



Improving Campus Quality of Life with In-Building Wireless

CASE STUDY

CHALLENGE

Long regarded as one of the nation's top 10 universities, Duke University offers a broad range of undergraduate and graduate programs at its Durham, North Carolina campus. Home to Duke University Medical School, Duke University Law School, the Fuqua School of Business, the Pratt School of Engineering, Duke University Medical Center, and one of the top ten research libraries in the United States, the university's 960-acre campus provides classrooms, residential space, laboratories, clinical facilities, and sports and performance venues for some 12,000 graduate and undergraduate students and more than 27,000 employees.

Duke prides itself on having a "small school" environment with the intellectual resources of a major university, and on maintaining a high quality of life on campus. The university is continually expanding its facilities, with recent additions to the engineering school and library facilities as well as a new residence hall. But the ongoing drive to modernize and expand its facilities also includes communications services. Students and faculty have grown dependent on cellular phones, and Duke's IT department had begun fielding increasing complaints about inconsistent cellular coverage in certain campus areas.



NEW CONSTRUCTION, NEW CONCERNS

One source of cellular coverage issues was the recently-completed Fitzpatrick Center, a \$97 million, 320,000 square foot research and teaching facility that is part of the Pratt School of Engineering. As a new, four-building complex that houses research and teaching for bioengineering, communications and photonics, the Fitzpatrick Center was an ideal place to begin deploying in-building wireless.

"We knew about in-building wireless systems and wanted to do a pilot deployment, so the Fitzpatrick Center was a good choice," said Dana Risley, senior manager of the finance and administration group at Duke. Through his own research as well as consultations with major cellular service providers in the area, Risley came up with a short list of requirements: reliability, ease of installation with minimal disruption (in both new construction and existing buildings), multi-frequency support, easy service upgrades, and cost-effectiveness.

"We wanted to be able to support any carrier's traffic as well as future migrations of our public safety and paging network traffic to the new system," Risley says, "and we wanted as much as possible to leverage our existing fiber and Cat-5 cabling installations."

Based on recommendations from Verizon and Alltel (the university's two main cellular carriers) as well as Risley's own research, Duke contracted with local subcontractors to install an InterReach Unison® system in the Fitzpatrick Center.

BASE STATION REPEATER REDUCES DELAYS

Although the Fitzpatrick Center was 75 percent occupied by the time of the Unison installation, the deployment was done in less than eight weeks. It would have been faster, except there were some scheduling delays by one of the contractors providing Cat-5 cable extensions to certain parts of the facility. To speed the arrival of high-performance cellular coverage, Duke opted to install a rooftop antenna on the Fitzpatrick Center to capture signals from nearby macro cell base stations, and then to repeat the signal within the building via the Unison system. The Unison system includes a Main Hub, four Expansion Hubs (one on each of the building's floors), and 28 antennas.

"We expect to add more carriers over time, and we also expect to have carrier base stations connected directly to the Unison network," says Risley. "Rooftop antennas were the fastest way to get the system up and running, because running fiber to the existing, on-campus base stations will take quite a bit of time."

Once the system was powered up, cellular coverage issues for Verizon and Alltel subscribers became a thing of the past inside the Fitzpatrick Center.

PHASING IN COVERAGE ACROSS THE CAMPUS

With the successful completion of the pilot project, Risley and IT voice services senior manager Jonathan Adams began planning a broader rollout. The next two buildings in line for cellular coverage with Unison systems are the Bryan Center (an expanded student union housing theaters, restaurants, a coffeehouse, stores, and a post office), and a new extension (opened in 2005) of the 122,000 square foot Bostock library. Both of these projects are scheduled for completion in the spring of 2006.

"We're developing a master plan to phase in wireless coverage in other campus buildings over time," says Adams, "including the residence halls and the medical center. Of course, we'll have to phase it so that all of the residence halls in any given area get the upgrade at the same time. Otherwise, we'll get some serious complaints from students about unevenness in the quality of life."

Other future plans include the integration of 800 MHz public safety and paging traffic into the same Unison network, as well as the addition of EV-DO data services as they become available. "As our legacy antennas for the public safety and paging systems fail, we can move the traffic onto the same infrastructure we use for cellular calls without a lot of reconfiguration of the network," says Adams. "It's just a matter of adding new electronics to the existing Unison system to support those networks."

With Unison in-building coverage, Duke University is on a path toward clear, consistent, and pervasive cellular service throughout its facilities. This coverage not only facilitates day-to-day calling between students and faculty, but will eventually support mobile data and video services that are becoming particularly popular with students. With cost-effective, high-performance Unison systems, Duke is enabling current and future mobile services that add to the quality of life, part of the ongoing drive for improvements that keep it in the top 10 ranking of American universities.

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