

LIBERTY UNIVERSITY REDUCES COSTS BY DELIVERING IPTV OVER 802.11N WIRELESS



Liberty University (LU), the world’s largest Christian university, is executing one of the most progressive mobility strategies in the education space by transitioning voice and broadcast television services to their wireless LAN. The University’s aggressive technology integration program was planned with careful attention to the return on investment, and LU will actually save money while offering its users an exceptional IT experience.

Information Technology has become the catalyst for growth at LU, enhancing learning and life experience on campus while enabling a distance learning initiative that today supports over 41,000 domestic and international students across the world. It also influences LU’s affiliation with other organizations: LU provides network services to several sister organizations, requiring that any new technology be extensible to remote facilities.

In the most recent upgrade, LU focused on enhancing the wired and wireless networks as well as network security. The networking gear had historically been provided by a single vendor, Cisco. 802.11 b/g Cisco wireless access points provided some coverage across campus, but problems persisted and the

REQUIREMENTS:

- Reliable data, voice and broadcast television over adaptive 802.11n Wi-Fi
- Consistent mobile network access for all users and students
- Mobile security with firewall-based policy enforcement per user
- Seamless integration with Network Access Control

SOLUTION:

- 3600 and 6000 Mobility Controllers
- M3 Controller Modules
- AP-125 802.11n Access Points
- AirWave Wireless Management Suite

network could not be sufficiently retrofitted to support Liberty’s new requirements. With the upgrade LU sought to move up to a best-in-class mobility infrastructure that would support all data and media services, including broadcast television (IPTV).

More specifically, LU was interested in the following network enhancements:

Network Availability	LU wanted campus-wide network access for handheld computing devices and smart phones, which were becoming increasingly popular for personal and academic use. The campus’ existing wireless infrastructure was simply not available everywhere these devices were used, and most of the devices didn’t support wired Ethernet even if it were available.
Wireless Capacity	With wireless fast becoming the primary form of edge network access on campus, expectations grew that the wireless network should support voice, interactive curriculum, and broadcast quality video applications. Two architectural issues made this impossible with the legacy wireless network. First, the RF capabilities of the legacy solution were designed for large sparsely populated areas, and the radios could not support Adaptive RF Management. Sectorized antenna panels were used, which couldn’t support heavier network loads in areas like lecture halls with densely clustered clients. Second, the legacy wireless network supported only 802.11 b/g (2.4 GHz band, 54 Mbps maximum per channel), while the new applications needed the 300 Mbps per channel and 5 GHz operation of 802.11n Wi-Fi.
Network Guest Access	The LU campus regularly hosts large conferences, musical concerts and athletic events at the Vines Center, a large indoor facility that seats over 8,000 people. LU lacked a secure and easily administered guest access solution through which it could provide network access to event participants, and to visiting scholars elsewhere on campus.

Identity and Access Management	The Cisco Clean Access (CCA) for Network Access Control (NAC) system offered limited identity and access management, lacking best-in-class features standard on other more sophisticated solutions. Purchased at a time when Cisco was the sole network provider for the campus, LU had since migrated towards finding the best available solutions and away from single source arrangements.
Wireless Management	Monitoring, configuring and optimizing LU's large and growing network was becoming increasingly challenging using the university's legacy management tools. Instead IT staff wanted a solution that helped improve operations management by providing improved visibility, control, analytics, and Help Desk support.
Security	Security was always a priority at LU, but over time the network had grown sufficiently that a new security paradigm was needed. The new approach needed to focus on delivering a consistent user experience, across multiple locations and access methods, to the growing cadre of mobile users. The network was originally designed to protect static users, but the proliferation of laptops and smart phones necessitated the use of role-based security to protect users regardless of where they worked or roamed.

MAKING A BUSINESS CASE FOR WIRELESS

Prior to selecting a solution to the issues mentioned above, the IT staff conducted a detailed review of campus infrastructure. The results highlighted the diminishing relevance and growing expense of Ethernet, and justified the case for transitioning to pervasive 802.11n Wi-Fi coverage.

