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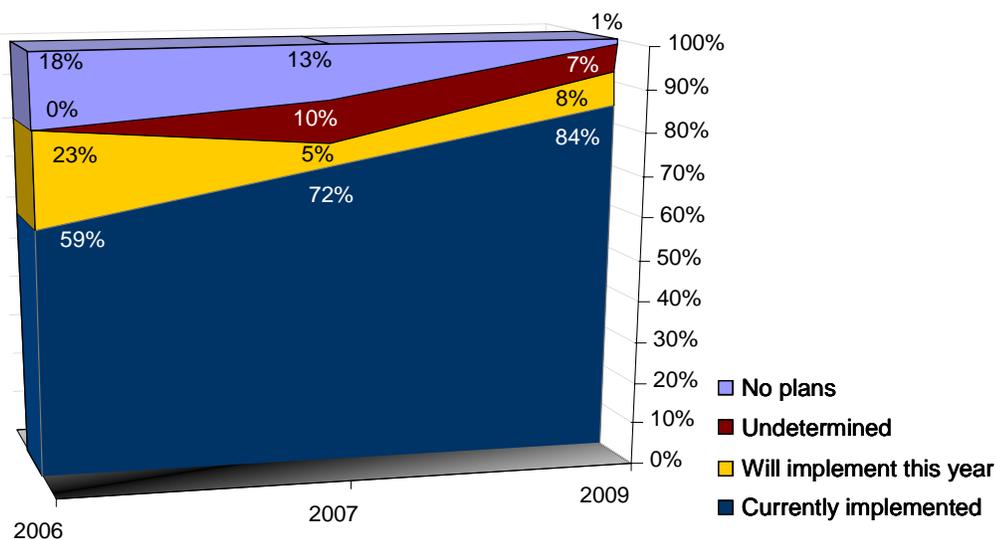
## A Need for Speed: Higher Education Moves to Wireless Networking with 802.11n

In the March 2010 Aberdeen benchmark report, *Multi-Site and Campus-Area Wireless LANs: Advantages of the Centralized Approach*, 163 institutions were surveyed regarding their use of multi-site and campus-area ("non-site-contiguous") Wireless LANs (WLANs). This Sector Insight provides an analysis into the pressures driving the higher education sector to 802.11n WLANs, and how this affects the strategies and actions that they choose in response.

### Mobility Drives the Increasing Demand for Fast WLAN

One of the top pressures driving the integration of campus-area wireless LANs is the increasing demand for WLAN coverage at all of the organization's locations. This is driven in large part by the increasing demand for mobility overall. The March 2009 Aberdeen benchmark report *More Mobility – Less Budget: Enterprise Strategies in the Current Economic Downturn* found that 84% of respondents already had a mobile initiative in place, a rate that has grown consistently since 2006 (Figure 1).

**Figure 1: Unstoppable Mobility**



Source: Aberdeen Group, March 2009

From November 2006 through December 2009, the percentage of respondents who had a mobility initiative in place increased 42%, while the percentage of those who had no plans for mobility decreased by 93%. The

### Sector Insight

Aberdeen's Sector Insights provide strategic perspective and analysis of primary research results by industry, market segment, or geography

### Definition of Terms

The 802.11 Wi-Fi® WLAN Standards:

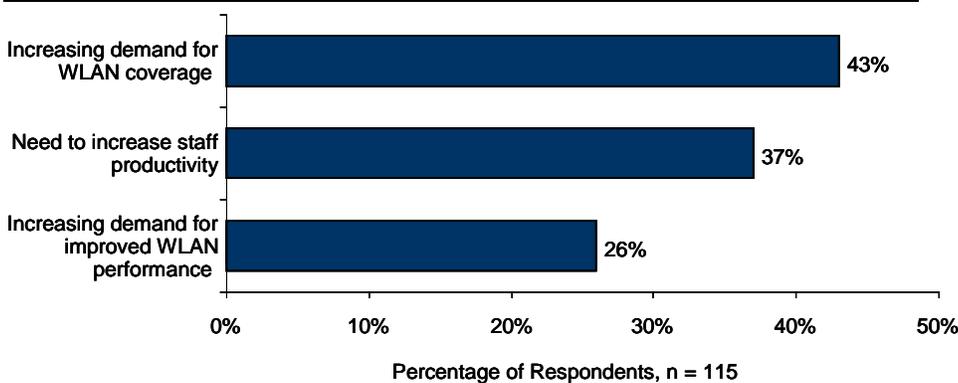
- ✓ **802.11b** is the first Wi-Fi standard; operates in the 2.4GHz radio spectrum and offers speeds of up to 11Mbps
- ✓ **802.11a** is a successor to 802.11b; operates in the 5GHz radio spectrum and offers speeds of up to 54Mbps, with a range of ~115ft
- ✓ **802.11g** uses the same 2.4GHz radio frequencies as the popular 802.11b, is backwards compatible with both 11a and 11b, and is almost 5-times faster at 54 Mbps, with a range of ~125ft
- ✓ **802.11n** is able to operate at both 2.4GHz and 5GHz; due to improved antenna technology (MIMO - Multiple Input - Multiple Output) and many other advancements, theoretically capable of speeds up to 540Mbps and a range of 230ft. already in widespread use

