ACUTA: Association for College and University Technology Advancement

Spring 2005

ACUTA Journal of Telecommunications in Higher Education

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**ACUTA's Core Purpose is to:** Support higher education institutions in achieving optimal use of communications technologies.

**ACUTA's Core Values are to:**
- Share information, resources and insight,
- Respect the expression of individual opinions and solutions,
- Maintain our commitment to professional development and growth,
- Advance the unique values and needs of higher education communications technologies, and
- Encourage volunteerism and individual contribution of members in support of organizational goals.
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Luci Norlin, page 30

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Growing BlackBerries on the GU Campus

Many, if not most, of us have felt the effects of cell phones on our resident student local and long-distance programs, but what will be the impact of the next generation of personal communications devices on our campus network services? While they create opportunities for new services offered anytime and anywhere, they also create technical, support, security, and wireless network challenges.

It's not just the students; in fact, at Georgetown University, the faculty and staff use of BlackBerry devices has put our support services personnel to the test, increasing steadily over the past two years. Initially, 12 devices were assigned in a pilot program for our executive staff. Now there are more than 100 BlackBerry devices on campus, and this number is growing at a rate of about 10 per month. The primary use of the devices is integration with our enterprise calendar and e-mail services.

One of the primary drivers is international and domestic travel. In the past, we met the needs of travelers by purchasing or renting an international phone from a provider. We also had several international phones that we loaned to executives. Now, individuals use BlackBerry devices wirelessly for voice (and sometimes data) services in most countries. Domestic or international travelers have access to e-mail without needing a dial-up or Internet connection and without lugging a laptop.

Another group of users who have benefited from the use of these devices is the University's Emergency Response Team. In addition to the ability to receive e-mails wherever they are, the 16 staff members' BlackBerry devices are configured so that they will emit a special alert in case of an emergency.

The BlackBerry syncs with our enterprise calendar only through Microsoft Outlook and the Oracle Connector for Outlook. This means that we are installing MS Outlook on all our faculty and staff computers and providing instruction to users on how to run the MS Office security updates, since Outlook provides a new entry point for viruses, worms, and so forth. The increase in BlackBerry handhelds created a corresponding increase in users who sync their MS Outlook account with the GU Calendar. We had several enterprise calendar crashes over the past semester due to a mismatch between versions of the sync software (Oracle Connector) and server software (Oracle Calendar). We learned that we must pay more attention to keeping our calendar server patched and up-to-date with the latest version in order to accommodate different versions of the client sync software and prevent system crashes.

We use BlackBerry Web Client to forward our e-mail messages to the device. There is a lot of overhead in individual account setup, management, and training with this method. We made some small adjustments to prioritize our e-mail routing to/from BlackBerry provider ISPs when we implemented a new schema for server-side virus scanning and MIMEDefang.

Since more clients were using MS Outlook to sync their BlackBerry handheld devices, more users decided to use MS Outlook as their primary desktop calendar client (as opposed to the Oracle Calendar desktop client). This caused a large increase in the demand for classes on how to use MS Outlook, especially as a combined e-mail and calendar desktop client. We also had a large increase in the need for BlackBerry user training. We increased our online documentation for the BlackBerry devices significantly, and “blackberry help” is now at the top of our Google search list.

One manager supports the BlackBerry devices, managing the installations and training clients to use them. He also trains support staff to troubleshoot and repair the devices. Because account-specific
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passwords are needed to access these phone support services, dealing with telephone technical and billing support from BlackBerry service providers has been a tedious task.

New security policies were drafted and adopted to account for the BlackBerry handhelds. Specific policies were written for the transfer of devices from one client to another. As noted before, MS Outlook provides a new entry point for viruses, worms, and so forth, and when we make changes for server-side virus scanning we need to be more aware of the impact it may have on BlackBerry services.

While Georgetown’s focus has been on administrative services, we are in the process of developing a strategy to provide services to the students. One of our first steps in this process is to look at expanding and enhancing our cellular and 802.11 coverage on the campus so that students, faculty, and staff will have adequate coverage.

