Making Your Data Center More Efficient

Data Center Environmental Management Strategy
Is The Cost-Effective Way To Optimize IT
And Energy Performance

Introduction

Information Technology has never been more strategic to businesses of all kinds. The cloud, big data, social media, and mobile technologies are creating new opportunities to serve customers, enable workforce collaboration, and keep costs under control. IT's high strategic profile, thanks to these new business initiatives, is placing new pressures on servers, storage, and networks – as well as the data center infrastructure on which they rely.

IT professionals must respond in several ways. This white paper, the first in a series of three, addresses maximizing the efficiency of physical data center infrastructure. Look for these additional papers sponsored by Panduit: **Optimizing Infrastructure for Hybrid Data Center Strategies** and **Efficient Infrastructure Enables Virtualization Strategies.**

Physical infrastructure is one of the most meaningful, and often overlooked, aspects of data center management. A physical data center that is well designed and intelligently monitored not only enables today's initiatives in a flexible manner, but frees up resources for tomorrow's efforts. Every time data center equipment is moved, or a device is added, the balance of power, cooling, space, and connectivity is altered. As a result, changes are needed, but what is the right action? To make the correct decisions, information is required. A robust data center environmental monitoring and management system provides the information to not only keep track of changes, but also to draw up a blueprint for a data center that delivers maximum value. It's an intelligent edge that can make the difference between success and failure to an organization.

The Importance of Actionable Data

A comprehensive monitoring system provides detailed, real-time, and actionable information about assets, power usage, cooling, connectivity, rack security, cabling, bandwidth, and power delivery. A strategy encompassing these factors can maximize the efficiency of data center infrastructure and ensure ongoing monitoring, so that administrators can make immediate adjustments as needed to utilize resources efficiently.

Monitoring systems vary. Available as software or as an appliance, the best systems collect standardized information from data center resources and deliver a comprehensive range of information to administrators via a graphical user interface. A system that is modular can be acquired as a series of software components and added to as data center resources expand. In practice, monitoring systems deliver different levels of detail.

Among the essential elements on which an environmental monitoring and management system should provide information are:

Space and cabinet utilization – The cabinets that contain switches, servers, and storage devices must be populated not only for maximum use, but also for electrical power and cooling that can be managed effectively. The system should indicate the power and cooling load per cabinet, as well as the space utilized in the cabinet.

Stranded capacity recovery – Gaining complete understanding of current capacity will provide guidance on how to properly arrange infrastructure to be most effective. Oftentimes, space, power, cooling, and connectivity are not used to their fullest potential, but a data center administrator may be unaware of the inefficiencies. For example, you may have used up your power, but still have available cooling, space, and connectivity ports. When you know what you have, you can make better use of it. Sometimes inefficiencies are suspected, but action is not taken to recover unused resources because it is believed that the payback will not justify the effort. An accurate ROI calculator can demonstrate the cost and benefit of an improvement, such as a new containment system.

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The Importance of Actionable Data (continued)
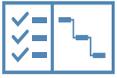
Future planning – As business needs change, the data center must also change. A monitoring system that provides complete and accurate information on power, cooling, and connectivity can indicate where it is possible to add equipment in the future and how the supporting infrastructure should be changed to accommodate it.

Virtual machines – By indicating levels of power, space, and cooling, a monitoring system can specify the server location on which a virtual machine can most efficiently be run – so that the VM can be moved to that location.

Cabinet security – A robust monitoring system allows clients to remotely monitor and control access to cabinets to allow technicians to install and/or conduct routine software service upgrades on network, server, and storage equipment.

