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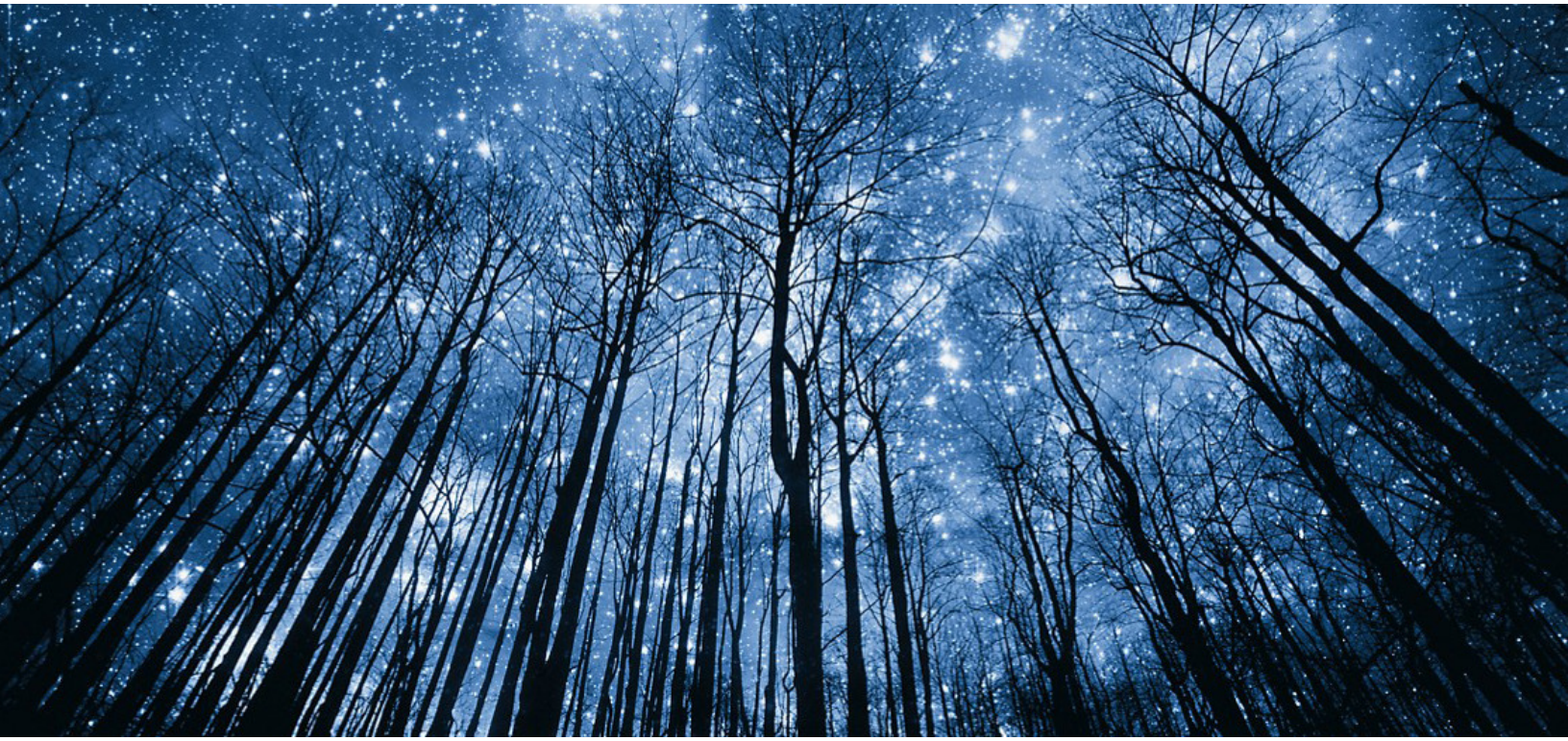
SMART POWER MANAGEMENT FOR DATA CENTERS



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Introduction

Supervising dynamic use of business computer servers in large data centers is a daunting task. Real-time power monitoring is essential for power management, intelligent cooling and is encouraged by the fact that the operational costs for many server components now exceed the capital investment of server hardware. Installing Power Distribution Units (PDUs) on all servers in the data center is a must for flexible power monitoring systems, a frustrating and expensive undertaking when new data centers are available on thousands of servers. Allocating a large amount of space for PDUs in a congested data center also necessitates interference with key business servers to attach to PDUs, further reducing data center reliability (adding layers of network hardware with servers can slow down service). Smart power solutions allow administrators to run power cycle servers remotely from devices and provide solutions, reducing server downtime by using a straight-forward approach to power management. Key features such as smart load shedding, intermediate management capacity, branch circuit protection, and three-phase power can help extend uptime and enable productive power management.

Why Power Management is a Top Concern

Power management is a major problem for data center managers. To manage power efficiently and effectively, data center managers are increasingly using remote or "smart" power management solutions, which develop hardware and/or software to monitor and control server level status and power. Intelligent power can be used in a wide range of sizes, with available solutions for a variety of applications – such as controlling a few locations in a small office/home office (SOHO) environment or an independent kiosk with a remote power switch for direct integration and medium-sized data center solutions.

