Penn State
College of Engineering

Alcatel-Lucent engineers a high speed network
that delivers educational excellence

PENNSTATE
College of Engineering

Alcatel·Lucent

- To provide increased network capacity and resources to meet the College's growth

- To take advantage of the increased capability of the University's network

- To deliver better performance and increased bandwidth for students and staff – including the capability to handle highly complex and very large data structures at high speed

- To provide secure remote, wireless, and mobile access

- To fulfill the need for initial purchase, maintenance, and additional equipment pricing to fit within tightening budgets

- To offer a flexible procurement model

- To reduce running costs and maintenance, and support overheads

- To 'future proof' and provide extended network lifespan

High speed network delivering educational excellence

The College of Engineering at The Pennsylvania State University has a long history as a leading educator of engineers of all disciplines. Providing world-class education requires world-class facilities for both students and staff – including a data network which can support both academic and administrative activities.

The College's students and staff rely on its network for access to university-wide student information and finance systems, the University's course management system, which is central to students' participation in classes, and the wide range of specialist IT applications that support teaching and research in the College's 13 departments.

The College identified a need to refresh its network to accommodate faculty and campus growth, take advantage of new resources provided by its parent University, and replace obsolete equipment. Additionally, the College decided to add wireless access to allow users greater flexibility.

Projected growth in data traffic and tightening budgets suggested that any solution needed to last at least seven years and be capable of handling data speeds of up to 40 GigE (gigabits per second Ethernet) in the University's backbone. Alcatel-Lucent's competitive offerings and previous success at the College made it an ideal supplier for a new data network.

Long-term relationship focused on the future

The College first began working with Alcatel-Lucent in 2000, when it was revamping an ATM (Asynchronous Transfer Mode) environment consisting of hardware from a number of vendors. At that time, the network linked 13 buildings, with 100 Mbps (Megabits per second) connections to the University's backbone through a single point.

During 2005, the College identified a need to link 26 buildings, an opportunity to take advantage of 10 GigE connections to the University's new backbone, demand by students and staff for more flexibility and off-site access, and continued growth in network traffic. "Engineering applications are very resource hungry so we constantly need to deal with demands for greater network capacity," explains Bill Burkhard, the College's Director of Information Technology and Design.

After an extensive technical evaluation of solutions from Alcatel-Lucent, Enterasys, Foundry, and Cisco, the College chose Alcatel-Lucent.

Burkhard continues, "The College chose Alcatel-Lucent equipment for this project based on price, hardware performance, and our preference for working directly with vendors rather than through VARs (Value Added Resellers) for major procurements. Alcatel-Lucent has been very flexible over the ten years we've worked with them. We use its network of local vendors for small purchases but we can also talk directly to Alcatel-Lucent whenever we're undertaking major upgrades such as the wireless network upgrade that we've just completed."

Burkhard says he was particularly impressed by the collaborative way Alcatel-Lucent worked with the College to get a solution that met its performance needs within the available budget. "That's carried on beyond the procurement, with Alcatel-Lucent offering us a good level of ongoing support at a price we can afford, and proving very helpful in working with us to resolve issues in a timely manner."
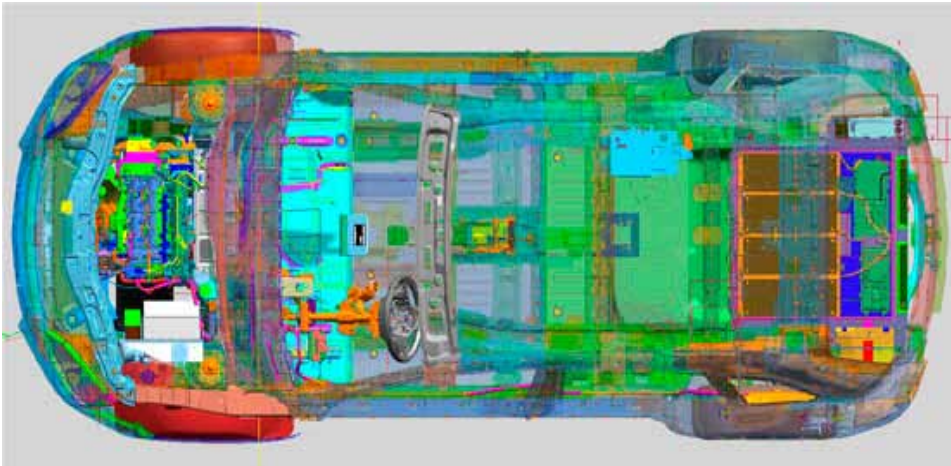
The College now has a network infrastructure based around two high-availability LAN switches (Alcatel-Lucent OmniSwitch 9700s) located in separate buildings approximately a mile apart. These core switches each connect to the University backbone through separate hubs. The 26 buildings that currently make up the College of Engineering's campus are connected through local LAN switches (Alcatel-Lucent OmniSwitch 6850s) creating 1–GigE links within the College's own network. The majority of connections to the desktop are then provided at 10/100M, although faculty may request 1–GigE connections where even greater capacity is needed.

