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EFFICIENCY: DOE lab teams with wireless company to curb data center's power needs *(Wednesday, November 10, 2010)*

Colin Sullivan, E&E reporter

BERKELEY, Calif. -- The Bay Area's foremost energy research facility has increased its data load capacity by 50 percent over the past three years with virtually no additional investment in cooling infrastructure, according to officials at the Energy Department.

The startling results came about after engineers at DOE's Lawrence Berkeley National Laboratory teamed with SynapSense, a wireless communications startup based in Folsom, Calif., to conduct a pilot project meant to demonstrate how data centers might be better managed to save energy. The project was started in 2007 by Energy Secretary Steven Chu, then director of the lab, and continued by his successors.

Three years on, officials at the lab and SynapSense got together yesterday to present their findings for the first time, during an internal presentation at the lab's campus here, which sits above University of California, Berkeley, in the hills overlooking San Francisco Bay on a secure, military-style compound.

Ed Ritenour, IT manager at the lab, said the facility's tech department in 2006 was rife with problems, with "cold and hot spots" spotted throughout a 5,000-square-foot server center that handles data flow for the entire compound. The server room was using a 15-ton air conditioner to cool the room, fans to redirect air and large grates in an attempt to reduce air pressure, all with limited success.

"Every time a new system went in, we had more complaints," Ritenour said. "Our capacity was not being used very effectively."

So the lab hired SynapSense to work in a collaborative arrangement with in-house engineers to design a better system. SynapSense provided the software, wireless sensors and startup-style flexibility, with Lawrence Berkeley on its end offering its innate ability to solve problems.

Venture-funded SynapSense, in other words, was granted an ideal, garage-shop venue to test its sensors and the beta version of its software, which was refined over time to adapt to the lab's specific needs. The consultants worked with federal engineers and IT managers to measure air

flow, air mixing and humidity in the server room, then renovated the facility itself to improve cooling conditions.

A 20-ton air conditioning unit went in, combined with better air flow infrastructure (exhaust chimneys were installed), wireless temperature sensors and water-cooled doors around the servers. The monitoring process, conducted in real time, led the lab to lower humidity in the server room, a step that dropped power use by 25 percent on its own, Ritenour said.

The resulting "power usage effectiveness" ratio -- a measure of energy efficiency often applied to data centers -- is 1.46. That is down from the lab's average of 1.65 and far below the national average of 2.0 for data centers.

A 1.65 PUE means that for every 100 kilowatts of electricity used to power IT load, 65 kilowatts are needed for the associated cooling infrastructure. A purely efficient system would have a ratio of 1.

The better conditions for air flow and cooling also led to an estimated savings of 643,000 kilowatt-hours per year -- on a pay-back time of about a year-and-a-half, when estimating the cost of doing business with SynapSense (which the company would not disclose).

Dale Sartor, team leader for the lab's environmental energy technologies division, said the results have made the lab "a showcase for continuous improvements" that might be applied beyond the facility's medium-sized data center.

"The IT group was a willing test bed, partly driven by the fact that they were running out of capacity," Sartor said. "By looking at efficiency and optimizing systems, we were able to extend the life of infrastructure."

Opportunities for SynapSense

The results at the lab are striking because of the potential application beyond its data center.

The IT sector's appetite has been said to account for 1.5 percent of total U.S. electricity demand, with server farms run by Internet giants Facebook, Google and others accounting for much of that flow and growing.

Facebook is under particular pressure to improve its energy performance, leading CEO Mark Zuckerberg to start building a giant data center in Prineville, Ore., to run the Internet traffic generated by the social networking firm's 500 million users. But that decision has also sparked protest from Greenpeace International, which charges that Zuckerberg has ignored the coal-heavy portfolio of his energy provider in Oregon, PacifiCorp (*ClimateWire*, Sept. 7).

All of which spells opportunity for a company like SynapSense, which has taken its improved product from the Lawrence Berkeley experience and moved on to bigger applications.

According to CEO Peter Van Deventer, the company has signed contracts with 20 companies within the Fortune top 100, including "the largest telecommunications firm in the United States, the largest software company in the world" and a major bank, he said.

Asked to provide more specifics, Patricia Nealon -- director of corporate marketing at SynapSense -- explained that only a few of their clients had gone public with that information. They include Facebook, Yahoo, Stanford University, Seattle City Light and IBM.

"Data centers are rapidly expanding their energy consumption, and we're at the forefront of how do you manage that, how do you get it under control," Van Deventer said.

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