Technology Helps School District Curtail Energy Costs

EXECUTIVE SUMMARY

COUNCIL ROCK SCHOOL DISTRICT

- Education, K-12
- Newtown, PA
- 1,400 employees

CHALLENGE

- Reduce energy costs with a "Go Green" program to help deal with budget pressures and environmental initiatives
- Improve information-sharing and communications across the district
- Save money and improve efficiency by applying best practices across operational areas

SOLUTION

- End-to-end Cisco network based on Catalyst switches provides reliable, high-performance, low-maintenance infrastructure
- Wireless in every school allows facilities engineers to check energy systems from anywhere
- Cisco Unified Communications provides teachers and administration with dedicated extensions, voicemail, four-digit extensions across the district, and more

RESULTS

- Curtailing energy consumption by 42.7 percent has saved US$5.3 million in district budget
- Replacing school PBXs with IP telephony saved about $75,000 the first year
- Network uptime has increased from 67 percent to over 99.9 percent

Cisco solutions help Council Rock School District save millions with network-based control of energy systems.

Business Challenge

Council Rock School District (CRSD) is the ninth largest school district in Pennsylvania, U.S.A., serving about 12,400 K-12 students. CRSD includes ten elementary schools, three middle schools, and two high schools, and participates in the local vocational-technical school. With over 1400 full-time staff, including teachers, supervisors, clerical, custodial, maintenance, and cafeteria employees, CRSD is the largest employer in the area.

Like most school districts, CRSD deals with constant budget pressures that only increase in tough economic times. When he joined the district, new superintendent Mark Klein charged his staff with benchmarking all aspects of operations against industry best practices, looking for areas to improve efficiency and effectiveness.

In 2005, the administration projected that by 2008 the district's annual energy budget would exceed US$5 million. Robert Schoch, director of business administration, presented a proposal to curtail energy consumption by 10 to 15 percent by adjusting energy usage to actual needs. However, the success of the plan depended heavily on the ability of the facilities department to monitor and control all of the district's heating, ventilating, and air conditioning (HVAC) systems remotely over the district's wide-area network (WAN).

An aging ATM network connected the district's seventeen buildings. If the WAN was available three days a week, it was considered a good week. Each building was on a separate network domain, so there was no way to share information across the district, or sometimes even across a hallway. The plan for wireless “clouds” in every building had stopped at a single wireless access point in each library. IP phones had been purchased but never unpacked.

> “We want to be energy efficient in every aspect of our IT operations, including the network equipment that has made so much of our Go Green program possible.”
>
> **—Matthew J. Frederickson, Director of Information Technology,Council Rock School District**

When he joined the school district as IT director in 2003, Matt Frederickson compared the district's network infrastructure against best practices and recommended a complete redesign. As it turned out, the centralized control and management that the IT group achieved with the new network provided the foundation for the district's money-saving energy management program.

Solution

“I have six people on staff to support all of the schools and end-users, and we needed a WAN that was highly reliable. The existing network was too maintenance-intensive, and the equipment was not truly enterprise level,” says Frederickson. “One of the best practices I recommended was to standardize on a single vendor to achieve greater operational efficiencies and improve reliability.”

Frederickson had extensive experience with Cisco and asked the existing network vendor and Cisco to respond to a request for proposal (RFP) to replace the district's network infrastructure. “The quote from the existing vendor was three times higher than Cisco's proposal,” says Frederickson, “so our decision was straightforward from both a budget and capabilities perspective.”

In the first phase of the upgrade, a Cisco® Catalyst® 6509 Series Switch was installed at the core, and each high school was connected to a gigabyte fiber WAN with Catalyst 4506-E Series Switches. The elementary and middle schools were connected to the network over Catalyst 3750 and Catalyst 2948G switches.

With a reliable, high-performance WAN in place, the IT department expanded wireless in all of the schools, creating true wireless clouds in all buildings. “Deployment went quickly because the Catalyst switches in the wiring closets supported Power over Ethernet (PoE),” says Frederickson. “We did not incur additional time or money to install electrical drops for every access point.”

Recently, the IT department added a Wireless Services Module (WiSM) to the Catalyst 6509. The WiSM provides real-time communication between access points and wireless LAN controller. “We can control and manage all 211 wireless access points across the district, including the wireless security cameras,” says Frederickson. “Changing configurations remotely takes about 30 seconds.” The district also added 60 high performance Cisco Aironet 1250 Series 802.11n access points during their migration. “We’re extremely pleased with the high-speed 802.11n access points. We split them between two high schools as the capabilities make it ideal for our dynamic environment where there is a constant mix of old and new technology. We will eventually migrate all of our access points to this new standard,” says Frederickson.

