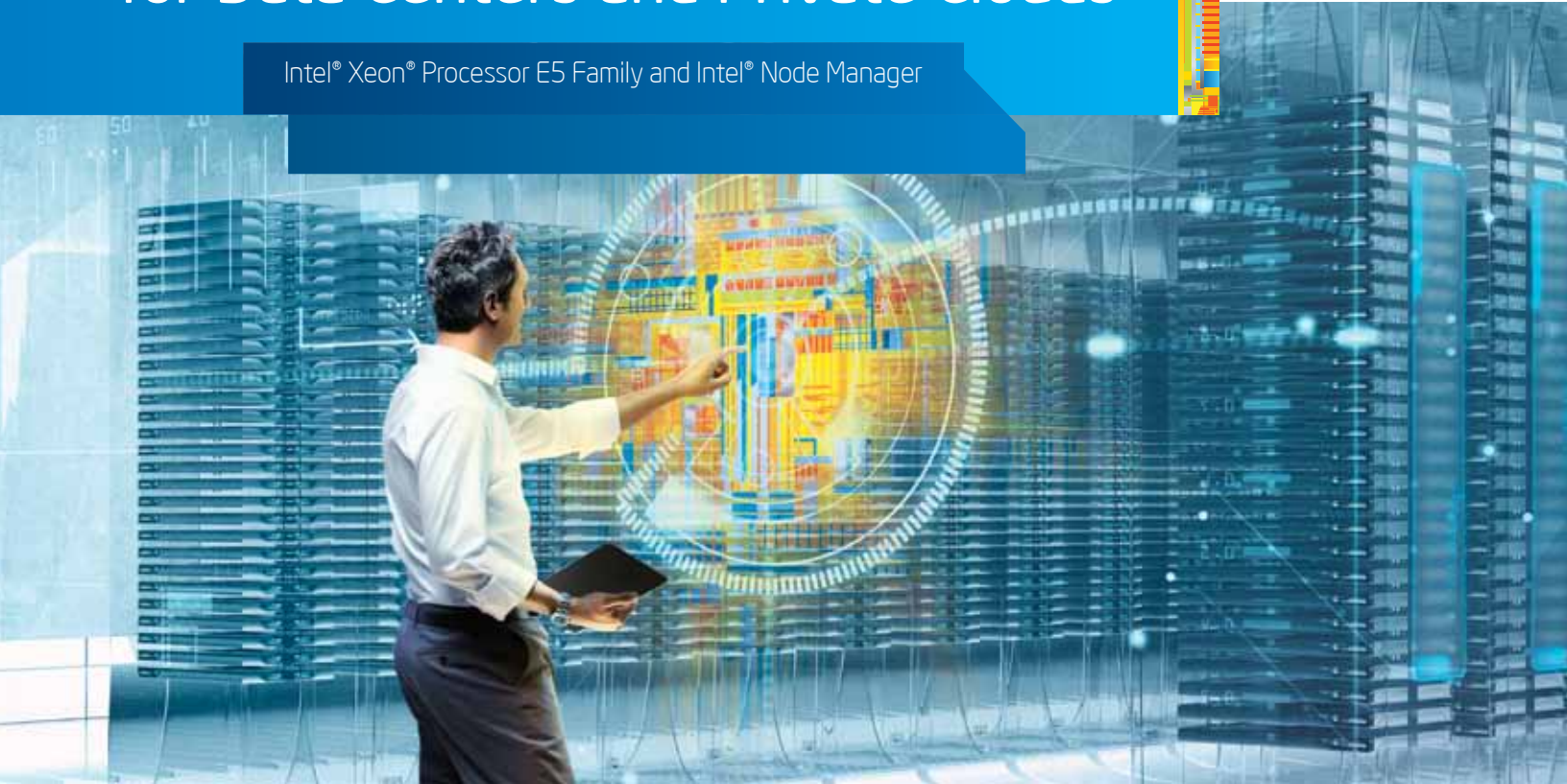


SOLUTION BRIEF

Better Power Management for Data Centers and Private Clouds

Intel® Xeon® Processor E5 Family and Intel® Node Manager

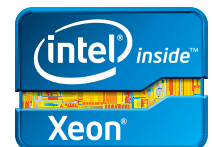


The Key to Improving Data Center Efficiency

Learn how Intel® Xeon® processor E5 family-based servers with Intel® Node Manager can help you maximize data center performance and capacity while reducing your power and cooling costs.

Just a few short years ago, power was largely an afterthought for data center operators. The power bill was paid by another department and no one in accounting was likely to question the expense. As long as power was available to support the incremental addition of new servers and racks, all was well.

Things are far different today. Utility costs have risen and many data centers are operating at or near their power and cooling capacity. Business demands have also changed. Companies are increasingly viewing IT as a profit center and demanding measurable returns and optimized cost models. With these changes, the ability to understand and manage power consumption is becoming a critical success factor.



Key Power and Thermal Challenges

To contain rising costs while simultaneously maximizing compute capacity, IT organizations need to address a number of key data center challenges.

