The Wireless War Dance

Why and when should you begin to take wireless seriously?

By **Laura Joyce Moriarty**

War bonnets off to those in the wireless business! A resounding victory goes to those chiefs who looked into the future and imagined a generation who can't sit through dinner without a half-dozen 60-second interruptions from a cadre of people who talk funny: "What about it! …As in?…Right…True…Later." This need for unfettered communications isn't just a figment of our cultural imagination. Its allure — an insane need to reach everyone, anytime, from anywhere, instantly, along with the rush to access personalized data from the Internet — has captured more of us than just the younger generation.

This burgeoning of wireless computing and telecommunications no doubt causes us some degree of dismay as we ponder the size of our computer networks, the closets, and all the tangled wires beneath our desks. And then there are the staggering costs associated with connecting our universities over the past decade. Well, don't throw out all the wires just yet.

Although many university network managers are already fairly well versed in the technical aspects of wireless technology, the best business drivers remain obscure. It's going to take some practice to manage wireless networking within a campus environment. While the convergence of voice and data drives business decisions, working with a multitude of carrier options that change on a weekly basis, as well as staying abreast of daily innovations, will make wireless implementations frustrating.

On the horizon, 3G-like performance,[1] ever-decreasing power consumption, radio-frequency architectural enhancements such as cryogenics, and improved clarity through ever-shrinking silicon chips[2] are just some of the technologies that will reduce costs and improve wireless performance very quickly. Carnegie Mellon's Wireless Andrew service is available to faculty, staff, and students, and offers wireless data connections at speeds up to 11Mbps as of August 2000.[3] Using wireless at this speed and this pervasively (in all administrative and academic buildings) is still rare in colleges and universities. Frequent upgrades and new standards should be expected. And while you try to sort out the real estate, business processes, customer values, and so forth, remember that wireless performance will always trail behind wired capabilities by an order of magnitude.

Wireless technology now encompasses a broad spectrum of non-mobile devices, such as satellites, digital TV, base stations, and wireless network connections. While some of these technologies may intersect various needs within specific college departments or university businesses, it appears that the major change on campuses will come through applications involving mobile wireless.

Today, a new radio chip technology called Bluetooth has attracted an enormous amount of attention, yet it's difficult to compare to any evolving technology in our recent history. Indeed, we've seen a massive rush to collaborate, standardize, partner, and build specifications around Bluetooth among large computing and communications companies such as IBM, Ericsson, Nokia, Toshiba, Lucent, Intel, Microsoft, 3Com, and Motorola, to name a few. Bluetooth engineering opens the door to wireless interactive communication among and between multiple devices (portable computers, cells, palm devices, and so forth) in a chaotic non-networked environment. Concurrently, there's a drive to standardize wireless technologies globally.

Bluetooth lets the wireless computer update the palm device that receives messages from the cellphone or pager and vice versa. Static and interference are already conquered within current ranges. Unlike infrared technology (used with, for example, some handheld devices), Bluetooth radio frequencies don't require a direct line of sight. The demand is high for improved screen performance, improved Web access with portal options, speech-recognition software, video transmission, a smart calendar, an infinite global directory service, and multiple filter options.[4]

How long it will take bandwidth to grow to an acceptable level for decision makers in colleges and universities to jump on the wireless bandwagon is probably a rhetorical question. A piconet today is surely the giganet of next week. Piconets (imagine a LAN within a room or floor that has no wires) are encoded and secured against eavesdropping. In some instances, the networking structure is circumvented by other technological creations, a simple add-on that allows wireless to work in wired environments.

Why Wireless on a Campus?

Using the new wireless technologies in colleges and universities will follow typical business cases. One case may be that without wireless access, the students will not come. Another case is

that productivity improvement can be associated with portable devices in wireless offices. The latter is best illuminated in a Gartner Group report[5] that states

> good investments in wireless networking and mobile workers will pay significant dividends for enterprises. Even today, the extra productivity of workers who use notebook computers at home (typically for three to five hours per week) more than makes up for the additional support costs. Investing in effective wireless technology will likely make mobile workers up to 30 percent more productive.

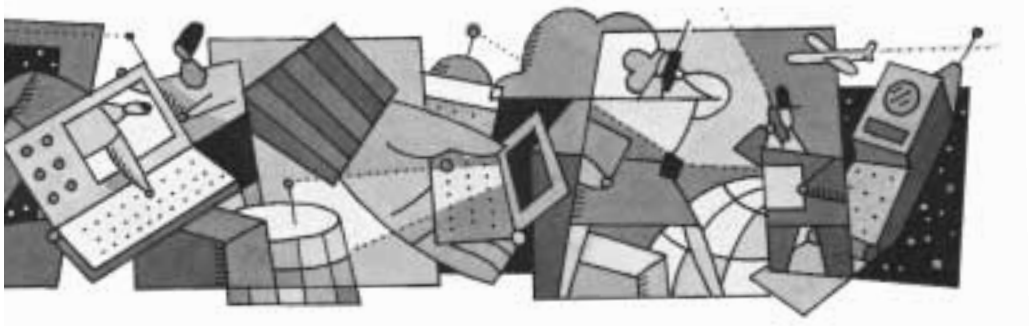
A more recent Gartner document[6] states,

> Wireless applications will not be driven by a single killer application but by an overall killer attitude: 'I can do anything, anywhere, at any time.' Through 2004, growth in the use of consumer-oriented mobile services will be driven more by consumers creating value than by service providers delivering it (0.6 probability).

When Should You Begin to Take Wireless Seriously?

