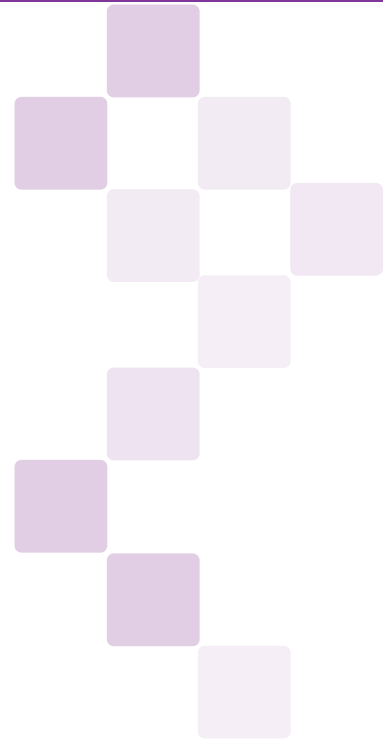


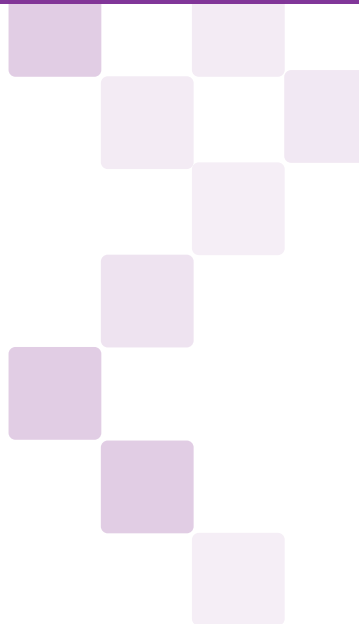
EBOOK

The Role of DCIM Software in Managing High-Density Racks



Sunbird[®]

DCIM that's easy, fast, and complete



Introduction

As data centers evolve to support growing demand, rack densities are increasing.

According to Uptime Institute, 80% of owner-operated data centers and 87% of colocation data centers are seeing their rack densities rise.

While a standard rack may operate at 3-5 kW, high-density racks typically run at 10 kW or more, with some exceeding 50 kW per rack in hyperscale and high-performance computing (HPC) environments.

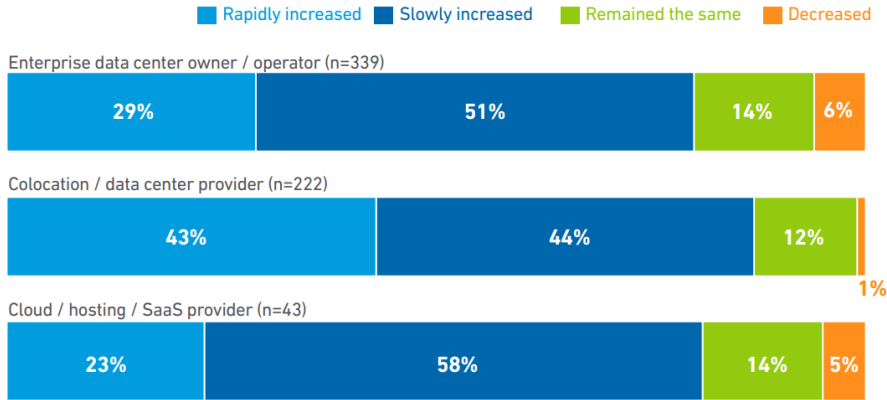
In addition to having a greater energy demand requiring advanced power distribution strategies, high-density racks typically pack more equipment in a smaller footprint, have complex network and power cabling, and generate large amounts of heat, necessitating innovative cooling solutions.

While this approach enables the deployment of more compute resources in a smaller area, it also introduces new challenges that require advanced management solutions.

In this eBook, we will discuss the key challenges with high-density deployments, and why leading data center professionals are deploying Data Center Infrastructure Management (DCIM) software to manage their high-density racks.

Typical rack power increases have accelerated

Over the past three years, how has the most common (modal average) rack power density deployed in your data center changed?



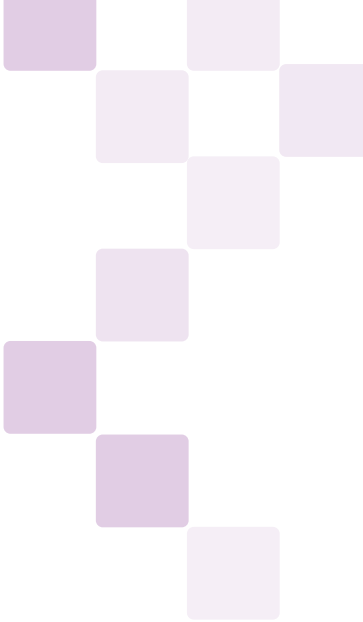
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UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2024



Source: [Uptime Institute](#)

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What's Driving Increasing Rack Densities?

As data center professionals strive to keep up with the rapid growth of demand for digital services, one of the most significant trends is the move towards higher rack densities. Increasing rack density is not just a matter of adding more servers or power per rack; it is a response to changing technology needs, operational challenges, and growth opportunities.

