

CONCORDIA UNIVERSITY DEPLOYS CISCO CAMPUS SOLUTIONS

EXECUTIVE SUMMARY

Concordia University

- Large, urban university in Montreal, Quebec
- Established in 1974 with two campuses approximately 8 km apart
- More than 30,000 students and roughly 4000 faculty and staff

BUSINESS CHALLENGE

- Network could not accommodate rapid growth of the university
- Subject to misconfiguration outages; difficult to troubleshoot
- Email and web portal unable to handle the volume of traffic
- Three new buildings requiring network support soon
- Project must be self-funding

NETWORK SOLUTION

- Cisco Business Ready Campus, including: resilient infrastructure, integrated security, wireless LAN, and IP telephony

BUSINESS VALUE

- *Protect*—Converged network ensures secure wired and wireless voice and data communication
Property theft reduced by monitoring IP video cameras in campus buildings
- *Optimize*—Wireless LAN allows creation of mobile computing labs
Phone expenses reduced from \$1.4 million to \$117 K annually
- *Grow*—Wired and wireless voice and data network are being extended to new buildings
Student enrollment can be increased through the establishment of E-learning program

Faced with rampant network growth, increased concerns about network security, and a desire to implement a more reliable, maintainable network, Concordia University selected Cisco Systems to solve their networking problems—and got a Business Ready Campus network that will protect their resources, optimize their investment, and grow with their needs.

Concordia University is a large, urban university in Montreal, Quebec. The university was founded in 1974 and has two campuses that are set approximately 8 km apart and connected via a Fiber network. The Sir George Williams Campus is located in downtown Montreal and the Loyola Campus is located in the residential west end of Montreal. The university has over 30,000 students and roughly 4000 faculty and staff. It prides itself on its diverse student body and strives to be one of the most accessible universities in Canada.

THE CHALLENGE

In the late 1990s through 2002, Concordia University experienced a rapid increase in its student population. While this was great for the university, it wasn't great for their network. In an effort to accommodate the surge in connectivity needs, the network was expanded quickly (both through authorized and unauthorized installations), allowing little time for extensive planning or tracking. This resulted in a network that included unsecured and sometimes incompatible equipment.

The network included less than optimal resiliency and redundancy. Combined with various unauthorized devices and the wireless access, this made the network susceptible to misconfiguration outages. Many wiring closets consisted of devices that were daisy chained one to another, making troubleshooting difficult. Speaking of one incident, Andrew McAusland (Executive Director, IITS, Concordia University) said “the network in an entire building collapsed and although we had basic services restored fairly quickly, it took two days to fully recover.”

The e-mail system, with over 80,000 accounts, was experiencing difficulties. Furthermore, Concordia University had recently implemented a web portal with some 50,000 accounts and deployed wireless coverage in all 75 buildings.

It quickly became apparent that the existing network could not handle the increased demands being placed on it - much less support three new, large buildings scheduled to be completed soon. The university understood that a complete overhaul of the network infrastructure was required. But a project of such magnitude requires a significant amount of funding, something that is scarce in the public education system.

So, Concordia University set forth the following goals:

- Find a solution that is self-funding
- Ensure that the network is resistant to device and power failures
- Add security without adding too many user constraints
- Make the network accessible everywhere on campus
- Improve productivity services
- Increase efficiency of network maintenance
- Protect current investments by reusing the existing infrastructure as much as possible

THE SOLUTION

Some of the problems experienced by Concordia University were the result of using point solutions from multiple vendors. An end-to-end solution provided by a Cisco Business Ready Campus network would solve them all, including the issue of funding.

When Concordia University initially explored the options for revamping their network, no changes were considered for the voice network. But upon deciding that the solution should be self-funding, Concordia University began looking harder at the possibility of voice over IP (VoIP).

Prior to this time, Concordia University was using a Centrex system. This system was costing the university close to \$1.4 million (CAD) per year. A year before, Cisco Systems® had approached the CFO of Concordia University with a proposal to move to VoIP. At that time, the university felt that such a move, though cost-effective, would be too time-consuming and potentially disruptive. But then Concordia University realized that by including a move to VoIP as a part of the network overhaul, they could recoup their investment in 4 years-making the solution “self-funding.”

Concordia University sent out a “request for proposal” for a restructured data network with integrated voice to a variety of companies. They received viable responses from six companies. Of the six, three of the proposals included a Cisco® infrastructure. Until this time, Concordia University had only looked at Cisco as a switch and router company. They had several Cisco devices installed at the core and distribution layers and a few Cisco wireless access points scattered throughout the campus, but they had not looked at Cisco as an end-to-end “solution” provider. After

evaluating the proposals and examining the capabilities of the system integrators, Concordia University selected the Cisco-based proposal offered by Bell Canada, their current telephony company. The proposed new network addressed all of Concordia University's goals, resulting in a Business Ready Campus network that protects their resources and communication, optimizes their equipment and personnel investment, and is capable of growing with the needs of the university.

