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Wireless: The 'n' is Near

Savvy colleges and universities anticipate a new wireless standard.

By Joseph C. Panettieri

Paul Lipsky's students have an endless appetite for broadband-especially wireless broadband.

As an assistant professor at New York Institute of Technology (NYIT), Lipsky teaches students how to master 3D animation and multimedia production tools. His students have designed rich full-motion graphics for CBS Sports, ESPN, and Nickelodeon.

Of course, sharing massive 3D files between servers, desktops, and notebooks on NYIT's Old Westbury, N.Y., campus requires very high-speed connections. The college's current network-which includes a mix of fiber optics, Ethernet, and WiFi-has plenty of horsepower for the near term.



But Silicon Valley engineers (across dozens of networking companies) want to provide institutions with an even better option. It's a major WiFi standard upgrade known as 802.11n. Compared to today's WiFi gear, 802.11n offers 10 times the speed and far better signal coverage (see "Know Your Options," pg. 40). In theory, students will be able to use 802.11n wireless connections to share 3D graphics, movies, and other big files as quickly as if they were on a wired network.

With 802.11n, students and professors will more easily graduate from wireless e-mail, text, and voice to full-blown videoconferencing. Already, many of today's students use popular free applications like Skype to trade instant messages and make zero-cost phone calls over the internet. In a year or two, it's highly likely that students and professors will increasingly use free videoconferencing features built into Skype and other applications. "You can't ignore the student trends," says Lipsky. "They're always looking for faster, richer communications systems. Especially wireless systems. Students are all about freedom and mobility."

Videoconferencing, of course, requires bandwidth-lots of it. And as more and more students embrace video chats and lectures, universities will be forced to regularly evaluate, adjust, and enhance their wireless network designs.

That could be challenging. Most universities currently use wireless gear based on the 802.11g, 802.11b, or 802.11a standards. Without going into the technical nitty gritty, those standards are fine for most wireless

applications. But for truly intense multimedia applications, universities will need to stick with high-speed wired connections (like gigabit Ethernet) or eventually switch to 802.11n wireless, according Ed Golod, president of Revenue Accelerators, a technology consulting firm in New York.

Waiting Game

Now, for the twist. The IEEE (Institute of Electrical and Electronics Engineers), an organization that oversees WiFi standards, had expected to complete and ratify the 802.11n specification sometime this year. But due to lingering technical hurdles, the final standard won't be completed until early 2008, the IEEE estimates.

In some ways, the delay has left vendors and institutions of higher ed in a lurch. Confident that the 802.11n standard was nearing completion, many vendors in mid-2006 jumped the gun and introduced wireless gear based on a draft of the standard. The pre-802.11n networking gear is widely available from Belkin, Buffalo Technology, D-link, Linksys, and Netgear. Similarly, Dell supports the draft standard in some of its latest wireless laptops.



But since the standard isn't fully baked, IHEs that mix and match today's pre-802.11n gear could wind up with a recipe for disaster. "Without certified testing using a completed standard, there's no guarantee all this hardware will interoperate," says Golod.

"With any prestandard products, there will be tons of interoperability issues," agrees Tom Chomicz, a network security engineer at CDW-G, a division of CDW that focuses on government, higher education, and K-12. "I think 95 percent of customers will continue doing 802.11g for the time being."

No Need to Panic

Still, nobody predicts a wireless meltdown. Most of the initial pre-802.11n gear targets homes and small offices, where customers typically use a single-vendor solution, avoiding interoperability issues.

"The popularity of the 802.11n draft-compatible hardware will remain restricted to consumers and the small office/home office space," affirms [Amit Sinha](#), chief technology officer of Atlanta-based wireless security company [AirDefense](#). "Large enterprises will wait for WiFi-certified and standards-compliant hardware. Enterprise adoption will definitely be delayed because of the standard delay."

To be sure, college and university IT leaders continue to monitor 802.11n's maturation closely. Most expect to use 802.11n within a few years but are deploying established WiFi hardware with vendor-specific enhancements in the meantime.

"We are watching the developing standard to see how it will affect our institution," says Keith Nelson, director of telecommunications and networking information technology services for The University of Texas at Austin. "User demands and what the industry supplies will drive adoption of the technology."

Technology managers should determine which departments or campus settings-if any-have demanding applications that require pre-802.11n's enhanced bandwidth and wireless signal range.

Nelson says it's too early to predict all of 802.11n's benefits, but he expects it to provide more bandwidth, better spectrum allocation and sharing, and a better overall user experience. But for 802.11n to truly succeed, he says, it needs to interoperate with existing standards such as 802.11g. "We have more than 1,700 wireless access

ports already installed," says Nelson. "If 802.11n does not provide good backwards compatibility, its deployment will be delayed."