To catch the waves of change at their early stages, vendors, users, and investors in technology will need to look outside their industries to find the early adopters that provide inspiration for how these trends translate into business value. Worldwide PDA shipments grew 13.6 percent year over year to 2.8 million in the third quarter of 2004. PDA usage is shifting toward business applications, and consumers are beginning to shift their attention to smart phones. Demand for wireless e-mail continues to grow as a primary driver of new PDA deployments.

Gartner predicts that micro-commerce opportunities for new products and services that sell for less than $5 will generate $30 billion in revenue per year by 2010. This is based on several trends, including (1) widespread access to physical and social network infrastructures, providing a marketplace for buyers and sellers to locate each other; (2) a low-cost model for competing transactions; and (3) automatic location identification for targeted content and services. This will allow for paid digital content at new levels of granularity: ring tones, music, video, government or transportation information, and location-based services (i.e., dispatching, routing services, parking space reservation).

Content providers will be forced to support these next-generation devices as their primary distribution vehicles as several developments take place, among them (1) the core technological differences between PCs, mobile devices, e-books, TVs, and cellular phones disappear over time; (2) electronic displays gain readability rivaling paper; (3) secure broadband wireless becomes available in virtually every device at extremely low prices; (4) extraordinarily inexpensive mass storage becomes commonplace; and (5) development of always-connected, low-power-consumption electronics are developed.

We, the universities, are among those content providers. How will we respond?

As I sit down to write this column, the inauguration has just taken place in Washington, and President Bush has outlined an ambitious set of goals and priorities for his next term in office. New cabinet officers are being confirmed, and they will bring with them a new leadership team in many Federal agencies—including the Department of Education—and created opportunities for Competitive Local Exchange Carriers (CLECs), and after years of wrangling the market has seen the increased competition that was a major goal of the legislation. The results have been mixed, with reduced long-distance revenue for carriers and for aggregators such as universities, but with reduced costs and increased choices for consumers.

These changes have also brought financial pain and turmoil for the industry, have been seen the demise of some companies, and have degraded customer service levels for many. At the same time, they have helped stimulate the development of advanced services and have prompted telecom companies to develop creative and innovative products and services to capture or retain the market. It’s hard to say how many of these new developments would have happened anyway without the Telecom Act of 1996, but in many ways it did spur competition and innovation.

Some might say that some of the reforms of 1996 have already been disassembled in some sense by regulatory decisions at the FCC, such as the recent decision to eliminate the unbundling requirement for basic telecom services. If the rules are sustained, LECs will no longer be required to provide access to their facilities to competitive carriers at a wholesale rate. This will create new challenges for competitive carriers that are not facilities-based in providing local service, including the major long-distance carriers that are relatively new players in the local market. It may also drive more local traffic onto IP networks, cable, and even power lines, as competitive local carriers seek ways of sustaining and growing their businesses.

ACUTA intends to be an active participant as the FCC and Congress deal with many of the key issues I have mentioned in this article during the coming few years. We will articulate proactive positions that are in the public interest and address the communications technology needs of the higher education community. Along the way, we will be seeking the input of our members on the positions we should be taking on matters such as E911, Universal Service, IP-enabled services, and others. I hope that you will share your views at our ACUTA events, and through surveys we periodically conduct via e-mail and the Web. This two-way dialog is vital to ensuring that we accurately reflect the views of our membership on these important issues.
Mobile VoIP for the Converged Campus

by Mike Houston
TeleSym

University students, faculty, and staff are by nature highly mobile. Seldom are they in one place for long. In a typical day they shuffle in and out of classrooms, libraries, research facilities and laboratories, living spaces, even the campus Starbucks.

Most are armed with the college-life tools du jour: wireless-equipped laptop computers, PDAs, and cell phones, all networked through a variety of service providers—a dorm-room T-1 or other high-speed connection, wireless hotspots, WLANs in the campus center, various telecoms, and so on. And everybody wants clear, uninterrupted service across the board.

