

College Connects with Cisco Outdoor Wireless Network

Lynchburg College deploys an outdoor wireless network to connect off-campus students to the Internet.

EXECUTIVE SUMMARY
<p>LYNCHBURG COLLEGE</p> <ul style="list-style-type: none"> • Education • Lynchburg, Virginia • 2400 students <p>BUSINESS CHALLENGE</p> <ul style="list-style-type: none"> • Provide network connectivity to student housing on the edge of campus • Replace a competitor's wireless network that was not performing to customer expectations • Avoid paying multiple service charges to a third-party Internet Service Provider <p>NETWORK SOLUTION</p> <ul style="list-style-type: none"> • A powerful outdoor wireless network, composed of Cisco outdoor mesh access points and controllers, brings Internet connectivity to 70 off-campus houses and the campus green space <p>BUSINESS RESULTS</p> <ul style="list-style-type: none"> • Promise of ubiquitous network access aids in student retention and recruitment • Wireless network is much more cost effective than laying new cable or paying for individual cable modem service accounts

Business Challenge

Founded in 1903, Lynchburg College is a residential college located 180 miles southwest of Washington, D.C., in the foothills of the Blue Ridge Mountains. Ranked in the top tier of southern colleges and universities by U.S. News and World Report, the college attracts students from all over the world. The pretty, 214-acre campus holds some 40 buildings, most of which are grouped on or near an oval of grass known as The Dell. Lynchburg College also maintains several off-campus student residences, which, until recently, were not connected to the main campus computer network.

The school knew that the lack of connectivity would displease students, who grew up with—and have come to expect—ubiquitous Internet access. So three years ago, the IT team set out to offer consistent Internet service to all its students, not just those who live on the main campus.

“We did not have any fiber optic or wired connection to bring the students who lived in these houses onto the campus network,” says Steve Straw, network services manager at Lynchburg College. “They had telephone service, but our students are often from affluent backgrounds, and 56 K dial-up connections were not satisfactory.”

Knowing that it would be price prohibitive and disruptive to lay new cable, Lynchburg College's IT team decided to connect the houses to the campus network with a wireless mesh network. In a wireless mesh, the network dynamically routes packets from node to node. A few nodes have to be connected directly to the wired network, but the rest share a connection with one another over the air. Mesh was a new idea at the time, so Lynchburg hired a small group of startup companies to build the network, and optimistically announced that high-speed wireless networking would be available to students in off-campus houses.

Unfortunately, there was one big problem with the college's initial mesh network.

“It did not work,” says Howard Ramagli, CIO at Lynchburg College. “It was a failure. The radios were underpowered, and the bridges could not communicate with the access points. Four weeks into the semester, I had more than 300 kids screaming at me.”

The College quickly appeased the unhappy off-campus students by buying cable modem accounts for all of them. But the staff knew this was only a temporary solution. While cable modem accounts provided Internet connectivity, they did not provide connectivity to the campus network. And paying the local cable provider for all of these accounts was expensive—about US\$34,000 to cover a ten-month school year.

Network Solution

In 2006, Ramagli and Straw set out to find a more cost-effective solution for the long term—a mesh network that would function correctly. Many of the issues with the initial mesh network stemmed from the fact that it included incompatible equipment from multiple vendors, so the team sought an equipment provider that offered an end-to-end network solution.

In its second search for a networking provider, the Lynchburg College team was happy to find that Cisco® had now started offering a complete mesh solution of hardware and management software, which would integrate with the college's main network.

“We already had an installed base of Cisco equipment for our wired network,” Ramagli says. “With Cisco, we have a single solution provider for the entire network, which always makes me happy. As soon as you employ two or more equipment vendors, they will start blaming each other.”

With help from the Cisco account team, Cisco-certified partner American Business Systems (ABS) conducted a comprehensive site survey, and then began the network installation.

The network includes seven Cisco 1000 Series Lightweight Access Points (APs) and 35 Cisco Aironet® 1500 Series Lightweight Outdoor Mesh Access Points, only seven of which need to be directly connected to the main campus. In addition to bridging the off-campus student housing to the college network, the mesh network also covers a large grassy area on campus, so that students can use the Internet from their laptops as they study outside in the sun.

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The access points are managed centrally from a Cisco 4400 Series Wireless LAN Controller and a Wireless Control System (WCS) management server. Among the controller's features is the ability to support separate Service Set Identifiers (SSIDs) for multiple virtual networks. This is an important feature for Lynchburg College because in addition to the student houses, the mesh also provides a network bridge for three off-campus administrative buildings. With separate SSIDs, the IT staff can help ensure that students do not have access to administrative network data.

Generally, the Cisco access points are powerful enough that they can be placed in outdoor locations and still provide signals strong enough to penetrate the walls of the student houses. (The only exceptions are a few houses that have heavy aluminum siding; these houses feature an additional indoor access point to bolster the radio signal.) The APs' coverage area is also capable of enduring seasonal interference issues.

“On a college campus, you have to take into account the ability of the network to penetrate leaves in trees,” Ramagli says. “The Cisco network provides sufficient radio signals even when the trees are fully leaved.”

“Radio interference with the Cisco network is almost a non-issue,” Straw says. “The product will adapt itself and change channels to compensate for whatever is around it.”

Additionally, the Cisco outdoor wireless network provides superior, integrated network security and protects the network against unauthorized “rogue” access points. It is supported by the Cisco NAC Appliance (also known as Cisco Clean Access), a network admission control product that uses the network infrastructure to enforce security policies. The appliance lets network administrators authenticate and authorize both wired and wireless users.

“An important feature of the system was that the Cisco mesh network integrated nicely with the Cisco Clean Access product that we were already using,” Straw says. “You cannot log into Clean Access through a rogue access point.”

Business Results

The Lynchburg College team says its second attempt at a mesh network has been a big success. “Cisco and ABS really had their act together,” Ramagli says. “The project went smoothly and came off without a hitch.”

The cost benefits are clear. Networking just a few of the student houses with cable and fiber would have cost more than US\$750,000, Ramagli says. The entire wireless mesh network cost about US\$175,000, including several spare access points and an ongoing maintenance contract. And considering that the college no longer has to pay US\$34,000 per year for cable modem service, the wireless network will basically have paid for itself in four years.

“In the long run it is going to save us a lot of money,” Straw says.

Ramagli adds that the mesh network is proving to be a good publicity tool for the school, inasmuch as it helps to keep the students content.

PRODUCT LIST

- Cisco 4400 Series Wireless LAN Controller
- Cisco Wireless Control System
- Cisco Aironet 1000 Series Lightweight Access Points
- Cisco Aironet 1500 Series Lightweight Outdoor Mesh Access Points
- Cisco NAC Appliance

“One of the things that we think it does is to help in terms of student retention,” Ramagli says. “We can tell them that no matter where you live on campus or off campus, you have access to the college network. And we can mean it. We have as few problems and calls about the wireless mesh network as we do about the wired network. It is just that reliable, and that makes me happy.”

NEXT STEPS

If the students had it their way, every inch of the Lynchburg College campus would have Wi-Fi access, both inside and outside the buildings.

“We continue to get that request from students,” Ramagli says. “It is a very mobile generation.”

The school has avoided providing Wi-Fi in the classrooms because faculty members are concerned students will surf the Web in lieu of listening to lectures. However, the staff is looking to expand the outdoor mesh.

“We are looking at our athletic fields and whether we could bring them onto the mesh,” Ramagli says. “The kids have full access to the fields almost all day, and with Wi-Fi access, students could hang out and work on their laptops while they watch their boyfriends or girlfriends at practice.”



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