# Wireless Network Improves Learning, Enhances Reputation of Premier Liberal Arts University

"After careful research we chose the Cisco Service-Oriented Network Architecture (SONA) framework. It enables all of the components in our existing technology infrastructure and is flexible enough to enable future components that are still on the drawing board."

Jay Dominick, assistant vice president for Information Systems and CIO, Wake Forest University

Increasingly, chief information officers (CIOs) at higher education institutions are being asked to not just run the IT department efficiently, but to become strategists and propose technology solutions that enhance learning and productivity. When Wake Forest Assistant Vice President for Information Systems and CIO Jay Dominick suggested the perennially top-ranked university turn the campus into a cutting-edge wireless communications center, the board liked what it heard. "Most people do not associate technology with liberal arts universities," explained Dr. Dominick, "but in the 21st century, many jobs require a sophisticated knowledge of high-tech devices and the ability to use them to research and produce presentations, reports, and other multimedia communications."

The key to Dominick's vision is mobility: any wireless device—notebook computer, personal digital assistant (PDA), cell phone—must be able to securely and easily access the Internet from any location on the Winston-Salem, North Carolina campus. Before 2004, only a handful of Wake Forest's buildings had wireless connectivity. Even then, users had to sign out a PCI card to insert in their notebook computer, perform some minor configuring, and then remember to return the card. The wireless coverage area was so small and the process so user-unfriendly that most students and faculty did not bother to use the service. "Students enrolling in college today grew up with the Internet, text messaging, and cell phones," said Dominick. "They expect instant access when they turn on their devices no matter where they are located. And when it's time to choose a college, they certainly expect ubiquitous access from the premier universities in the country."

**CISCO SYSTEMS**

Prepared by
Internet Business Solutions Group

## CISCO SONA NETWORK KEY TO SOLUTION

The first step in this new direction required installing a pure wireless network. To help it develop a comprehensive plan, Wake Forest called on the Cisco® Internet Business Solutions Group (IBSG) because it has the business expertise and proven methodologies and governance models that apply to the education sector. "IBSG listened to the goals of Wake Forest," said Dr. Tracey Wilen-Daugenti, practice lead, Higher Education, IBSG, "and helped achieve the results they wanted in the least time possible by providing thought leadership and technology expertise, and by sharing best practices in the education field."

Dominick wanted the university's primary network to be a robust, high-performance wireless platform—not a wireless layer on top of the existing wired network. "We chose the Cisco Service-Oriented Network Architecture (SONA) framework because it enables all of the components in our existing technology infrastructure and is flexible enough to enable future components that are still on the drawing board." Cisco SONA helps organizations transform their existing infrastructure into an Intelligent Information Network (IIN) that supports new IT strategies, including service-oriented architecture (SOA), Web services, and virtualization. This allows institutions like Wake Forest to reduce complexity and management costs, enhance system resiliency and flexibility, and improve usage and efficiency of their networked assets.

Wake Forest set up 750 access points on its approximately 300-acre Reynolda campus and eliminated 16,000 wired connections. It now has the blanket wireless coverage Dominick envisioned. "For the last 10 years, every incoming freshman has been given a new notebook computer, which is upgraded every two years. But we only started to see students take advantage of the full capability of the mobility of their computers after the SONA wireless network was in place. Now a student can open his or her notebook computer and get access anywhere.

## WIRELESS CLASSROOMS AND POLLING ENHANCE LEARNING

Wireless classrooms are improving the way students learn and are promoting positive changes in the way professors and students interact—an important facet of Wake Forest's liberal arts campus. For example, the Wake Forest-developed application, Class-in-Hand, allows students to ask their professor a question, even in the middle of a lecture. The instructor can respond to the student immediately using a handheld computer or, if the professor thinks it's a good question, project it on the screen and use it as a starting point for discussion. The application also has a real-time polling feature. If a professor senses that many of his students do not understand a concept, he can poll the students, who respond anonymously. Wireless technology also enables students to work more efficiently in the classroom. "When I taught a class recently," said Dominick, "the best students used their notebook computers extensively and took advantage of the integrated technology now in the classroom. They typed their notes directly into my PowerPoint presentation, which I e-mailed to everyone. Then they added related links, text, and graphics from the Web. When they were done, they had comprehensive class notes from which to study before they even left the classroom. The students who used their notebook computers to stay organized finished in the top of the class."