Network Resiliency

The campus infrastructure was redesigned to include:

- 6000 inline power ports in 157 wiring closets and an uninterruptible power supply system (UPS)
- Fully redundant Gigabit links from each wiring closet to redundant Layer 3 distribution switches (Cisco Catalyst® 3550-12G)
- Multiple Gigabit links from each distribution switch to a redundant core switch (Cisco Catalyst 6500 Series Switches)

Network Security

Security was improved through the use of:

- Radius authentication to control access to network equipment
- 802.1X authentication to control access to the wireless network
- Redundant firewalls to protect critical services, including the IP telephony server

Network Accessibility

The existing wireless network was expanded and secured by:

- Installing more than 200 Cisco Aironet® Access Points to provide public as well as classroom access
- Implementing Cisco Secure Access Control Servers (ACSs) to validate user login using 802.1X Cisco LEAP extensions

Network Efficiency

For Concordia University, redesigning the network infrastructure is a huge step toward having a more efficient network. To ensure that the resulting immense, hierarchical network could be effectively maintained, Cisco Works LAN Management Solution (LMS) was deployed. LMS allows Concordia's IT department to keep track of all the network equipment and manage the network topology as a whole to ensure proper growth in the future.

Application Productivity

The usefulness of the existing web portal was enhanced with the addition of the Cisco Catalyst 11503 to provide load balancing between the multiple web servers containing student information.

Self-Funding

The key to the entire solution was making it self-funding through the implementation of VoIP. In the beginning, Concordia University was leasing 3800 Centrex lines at a cost of \$28 (CAD) per line per month, or \$1.2 million (CAD) a year. Adds, moves, and changes (which occur frequently in a university environment) were costing an additional \$125,000 to \$150,000 (CAD) per year.

Concordia replaced their traditional phone system with:

- 3400 Cisco IP phones (7910, 7940, 7960, and 7920 wireless IP phone)
- 7 Cisco CallManager servers
- 96 Interactive Voice Response (IVR) and Automated Speech Recognition (ASR) ports to manage incoming calls and provide “dial by name” and extension transfers
- Cisco VG-248 Analog Phone Gateway to integrate with the existing Octel messaging system
- Cisco IP Call Center Express for call center needs
- Cisco Catalyst 6608 with a T1 module for PSTN access

It was estimated that the savings realized by moving to VoIP would allow Concordia University to recoup the cost of the new network in 4.1 years.

THE PROCESS

To facilitate a smooth transition from the existing data and telephone networks to the new converged network, Concordia University worked with Cisco and Bell Canada to carefully plan the design and implementation.

- First, Concordia University established teams inside the institution to mirror the teams of the system integrator. These teams included budget and purchase order processing, network architecture, system administration, and even publicity and training. The alignment of the teams helped to avoid any disconnects and greatly improved communication during the project.
- Next, Concordia University hired a full-time consultant with VoIP experience to manage the project internally.
- Additionally, Concordia University placed a freeze on all add, move, and change requests to the voice system for three months. This allowed the design and implementation teams to work with a solid base of information (instead of chasing a moving target).

Once the roll out began, extensive verification and testing was performed. Each office was checked to ensure that the appropriate wall jacks and cabling were installed.

“In a community as scattered as ours, being able to control the communications from a single point is what’s going to save you...”

Andrew McAusland
Executive Director IITS
Concordia University, Montreal, Quebec

Connections within the network infrastructure, including the fiber network between the campuses, were tested. And the operation of each IP phone was verified.

Comprehensive training for the IP phones was made available via the Web. This included links to Cisco sites and status information on the roll out. One representative from each of the 175 departments was designated as the IP phone liaison. This person acted as the “first point of contact” for any questions regarding the new phones.

Upon cut over to the new network, which occurred in June, a standard set of features was programmed into the phone, each data port was tested to validate connectivity, a UPS system was installed, and the backlog of voice requests was reviewed.

THE RESULTS

The resulting network is much more robust, resilient, scalable, and secure. Security breaches and power outages have been mitigated. And network performance has been significantly improved. Services, such as e-mail and the university's web portal, can now easily handle the volume of traffic generated by users.

Students, staff, and faculty now enjoy secure wireless access in all of the classrooms as well as the areas surrounding the university, such as the cafes. As an added bonus, costly, dedicated computer lab space is a thing of the past-as laptops on carts can easily be rolled from classroom to classroom.

The wiring closets are no longer a tangled web of cables and devices, and all non-authorized equipment has been removed. This enables the IT staff to perform network management and troubleshooting much more efficiently, making for a more productive IT staff and more productive users. According to McAusland, “most of the problems can be fixed remotely now.”

The cost of the voice system has been significantly reduced. More than 90% of the Centrex lines have been eliminated-reducing the annual cost from \$1.4 million (CAD) down to \$117,600 (CAD) and allowing all adds, moves, and changes to be performed by the university staff at no additional cost. “In essence, we're our own telephone company,” says McAusland. Based on new estimates and a lower than expected cost of the project, the new network will now pay for itself in 3.8 years.

NEXT STEPS

Now that Concordia University has a solid network foundation and a sampling of the benefits of a Business Ready Campus network, they are excited to do more. In general, their next steps are to expand network coverage and services.

Concordia University plans to:

- Extend the network architecture and IP telephony services to the new building when it opens next year.
- Expand the wireless network from 200 to 400 access points with the addition of the new building.
- Extend the deployment of 802.1X authentication to all (wired and wireless) public access ports.
- Implement Cisco IP/TV and IP Videoconferencing solutions.
- Develop e-learning content for distribution through IP/TV and IP Videoconferencing.
- Add IP Video Surveillance to improve the physical security of the university campus.



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Printed in the USA

DOC ID REV DATE