This explosion of mobile technology naturally requires a marriage of all these services. Campus network services administrators have trained a keen eye on a convergence of phone networks and IP network infrastructure, one that can be accomplished without expensive investments in hardware or operating system software. But are we there yet?

A crystal-clear view of that convergent future is on display at Dartmouth College. The Hanover, New Hampshire, school is among the country's most connected in terms of organizational computing.

Dartmouth is working on a wireless LAN and VoIP rollout on its campus, and one component of that rollout is software from TeleSym Inc. The company's SymPhone system for voice calling on wireless networks brings phone capability to several mobile platforms, including Windows and Macintosh laptops and Windows Mobile devices.

Dartmouth isn't alone. "After several false starts," writes Joseph C. Panettieri in a Campus Technology article titled "Telecommunications: Can Cisco Answer the Call?" (10/1/04), "hundreds of colleges and universities are dialing up VoIP in an effort to slash long-term telecom costs, ease management headaches, and consolidate digital traffic onto a single network infrastructure.

"VoIP has become the Holy Grail of campus telecom," says Matt Villano in "The Plan's the Thing," on UniversityBusiness.com. "For those [institutions] that haven't advanced much beyond the PBX, VoIP is the next step, an investment that will move them into the 21st century."

For the institutions that have dabbled with packet routing already, the challenge is to continue to go beyond it and use the Internet Protocol to further improve communications. "Some schools have answered this call by incorporating wireless and cellular services," says Villano. "Others, seeing advanced campus telecommunications as a competitive edge in the higher-ed marketplace, have sought to capture more of the Internet itself, and have bought up thousands of miles of fiber-optic cables on the cheap."
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Trouble in Paradise

It hasn’t been easy for VoIP in general. Many early efforts were plagued by hardware glitches, software bugs, and wiring snafus. Through the late 1990s, many corporate customers and universities balked at first-generation VoIP systems, because they lacked Quality-of-Service (QoS) features found in traditional phone systems. Many VoIP pilot tests were further delayed by the dot-com implosion, the economic recession, and the September 11 terrorist attacks. Skeptics said it was difficult to embrace VoIP—which can cost $1,000 or more per user when deployed down to the desktop—without a proven track record for the technology.

The emergence of wireless VoIP suffered its own set of problems, including the following:

• Call quality is often difficult to maintain on wireless networks.
• Security has been a challenge but is of critical concern to universities and enterprises.
• Providing the service on both the client and the server side of the infrastructure is not economical.
• Current architectures do not scale technically or economically for service providers.
• Solutions that interoperate with existing infrastructures and switches are hard to find.

For example, says Carnegie Mellon’s Charles R. Bartel in “Beyond Networking” (www.campus-technology.com), “Most data, particularly with IP protocols, are more accepting of latency than audio or video. If the packet doesn’t get through, there is the provision for doing some retransmission. Voice communications—like video—is not as forgiving in terms of latency. So, what you are going to have to see for telephony to really take off in the realm of wireless is more robust QoS types of implementations. And those are things that are being worked on by the IEEE now and will be eventually incorporated into the existing wireless standards. So I think that you are going to see VoIP, Internet telephony, or whatever you are going to call it occurring in wireless technology. But you are probably going to be seeing that a little later than on the wired side.”

Big System on Campus

With the technology maturing, converged networks are getting a lot of attention on campuses across the country. Are these converged networks effective in the near-term? And what are
the implications for colleges and universities?

Proponents say VoIP means call clarity, mobility, efficiency, a new collaborative tool, and tremendous cost savings. Mobile VoIP systems enable telecom administrators at schools like Dartmouth to bring new services to their students and faculty—and that’s good news for both groups. With a mobile VoIP solution such as the SymPhone, faculty and students collaborate easily anywhere they have a broadband IP connection using the PCs and devices they already use. The university controls phone service costs and offers faculty and students a single office/dorm number that provides communication from any point on campus. Physical plant workers have the communications services they need from anywhere on campus and maintenance crews benefit from intercom communications capability. And finally, the system ensures VoIP security and authentication on the campus infrastructure.