In the next phase of the network upgrade, the IT group evaluated CRSD's telephone systems. All three middle schools had their own private branch exchanges (PBXs), and all were due for replacement. A telecommunications consultant had submitted a proposal to replace the end of life switches with new PBXs. But the IT team found that the PBXs placed a tremendous burden on administrative staff, and hampered communications between teachers and parents. Teachers did not have their own extensions, so the front office spent hours a day taking and relaying messages. In addition, a telephone technician had to come to the school each time an extension had to be moved, which was not only expensive but could take months.

When Frederickson compared the price of the new PBXs to installing Cisco Unified Communications Manager (CallManager) and IP phones, “it was more cost effective to replace the PBXs with IP telephony. In addition, with IP telephony, we could give every teacher a dedicated extension and voicemail. We can set up or change any extension

anywhere in the district with a mouse click. If a teacher changes classrooms, he or she just takes the phone to the new room, plugs it in, and all of the programming moves with the phone. Instead of making a toll call, we have four-digit extensions across the network. We also have auto-attendant, so it's easy for parents to reach a department or teacher at any hour without going through the front office."

PRODUCT LIST

Routing and Switching
- Catalyst 6509 Series Switches
- Catalyst 3750 Series Switches
- Catalyst 4506 Series Switches
- Catalyst 2948G Series Switches

Network Management
- CiscoWorks

Wireless
- Cisco Aironet® Wireless Access Points

Security
- Cisco VPN 3000 Concentrators
- Cisco PIX 500 Firewall
- Cisco IDS

IP Telephony
- Cisco Unified Communications Manager (CallManager)
- Cisco Unity Connection Voice Messaging Solution
- Cisco Unified Presence Server

Results

With the new network in place, providing centralized control over all of the district's HVAC systems merely required running a cable from the controllers to the switches in each building's wiring closets. The IT team installed Johnson Controls and Siemens software running on a server at the network operations center. Maintenance engineers use laptops and a secure web-based interface to check, diagnose, and adjust any HVAC system in a building, or in any building in the district, from any location, even from home through VPN connections.

To date, the district's "Go Green" program has exceeded its original projections and everyone's wildest expectations, cutting consumption by 42.7 percent and preserving an astounding $5.3 million for the district's budget. CRSD has been awarded ENERGY STAR's "Partner of the Year" for two years in a row.

Tom Schneider, CRSD's supervisor of operational services, illustrates how network-based control can save tens of thousands of dollars with a single mouse click. "Over Thanksgiving and winter break last year, we set the whole district to unoccupied mode, dropping the temperature to 55 degrees. We compared the energy usage to the previous year, and even though the outdoor temperature was actually an average of four degrees colder, we saved $64,000 in energy over those 14 days."

"Today we think of anything that draws power from any source as something we can manage in order to save energy," says Frederickson. "With centralized control of all the IP phones in the district, we can power down the phones without losing access to vital phone services. We can also power down all of the wireless access points when the schools are unoccupied." By turning off the desktop PCs for 12 hours a day remotely for just 1700 of the district's 5000 computers, Frederickson estimates that the district will save an additional $85,000 a year.

One of the primary goals for the network redesign was to create a more reliable, high-performance, lower maintenance environment. "We've exceeded our expectations with the Cisco network," says Frederickson. "We went from a network that had regular daily outages to one that has nearly perfect availability. Just replacing the old PBXs with IP telephony and eliminating unnecessary telephone lines and long distance calls saved about $75,000 the first year and gave us voice services that are a thousand times easier to manage. In addition, we are using bandwidth so efficiently with our wired and wireless networks that teachers can take greater advantage of technology in the classroom and while in motion on campus, saving money by taking virtual field trips instead of real ones, while going to more exotic places, like Antarctica and outer space!"

"By bringing together best practices in energy management and IT, we believe that we have developed a program that other schools can adopt to help deal with fiscal pressures and environmental imperatives. That's a gratifying contribution that reaches beyond the boundaries of our district," says Mark Klein, district superintendent.

A closer look... ePlus

Council Rock School District worked closely with ePlus as its channel partner. ePlus' Gold and Master certification status with Cisco and their experienced engineering staff put ePlus in a unique position to implement a state of the art infrastructure at competitive prices. Over the last six years, ePlus has worked closely with district technical staff on several large network projects including Unified Communications and Wireless, with recent engagement around Physical Security.

www.ePlus.com

Next Steps

Frederickson is piloting the Cisco EnergyWise capability of the IOS software on Catalyst switches, which will allow him to monitor and optimize the energy usage of the network itself, from PoE devices to PCs to-IP-enabled building controllers. "We want to be energy efficient in every aspect of our IT operations, including the network equipment that has made so much of our Go Green program possible."

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