



Customer Application Note

Delivering 21st century education at Gordon College

How would you design a college's network infrastructure to deliver world-class education? Five years ago, Gordon College of Wenham, MA USA was faced with this very issue. They took an innovative approach: Faculty, students, alumni and IT were engaged in a process to develop a shared vision of the communications services required to enhance the education experience for 21st century students. This included partnering with a telecommunications company that has demonstrated leadership in IP (Internet Protocol) communications - to deliver the integrated voice, data, wireless data, security, video and video-on-demand solutions needed to create this world-class environment.

DELIVERING 21ST CENTURY EDUCATION AT GORDON COLLEGE

To deliver excellence in liberal arts education, Gordon College envisioned the benefits of convergence, and chose Alcatel-Lucent to deliver the necessary infrastructure: IP TV, Video on Demand, VoIP, and IP data.

The modern child is bombarded with sensory input from a very early age. At no other time in history have educators had to compete with such distractions to teach and achieve learning. In 2000, Gordon College recognized that recruiting and capturing the minds of these young adults would necessitate a learning infrastructure facilitating 'learning on demand' and 'teaching from any place'. To accomplish this, it was understood that ubiquitous broadband network access must be available to the students, faculty, and staff



on campus. As Gordon College began planning this education environment evolution, it became apparent that the entire 'business' of education could change - that Voice over IP (VoIP) could provide better communications than traditional voice; that archived video assets and TV shows could provide richer educational experiences than cable TV and VCRs; and that highspeed access to the Internet, library, and file servers (data and video) could promote the intellectual maturity necessary to prepare students for leadership roles anywhere in the world.

It became apparent that not just any infrastructure would meet their needs. This next-generation teaching and learning environment had to offer high availability, be easily managed and secure, utilize industry standards, possess enough intelligence to identify and protect delay-sensitive traffic, and be robust enough to meet the demands of caffeine-fueled students, 24/7.

➤ The customer

Gordon College is located 25 miles north of Boston, in Wenham, MA, USA. Over the past three years, it has been selected as one of the nation's best liberal arts and sciences colleges, as recognized in the annual "America's Best Colleges" edition, published by *U.S. News & World Report*. Founded in 1889 as a Christian Missionary Training Institute, today Gordon College boasts a 15:1 student/faculty ratio, services nearly 1,600 students, and strives to graduate men and women distinguished by intellectual maturity and Christian character, committed to a lifestyle of service, and prepared for leadership roles worldwide.



➤ The challenge

Understanding that today's students have been conditioned to shape their entertainment and information delivery to a schedule that fits their lifestyle - from listening to music, to speaking on the phone, to viewing their

favorite TV shows - Gordon College realized that they needed a strategic plan to address the evolving teaching and learning needs of students and faculty.

In 2000, a broad-based committee of students, alumni, faculty, and administrators developed a vision for enhanced education and a blueprint which has guided the college over the past five years in a phased plan. Faculty, students and alumni shared a vision for enhanced education services, leveraging a new generation of communications applications and infrastructure. And they believed that with a multi-year plan, IT could enhance the education experience, to deliver an extraordinary education experiences on an ordinary IT budget. The blueprint yielded a multi-year, phased plan:

- Phase 1 - upgrade the physical infrastructure;
- Phase 2 - deploy Ethernet IP communications foundation;
- Phase 3 - deploy IP telephony;
- Phase 4 - deploy Wireless LAN technology;
- Phase 5 - deploy video on demand and IP TV.

Phase 1 consisted of upgrading the campus optical and copper infrastructure. Single-mode fiber was chosen between buildings, multi-mode fiber between wiring closets, and Category 5, 5e and 6 coppers cabling for all data and voice locations. It was at this time that the decision to run data cable for video instead of coaxial was made - saving almost \$200,000.

Russ Leathe, Director of Networking and Computer Services, said that this phase was very much in line with the Christian heritage of the college. "We took the biblical principle that you have to build a firm foundation".

➤ Why Alcatel-Lucent

Once this firm foundation was deployed, Gordon College knew it must partner with a visionary company - one which had mastered the challenges of convergence, and was willing to work with them as if the college's goals were their own goals.

Gordon College found Alcatel-Lucent to be that partner, and turned to them for the remaining phases of this strategic plan. "Who better to do that with than Alcatel-Lucent? They didn't try to sell us a specific product, they actually helped us with our strategic direction," said Leathe.

