CASE STUDY

Cloud Data Center
Global Telecom Company

Real-Time Power, Thermal and Health Monitoring

Intel® Data Center Manager improves server utilization and capacity planning while increasing energy efficiency for global telecom company

Business:

Multinational company focused on software development, system integration and technical services managing the data center of a global telecom industry client.

Challenges

- Real-time power and thermal monitoring
- Data center health monitoring
- Server utilization
- Capacity planning
- Increase energy efficiency
- Server-level centralized remote access

Solutions

- Intel® Data Center Manager
- Intel® Virtual Gateway

Executive Summary

A multinational company focused on software development, system integration and technical services serving a client in the telecom industry installed the Intel® Data Center Manager (Intel® DCM) in its customer's data center to gain greater insight into power and thermal monitoring, data center health and energy efficiency, as well capacity planning. Currently, the total number of servers in the data center was 14,000 devices, and a test deployment was conducted on 5100 devices.

Using the Intel® DCM cooling analysis, the IT staff was able to reduce cooling cost and improve Power Usage Effectiveness (PUE), thus increasing energy efficiency. The test deployment indicated that if Intel® DCM was deployed across the data center's 14,000 servers, the annual cooling costs of the data center would be reduced $321,300 USD. Through Intel® DCM's ability to measure power usage at the device level, IT staff was able to increase rack density by 25%, thus indicating an added source of potential annual savings. Additionally, Intel® DCM's ability to deliver device level power and thermal data eliminated the need of intelligent PDUs. Based on the customer's current data center environment of 1400 racks, the projected annual savings was $280,000 USD.

The IT administrators also installed the Intel® Virtual Gateway solution, a cross-platform, virtual keyboard-video-mouse used for diagnosing, troubleshooting, and monitoring the health of data center hardware, to be able to gain remote server visibility and control. Because Intel® DCM delivers software KVM for device management, the need of hardware KVM devices was eliminated. The test deployment indicated that if the Intel® Virtual Gateway solution was deployed

across the data center's 14,000 servers, the annual cost savings would be $875,000 USD.

The test deployment of Intel® DCM and Intel® Virtual Gateway projected a total annual cost savings of $1,476,300 USD when the solutions are deployed across all devices in the telecom client's data center environment.

Background

A multinational company focused on software development, system integration and technical services needed to develop software for power, thermal and health monitoring of its customer's data center. Additionally, the IT staff needed to be able to diagnose, troubleshoot and monitor the health of the data center's hardware remotely.

The IT staff purchased the Intel® DCM Software Development Kit (SDK) and installed Intel® DCM in the customer's data center to assess its value in a wider deployment. Intel® DCM is a software and technology product that monitors, manages and optimizes the energy consumption and temperature of data center servers. The test deployment included a total of 5100 devices, and 14,000 devices were targeted for final deployment.

Additionally, the IT administrators purchased the Intel® Virtual Gateway Software Development Kit (SDK). Intel® Virtual Gateway is a cross-platform, virtual keyboard-video-mouse used for diagnosing, troubleshooting, and monitoring the health of data center hardware. A firmware-based capability embedded directly into the server, Intel® Virtual Gateway eliminates the need for complicated and expensive KVM infrastructure and works across platforms and OEMs.

Intel® DCM Provides Thermal Monitoring, Improving Energy Efficiency

Today, many data centers are maxed out in power capacity. Additionally, poor thermal design leads to hot spots that limit rack loading. Establishing a power monitoring capability requires establishing a separate infrastructure of IP-based intelligent power strips. Moreover, a lack of visibility into actual power consumption requires significant overprovisioning to maintain reserve margins.

An additional challenge that IT administrators face in having a single solution for power management across all devices in the data center is that there are multiple proprietary power measurement and control protocols supported by different OEMs.

The IT staff of the multinational software development and system integration company installed Intel® DCM in its customer's data center. IT administrators immediately benefitted from Intel® DCM's short learning curve, ease of use, and simplicity of deployment. Intel® DCM eliminates the need for complex, device-specific configuration, setup or customization. One of the key features of Intel® DCM is its functionality in a heterogeneous server environment, another benefit that satisfied the customer's data center environment.

