Sensor data can make your data center smarter—Intel can help cloud service providers use telemetry to optimize PUE, reduce TCO and boost resource utilization

“Make your life easier by investing in smarter data center technologies... Developing the ability to gather and analyze real-time data from the critical infrastructure will really be table stakes from here on out, especially in a more distributed and diverse data-center ecosystem.”

—Jennifer Cooke
Research Director, IDC Data Center Trends and Strategies Team

Industry Strategic Challenges

The data center is the steadily beating heart of any cloud service provider’s (CSP’s) business. As global IP traffic is predicted to increase nearly threefold over the next five years, reaching 3.3 zettabytes by 2021¹, those data centers will need to further optimize performance, utilization and power, while maintaining high availability and keeping costs affordable.

Today’s data centers require intensive human monitoring and repair, characterized by reactive management and manual provisioning and remediation. There is limited visibility into what servers are doing at scale.

As the number of data centers and servers grows to keep up with data growth, it becomes imperative to introduce automation so that data centers are self-running and self-healing—improving efficiency and reducing operational costs.

Business Drivers and Desired Outcomes

CSPs must focus on what is happening in their data centers. Are your data center managers asking questions such as:

•  "Why is my data center running too hot?"
•  "How can I lower my power usage effectiveness (PUE)?"
•  "Why are my racks not getting enough power?"
•  "Where is the network exposed to attack?"

If so, you are not alone. CSPs large and small continually seek to improve data center management. But answering these and similar questions using telemetry is the way to stay one step ahead in the fiercely competitive CSP marketplace.

PUE is a great place to start—energy accounts for a substantial portion of data center budgets, at up to 40 percent of total costs². But you cannot ignore considerations like thermals, workload placement, memory and cache utilization that contribute to total cost of ownership (TCO). Choose a telemetry solution that can scale from solving one or two problems on a single node to monitoring a wide range of issues on tens of thousands of nodes. And while gathering telemetry data from sensors may be the first step, you must also consider the usefulness of the data, how best to use it, where to store it and how long to keep it.
As you develop a telemetry strategy, you may find that facilities personnel, familiar with the building management system (BMS), have different priorities and knowledge bases than IT personnel. Also, once IT passes the telemetry data to data scientists (who have little knowledge of hardware capacity planning and performance), the scientists may struggle to articulate how to fix the problems revealed by the data.

While these challenges are real, they can be solved, and with astronomical results. Telemetry-driven power management, thermal management and workload optimization can increase uptime, reduce TCO and PUE, and evolve toward the autonomous data center of the future.

**Digital Transformation & Business Innovation**

Telemetry creates the ability to detect problems early and then take action (see Figure 1). For example, you can shift a workload the instant a server’s performance starts to deteriorate or sense a change in the weather and automatically adjust the data center’s cooling equipment. By acting on the telemetry data, you can perform preventative maintenance, reduce downtime, experience fewer urgent issues and improve data center efficiency.

Intel provides solutions that enable you to measure power at each individual server, using sensors already present in Intel® Xeon® Scalable processors. And while power is one important metric for PUE, temperature also plays a role. Temperature sensors placed on server racks do not provide insight into what’s really going on with each individual server. But accessing the data provided by inlet, outlet and airflow sensors on Intel Xeon Scalable processors can provide exceptional thermal data. With a good visualization tool, you can set thresholds for power and thermal data to enable better overall data center PUE management.

**Enabling Transformation**

It can be a daunting task to identify and remedy gaps in tooling and then begin collecting telemetry data, let alone put it to good use and scale the solution from a few nodes to thousands of nodes. Interdependency between power and thermals can further complicate matters. The good news is that Intel provides powerful telemetry solutions and can consult with data center managers on how to best use those solutions to optimize performance, utilization and power.

Intel Xeon Scalable processors have built-in sensors that can provide data to help optimize utilization, reliability and power. Other monitoring capabilities can help with performance metrics, such as memory and cache usage. Adjacent storage and accelerators can further contribute to data center health and performance.

![Figure 1: The power of telemetry across the data center lies in the ability to detect problems early and take appropriate action](image-url)
Solution Summary
The first step toward a modern data center infrastructure is to learn how to expose the telemetry already present in your data center to one or more data center management tools. Then, you can move up the telemetry maturity ladder by interacting with the telemetry data to take action, use analytics to automate monitoring and action, and finally add in machine learning and artificial intelligence to create a truly autonomous, self-monitoring and self-healing data center with low PUE and TCO. Intel can help you complete the journey with solutions and expertise tailored to your needs.

Solution Ingredients
- Intel® Cloud Insider Program
- Intel® Power Thermal Aware Solution (Intel® PTAS)
- Intel® Xeon® processor Scalable family
- Intel® Optane™ storage technology
- Intel® FPGA

Find the solution that is right for your organization. Contact your Intel representative or visit Cloud Insider Program