It wasn’t long ago that Scott Crothers didn’t sleep well at night. In fact, there was a nearly 10-year stretch when the network engineer for West Des Moines Community Schools (WDMCS) would lie awake stressing about the fate of his data center.

“For a long period of time, I was extremely nervous,” Crothers recalls. “Any time there was any type of storm coming in, the first thing I worried about was whether I would make it through without losing something.”

Crothers’ apprehension stemmed from the fact that the district’s data center had significantly outgrown its capacity. With the room’s available power and cooling supply heavily taxed, the connected equipment was at constant risk of failure.

Fast forward four years, and the climate has changed dramatically for WDMCS, which ranks as Iowa’s ninth largest school district, serving more than 9,000 K-12 students at 13 schools. Having refreshed the data center and deployed numerous Eaton uninterruptible power systems (UPSs) in 2010, Crothers now sleeps like a baby.

“My stress level has gone down substantially,” he acknowledges. “For the past four years, I haven’t had to worry about a thing. When I think back about the previous 10 years, I can’t believe I made it.”

The district now enjoys continuous uptime and the highest level of availability, thanks to a 40kVA Eaton 9390 UPS that safeguards seven data cabinets, approximately 65 physical servers, five virtualized ESX servers, a storage area network, and a vast array of switches and networking equipment. A variety of additional Eaton UPSs protect the district’s LAN, phone system, EMC backup solution and data closets at individual school sites.

“It has really given me peace of mind so I’m not up at night worrying about whether something will happen to my data center or my switches,” Crothers says of the comprehensive power protection solution.

The Importance of Future Planning

The insomnia suffered previously by the network engineer dates back to the original design of the district’s data center.

“It was built in 1995 with not a whole lot of thought going into it,” Crothers explains. “An existing room was designated as the data center and a raised floor was put in. At the time, nobody really thought too much about power requirements.”

By 2008, that lack of forethought had become a real issue for WDMCS.

“The data center had built up, and I was putting in more equipment than what the electrical could handle,” Crothers recalls.

In addition, the network engineer was struggling to manage multiple UPSs attached to individual pieces of equipment, and the existence of only 15-amp circuits in the room prevented WDMCS from scaling to a more robust, centralized UPS that would require larger circuitry. Furthermore, the district’s existing cooling solution was unable to keep pace with ever-escalating heat generation.

“There were issues all over, and it got to the point where we had simply outgrown our electrical and cooling capacity,” Crothers says. “We were still running off the building power with no dedicated transformer. We clearly needed to refresh the data center.”

WDMCS wasn’t alone in its uptime challenges. “Lack of reliable power is a key issue for data center managers,” confirms Anu Cherian, a senior industry analyst for Frost & Sullivan’s Energy & Power Systems division. “As demands on data centers continue to increase year over year, there is a need to have 100 percent uptime. Voltage sags, surges and other power disturbances bring network systems down, translating into significant losses for organizations.”

As a matter of fact, the final straw for WDMCS occurred when Crothers attempted to add a new device to the heavily congested data center.

“I plugged in a new server and took down a circuit,” he recalls. “I overloaded it and lost two servers in the process.” That’s when Crothers realized that he needed to pull the plug altogether on the makeshift solution. And a key aspect of the district’s data center overhaul would be deploying a new power protection solution.

“I wanted a new UPS with much greater capacity and runtime,” he says.

Crothers didn’t have to look far to find the optimal solution. Having purchased a 10kVA Eaton 9155 UPS a year earlier to protect the district’s EMC backup device, as well as an 18kVA Eaton 9170+ UPS that was delivering high availability to the LAN and phone system, the network engineer knew he wanted to go with a manufacturer that had already passed the critical tests for reliability and availability.

Indeed, Frost & Sullivan’s Cherian points out that
today’s customers are demanding more from their UPSs, especially in terms of efficiency and performance at peak loads. “Expectations are also higher from parallel components such as batteries, and their upkeep is now closely monitored to help the UPS system maintain its effectiveness throughout the lifetime of the equipment,” she says, noting that the global UPS market reached $8.5 billion in 2012.

Among data center UPS options, the Eaton 9390 proved to be a top performer for WDMCS. The unit offers a high level of protection with a double-conversion, online design that safeguards the district’s equipment against the most common power problems, including outages, sags, surges, spikes, brownouts, line noise, frequency variation, switching transients and harmonic distortion. “When I purchased the 9390, it was because of my positive experience with the 9155 and the 9170,” Crothers explains. “I knew that I wanted to go with Eaton for the data center UPS.”

Furthermore, the 9390 delivers an exceptional combination of power performance, battery management, scalable architecture, flexibility, power density, and warranty and service, making it ideal for large-system applications. The unit also offers optimal power performance with a high efficiency rating of 94 percent and output power factor of .90 – an advantage that not only lowers the total cost of ownership by reducing the amount of power to support protected loads, but also results in less heat to decrease facility cooling costs. And by adding two battery cabinets to the 9390, the district has achieved its desired runtime of roughly 40 minutes.