The Intel® DCM SDK solution is a middleware with APIs for data center power and thermal management that is easy to integrate in the Management Console. The Management Console identifies cooling efficiencies, detects underutilized systems, visualizes power consumption in maps and graphs, and models power consumption changes and impact to infrastructure.

The IT staff utilized the Intel® DCM's health monitoring and utilization function to obtain granular sub-component failure analysis and out of band real-time utilization data, including CPU, disk and memory. Because Intel® DCM provides power and thermal monitoring and management for servers, racks and groups of servers, IT administrators were able to aggregate real-time, accurate power and thermal consumption data, and manage the data center's hot spots.

The main purpose of data center cooling infrastructure is to provide a good thermal environment for the protection and reliability of IT equipment, especially the servers. Some data centers use supply or return air temperature to control CRACs. Others base their control policy on distributed physical sensors on the ceiling of hot and cold aisles. However, these approaches can't reflect the nonuniform temperature distribution at server inlets caused by any recirculation or bypass of air between hot and cold aisles with sufficient granularity.

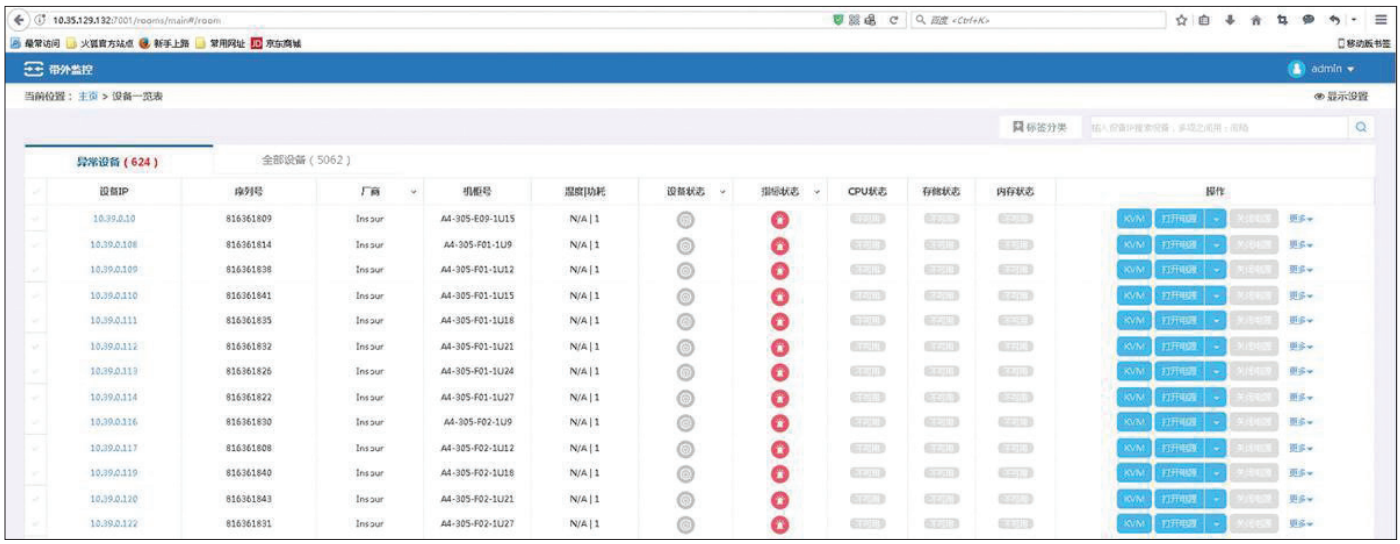

Figure 1. Intel® DCM Software Development Kit (SDK) UI

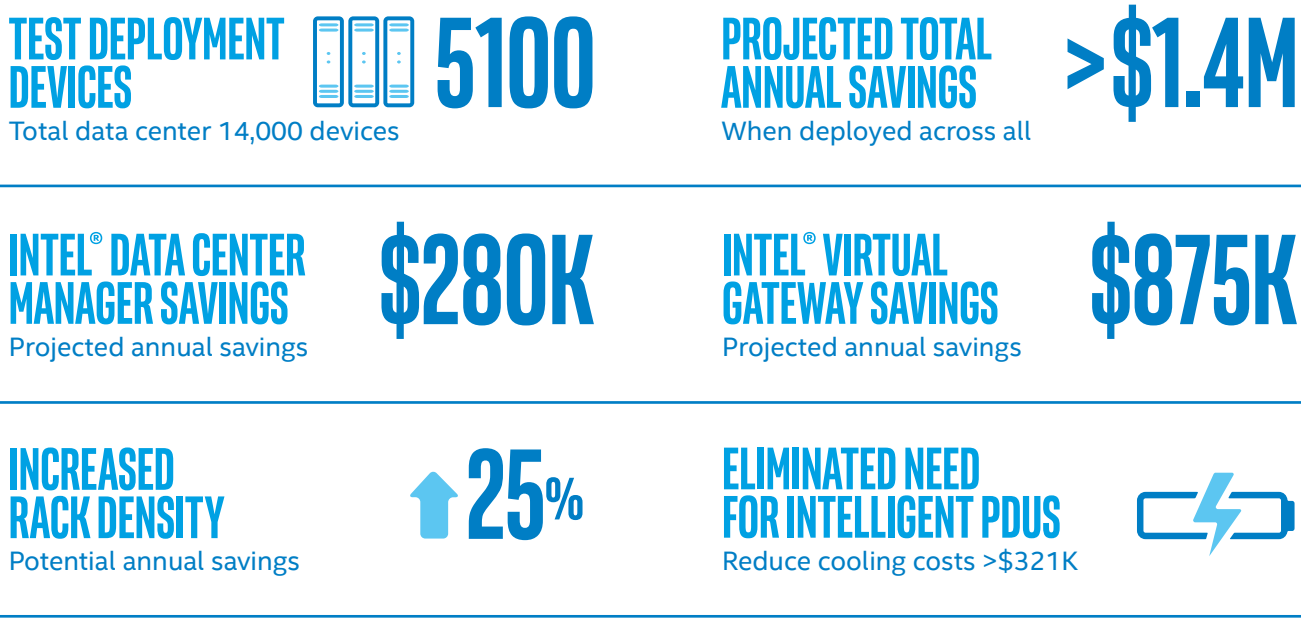

Figure 2. Key Benefits of Intel® DCM and Intel® Virtual Gateway Deployment

The Intel® DCM provided IT staff with accurate real-time power and thermal consumption data to deliver the insights needed to manage the data center power usage and hotspots. This included real-time monitoring of actual power and inlet temperature data aggregated to servers, racks, and groups of servers, as well as server health component monitoring at a granular level.

Using the Intel® DCM cooling analysis, the IT staff was able to reduce cooling cost and improve Power Usage Effectiveness (PUE), thus increasing energy efficiency. This was accomplished by safely raising the temperature of the server room while continuously monitoring data center devices for temperature issues. The test deployment indicated that if Intel® DCM was deployed across the data center's 14,000 servers, the annual cost savings would be $321,300 USD.

Improve Capacity Planning and Increase Rack Density

According to a research report sponsored by Intel®, 43% of data centers use manual methods for capacity planning and forecasting. Intel® DCM automates the collection, management, and analysis of power and temperature readings at the individual device level. Leveraging this granular information, data center managers can improve capacity planning, identify and decommission energy-wasting assets, and strategize new equipment outlays using predictions based on actual energy usage. This prevents outages from occurring by identifying and resolving sources of overload, hot spots, and cooling issues before they become problems.