- **Lack of Access to Basic Data.** Accurate data is needed for short-term and long-term capacity planning to ensure IT does not overinvest or underinvest in power and cooling infrastructure. Specifically, IT needs the ability to monitor individual and aggregated server power and temperature data at any point in time and also as historical trends.
- **Inefficient Use of Power.** To account for worst-case power consumption, server power is typically over allocated and racks are under populated. This results in inefficient use of power infrastructure and overinvestment in racks and power capacity. IT needs the ability to limit power consumption below theoretical peak values so the kilowatt capacity of each rack can be fully utilized.
- **Power and Cooling Excursions.** The availability of business-critical applications is a top priority for IT, yet a utility brownout or a cooling tower failure can put operations at risk. IT must be able to survive such failures to avoid downtime and deliver reliably on service level agreements (SLAs).
- **Hot Spots.** Today's higher density computing environments are more efficient, but can lead to localized hot spots during periods of peak utilization. New tools are needed so IT staff can identify and mitigate hot spots and optimize workload placement based on power and cooling availability and efficiency.

Solving Your Challenges Without Breaking Your Budget

The Intel® Xeon® processor E5 product family helps IT organizations meet today's power and thermal challenges in two key ways.

- **Exceptional Energy-Efficiency.** Servers based on the Intel Xeon processor E5 family are optimized for energy-efficiency at all operating points. They adapt automatically to workloads to reduce power consumption without slowing performance. Businesses have used these servers to save millions of dollars in capital and operating costs, while simplifying their infrastructure and reducing space and power requirements by as much as 90 percent.¹

- **Optimized Power Management.** A wide range of servers based on the Intel Xeon processor E5 family support Intel Node Manager,² which provides the information and control needed for efficient, policy-based power management. With this support, IT can tackle all the power and thermal challenges outlined above to get more value out of every watt in their data centers and private clouds.

Optimizing Data Center Efficiency with Intel Node Manager

In combination with an enabled management console and servers based on the latest Intel Xeon processors, Intel Node Manager provides the capabilities needed to efficiently and effectively manage power and thermals in a data center or next-generation private cloud environment.

Monitoring and Reporting Data to Improve Data Center Planning

Intel Node Manager monitors and reports actual power consumption and temperature for Intel Xeon processor-based servers that support this technology. When used with a management console that trends data over time for single servers and groups of servers, data center planners have the information they need to accurately determine where and when to add additional power, cooling, and compute capacity.

Setting Power Limits to Enable Higher Rack Densities

To determine how many servers can fit in a rack, IT typically divides total rack power by the nameplate value of the server power supplies. However, the peak power consumed by a server is rarely as high as the nameplate value, so racks are invariably under-populated. Power is stranded and new racks must be deployed sooner than would otherwise be necessary. Intel Node Manager lets IT limit rack power to the actual maximum value consumed by the servers. With this protection, IT can safely deploy more servers to each rack and utilize allocated power more efficiently.

Policy-Based Power Reduction to Survive Power and Cooling Events

When a facility's cooling capacity is compromised or an electrical brownout occurs, maintaining service levels can be a real challenge. Intel Node Manager allows IT to enforce dynamic power limiting policies to automatically reduce the amount of power consumed and heat generated. This enables servers to continue operating in a compromised environment until the issue is resolved. When necessary, they can also be shut down gracefully to avoid overheating and damage.

Managing and Avoiding Hot Spots by Optimizing Workload Placement

Placing and migrating virtual machines in a highly virtualized environment is typically based on CPU and memory capacity, with little or no assurance that sufficient power or cooling is available on the target server. Intel Node Manager provides the power and cooling data IT needs to ensure virtual machines are migrated only to servers and groups of servers with sufficient power and thermal headroom to support the additional workload.

The Best Foundation for Your Data Center and Your Private Cloud

The ability to monitor and control data center power and thermals with Intel Node Manager is one of many advantages provided by Intel® Xeon® processor-based servers. Intel partners with leading IT organizations around the world to define current challenges and next-generation requirements. Intel also works with leading hardware and software vendors and cloud providers through Intel Cloud Builders (www.intel.com/cloudbuilders) to understand challenges and define solutions for next-generation cloud deployments.

These efforts help to inform Intel's technology roadmap, which ensures that new server products not only deliver superior performance and energy efficiency, but also include and support critical new technologies, such as Intel Node Manager. With these integrated capabilities, the latest Intel Xeon processor-based servers can help you solve your data center performance, power, cooling, and space challenges today. They can also help smooth your adoption of next-generation cloud solutions.

Intel® Node Manager USAGE MODEL

- Track actual temperature and power usage directly from the server.
- Control maximum node power to increase rack density and confidence.
- Automatically reduce power to extend operations during power or cooling events.
- Use power data and strategic limiting to place workloads for maximum efficiency.

MONITOR

LIMIT

SURVIVE

OPTIMIZE

Learn More Today

Intel® Xeon® processor: <http://www.intel.com/xeon>

Intel® Node Manager: <http://www.intel.com/go/nodemanager>

Intel Resources for Your Journey to the Cloud: <http://www.intel.com/cloud>



¹ Source: "University Sees Major Savings with Data Center Consolidation." A Cisco customer case study, documenting how the University of Colorado replaced 300 legacy servers with just 10 Intel Xeon processor-based servers, reducing its server footprint by 95% and power consumption by 90%. http://www.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/U_of_Colorado_casestudy_final.pdf

² Support for Intel® Node Manager varies by server vendor. Check with your preferred vendor for information.

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