The Power Factor

Prior to selecting a UPS model, the district also engaged an electrical engineer to conduct a power usage study. “At the time, we were using about 16kVA for power, but considering our future capacity, we decided to double it and went with a 40kVA unit,” Crothers explains.

But the new UPS solution couldn’t be deployed until the environment was properly prepared for it. WDMCS opted to gut the existing data center and redesign it from the ground up, stripping out the raised floor and eliminating the hot and cold aisles. “We wanted to ensure that there was the infrastructure behind the
data center to support all of our equipment, so I wouldn’t have to worry about overloading a circuit or starting a fire,” Crothers emphasizes.

In addition to the 9390 UPS, WDMCS installed a pair of 15-ton redundant cooling systems; new energy-efficient cabinets with hot air ducted above ceiling; and metered power distribution units with three circuits feeding each of the district’s seven cabinets. The PDUs enable Crothers to quickly and easily ascertain vital information about the connected equipment, such as voltage, wattage, and the draw of amps.

“So I no longer have to worry about plugging in a piece of equipment and overloading a circuit, because now I can see what each is running,” he explains. “And with the three circuits, if one fails, I don’t lose everything.”

The district also put in a new, dedicated 40kVA transformer, “so we’re on our own circuit and not having to worry about someone plugging in a vacuum cleaner in another part of the building and losing our load,” Crothers says.

Furthermore, after designating the data center facility as an emergency shelter in 2010, WDMCS later received a FEMA grant to purchase a backup generator that now serves the entire building.

**Dependability Established**

With the data center refresh complete, WDMCS is no longer at risk when Mother Nature comes to town. “It’s a real weight off my shoulders,” Crothers confirms. “I don’t need to worry about every little hiccup because of weather, or wonder whether or not my data center is going to stay up and running.”

The peace of mind is a dramatic change from the district’s previous setup. “If we had an outage, our teachers and staff would be unable to access anything on the network,” Crothers says. “They couldn’t even use their local PCs because they are tied to the active directory at the data center. If we lost power, we’d lose everything,” he emphasizes. “All of our applications, our network, the Internet — everything goes through the data center. It would be totally dead if we didn’t have a solid backup power solution.”

UPS maintenance and management hassles have also been significantly alleviated, thanks to the capabilities of the centralized Eaton 9390.

“The management has been so much easier with a single point of contact,” Crothers confirms.

The network engineer also values the local support provided by Eaton, with
customer service engineers who perform regularly scheduled preventive maintenance on the UPSs.

“When it comes to powering this type of stuff, I’d rather talk to an expert,” Crothers explains. “Eaton has numerous local service technicians that I can call and they will dispatch someone if I have any issues with it. Not that I’ve had any issues,” he is quick to add.

“Overall I’ve been extremely happy with all three of my Eaton UPSs,” Crothers continues, noting that he has even deployed smaller Eaton 9130 UPSs to protect the switches within data closets at individual school campuses. With approximately 40 installed, the units ensure that the time clocks and bell system all operate as expected.

“I’ve standardized on Eaton,” the network engineer says. “I’ll be staying with them.”

Another valued ongoing partnership is the one Crothers enjoys with CDW-G. “My CDW-G account manager connected me with Eaton,” he explains. “CDW-G has a very good working relationship with Eaton, and I can always get the answers I need very quickly. I really value having a source I can trust.”

OVERCOMING UNPLANNED OUTAGES

Forget just losing sleep — when it comes to power outages, 84 percent of data center managers said they’d rather walk barefoot over hot coals than experience downtime at their facility, according to a recent Ponemon Institute survey.

Perhaps that choice isn’t so surprising, considering that the 2013 Study on Data Center Outages also assigned a price tag to the cost of downtime — a whopping $7,900 per minute. The survey attributes these skyrocketing costs to the fact that data centers have become increasingly valuable to their operators as a result of more operations being supported by the data center.

The Ponemon Institute isn’t the only expert weighing in on the severity of power outages. In fact, the White House last year released a report showing that outages caused by harsh weather cost the U.S. economy an average of $18 billion to $33 billion a year. The sum takes into account lost output and wages, spoiled inventory, delayed production and damage to the electric grid.

Some of the other highlights of the Ponemon study, which surveyed 584 individuals in U.S. organizations who have responsibility for data center operations, include:

• The average length of an outage was 86 minutes, resulting in an average cost per incident of approximately $690,200.

• 85 percent reported that their organization had experienced a loss of utility power over the past 24 months, with 91 percent noting that the outage was unplanned.

• When it comes to the cause of unplanned outages, 83 percent of those surveyed pinpointed a specific source. The most frequent root causes were cited as: UPS battery failure (55 percent), UPS capacity exceeded (46 percent) and accidental EPO/human error (48 percent).

• 52 percent of those surveyed believe all or most of the unplanned outages could have been prevented, with the most common prevention tactics determined as: investing in improved equipment (49 percent), bolstering security and surveillance practices (28 percent) and allotting more money in the budget (26 percent).