demand for mobility, with its accompanying need for wireless *connectivity*, is the primary force driving the increased demand for WLAN coverage among all respondents (Figure 2).

## Top Pressures in Higher Education

In the March 2010 report *Multi-Site and Campus-Area Wireless LANs: Advantages of the Centralized Approach*, survey respondents were asked to rank-order the top pressures driving the integration of their multi-site or campus-area WLANs. Of the 10 pressures presented, Figure 2 illustrates the top three pressures selected by all respondents.

**Figure 2: Top Pressures for Multi-Location WLAN Integration**



Source: Aberdeen Group, March 2010

The pressure to increase staff productivity correlates with prior Aberdeen research showing that increased mobility results in increased productivity while the demand for improved WLAN performance illustrates an increasing reliance on the WLAN as core network infrastructure, versus simply a 'network of convenience.'

Table I revisits the top pressures in Figure 1 from a higher education sector perspective. If we focus on the top two pressures for all respondents and Higher Education, we see that an increase in demand for WLAN coverage at all sites along with improving WLAN performance is seen as a top pressure among both groups. However, Higher Education shows a significantly larger percentage of respondents who chose the coverage issue as a top pressure, corresponding to strong student demand for constant connectivity throughout every corner of the campus. Within the ivy walls, the student is the ultimate customer.

**Table I: Top Pressure by Sector**

	All Respondents	Higher Education
Increasing demand for WLAN coverage at all locations	43%	60%

	All Respondents	Higher Education
Need to increase staff productivity	37%	28%
Increasing demand for improved WLAN performance	26%	36%
Decrease telecom services costs	18%	8%
Unprotected PII, HIPAA or sensitive data	12%	20%

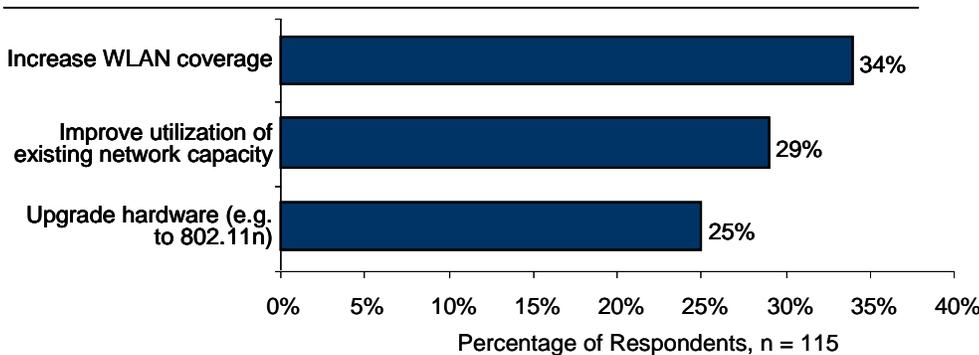
Source: Aberdeen Group, March 2010

Higher education respondents selected the same pressure of increased demand for improved WLAN performance for a similar reason: students who are web surfing, downloading video, playing online games, and even studying, are used to uncompromised bandwidth at home, and carry that expectation forward as a demand at school. In addition, education technology has advanced to include distance learning, online collaboration, and innovative research, all of which require maximum performance.

### Top Sector Strategies

Respondents then identified their top strategies in response to the pressures described above. Increasing WLAN coverage is at the top of their list, indicating an action which is likely to include either increasing the number of Access Points (APs) or upgrading to the greater range enabled by the Wi-Fi® 802.11n WLAN standard (Figure 3). The next strategic action identified is to improve the utilization of their existing wireless network capacity.

**Figure 3: Top Strategic Actions** (all respondents)



Source: Aberdeen Group, March 2010

This is a logical action during an economic downturn; the theme of optimizing the performance and security of an existing WLAN was the subject of the May 2009 Aberdeen report, [Wireless LAN 2009: From Network of Convenience to Business-Critical Infrastructure](#).