Avoiding Unnecessary Expenses

When insufficient information is available, mistakes in future planning are likely. The result is wasted money in the form of both capital expenses for new data centers and equipment, and operational expenses for the cost of running the data center. Here are a few examples of how a robust environmental and monitoring system can create great impact:

Case Study: Wall Street Investment Bank

SynapSense® Solution Deployed:

- Environmental Monitoring and Optimization Services
- 5X higher pressure than before floor rebalancing using SynapSense System
- Savings and Payback Exceeding Preliminary Estimate

Projected Savings & ROI Analysis	Projected	Actual
Annual Energy Savings (MWh)	258	302
Fan Energy (MWh)	168	209
Chiller Energy (MWh)	90	93
Carbon Abatement (Metric Tons)	135	158.1
PUE Baseline (1.65)	1.57	1.56
Project Cost	$70,500	$70,500
Annual Energy Savings	$28,412	$33,263
Maximum NYSERDA Incentive	$36,161	$48,382
Capped NYSERDA Incentive	$35,268	$35,268
Simple Payback (Months)	14.9	12.7

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Avoiding Unnecessary Expenses (continued)

Case Study: Fortune 50 Company

SynapSense® Solution Deployed:

Monitoring Optimization Services
SynapSense® Active Control™ Feature

- 100, 000 Ft.^{2}

- 3,674 sense points

- Project cost: $695,000.00

- Annual energy savings
  - $766K
  - 8,244 MWh

- $530K paid utility incentive

- Net customer cost: $165K

- Annual carbon abatement: 2,555,840 lbs CO_2

Intelligent Hardware, Optimal Performance

Information is essential, but the purpose of the information is to enable effective action. Thus, a complete environmental monitoring and management system should be paired with intelligent hardware so that the data center infrastructure can be monitored and controlled to deliver optimal performance. The interaction between a monitoring system solution and a thermal management system, in particular, can yield significant dividends. Because cooling is one of the largest costs, it is likely to generate a significant return on investment when optimized.

Different pieces of equipment have different thermal characteristics. So it's important that a thermal management system and corresponding monitoring system solution understand those traits – for example, the way that Cisco switches breathe. With information at such a level of detail, data center administrators can optimally place equipment, such as in-cabinet ducting, blanking panels, and shades, as well as cool boots, to contain and direct airflow.

In another example, the ability of a monitoring system solution to track connectivity ports and whether or not they are in use can pay significant dividends in terms of data center flexibility and expandability. Knowledge of port location and availability enables a data center administrator to quickly and efficiently deploy assets such as servers and storage devices.

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Environmental Monitoring and Management Roadmap

A data center environmental monitoring and management system encompasses a wide range of actionable information, starting with the most basic and advancing up to highly detailed data that enables a high degree of control. An excellent way to understand your infrastructure – and your ability to manage it – is a clearly defined roadmap that increases in detail at each level.

ONE
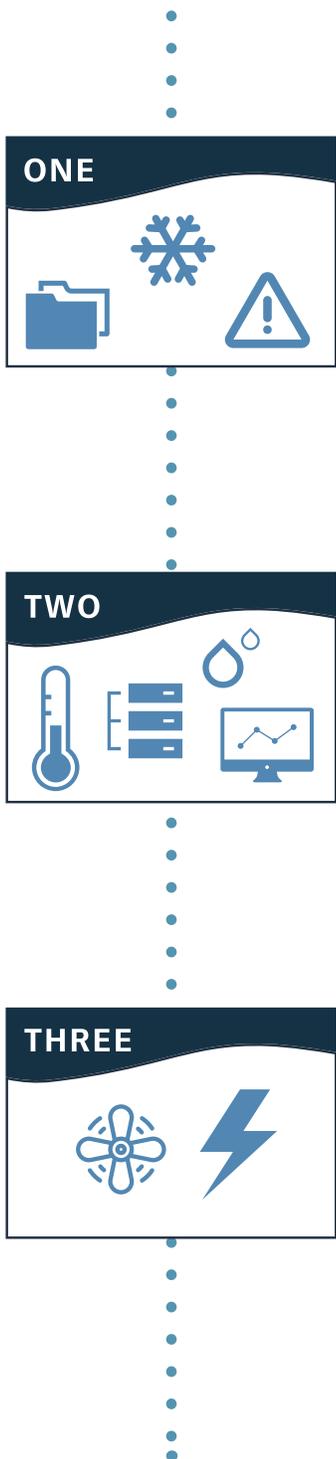
Level 1 – Basic information about the amount of resources you have available, such as the amount of cooling capacity you have and how much you're using. With basic information, you are able to set alarm thresholds and alert notifications to reduce the risk of unplanned downtime.