Additionally, Intel® DCM' stores server-related measurement data such as current power consumption and its historical trending feature maintains this data for a year. Meanwhile, the solution's policy-based management function provides an intelligent heuristics engine that maintains group power caps while ensuring optimal performance. This data provides the foundation for high-precision capacity analysis, reliable capacity planning, and accurate threshold monitoring.

Intel® DCM's ability to provide detailed information about server power characteristics assisted IT administrators to set fixed-rack power envelopes in their customer's data center, enabling them to safely increase server count per rack, which will improve utilization. By measuring power usage at the device level, IT staff was able to increase rack density by 25%, thus indicating an added potential annual savings opportunity.

Additionally, Intel® DCM's ability to deliver device level power and thermal data eliminated the need of intelligent PDUs, another significant source of cost-savings. Based on the customer's current data center environment of 1400 racks, the projected annual savings was $280,000 USD.

Remote Server Visibility and Control From Anywhere

Intel® Virtual Gateway replaces legacy KVM (keyboard-video-mouse) hardware with a firmware-based capability embedded directly into the server. Supporting multiple OEM server vendors, Intel® Virtual Gateway is delivered either as a console or as an SDK. The software solution reduces complexity and adds new capabilities beyond the limits of hardware switches, eliminating the need for complicated and expensive KVM infrastructure. Intel® Virtual Gateway delivers KVM capability that provides server visibility and control for both in-band and out-of-band communications.

Intel® Virtual Gateway SDK provided IT staff with the ability to manage their customer's data center through a centralized, at-a-glance dashboard for remote access, subsystem monitoring, automated health alerts, and remote on/off control. This enabled IT administrators to view single or multiple units and subsystems on the same pane of glass, in real time, from anywhere, and remotely toggle power.

Because Intel® Virtual Gateway delivers software KVM for device management, the need of hardware KVM devices was eliminated. The test deployment indicated that if Intel® DCM was deployed across the data center's 14,000 servers, the annual cost savings would be $875,000 USD.

Intel® DCM & Intel® Virtual Gateway Deployment Results

A multinational company serving a client in the telecom industry installed the Intel® DCM in its customer's data center to gain greater insight into power and thermal monitoring, data center health and energy efficiency, as well capacity planning. The IT administrators also installed the Intel® Virtual Gateway solution, a cross-platform, virtual keyboard-video-mouse used for diagnosing, troubleshooting, and monitoring the health of data center hardware, to be able to gain remote server visibility and control.

- The test deployment indicated that if Intel® DCM was deployed across the data center's 14,000 servers, the annual cooling costs of the data center would be reduced $321,300 USD.
- Through Intel® DCM's ability to measure power usage at the device level, IT staff was able to increase rack density by 25%, thus indicating a potential annual savings opportunity.
- Intel® DCM's ability to deliver device level power and thermal data eliminated the need of intelligent PDUs. Based on the customer's current data center environment of 1400 racks, the projected annual savings was $280,000 USD.
- The IT administrators also installed the Intel® Virtual Gateway solution, which eliminated the need of hardware KVM devices. The test deployment indicated that if the Intel® Virtual Gateway solution was deployed across the data center's 14,000 servers, the annual cost savings would be $875,000 USD.

The test deployment of Intel® DCM and Intel® Virtual Gateway projected a total annual cost savings of $1,476,300 USD when the solutions are deployed across all devices in the telecom client's data center environment.

Where to Get More Information

For more information on Intel® Data Center Manager, visit **intel.com/dcm** or contact **dcmsales@intel.com**

About Intel® Data Center Manager

Intel® Data Center Manager (Intel® DCM) provides accurate, real-time power, thermal and health monitoring and management for individual servers, group of servers, racks and IT equipment in the data center. It's a capability that is useful for both IT and facility administrators, which allows them to work jointly to increase data center efficiency and uptime.

PUE is an indicator defined by Green Grid, a global consortium working to improve power efficiency in the data center system. PUE is a metric for the efficiency of electricity use, defined as:

$$\text{PUE} = \frac{\text{Total power dissipation in a target facility}}{\text{Total power consumption for the IT equipment}}$$