



## **Cornell University Unplugged**

By Kevin Baradet

One of the hottest technologies to hit campuses nationwide is Wi-Fi. Unlike a typical slow and steady technology adoption curve, pre-installed wireless chips in laptops, such as Intel's Centrino, have resulted in a rapid increase in demand for wireless access on campus. In fact, Wi-Fi is becoming a factor for students deciding on a university in which to enroll.

Home to more than 20,000 students and 10,000 faculty and staff each year, Cornell's network infrastructure supports wireless-enabled laptops, PDAs, Tablet PCs and other handheld devices in 45 buildings, as well as locations across campus where users assemble most, such as classrooms and study areas.

Although Cornell had the foresight to predict this surge in wireless network traffic, many large universities face significant challenges with the deployment of wireless networks—including scalability, manageability, security, and the impracticality of placing wireless switches in every wiring closet on campus—a daunting task for roll-out and maintenance. Cornell University opted for a better system—routed wireless networking. After intensive testing of several wireless technologies, The Johnson Graduate School of Management at Cornell University deployed Chantry Networks' BeaconWorks wireless LAN system in early 2003. The goal of Cornell's next-generation WLAN deployment was to meet the unique requirements of different wireless user groups; implement a fully integrated network infrastructure that can be centrally managed; lower the cost of ownership and network management; lower the administrative overhead and headaches a switched wireless system can create; and provide greater wireless coverage across campus.

### **Solving the Wireless Equation**

Rather than build an entirely new wireless network, Cornell wanted to extend its existing wired network to incorporate not just wireless access, but a state-of-the-art wireless infrastructure. Deciding to take a phased approach to campus-wide wireless, The Johnson School of Management at Cornell University needed a system that would increase the size of its network over time, support all current and future industry standards, and offer out-of-the-box interoperability with its existing wired and wireless networking equipment. By building BeaconWorks around Layer 3 architecture—the same architecture that serves as the foundation for the Internet—the network was able to deliver scalability and availability beyond Cornell's existing infrastructure.

Chantry's BeaconWorks uses IP (Internet Protocol) as the access medium between its BeaconPoint access points and BeaconMaster WLAN router. With BeaconWorks, the School can centrally manage hundreds of access points and thousands of mobile users campus-wide. Layer 3 wireless architecture also allows BeaconWorks to easily interoperate with Cornell's existing routed and switched networking equipment.

### **Lessons Learned in and around the Classroom**

Through the testing and implementation of a variety of wireless networking technologies, Cornell established best practices that can apply to most universities considering a phased or large-scale wireless deployment.

- Any large-scale deployment requires access points that are inexpensive to install and maintain, but also provide great coverage. A state-of-the-art wireless network needs to operate with the quality of service of a wired network—not that of a cellular network.
- Successful wireless networks are developed in a collaborative process. Having a champion to voice the requirements of the users and shepherd the trial phases is vital to a smooth transition, satisfied users and appropriate deployment of network administrators.
- While one would think cellular access would be inhibited by Cornell's surrounding environment of mountains and gorges, in fact, it is the use of concrete in older buildings that blocks cellular signals. By using a Layer 3 wireless LAN, the school can have fully functioning devices and pagers.
- Look for additional features. Eventually, professors will want to limit students' usage of devices during lectures and class time. A wireless system that provides virtualization (separate virtual networks) is essential to implementing a measure of control in the classroom.
- Choose systems that interoperate with existing network equipment. No business should build a wireless network from scratch. Time, money and resources used to create wired networks need to be leveraged. As a result, be sure to select a system that is backward and forward compatible.

### **Leveraging the Big LAN on Campus**

Cornell University is building a wireless network without boundaries. Wireless networks are no longer just about access—they are about changing the way we interact with others using new dual-mode phones, computers, and other wireless-enabled devices.

Cornell's wireless initiatives continue to attract students, increase the productivity of all constituents, and help propel the university's reputation as a world-class institution of higher education.

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