Once the current network's capacity is optimized, a logical next step would be to upgrade the wireless network hardware, typically to 802.11n. The 11n

### Study Demographics

#### Geographic Region

- √ North America (60.5%)
- √ Europe (27%)
- √ Asia / Pacific (18.5%)
- √ Middle East Africa (11.5%)
- √ Latin America (6%)

standard specifies speeds at up to 10-times and range up to three-times that of that fastest prior WLAN standard, 802.11g. It is worth noting, however, that in typical use, due to environmental factors, configuration issues, and endpoint or mobile client capabilities, the performance is about half that: five-times to seven-times the speed, and two-times the distance of the prior generation. These are real performance advantages however, and when we look at the strategic actions by sector, we see this is the one strategy that all sector respondents agree upon (Table 2).

**Table 2: Top Strategic Actions by Sector**

	All Respondents	Higher Education
Increase WLAN coverage	34%	36%
Improve utilization of existing network capacity	29%	20%
Upgrade hardware (e.g. to 802.11n)	25%	24%
Support more end-users with fewer IT Staff	20%	20%
Identify areas of inadequate coverage	15%	24%

Source: Aberdeen Group, March 2010

With increasing usage of the wireless infrastructure to deliver high-demand video services (for video-based collaboration and instruction, as well as for entertainment and social media) and mobile Voice-over-IP (VoIP - both institutionally-based and social-media-based services), areas of weak coverage cause calls to drop and video to lag. The evolving usage patterns highlight every uncovered corner of the campus as a potential point of connection vulnerability.

## The Need for Speed

The demographics of the student population are accelerating this demand for full-speed wireless access throughout every corner of campus, both indoors and out. Every mobile device, smartphone, game machine, and media player is a potential consumer of mobile broadband access. Students now prefer online entertainment portals such as Hulu.com, Skype, and YouTube for their video intake, bypassing the traditional cable television already in place in dorms and classrooms. A well-implemented 802.11n infrastructure can meet the demand for greater throughput and corner-to-corner coverage.

## New Teaching Methods

Recent advances in education technology are creating additional loads on already-overburdened wireless networks. Video collaboration has taken center stage in teaching. Large digital images used in research and the arts are proliferating. Distance education is being looked at as a way to reach underserved student populations. Distance education can also turn

production of content into a repeatable and durable teaching asset that can be utilized repeatedly and on-demand.

Intra-university collaboration between geographies, for example between US institutions and those in Russia, China, India, Africa, and South America, is also an area of growth. Typically, these exchanges include the sharing of large documents, remote data repository analysis, and video-based telepresence. The Internet2 initiative ([www.internet2.edu/](http://www.internet2.edu/)) has been leading this effort, much of it leveraging high-speed fiber- and satellite-based communications. This high usage model inevitably migrates on campus to 'the edges,' where mobile access is assumed.

### A New Recruitment Tool

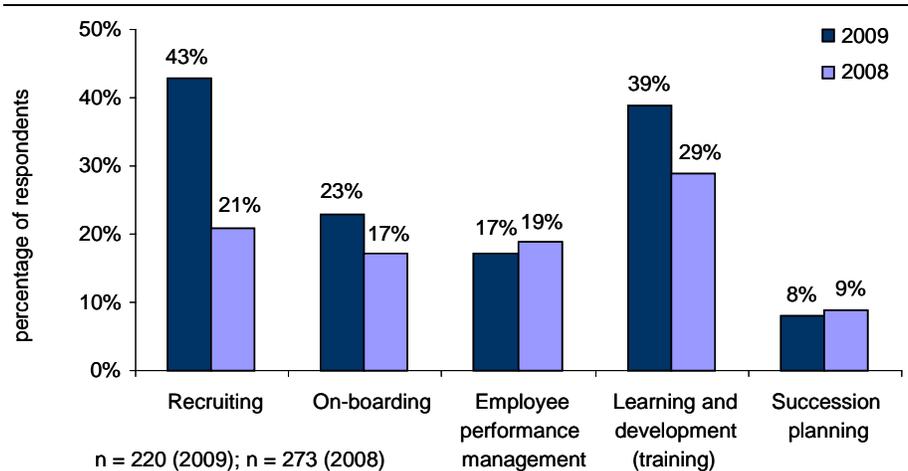
Universities without an advanced technology infrastructure stand to lose top faculty and top student talent. Students demand and expect state-of-the-art technology access; and, perhaps equally important, their parents don't want to spend thousands of dollars for a limited education. Faculty also demand the best tools that budgets can afford for research and advancement of their subject of interest. As a result, advanced technology infrastructure has become a recruiting tool to attract to the institution the most highly qualified student and faculty candidates.