Intelligent Power Management

To increase the number of legacy data centers throughout their life cycle, there are many ways to modernize things, from portable backup management to equipment development or replacement, and from specialized training and maintenance programs to a variety of services. Let's look at one of the less expensive options that represent a major return on investment; improving power management.

Administrators can remotely provide power to cycle servers and devices and troubleshoot issues, significantly lowering server downtime by providing direct access to power control using Intelligent power management. Establishments that used intelligent power products reported a typical recovery time of 10 to 30 minutes for remotely managed appliances, in comparison to 1-2 hours for appliances that were not remotely operated, according to a survey conducted by Cyclades in the year 2005.

Additionally, beyond decreasing downtime and reducing time-to-repair (TTR), intelligent power products suggest numerous noteworthy benefits.

- Administrators can presciently monitor and shield mission-critical devices using their own environmental monitoring devices or third party.
- Late night trips to the data center could be removed or decreased.
- Decrease in server reboots using third-party service calls.
- Permitting application of lucrative lights-out action at ROBO sites.

Advanced Characteristics of Intelligent Power Management

Intelligent power management devices increase uptime and enable more efficient power supervision. These characteristics include:

1. Smart load shedding capability
2. Integrated Management ability
3. Branch circuit protection
4. Three-phase power

Smart Load Shedding

This feature, which is embedded in firmware already in many server technology intelligent power products, enables administrators to automatically "shed," or perform a graceful shutdown of designated non-essential devices when certain pre-defined conditions occur, helping to avoid equipment damage and downtime when problems arise. For example, administrators can specify that non-critical devices are automatically shed when an intelligent power device is notified (via SNMP) that an uninterrupted power supply (UPS) is on battery-power status. In addition, load shedding can also be set to take place when probes within 10 feet of an intelligent power device measure temperatures that exceed pre-defined thresholds, or when true root-mean-squared (RMS) current levels are greater than set thresholds. Also, controllers may stop the system from restoring power by automatic detection to disassemble the devices when adverse conditions are reversed, i.e. UPS is at high power and/or temperature, and the current load is normal.

Integrated Management ability

Aggregation of integrated management platforms provides access to several appliances, which includes power, making administration extra effective, and permitting management to fix, access and power appliances rapidly if glitches arise. Administrators can control their current savings by leveraging subsidiary APC environmental monitoring devices along with 3rd party monitoring devices. Every device has a discrete access with its own IP address and can be managed centrally.

Branch Circuit Protection

Protection of the branch circuit can help prevent disruption and loss, as each branch of the collection store has its own fuse or circuit breaker to separate confusing forces and problems. Branch-protected devices usually fall into two categories; modified circuit breakers installed in Underwriters Laboratories (UL) 489, or fittings listed on UL 248 level.

Three-Phase Power

Recently, power has become an even greater problem due to increased use of blade servers and clusters of computers in close proximity. Newer machines usually require more power per the same foot, with requirements up to 40 kW per cabinet. This trend toward high power is expected to continue, with estimates that blade servers will become the fastest-growing form of server in 2029. Most of today's highly efficient server sites require at least one phase to help reduce this growing need for energy, especially for programs that require 24-48 areas.

Many controllers prefer to use three-phase 208V power because compared to single-phase power, Phase 3 power consumes a few circuits, provides moderate power load, reduces the total number of Power Distribution Units (PDU) required for power consumption, and greatly increases the available amperage instead of setting up the server. Although three power technologies are not limited to the products of a remote power controller, many solutions may accept the power flow. To meet the demand for high-end servers, server technology offers a number of three-phase power options, including Section 208 V 60A 3 power, -208V 30A or phase 208 V 30A 3 circuits in IT infrastructure to meet the latest trends. and future energy needs of densely populated areas.

Benefits of Intelligent Power Management

An intelligent power management system offers multiple benefits. Once implemented, smart power management systems:

Reduce the number and period of unintended outages. Identify and address subscriber capacity, (e.g. UPS and generators), risk branch IT circuits, and equipment maintenance requirements, (e.g. transformer overheating and battery failure). Get alarms at power outage events to enable a quick cause analysis to sort out and respond to a problem before it triggers a break.

Improve efficiency of upkeep events. Safely prepare for loading of critical power-supply components without compromising reliability, re-calibration phases to ensure full-capacity circuit loading, and assess power quality issues such as harmonics.

Control onsite renewable energy. Understand and manage all energy resources and determine the best times to switch or add to your main feed with other energy sources.

Improve effectiveness of power distribution. Rack level real-time and historical energy efficiency are tracked, as per the standards of Green Grid, to help customers achieve sustainability objectives and reduce local PUE. Analyze power system losses and identify loads that should be decommissioned or replaced with more efficient alternatives.

Provision cost allocation for energy and billing. Correctly analyze rack and consumer energy, peak power value, and current from branch circuit information. Transfer energy billing data to accounting, financial, or billing systems.

Conclusion

The size of modern data centers has expanded exponentially with the increase in Internet use the and the requirement for information storage and processing. This has led to a surge in power consumption rates of data centers. As the density of data centers increase, power management tactics that aim to ensure high effectiveness and lower OpEx are expected to be an essential part of future business strategies. In this article, we highlighted the necessity for power management in data centers. New strategies must be implemented that encourage business to come up with new resolutions for redesigning green data centers in the future.

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