At least one wireless classroom may be the norm for most colleges and universities today. Teaching and wireless seem a natural fit. The advantages are many, especially financial savings and unfettered classrooms. Johns Hopkins University already uses a wireless network for laptop computers on a few floors in its School of Public Health. Ross McKenzie, director of Information Systems for the school, said the cost savings with wireless came to about $15,000 per room, when compared to a standard wired network. "...The school has drawn attention because it's one of the largest higher education institutions not just studying a wireless network, but using it."[7] Valdosta State in Georgia is an example of a small college that has wireless-ready residence halls.

The real issues surround bandwidth and how soon wireless devices can support true university collaborative research. Researchers already have a pretty accurate idea of how far they can push the technologies to apply large-scale, real-time, network applications. For example, multicasting, multistreaming applications and synchronous communications technologies are necessary tools for successful electronic learning and instructional collaboration, truly functional digital libraries, telemedicine, and virtual research laboratories. In brief, you cannot have true collaboration if the Internet allows you to see or transfer another's data or formula, but doesn't let you interact with it in real time. Research will have experienced a sea change when delays in audio or visual transmission are eliminated and when both parties can share wirelessly the same database in real time on a split computer screen, can access the same data through a shared application, and can simultaneously write on a whiteboard (on still another split screen) just as if they were sitting across the table from each other in the same room.[8] It would seem, then, that wireless isn't quite ready for prime-time research.



The Culture Pushing the Change

In *eWEEK*, Carmen Nobel and Scott Berinato[9] wrote that

> the number of wireless devices accessing the Internet will soon surpass that of PCs. International Data Corporation predicts 50 million handheld devices will be in the work force by 2003, a good portion of them with wireless capabilities. IGI Consulting foresees an 88 percent increase in the number of smart phones produced by 2003, jumping to 330 million units. And Forrester Research Inc. expects that 57 percent of the total work force will be mobile within two years.

In "Wireless Net: Not Yet" David Lake wrote, "Only 6 million people will surf the Net via mobile devices in 2000. Optimistic forecasts say this number will rocket to 484 million in five years."[10] The Gartner Group outlines specific predictions according to the expected match between consumer demand and wireless services. "The critical issue for mobile access is latency—the sum of all interrelated, end-to-end service connections, search, and delivery times. Many users will become frustrated more by problems of latency and time than by bandwidth shortage."[11] Is the optimism in sync with reality? As colleges and universities make choices, maybe what matters most is matching great new solutions to current needs as they arise across an enterprise.

Each institution must evaluate strategically how it wants to handle computing enterprisewide for the next five years or so. Take, for example, the University of Wisconsin's Project 1.6 Wireless Campus, which calls for "a change from port-based to MAC-based authentication so that users can 'plug-in' from anywhere on campus" and suggests that "a plan must be developed to also eliminate the 'plug' and proceed to a wireless campus." The project's timeline is two to five years out with an approximate cost of $1,500 per classroom and $600 per computer.[12]

How Should You Approach Wireless?

Governance mechanisms, as well as typically broad university regulations, could propel broader wireless use and acceptance or could obstruct them. Do unwired connections change the meaning of communication policies, for

example? Most universities have a set of policies governing the correct access and use of information technology, covering faculty, staff, and students. Assume that in five years most communications will completely circumvent the ownership of communications hardware and, consequently, the rules and regulations of a university. Most university policies include statements such as,

> It is the policy of the university that its computing, telecommunications, video, and associated network facilities be used ethically and legally, in accord with applicable licenses and contracts, and according to their intended use in support of the university's mission.

Who will own the licenses and contracts? Tracking the use of wireless communications isn't obvious. Will an institutional license with providers be interpreted as one of its networked facilities, especially if the student uses personal equipment that he or she pays for using the same globally accessible towers?

Since broad security remains nebulous within the wireless world, campus policies may need revision to cover privacy, authorization, disclosure, access, discrimination, and conduct. For example, the U.S. Federal Communications Commission's E911 regulation requires that wireless network operators must pass a caller's phone number cell site and cell sector location to a public safety answering point if personal wireless connectivity is used to call 911.[13] Those universities with medical schools and hospitals will enjoy incredible opportunities around just this one application. Medical staff could track, through verifiable location-based applications, the site of a medical emergency. Immediately available to ambulance services are navigation instructions, the extent of the emergency needs, other services being called, rescue teams, roadside services, weather conditions, and so forth.

We can only imagine what community benefits might come from sharing real-time medical imaging, laboratory experiments, or satellite data among professionals during a virtual conference. The anytime, anywhere concept completely changes communications in the event of accidents, crimes, storms, or other natural disasters. Communication and data input during archeological digs or ecological adventures in rain forests provide examples of why academics will treasure wireless.

Recent news from EDUCAUSE's Advanced Networking Project with Minority-Serving Institutions (AN-MSI) describes how tribal colleges and universities will soon benefit from a project to test wireless technology to provide multi-service IP, enabling voice, data, and video. One objective for the project is to explore the effectiveness of wireless technology as a solution to data transmission problems. Project Director Tom Davis noted that wireless technology can help address long-term inequities, such as the lack of telephone access to significant portions of tribal areas. He added that because information technology is becoming central to economic activity, "those places without access to such technology are, most likely, going to be relegated to second-class economic status within this country and the world."[14]

As colleges and universities make choices, maybe what matters most is matching great new solutions to current needs as they arise across an enterprise.

This is a profound thought for the educator and the college or university administrator. Wireless is more than instant gratification for the wild and geeky — it's a way to broaden community involvement. Indeed, this powerful information technology will make or break the economic viability of many institutions of higher education. e

Endnotes:

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3. "Wireless Andrew" [http://www.cmu.edu:80/computing/wireless/aboutwireless.html].
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