➤ The Alcatel-Lucent solution

"Phase 2 has really been phases 2a and 2b, because we have totally upgraded our network infrastructure this summer," said Leathe. Originally deploying a mix of OmniSwitch/Routers and OmniCore switches, the college upgraded to OmniSwitch 8800s for the core, OmniSwitch 7000s for some aggregation and edge connectivity, and the OmniSwitch 6800 and 6600 at the edge.

With the current Alcatel-Lucent solution, "We now have a 10 Gigabit ring between four main campus buildings, with multiple Gigabit links to wiring closets in dorms, lecture halls, offices and the library," says Leathe (see Figure 1). "Alcatel-Lucent was selected because they are an IP communications leader.

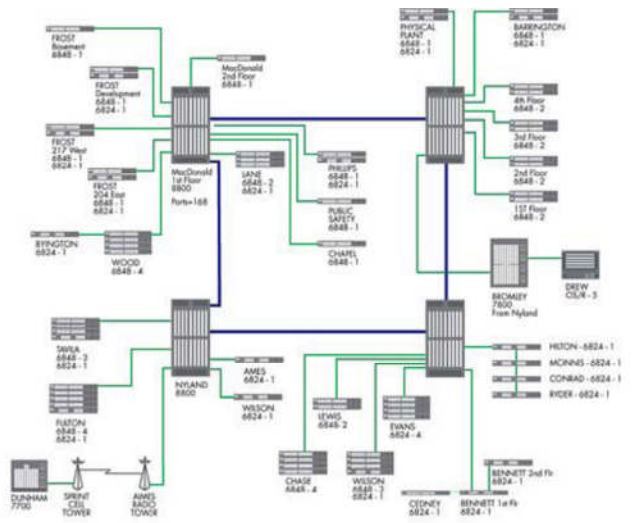
They were evangelizing the benefits of convergence before any of the others could spell it." For this phase, the key requirements were standards compliance, high availability, server load balancing, and manageability.

The requirements for the third phase demanded a solution that supported wireless, digital, analog and IP telephony in one chassis. This allowed the college choices - analog phones for the dorm rooms, digital phones for the offices, IP phones for classrooms, remote buildings and select departments, with wireless phones for the IT department. "The decision for Alcatel-Lucent was a no-brainer. The OmniPCX proved to have more capabilities than we ever thought possible. We are now looking to integrate PCX with cellular technology for the students."

In 2004, Gordon College embarked on the fourth phase - ubiquitous access to the college's resources. Said Leathe, "Getting the right information is as important as having a network that is highly available. When a professor is using the Web and wireless applications as a classroom tool, the last thing you want is a slowdown in the network."

Deploying the OmniAccess Wireless LAN (WLAN) switch, the college was able to cost-effectively provide wireless network access from almost anywhere on campus. The Wireless LAN was designed to extend the reach of the wired LAN, rather than as an overlay. "We envisioned a secure mobile environment, where the same mechanisms we use to authenticate the wired user are used for the wireless user." This was possible with the Alcatel-Lucent solution, and more. "We are now able to apply QoS (Quality of Service) parameters based on a user's ID or the access point SSID (Service Set Identifier)." What this means is that the college can confidently employ WLAN IP phones and other mission-critical wireless applications, secure in the knowledge that the traffic will be assigned the highest priority throughout the network.

Figure 1: Grapevine Network Upgrade



➤ Security enhancements complete the picture

To enhance student safety and campus security, Gordon College is planning to install IP security cameras in some of its remote parking facilities, monitoring them via the wireless network. If a problem is reported, the dispatched officer could potentially assess the situation by means of a laptop in the vehicle before arriving at the scene.

Before deploying the next phase of the plan, Leathe discovered that there was a bit of 'tweaking' that needed to be done. "I remember the day I got married, I remember when all of my children were born, and I remember when the Blaster worm hit my network... What this meant was that every single switch on the student side of the campus was saturated, overloaded. I physically had to disconnect the fiber uplinks to restore stability to the IP telephony network." After two weeks of individually cleaning student computers, Leathe vowed that this would never happen again. Once again, Gordon College found a solution from Alcatel-Lucent.

Gordon College uses the OmniVista network management platform to manage the voice and data network. This platform accommodates additional applications which operate inside the main management software. One application recently added to OmniVista was the Quarantine Manager. The Quarantine Manager interfaces with any third-party security device that generates a syslog, including Alcatel-Lucent wired and WLAN switches. Upon receipt of a communication from a configured device, the Quarantine Manager will submit a VLAN policy assignment to the wired and WLAN switches in the network, to isolate or quarantine the MAC address of the offending device. This fine granularity allows the solution to be utilized on shared media - such as wireless access points - since only the misbehaving device is quarantined, not the port into which the device is connected.

