors, systems integrators and standards bodies—to converge IT and Facilities monitoring into a single pane of glass.

A unified solution gathers, presents and analyzes system-wide data in detail, to identify opportunities for cost savings, downtime prevention and energy efficiency across IT and Facilities domains. It provides common views and workspaces to visualize power and thermal data, linked to hardware and business services. It takes the complexity out of managing power systems by providing a clear picture of energy consumption and utilization at a component, service and data center level.

With this capability, IT and Facilities can work collaboratively to meet their mutually dependent objectives: satisfying performance expectations at less cost and less carbon footprint, while reducing risk for critical business services.

Capabilities made possible by converging IT and Facilities

- View real-time status, capacity and alerts for IT and power components.
- Visually monitor power and thermal information, and identify problem areas.
- Incorporate energy into Facilities asset management workflows.
- View and control power usage for data center assets.
- Identify and respond to up-to-the-minute energy conditions in the data center.
- Correlate energy use with SLAs to reduce power where possible.
- Determine the real financial cost of power by business services.
- Track and trend changes in energy usage over time.
- Model ways to optimize power consumption.
- Link energy consumption and efficiency to IT applications.
- Dynamically provision servers to respond to real-time energy conditions.
- Optimize energy utilization of assets and extend asset life.
- Determine optimal location for new servers.
- Chargeback power costs based on actual energy consumption.
- Qualify for power company or government rebates and incentives.

For more information

To learn more about how converged monitoring and management of IT and Facilities systems can benefit your organization, contact your Eaton representative or Eaton Corporation at www.eaton.com/datacenter or www.eaton.com/powerxpert.
About Eaton

Eaton Corporation is a diversified power management company with 2008 sales of $15 billion. Eaton is a global technology leader in electrical systems for power quality, distribution and control; hydraulics components, systems and services for industrial and mobile equipment; aerospace fuel, hydraulics and pneumatic systems for commercial and military use; and truck and automotive drivetrain and powertrain systems for performance, fuel economy and safety.

Eaton has approximately 75,000 employees and sells products to customers in more than 150 countries. For more information, visit www.eaton.com.

About the author

Dr. Kenneth Uhlman, PE, is the director of data center business development for Eaton Corporation, where he is responsible for Eaton’s global data center strategy. He focuses on improving efficiency, availability and business service management for data centers, including the convergence of IT and Facilities.

He holds three U.S. patents, is a licensed Professional Engineer in California. He holds a doctorate in Organizational Development from the University of Phoenix School of Advanced Studies and a BSEE from North Dakota State University. His dissertation was titled, “Corporate transformations and collaborative partnerships in mission-critical facilities.”

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