



OUTSTANDING FACILITIES PRODUCT
A FACILITY PRODUCT THAT IMPROVES DATA CENTER ENERGY EFFICIENCY, IN A CLIENT INSTALLATION CASE STUDY

ORANGEBURG DATA CENTER: DATA CENTER INTELLIGENT COOLING CONTROLS

VERIZON WIRELESS

PROJECT TEAM: Charles Monteith, John Toner, Dennis Purcell (Verizon Wireless) with Emerson Network Power

Verizon Wireless partnered with Emerson Network Power to install an intelligent cooling control system for its data center. Via better control, Verizon improved its cooling efficiency by placing redundant cooling components in a “hot stand-by” mode. These stand-by units can reactivate as needed, saving energy without increasing risk to IT operations.

Verizon Wireless’s New York data center hits a cooling wall

In 2005, Verizon Wireless completed work on a data center facility in New York with 32,500 sq ft of raised floor space, spread across two floors of a larger office building. The second floor of the facility accounted for about half of the raised floor space, of which about 12,000 sq ft was usable area. The computer room was cooled by 32 downflow Liebert DX units, each with 98 kW of nominal cooling capacity. After the space was completed, the IT load grew tremendously over the next few years, going from about 550 kW of UPS load in 2007 to 1,700 kW in mid-2009.

By early 2008, cooling had become problematic. Even after basic tuning of the cooling system, site operators still had to run all 32 computer room air conditioner CRAC units, cycling air in the computer room almost three times per minute. IT equipment followed a hot aisle/cold aisle pattern, but some hardware didn’t comply with the layout. Also, there was no automated way to cycle CRAC units on and off in response to changing cooling loads – all CRACs were monitored and controlled by humans in IT site operations.

Optimized cooling and improved control

To deal with the cooling problem, Verizon Wireless set goals to optimize cooling within space limitations, automatically reduce operation of excess units, and realize the power savings they estimated might be possible – around 230 kW. Using a “back to basics” approach, they improved compliance with the hot/cold aisle arrangement, installed over 1,400 rack units of blanking panels, and sealed air leaks between racks and in raised floor openings for cables and PDUs. They also installed energy-efficient window blinds and implemented other air distribution-tuning measures. However, site operators kept coming back to the same problems: too many cooling units and insufficient controls.

So, Verizon partnered with Emerson Network Power to implement better control, communication, and monitoring technology for its existing CRAC units. Using Emerson’s Liebert iCOM control system, site operators connected the CRACs to work as an integrated system rather than 32 individual units. They created six smaller cooling zones, for better temperature management and correction of hot spots.



PROJECT AT-A-GLANCE

- Cooling had become problematic in a 32,500 sq ft New York data center, due to huge growth in IT load. Even after a cooling system tune up, excessive cooling units and lack of control were still a problem
- Verizon Wireless partnered with Emerson Network Power to implement improved cooling control via the Liebert iCOM control system
- Intelligent controls allowed extra cooling units to be automatically cycled on and off, driving energy savings

PROJECT ACHIEVEMENTS

Relieved eight of 32 CRAC units from continuous operation

Saved 1,752,000 kWh and 572 metric tons of CO2 per year

Project payback period of less than 13 months

Created custom firmware for cooling controls, enabling special CRAC behavior in the event of a power outage

VERIZON WIRELESS: ORANGEBURG DATA CENTER – DATA CENTER INTELLIGENT COOLING CONTROLS

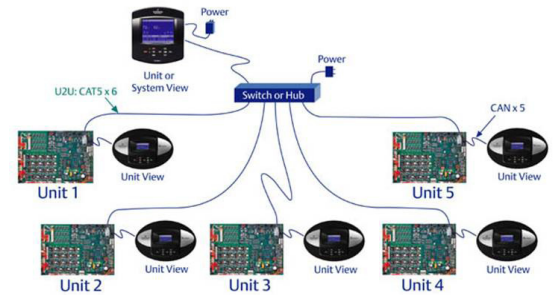
One piece of new knowledge developed during the project was customized firmware for the iCOM system. Verizon's operators wanted additional flexibility for controlling when CRAC units cycled on and off. During normal operation, operators wanted redundant units to go into standby when not needed. However, in the event of a power outage, operators wanted all units to come online and restore cool temperatures as quickly as possible after power came back on. Afterwards, as temperatures returned to normal, they wanted units to shift back into standby as appropriate. This new logic required customizing the existing iCOM firmware. It took three months of supervised testing and programming to develop the optimal plan.

After giving the iCOM system control of the CRAC units in March 2009, Verizon Wireless was able to better match delivered cooling with actual head loads and manage the needs of different cooling zones.

Energy and Financial Impacts

Improved cooling control allowed Verizon Wireless to relieve eight of its 32 CRAC units from continuous operation, instead allowing them to be in "hot stand-by" as redundant units. Also, better control of hot spots allowed operators to feel comfortable raising the temperature set point slightly from 21 °C (70 °F) to 23 °C (73 °F), saving additional energy. These measures save ~200 kW on average, or about 1,752,000 kWh and 572 metric tons of CO₂ per year. The payback on the project was less than 13 months. Verizon did not provide a dollar savings estimate, but assuming an electricity price of \$0.10 / kWh, Uptime Institute estimates a savings of around ~\$175,000 a year.

Finally, Verizon Wireless sees other benefits from improved control. Reduced usage of cooling units extends their life and reduces maintenance costs. It is easier to track CRAC unit maintenance history and to automatically schedule maintenance based on a unit's monitored performance.



ABOUT VERIZON WIRELESS

Verizon Wireless operates the nation's largest and most reliable wireless voice and 3G network.

Headquartered in Basking Ridge, N.J., Verizon Wireless is a joint venture of Verizon Communications (NYSE, NASDAQ:VZ) and Vodafone (NASDAQ and LSE: VOD). A leader in wireless voice and data services, the company:

- built the nation's first wide-area wireless broadband network
- delivered the nation's first wireless consumer 3G multimedia service
- launched the most comprehensive mobile music service in the world

Acknowledgements: The information in this case brief was taken from the GEIT Award Winner Presentation "Intelligent Control of Data Center Cooling: Saving Energy and Improving Availability", presented by Dennis Purcell of Verizon Wireless at Uptime Institute's Symposium 2010, May 17-19, 2010 in New York, NY.



The Green Enterprise IT Awards are the Uptime Institute's highest honor. The Institute grants these Awards to projects, ideas and products that significantly improve energy productivity and resource use in IT. The Awards are open to applicants in all countries and are carefully judged by a committee of independent experts. Award winners are announced at the high-profile Uptime Institute Symposium annually. symposium.uptimeinstitute.com