Key Factors Contributing to Increasing Rack Densities

- **Growth in data-intensive applications.** Data centers are increasingly required to support workloads like artificial intelligence, machine learning, and big data analytics. These applications demand substantial processing power and memory. In response, operators must deploy more computing resources into limited footprints.
- **Increasing energy efficiency demands.** Data center managers are under growing pressure to reduce energy waste both for cost reasons and to meet environmental sustainability goals. Though power-hungry, high-density infrastructure often boasts significant energy efficiency improvements over traditional counterparts.
- **Space constraints and real estate costs.** Data center space now comes at a premium. Many organizations face high real estate costs and limited available space. Increasing rack density is a direct response to this challenge, as it enables operators to maximize computing resources without expanding the facility footprint.
- **Advances in hardware technology.** Ongoing improvements in server and storage hardware—such as higher performance per watt and smaller form factors—have made it possible to deploy more compute resources into the same physical space.



(continued)

What's Driving Increasing Rack Densities? (continued)

Benefits of Increasing Rack Densities

The move towards higher rack densities offers a host of benefits for data center managers, including:

- **Space optimization.** By deploying more equipment into the same space, high-density racks can help organizations maximize space utilization and potentially reduce their required floor area.
- **Cost savings.** Consolidating equipment into fewer, higher density racks can lead to lower operational costs.
- **Energy efficiency.** High-density racks can offer greater efficiency and contribute to more sustainable data center operations.
- **Improved performance.** With more compute resources per rack, high-density systems can deliver faster processing speeds and better performance for demanding workloads.

The trend towards high-density deployments in data centers is only expected to increase, bringing with it both challenges and opportunities. Effective management of these high-density environments is critical to ensuring operational efficiency, uptime, and cost-effectiveness.

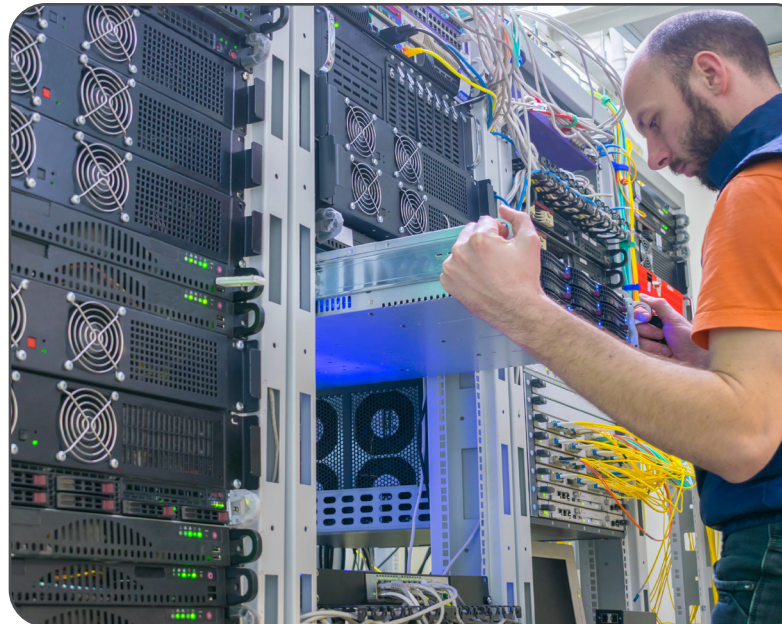


Common Challenges of Managing High-Density Deployments

According to Uptime Institute, accommodating significantly denser IT is among the top concerns for today's data center professionals, with 91% of survey respondents saying that they are at least slightly concerned about it. Almost one-quarter of data center professionals are very concerned about how they will manage denser IT going forward.

This is understandable because the massive power requirements and complexity of high-density racks present significant challenges, including:

- **Power distribution and capacity planning.** High-density racks require substantially more power than traditional racks. This increased power draw can strain existing electrical systems. Without careful monitoring and capacity planning, there is an elevated risk of tripping a circuit breaker and experiencing unplanned downtime.
- **Cooling management.** Concentrating more equipment in a rack leads to more heat, which can result in hot spots. Conventional cooling methods may be inadequate in dissipating the heat generated by densely packed servers, increasing the risk of equipment failure. Some organizations find that their cooling resources only allow them to put a minimal number of high-performance servers in a rack, even if they have the power capacity. This ends up wasting rack space capacity and necessitates deploying more cabinets.
- **Asset and connectivity tracking.** As equipment is deployed more tightly together, tracking individual assets and components becomes increasingly challenging. The density of cables and port connections complicates documentation, planning, and troubleshooting efforts.
- **Space and infrastructure limitations.** The compact arrangement of equipment in high-density racks restricts physical access for routine maintenance or troubleshooting issues.
- **Operational complexity and risk of downtime.** In high-density environments, the concentrated nature of the infrastructure means that even minor failures can have a cascading effect, potentially impacting multiple systems simultaneously. The increased operational complexity raises the overall risk of downtime.



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