The August 2009 report *Talent Acquisition Strategies 2009: Cutting through the Clutter and Proactively Managing Quality Candidates* found that between 2008 and 2009, the use of Web 2.0 tools for recruiting has more than doubled, and video interaction is one area where these tools are seeing the greatest level of adoption. As society at large becomes more comfortable with new ways of remote connecting, via video and text delivered to their personal computers and mobile devices, top organizations are seeing the benefits of remotely connecting and collaborating with potential recruits, leveraging them to benefit both the organization and the candidates.

#### Definition

**Web 2.0 tools** are collaborative technologies and social media, including wikis, blogs, vlogs, and other online text and video-based social networking tools

**Figure 4: Use of Web 2.0 Tools throughout the Talent Lifecycle**

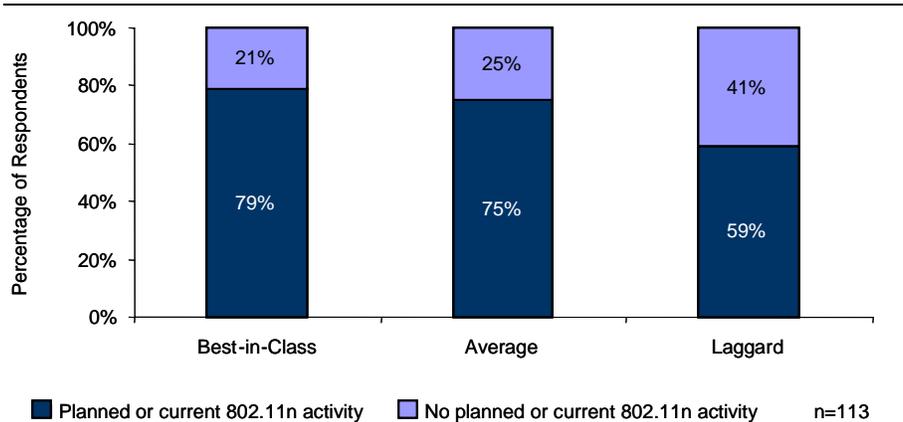


Source: Aberdeen Group, November 2009

## 802.11n to the Rescue

With higher education's appetite for greater throughput and performance, end-user adoption of Wi-Fi 802.11n has begun to accelerate. The May 2009 report [Wireless LAN 2009: From Network of Convenience to Business-Critical Infrastructure](#) found that 79% of Best-in-Class and 75% of Industry Average respondents either have current or planned 802.11n implementations, whereas the Laggards trail the Industry Average by 27% (Figure 5).

**Figure 5: 802.11n Activity**



Source: Aberdeen Group, May 2009

"We see the need for speed. With 802.11n, a few access points reduce the number of wire line drops. It's a lot less expensive and much more efficient."

~ Director, IT Outsourcing and Integration Services

802.11n has the advantage of providing the performance and security of a wireline network at a lower cost of acquisition, installation, and maintenance. It also enables institutions to upgrade their network infrastructure in older campus buildings where laying in new cable for wireline infrastructure would be cost-prohibitive.