> **"The quality of writing and papers on the annual EuroTour trip increased significantly after the introduction of handheld devices. Students...combined the interviews, photos of historical sites, which they took with their Pocket PC phone cameras, and other real-time research to create stunning, information-filled presentations. It was a tremendous learning experience they will never forget."**
>
> **Jay Dominick, assistant vice president for Information Systems and CIO**
> **Wake Forest University**

## WIRELESS OVERSEAS PROGRAM IMPROVES QUALITY OF ASSIGNMENTS

Wireless devices are also indispensable learning tools in Wake Forest's overseas programs. In one Wake Forest study-abroad program called the EuroTour, students spend five weeks touring Europe while gathering information that they turn into reports and other assignments. The students are armed with easy-to-carry Pocket PC phones and wireless keyboards—notebook computers remain at home. Robert Evans, the professor of one of the three courses that uses the Pocket PC phones, explained that "the handheld computers are a way for students to conveniently and accurately collect information while traveling and then to process it with their notebooks after returning home." During the 2006 EuroTour, each student conducted interviews with more than 35 citizens in seven countries. They wrote survey questions on their Pocket PC phones, which allowed them to interview quickly and consistently, including allowing non-native English speakers to sometimes read their handheld questions themselves for clarity. Upon their return to the States and to their notebook computers, they downloaded all of their data and used spreadsheet and word-processing programs to analyze it and produce text and graphics to summarize their findings. "In addition to using questionnaires and PDA cameras to collect information during the trip, my students were able to access the Internet for information relevant to their studies, on the fly, using Wi-Fi," he said. Evans found that the quality of writing and papers on the annual trip increased significantly after the introduction of handheld devices. "Students did not have to scribble notes, carry around several notebooks, or run back to their rooms to record what they remembered," added Dominick. "They combined the interviews, photos of historical sites, which they took with their Pocket PC phone cameras, and other real-time research to create stunning, information-filled presentations. It was a tremendous learning experience they will never forget."

While traveling abroad, students can also beam their research to the professor, who reviews the information, suggests additional topics to consider, and serves as a backup resource by archiving each student's data on a storage card. "The professors keep students from falling behind by giving instant progress reports," noted Dominick. "Instructors also disseminate reading assignments and other class information via the Pocket PC versus having to find a store to make paper copies and then tracking each student down to hand out the materials. The location of hospitals, consulates, travel agencies, and other important information while traveling is only a few keystrokes away for the professor, too."

In addition, Cisco helps Wake Forest extend its education globally. Students living in university housing while studying abroad in London, Venice, Vienna, and in Salamanca, Spain have a secure virtual private network (VPN) connection to Wake Forest's network, so they can access the university library and other campus resources. They use the university's VoIP connections to link their remote campuses to the home campus, enabling better communications between the far flung parts of the university.

## INCREASE IN STAFF PRODUCTIVITY

On the administration side, staff members are using their notebook computers and mobile devices to do more in less time. During meetings, administrators can search online for information they need to make decisions on the spot instead of going back to their offices to find the data and then schedule another meeting to take a vote. "In addition, we recently implemented a new enterprise resource planning (ERP) system, which required countless hours of training," explained Dominick. "But we do not need a computer-training lab on campus because training sessions can be held anywhere. Attendees bring their notebook computers, access the ERP wirelessly, and the training begins."

## STUDENTS TRAIN FACULTY, UNIVERSITY CUTS COSTS

Through several student technology programs, Wake Forest enhances its students' knowledge of technology, dramatically reduces its computer-support budget, and provides students with real-world experience through jobs on campus. Student Technology Advisors (STARS), Resident Technology Advisor (RTA), and Knowledge2Work programs all give students opportunities to develop technical skills while helping the university. Under STARS, students with majors as diverse as history and physics are hired and trained to work one-on-one with faculty members to solve their computer problems and explore how to use technology to improve teaching and learning.