LU determined that by using only Wi-Fi in its dormitories it would be able to significantly reduce operating costs associated with powering and maintaining closet infrastructure. Any orphaned network switches could be decommissioned and added to a spare parts pool or used to expand the network elsewhere on campus.

A use-it-or-lose-it policy was also instituted to decommission additional Ethernet ports that hadn't been used for more than 90 days. This policy was intended to accelerate cost savings realized by eliminating wasteful wired infrastructure and services.

WLAN DEPLOYMENT DETAILS

LU has 212 buildings totaling 4.3 million square feet of facilities, over 52,000 local and distance education students, and more than 3,500 full time employees. Prior to selecting a vendor to upgrade its Wi-Fi network, the university staged both a 36 access point Aruba network at a remote site, and networks from its incumbent supplier at two residence halls. At the conclusion of the evaluation period Aruba's solution was deemed technically superior, and the university subsequently purchased a campus-wide Aruba 802.11n Wi-Fi network managed by Aruba's AirWave Wireless Management Suite.

Today the network consists of approximately 800 AP-125 802.11n Access Points, three Aruba 3000 series Mobility Controllers, and three Aruba 6000 Mobility Controllers equipped with M3 controller modules and deployed in a redundant configuration. Each M3 Mobility Controller supports a 10 Gbps connection to a distribution switch, providing ample backhaul capacity for 802.11n clients accessing bandwidth-intensive applications like broadcast video.

For guest access LU has provisioned a separate guest SSID that is restricted by Aruba's Policy Enforcement Firewall (PEF) to accessing only the DMZ on the Internet Edge Switch. This design of the guest access system enables LU to completely isolate guest users from the production network, while still delivering Internet access. Guests are automatically directed to a captive portal page and granted access only after they agree to a network usage policy.

The Network Access Control (NAC) solution at Liberty is tightly coupled to the network infrastructure: clients are scanned to assess security posture and policy enforcement is effected by PEF. Scanning occurs during authentication and unobtrusively at regular intervals during the network session. In the event of a failed posture scan, the NAC solution & PEF temporarily move the user to an isolated network for automatic remediation.

BROADCAST TELEVISION OVER 802.11N

LU determined that maintaining a wired network just to support video would be excessively expensive, both with respect to the initial build out and ongoing maintenance. Since consumers of video content were increasingly mobile – using laptops and smart phones as well as televisions – LU determined that in addition to being expensive, Ethernet was simply not a suitable video delivery mechanism.

In an industry first, LU launched a campus-wide program to encode and distribute multi-channel, IP-based television (IPTV) campus-wide via wireless LAN to fixed televisions and computers, as well as roaming devices. The solution couples Aruba's adaptive high-speed 802.11n Wi-Fi with HaiVision Network Video compression and conversion technology. New Aruba multicast optimization technology efficiently transmits video streams while traffic prioritization techniques allow the wireless IPTV service to scale.

The result is an optimized video delivery infrastructure that leverages 802.11n everywhere possible – minimizes reliance on expensive coaxial and Ethernet cabling plants – and significantly enhances user mobility while reducing capital and operating expenses.

Liberty University's 802.11n wireless network now supports 15 live IPTV channels over the wireless network including, among others, ABC, CBS, NBC, Fox CNN, ESPN, and the Liberty Channel with 3 Mbps per channel/video stream. Video performance was tested up to 30 simultaneous users, viewing different video channels, on a single access point before seeing significant video quality degradation.

WLAN DEPLOYMENT DETAILS

Liberty University leveraged Aruba advancements in 802.11n and multicast optimization technology to transition to a wireless access layer and deliver over-the-air multi-channel video to fixed and mobile devices. In the process the university greatly reduced the cost of its networking infrastructure while improving accessibility to video and interactive media services.



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