The second phase of the project added an Alcatel-Lucent wireless LAN to increase user access flexibility. This means that students can access the network more easily from their own laptops and other devices, not just college IT equipment.

Results and benefits

The new Alcatel-Lucent solution not only allows the College's faculty, staff, and students to access both College and University resources from within any of its buildings but also allows them to access the College's resources securely from elsewhere.

In addition, it manages user access to resources. For instance, students from other colleges taking courses within the College of Engineering need to be given access to the appropriate College facilities for their specific course, while students who happen to be working in the College's buildings but who are not taking its courses only need access to the University's backbone.

The new network is also helping the College to deliver improved resilience to help protect complex research data and minimize impacts on students' work in event of a failure. The College has used the network to group six virtual servers into clusters of three in its two core buildings. These use two independent links to the University backbone. The network provides the capacity for these clusters, each with 30 terabytes (TB) of primary storage and 30TB of backup storage, to replicate the data held on the cluster in the other building meaning that the College now has a 'hot standby' for critical applications. Similarly, e-mail servers housed in both buildings ensure e-mail service is restored within five to ten minutes in event of a server failure.

SOLUTION

- Data Network Solutions

  Alcatel-Lucent OmniSwitch 9000

  Alcatel-Lucent OmniSwitch 9700

  Alcatel-Lucent OmniSwitch 6850

  Alcatel-Lucent OmniAccess WLAN wireless LAN switch

  Alcatel-Lucent OmniAccess WLAN wireless access point

- Network Management Solutions

  Alcatel-Lucent OmniVista Network Management System

  Alcatel-Lucent OmniAccess WLAN [Management Solution]

BENEFITS

- Excellent performance and resilience deliver user time savings that make more efficient use of learning and research resources – response times reduce from 2-3 minutes to a few seconds – equivalent to saving 10-20 percent of class time

- Significant savings over the cost of similar network systems from competitors – as much as 50 percent

- Significant improvement in network user satisfaction

- High quality products mean less time spent fixing problems and allowing just two technicians to service the daily support needs of over 10,000 students and over 900 staff

- Built-in facilities and capabilities mean improvements and changes can be made to the network without the need for major upgrades leading to a longer planned life-expectancy for the network infrastructure

This level of availability is very important to the College's users, says Burkhard. "They often go out of the country or elsewhere in the U.S. to work, and we need to be sure they can get to College resources and e-mail whenever they need to," he explains. "The Alcatel-Lucent solution is a key part of helping us to provide a robust environment that delivers services to users 24x7."

Enhanced performance – reduced running costs

The most obvious benefit of the new Alcatel-Lucent environment has been the enhanced performance seen by users.

"Students can now share and access information in collaborative spaces immediately rather than having to wait two or three minutes to get data," Burkhard explains. "That may not sound much, but it makes a big difference during a 50-minute class. Faculty and staff can also communicate more effectively and rapidly – using videoconferencing over the network, for instance. Since we first began working with Alcatel-Lucent in 2000, user satisfaction with the network has increased significantly."

Low ongoing support costs are another key benefit. "It says a lot about the ease-of-use and quality of the Alcatel-Lucent equipment that I have just two staff supporting networking across 26 buildings for 10,000 users, and that they have time to look at future needs and projects rather than just focus on managing and maintaining the current network," Burkhard points out.

He continues, "Because Alcatel-Lucent tests its products – including software upgrades - thoroughly in house to ensure there are no bugs, we don't have to spend a lot of our time chasing down bugs. The mobility capabilities of the wireless LAN are also terrific. We simply need to take an access point to wherever we need it and, as long as we can connect it to an Ethernet port, it can securely tunnel back to the College's systems, providing fully secure access to our services."

Onwards to the future

While the Alcatel-Lucent solution meets the needs of the College today, it also provides a high level of future-proofing. An important aspect of the Alcatel-Lucent solution is the ease with which it can be upgraded. This will make it very easy to take advantage of the University's planned move to 40–GigE backbone connections.

Additionally, selection was partly influenced by Alcatel-Lucent's support for intrusion detection and protection. Budget pressures have delayed implementation of this aspect, but Burkhard knows the College can add this capability when it's ready without the need for a significant upgrade. "The capacity we have with Alcatel-Lucent will support us well for a number of years before we need to expand again," concludes Burkhard.

Penn State College of Engineering serves approximately 8,300 undergraduates, 600 master's students, and 900 Ph.D. candidates, with around 900 teaching, faculty and support staff.

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BILL BURKHARD, DIRECTOR OF INFORMATION TECHNOLOGY AND DESIGN, PENN STATE COLLEGE OF ENGINEERING

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