Students living in the residence halls can call on live-in RTAs any hour of the day or night to answer computer questions. "Students are paid well in this program," said Dominick, "and the University saves money, so it is a win-win situation. Professional trainers and support technicians would each cost upwards of $40,000 annually, so with student-workers in those positions, we can use the savings to improve other campus technology services. The university's Knowledge2Work program helps students develop the skills needed to run their own Web-design and support business catering to Winston-Salem's nonprofit organizations and small businesses. Students with a variety of backgrounds—from business management and art design to computer science—run the small company which prepares them for real-world employment."

> "Cisco Capital provided us with a sustainable method for implementing the entire network architecture at one time, rather than having to piece it together over multiple years. They helped us move our network from a capital expense to an operational expense, which more appropriately reflects its importance to the university."
>
> **Jay Dominick, assistant vice president and CIO**
> **Wake Forest University**

## CISCO LEASING PROGRAM MAKES CIO'S VISION A REALITY

Technology makeovers like the one undertaken by Wake Forest never used to get past the wish-list stage because of the huge capital expenses involved. But a leasing program offered by Cisco now makes it possible for any size organization to not only upgrade its entire enterprise, but keep it "evergreen" by adding the latest technologies on a periodic basis. "What we've done that's unique in the industry," said Chris Kast, regional manager for Cisco Capital, "is set up a four-year leasing program that organizations can pay for as a predictable, monthly operational line item instead of one or more unpredictable, exorbitant capital outlays. At the end of four years, a refresh process begins where the latest upgrades are installed, but the budget line item does not change. So Wake Forest pays for technology as they use it, much like they do a utility."

Cisco Capital Leasing was a critical element of Wake Forest's overall engagement with Cisco. According to Dominick, "Cisco Capital provided us with a sustainable method for implementing the entire network architecture at one time, rather than having to piece it together over multiple years. They helped us move our network from a capital expense to an operational expense which more appropriately reflects its importance to the university."

## UNIQUE IT GOVERNANCE MODEL

The university's IT governance model fully supports its wireless initiative. Information Systems (IS) centrally funds the notebook computers for faculty, students, and staff. The model also ensures the infrastructure is standardized, so Dominick's staff can spend most of its time on training, customer service, and making the software image just right. "We want our IT environment to be high quality, low cost, and highly reproducible," said Dominick. "Liberal arts universities teach students to think. We want to teach students to think using the latest technology devices found in business and society in general. Students understand that technology and critical thinking are two important keys to success in life—and so do their parents, which is why every year thousands of high school seniors place Wake Forest high on their list of preferred colleges."

## MORE INFORMATION

The Cisco Internet Business Solutions Group (IBSG), the global strategic consulting arm of Cisco Systems, helps Global Fortune 500 companies and public organizations transform the way they do business—first designing innovative business processes and then by integrating advanced technologies into visionary roadmaps that improve customer experience and revenue growth.

For further information about IBSG, visit **http://www.cisco.com/go/ibsg**

**CISCO SYSTEMS**

**Corporate Headquarters**
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
**Tel:**  408 526-4000
       800 553-NETS (6387)
**Fax:**  408 526-4100

**European Headquarters**
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
**Tel:**   31 0 20 357 1000
**Fax:**  31 0 20 357 1100

**Americas Headquarters**
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
**Tel:**  408 526-7660
**Fax:**  408 527-0883

**Asia Pacific Headquarters**
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
**Tel:**  +65 6317 7777
**Fax:**  +65 6317 7799

Cisco Systems has more than 200 offices in the following countries and regions. Addresses, phone numbers, and fax numbers are listed on the
**Cisco Website at www.cisco.com/go/offices.**

Argentina · Australia · Austria · Belgium · Brazil · Bulgaria · Canada · Chile · China PRC · Colombia · Costa Rica · Croatia · Cyprus · Czech Republic · Denmark · Dubai, UAE
Finland · France · Germany · Greece · Hong Kong SAR · Hungary · India · Indonesia · Ireland · Israel · Italy · Japan · Korea · Luxembourg · Malaysia · Mexico
The Netherlands · New Zealand · Norway · Peru · Philippines · Poland · Portugal · Puerto Rico · Romania · Russia · Saudi Arabia · Scotland · Singapore · Slovakia
Slovenia · South Africa · Spain · Sweden · Switzerland · Taiwan · Thailand · Turkey · Ukraine · United Kingdom · United States · Venezuela · Vietnam · Zimbabwe