APPLICATION:

Data Center Energy Management

Vigilent and Dust Networks Close the Loop on Energy Management at the California Franchise Tax Board

SUMMARY:
Using Dust Networks wireless mesh technology, Vigilent delivered their intelligent energy management system to the California Franchise Tax Board, reducing energy consumption by 15%, with a payback of 3 years, and an annual savings for the State of California of $43,000.

CHALLENGES: For many enterprises, the data center is the crux of their business, operational disruptions and security breaches are calamitous events, and the California Franchise Tax Board was no exception. While retrofitting their data center with an energy management system made fiscal and environmental sense, installation had to be non-disruptive, reliability was crucial, security could not be compromised, and maintenance needed to be minimal.

SOLUTION: Vigilent incorporated Dust Networks battery-driven wireless mesh network nodes into temperature/humidity sensors deployed throughout the data center. The nodes self-formed a secure wireless sensor network that communicated data through Dust Networks' advanced network manager to the Vigilent energy management system. Dust Networks' WSN provided the battery-life, security and reliability they needed.

THE CHALLENGE

Data centers have become essential to the functioning of business, communications, academic, and governmental systems that use them to aid business processes, information management, and communications functions. Data centers are also energy gluttons, consuming 61 billion kilowatt-hours or 1.5 percent of total U.S. electricity consumption, at a cost of $4.5 billion (2006 figures), much of it for cooling the server racks. In 2004, Dr. Clifford Federspiel launched Vigilent to pioneer an entirely new approach to dynamic cooling by applying artificial intelligence technology to the challenge of converting cooling plants into a managed resource.

The Vigilent intelligent energy management system is based on their M3 closed-loop control technology, which measures key attributes in the environment including inlet air temperatures, as well as AHU/CRAC (air handling unit/computer room air conditioning) discharge/return air. An advanced artificial intelligence (AI) engine analyzes the data, compares it to historical trends, and profiles the system and environment in real time, recommending changes in device performance. The recommendations of the AI engine are automatically – and constantly – used to close the loop, controlling components of the cooling plant (fans, condensers, etc.) and to respond in real-time, using industry-standard protocols.

To collect temperature and humidity data throughout the data center, sensors need to be widely and densely distributed. However, retrofitting the data center with communications and power cabling is out of the question – it is too inflexible, a single mistake could bring down an entire site, and the material and labor costs are prohibitive. Vigilent chose to use sensor nodes that were connected wirelessly to address these concerns. In selecting a wireless networking solution, the company identified as critical success factors the need for low power consumption, high reliability, and robust security.

THE SOLUTION

Dust Networks' wireless mesh network solution, combining wireless nodes, managers and intelligent network management, met all of the requirements Vigilent identified. Dust Networks® provides embeddable wireless sensor network systems-on-chip, modules and network managers which deliver low-power, reliable, resilient and scalable network solution including advanced network management and comprehensive security features.

"In order to make our solution very flexible, we need to run our wireless sensor devices on batteries," said Dr. Federspiel. "What that translates to is a need for the battery life to be significantly longer than the pay-back period for the system. A two-year simple payback model requires a battery life of four years." Dust Networks wireless nodes, running for up to five years on two AA batteries easily meet this battery-life requirement. And the advanced networking technology creates a flexible, auto-forming mesh network that is easy to expand and modify with changing conditions.

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Because the Vigilent energy management system continuously optimizes the data center environment, reliability is also crucial. Data centers are difficult environments for radio signals, with metal, concrete, walls, equipment and rolling server racks reflecting, deflecting and attenuating the signals. The wireless communications network needs to function flawlessly without intervention. Dust Networks field-proven, industrial strength network provides advanced RF resiliency with self-healing and self-sustaining capabilities as well as remote management and configuration.

Dust Networks also provided the security Vigilent needed. "Data centers are hyper-secure facilities. Having a locked-down, secure wireless network that guards against intrusion or disruption is very important to our customers," said Dr. Federspiel. Dust Networks' comprehensive security management includes authentication, encryption, key management and message integrity. "In addition to the explicit security features," continued Dr. Federspiel, "some of Dust Network's underlying advanced networking technology, the things that make it very reliable and low-power for example, help to make it even more secure."

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> ***Dr. Clifford Federspiel***

THE RESULTS

Vigilent has been deploying data center energy management systems utilizing Dust Networks wireless mesh network products since 2007. A study by the Lawrence Livermore National Labs for the California Energy Commission reported that Vigilent provided sufficient dynamic cooling control to reduce overall power consumption by 15% at the California Franchise Tax Board's 10,000sf data center with a simple payback period of two years.

IN CONCLUSION

"Vigilent is in the business of delivering intelligent energy management systems that provide increased uptime and reduce energy costs. We believe that a robust wireless solution is critical to our ability to provide continuous, real-time monitoring and control," Dr. Federspiel observed. "Dust Networks provides us with an industrial grade solution that is essential in the demanding environments in which our systems are installed. In addition, the way that Dust™ has designed their product allowed us to bypass all of the middleware that goes along with other manufacturers' wireless devices. We instead, have focused on what matters most to the customer: delivering measurable value from day one."

Why Work with Dust Networks? Dust Networks is the leader in wireless sensor networking, delivering intelligent mesh technology when ultra-low power matters. Dust Networks is defining the way to connect smart devices. Using standards-based wireless mesh network technology, Dust Networks designs chips, modules and managers that create networks that are reliable, resilient and scalable with advanced network management and comprehensive security features.

About Vigilent

Vigilent (vigilant.com) is the leader in intelligent energy management systems for data centers, telecommunications facilities and large, commercial buildings. Pioneering the application of advanced, artificial intelligence technology to the real-time demands of energy usage, Vigilent delivers significant reductions in energy costs while increasing resiliency and ride-through in data centers, and offering tenant comfort and greener operations in large buildings. Vigilent is a privately held firm located in the technology corridor of San Francisco's East Bay and is committed to green energy solutions that make for a more sustainable planet.