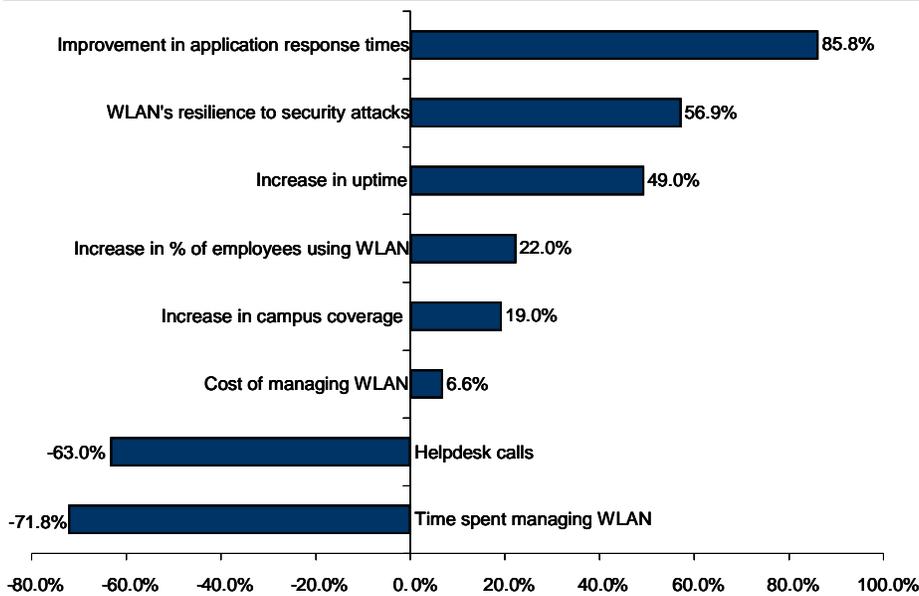
## 802.11n's Network Performance Boost

The [Beyond Wireless - The State of WLAN 2009](#) report identified concrete performance advantages for users of 802.11n-based WLANs, as compared to those who had not yet adopted 802.11n.

As shown in Figure 6, the respondents that were currently using 802.11n experienced more than an 85% improvement in application response times over those that had not yet migrated. 802.11n adopters reported 57% more resilience to security attacks, indicating that many of them improved their security solutions at the same time that they upgraded or installed their 11n network. Aberdeen's research also revealed that with a migration to 802.11n, organizations also moved more mission-critical applications onto the WLAN, making invulnerability to attack a higher priority.

The users of 802.11n achieved a 49% increase in network uptime over all others, 22% growth in the percentage of staff using the WLAN, and 19% increase in campus coverage, coinciding with the greater range of 802.11n-based APs.

**Figure 6: Users of 802.11n Versus All Others**



Source: Aberdeen Group, December 2008

"We are looking at the recent ratification of 802.11n as a good time to look at a campus refresh of our WLAN infrastructure. There is an approaching inflection point in the market regarding 11n replacing the existing a|b|g networks"

~ Director of Networks and Systems; Large Research University

Note that these advantages are not without cost; 11n users paid more than 6% more to manage their networks than non-11n users. Some of this cost is associated with the equipment purchase of the 802.11n-specific hardware and software itself.

However, they attained significant cost savings in other areas (63% fewer helpdesk calls for example) that are likely due to the improved bandwidth and range leading to fewer dropped data and voice sessions, and therefore fewer student, faculty, and staff complaints. Almost 72% less time was required to manage the WLAN, indicating that at least some of the strategic action to reduce complexity through WLAN / wireline convergence had been achieved. They also saved 15% on their telecommunications costs, as fixed mobile convergence and VoIP solutions helped to reduce carrier service billings.

## Key Takeaways

For those institutes of higher learning who have not yet 'taken the plunge' to upgrade their wireless infrastructure to 802.11n, it is highly recommended that they do so. A robust, secure, and high performance wireless network is simultaneously an educational platform, a research tool, a content delivery infrastructure, and a talent recruiting tool.

The 802.11n technology is well-proven and stable, and the cost/benefit equation has recently shifted towards the greater benefit at a lower cost. Solutions are available from a wide array of vendors, many of which are backward-compatible with existing infrastructure. Solutions that use a standards-based approach may also have an advantage in being able to integrate WLAN technologies from a variety of vendors.

Consideration should be given to ensure that the institution's wireline backbone has adequate performance to serve the increased bandwidth of 802.11n. The "best" of the Best-in-Class view wireline and wireless as a unified topology, and seek the tools and expertise to leverage the 'single network' as a core corporate asset. Integration of wired and wireless strategies is recommended, along with the tools to enable and deploy them.

For more information on this or other research topics, please visit [www.aberdeen.com](http://www.aberdeen.com).

Related Research	
<a href="#"><u>Multi-Site and Campus-Area Wireless LANs: Advantages of the Centralized Approach</u></a> , March 2010	<a href="#"><u>You Can Take it with You: Enterprise Mobile Messaging and Collaboration</u></a> , November 2008
<a href="#"><u>Talent Acquisition Strategies 2009: Cutting through the Clutter and Proactively Managing Quality Candidates</u></a> ; August 2009	<a href="#"><u>Enterprise Mobile Messaging and Collaboration Impacts Work / Life Balance</u></a> , October 2008
<a href="#"><u>Wireless LAN 2009: From Network of Convenience to Business-Critical Infrastructure</u></a> ; May 2009	<a href="#"><u>Voice over WiFi in the Enterprise</u></a> , August 2008
<a href="#"><u>More Mobility – Less Budget: Enterprise Strategies for the Current Economic Downturn</u></a> , March 2009	<a href="#"><u>Deploying Applications on the WLAN: The Next Step Towards Ubiquitous Enterprise Mobility</u></a> , January 2008
<a href="#"><u>Beyond Wireless: The State of WLAN 2009</u></a> , December 2008	
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