The college installed a Fortinet Fortigate unified threat management appliance to identify these anomalous traffic patterns. Within 10 minutes, Fortigate and Quarantine Manager collaborated to isolate nine different attacks. The dynamic nature of this solution was just what Leathe needed. "We have a staff of four. We don't work 24/7. The Blaster worm began around midnight. If I had had the Quarantine Manager, students and faculty would not have suffered from Blaster downtime, and I would not have been called in from home."

According to Leathe, Quarantine Manager has supplied the missing piece of the converged network puzzle. Until Blaster hit the network, the focus on network stability was limited to discussions of MTBF (Mean Time Between Failure), hardware redundancy, physical link redundancy/link aggregation, and QoS. Now, attack identification and isolation are included on the list. "Attack containment is just as important as bandwidth, reliability and redundancy, when evaluating network vendors. Without this capability, every network is a disaster just waiting to happen."

➤ Video and TV as educational tools

Confident that the college's IP communications infrastructure was now fully protected, Leathe has begun the implementation of the fifth phase, installation of IP TV and video on demand throughout the campus. "The digitizing of our analog video assets, and providing video on demand, means that no student is disenfranchised. No longer is a student or faculty member at the mercy of a single video source."

Delivery of digital content is not just limited to old video tapes and DVDs. "The beauty of video on demand is that you can now capture lectures and store them on a video server, allowing students to review them at their leisure. This is a terrific teaching tool - we all know that not every single student learns the same way. Students today are multimedia, multi-sensory oriented. Being able to view a lecture multiple times aids the learning process by moving the information from short-term memory to long-term memory."

In addition to teaching and learning, the IP TV network will facilitate remote viewing of ceremonies and athletic events, nurturing the connection with the college for alumni and students alike. Following in the tradition of the college's founders, several student's parents are missionaries in Africa or India. With this solution, any parent can witness their child's graduation over the Internet.

Another aspect of controlling the video network on campus is campus security. With IP TV, in a matter of minutes the College president can now broadcast live to the student body, addressing everyone with the same emergency information or other public updates.

➤ Building for the future

As Gordon College re-visits its plan this year, one area which had not been addressed was to link a remote campus to the main campus via high-bandwidth links. Currently, this part of the campus had just a 56 Kbit/s leased line connecting to the campus. That type of bandwidth does not support the services being delivered to the main campus, making the building an island in the Gordon College community.

Again, looking to Alcatel-Lucent for guidance, they are in the midst of installing an Alcatel-Lucent microwave product, the MDR-8000, to provide 155 Mbit/s of

Bandwidth to this building. At the completion of this project, the remote campus will no longer be an island, but will be transformed into an integrated part of the campus experience - with IP telephony, high-speed data, and IP TV/Video on Demand.

While recognized for delivering world class liberal arts and science education, Gordon College has also turned to Alcatel-Lucent for assistance with teaching networking technology. "There is a real need to teach the basics of networking, how to design networks, how it all interoperates" said Leathe. "We asked Alcatel-Lucent how they can help us satisfy this interest by the students. They responded by working with us on the Alcatel-Lucent University Training Partner Program where we can become a certified Alcatel-Lucent Training Center for the Boston area."

Recognizing that the successful implementation of their vision required close collaboration with the manufacturer, Leathe said, "My expectations have been exceeded. It is Alcatel-Lucent's willingness to work through the negotiation process and develop a partnership that is key to this successful relationship. Excellent service, excellent support, what really has impressed me is that their solutions are not proprietary, they are standards-based. This allows us to feel confident that whatever technology that may come up and need support, the equipment we have today will be supported by that technology."

➤ Conclusion

Gordon College is leveraging communications to enhance the education experience. They are delivering leading-edge education services on an ordinary IT budget. This success began with a shared vision for 21st century education services between faculty, students and alumni. The vision has allowed steady direction, and consistent progress, by following a multi-year, phased blueprint. They have leveraged converged voice, video, and data applications to enhance the education experience.

The critical success factors for Gordon College were the development of a shared vision for delivering communication enhanced education services, and the adoption of a multi-year blueprint to ensure that delivery.

Partner selection was also critical to their success. It was essential to find a partner that could both contribute to the blueprint, and also deliver the IP infrastructure and communications applications to deliver on the vision.

"I'm prepared for the future. We can fulfill our president's vision of a lifelong relationship with students and alumni with a global reach - anywhere, anytime access to resources. Gordon College is leveraging 21st century communication services to educate the 21st century student. Alcatel-Lucent has been a partner in developing the vision, the blueprint, and delivering products that deliver the services," says Mr. Leathe.

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