The situation is similar at the University of Illinois at Urbana-Champaign, which is taking a wait-and-see approach to 802.11n. At least for the short term, UI officials doubt laptops will have enough power to maintain high-speed connections with 802.11n networks, says Mike Smeltzer, director of network communications for Campus Information Technologies and Educational Services.

Smeltzer expects to give it a closer look in the future. "Where we think it might provide some serious gain is for point-to-point and outdoor mesh backhaul links," he says. "Either way, we'll most likely wait until the standard is finalized before buying into the technology. The big challenge will be getting power to the multiple transmitters in a way that works with points of entry and laptop batteries."

Know Your Options

The forthcoming 802.11n standard is 10 times faster than traditional offerings and offers 60 percent better range than other options. Some numbers of note:

Standard Intro.	Date	Frequency	Max Data Rate	Range (Indoor)
802.11a	1999	5 GHz	54 Mbps	~100 feet
802.11b	1999	2.4 GHz	11 Mbps	~100 feet
802.11g	2003	2.4 GHz	54 Mbps	~100 feet
802.11n	2008*	2.4 or 5 GHz	540 Mbps	~160 feet

* Estimated

Do Your Homework

Meanwhile, a group of wireless vendors, working within an umbrella group known as the Wi-Fi Alliance, is striving to stamp out 802.11n interoperability concerns. The organization plans to evaluate and certify WiFi products with baseline 802.11n capabilities in the first half of 2007-about a year before the draft standard is finalized.

Technology managers should check in with their networking partners for a complete 802.11n product road map. At the same time, they should determine which departments or campus settings-if any-have demanding applications that require pre-802.11n's enhanced bandwidth and wireless signal range. In most cases, IHEs will discover that today's mainstream 802.11g equipment meets the vast majority of customer needs, according to John DiGiovanni, director of marketing at Xirrus, a WiFi startup in West Lake Village, Calif.

Seek Alternatives

Industry giants such as Cisco Systems and Symbol Technologies (recently acquired by Motorola) dominate the WiFi sector. But WiFi startups also continue to deliver innovative technologies.

Xirrus, for one, has received a patent for its WiFi array systems, which deliver 2.5 times the range and 13 times the throughput of typical WiFi systems, according to The Tolly Group, a network testing firm in Boca Raton, Fla.

Xirrus, Meru Networks, and other fledgling companies are evangelizing about all-wireless campuses that require little, if any, network wiring. Meru's true believers include U of I, which began deploying Meru controllers and about 800 wireless access



points across its 1,458-acre campus earlier this year, with the network's completion projected for early 2008. Additionally, Meru's "dual-speed" wireless technology vastly improves the performance of newer laptops, which come equipped with 802.11g technology, according to The Tolly Group.

Still, Urbana-Champaign can't go completely wireless. "We have users with actual needs for gigabit connectivity," says Smeltzer. "WiFi is a way off from being able to meet their needs. So we are continuing to deploy wired connections with a Meru wireless overlay for mobility, but not primary connectivity."

In the future, Urbana-Champaign officials expect wireless to be able to support more of the institution's primary connectivity needs and reduce the need for wired connections, "but we are not at that point yet," he says.

The university is two years into a five-year plan to provide all interior public spaces on campus with WiFi coverage. By the end of 2006, some 61 percent of all classrooms on campus will have WiFi. Complete WiFi coverage is expected by 2009, says Smeltzer.

Meanwhile, Cedarville University (Ohio) uses Meru's wireless technology for current applications and as a potential bridge to future 802.11n technologies. With Meru's WLAN System, administrators there expanded wireless coverage to include all residence halls, classrooms, open-seating areas of major academic buildings on campus, and conference centers.

Asserts David Rotman, associate vice president for technology and CIO at Cedarville: "Key objectives for our campus included improved mobility, ubiquitous access to the numerous applications offered on our network, and lower costs." The Meru Networks WLAN System addresses all of those requirements.

As of mid-September, 1,500 student-owned wireless devices were already registered on Cedarville's wireless LAN. The university plans to deploy Voice over WLAN in the near future.

As voice and video move onto wireless networks, IT leaders should familiarize themselves with 802.11e, another wireless standard that ensures quality of service (QoS) for delay-sensitive applications like wireless Voice over IP and streaming multimedia.

Still, vendors continue to blur the lines between standards and their own innovations. "Many of the services that 802.11e provides are already available from Meru," notes Smeltzer. "We expect them to implement the formal standards based versions available in 802.11e over time."

Colleges and universities will certainly take their time as they evaluate the evolution of 802.11n. But don't wait too long. Students don't stand still. Skype, Google, Microsoft Live, MySpace, and other multimedia applications will demand next-generation WiFi networks.

Will you be prepared?

Joseph C. Panettieri (joe_pan5@yahoo.com) is VP of editorial content at Microsoft Communications (www.microcast.biz). He has covered Silicon Valley since 1992. Read his daily blog, The VAR Guy, at www.techimag.com.

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