Level 2 – More detailed information, in context. For example, you are able to monitor power loads to quickly find underutilized rack power and determine the optimal placement of equipment. At this level, you utilize:

- Live color imaging depicting data points such as temperature, humidity and sub-floor pressure, overlaid on a floor plan. This enables managers to spot problems quickly.

- Monitoring, which provides you the information needed to adjust and react to utilization trends, as well as to plan for the future. For example, poor placement of blanking panels may create hotspots. If you are able to monitor conditions, you will be able to take steps to avoid failure due to overheating before it occurs. You may also compare the performance of your own data center to ASHRAE guidelines.

TWO

Level 3 – Still more detailed information, with a focus on enabling immediate action often with the aid of automation. You are able to see the location of each piece of equipment on the map, and to see specific information about different vendors' gear. You are also able to closely monitor and automatically control infrastructure components to enable the highest level of efficiency.

- Cooling – Automatically increase or decrease fan speed to reach a desired temperature.

- Assets and connectivity – Integrate work order management to automate operational moves, adds, and changes, as well as the resulting documentation.

- Power – Perform comprehensive power chain monitoring across facilities.

THREE

Understanding which level your infrastructure resides is important. It's possible you may be at one level for electrical power, and at another level for thermal management. When you understand what you know – and what you don't know – you are in a better position to optimally manage your data center. The SynapSense® Wireless Monitoring and Cooling Control Solution enables you to implement actionable data capabilities in a highly effective manner, in a way that is consistent with your current roadmap level and helps advance your systems to achieve the highest level of efficiency.

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Conclusion

Strategic IT initiatives such as the cloud, big data, social media, and mobility are enabling new ways of doing business. But they are also placing unprecedented demands on the critical connections that enable them, with data centers taking a large amount of the strain.

Every change to the data center must be met with corresponding changes to the four most important capacity management resources of the data center to ensure a high level of performance and uptime:

Cooling – Stranded cooling capacity leads to hotspots and thermally induced downtime. Overcooling, intended to ensure equipment safety, is expensive and wasteful.

Power – Underutilized power/stranded power capacity is due to lack of consumption visibility. Without visibility, it is difficult to provide accurate evidence of carbon footprint and energy consumption for "green" credentials.

Space – Inefficient utilization and even asset loss due to poor asset tracking can slow deployment and hamper the effective utilization of rack space.

Connectivity – Lack of connectivity tracking can affect equipment deployment. Disconnections and unauthorized changes cause risk to operations.

Deploying a strong environmental monitoring and management system that will provide the information you need and allows you to do more with your existing data center investments is essential to maximize your data center's performance and avoid unnecessary costs. Intelligent hardware that can provide the monitoring system with detailed real-time information and can respond to the recommendations from the monitoring system is essential as well. For example, a monitoring system working hand-in-hand with a thermal management system enables you to seal, direct, contain, and monitor your systems for highly efficient cooling.

A full-featured environmental monitoring and management system enables your IT organization to support your business more efficiently so it can move more quickly to embrace new opportunities. An organization that does not have to spend as much to merely keep the lights on can spend more on innovation to move faster, embrace new ways of doing business, and gain a competitive edge.

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Since 1955, Panduit's culture of curiosity and passion for problem solving have enabled more meaningful connections between companies' business goals and their marketplace success. Panduit creates leading-edge physical, electrical, and network infrastructure solutions for enterprise-wide environments, from the data center to the telecom room, from the desktop to the plant floor. Headquartered in Tinley Park, IL, USA and operating in 112 global locations, Panduit's proven reputation for quality and technology leadership, coupled with a robust partner ecosystem, help support, sustain, and empower business growth in a connected world.

For more information

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