Concludes UniversityBusiness.com’s Villano, “Down the road, as fiber-optic fire sales continue and VoIP technology becomes more widespread, perhaps strategies at every institution will include steps to move away from the traditional PBX. In the meantime, as the world of telecom is changing so quickly, it’s clear that even the most sophisticated colleges and universities need to develop a plan to incorporate new telecom technologies with old ones, and modernize systems overall. Whether an institution decides to tackle the telecommunications issue aggressively or with patience, solo or with friends, strategic planning is paramount, and the approach must be flexible enough to roll with change.”

Students and professors have always been on the move, and always will be. The big difference is that now their communications options will be as mobile as they are.

Mike Houston is director of marketing at TeleSym. Reach Mike at mikeh@telesym.com.

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Managing Remote IP Telephony Systems

by Gary Audin
Delphi, Inc.

Colleges and universities are constantly expanding their reach to serve their communities and students. Telephone communications must expand as well, and voice over IP is the most logical technology for this expansion. VoIP, also referred to as IP telephony (IPT), has primarily been deployed in large, centralized organizations, aiming to reap operational and capital cost savings. The major growth of IPT in coming years, however, will be through adoption and deployment in distributed, multisite environments in which economy of scale produces greater returns on investment. Technology introduced recently by equipment vendors such as Cisco is now facilitating cost-effective, out-of-the-box IPT for these distributed organizations. Many schools have Cisco-based router and LAN switch infrastructures; a reasonable evolution for these schools is to leverage these router products to support VoIP/IPT.

What Is a Distributed Campus?

Distributed organizations have many small sites including 5 to 25 devices (that is, PCs and telephones), a few midsize sites of 100 or more devices, and, most likely, a single large main site of hundreds to more than thousands of devices.

For organizations that support this array of sites, there should be two sizing levels for IPT products: one that can support 4 to 200 devices and a second that can support 200 to 1,000 devices. The large central site could be implemented by using a separate server-based IP PBX, while the smaller sites could be implemented with an IP PBX integrated into the same router that is already supporting data transmission at the remote sites.

The distributed architecture provides voice features and functions that can be supported at each of a school’s distributed sites and/or can be located at the main site. The telephone user interface can be common to all locations. The network of sites can be designed in such a way that the loss of any site, regardless of size, will not bring down the entire network because all sites can support all voice applications. The architecture provides distributed intelligence to the users where it is needed, whether it is local or remote. If one or more of the small or midsize router-based IPT systems fail, the larger central site can provide service as long as the network is still functioning.

The ability of a distributed approach to support features and functions locally without having to signal through the entire network is another of its capabilities. This functionality speeds the execution of the call request and reduces bandwidth requirements, providing superior disaster and recovery response because any site can work in concert with other surviving sites even if one is lost.

Extending Capital Expenditures and Resources

Extending the IP network to support voice traffic extends capital investment and reduces capital expenditures in the future. Leveraging existing IP-based LAN and WAN networks has produced an infrastructure that already supports a wide range of data applications. This functionality eliminates the need for a
Relationship to Cisco CallManager

The Cisco CallManager Express and Cisco Unity Express solutions are designed to work with Cisco CallManager products and their services. In a Cisco CallManager environment, Cisco Unity Express provides local storage and processing of voicemail and automated attendant services for the branch campus, thereby reducing WAN bandwidth and quality of service (QoS) concerns. IP phone operation is similar to the phone operation with Cisco CallManager. Very little user training will be necessary should schools migrate to Cisco CallManager as they outgrow the Cisco CallManager Express solution. The Cisco CallManager Express platform can be exchanged for the CallManager server-based platform as the school grows without requiring major management and personnel retraining.

Deployment VoIP across Distributed Campuses

IPT in distributed campuses will be deployed over time, so the management solution needs to scale from a few to many locations. Subsequently, the solution needs to represent, digest, analyze, and display the data in various ways to address the differing skill levels of those at remote sites. The management solution must be able to set different service levels and thresholds for each particular location.

The management system for distributed IPT should:
- Report performance of the network
- Display network impairments
- Measure traffic utilization
- Alert to device failures
- Provide notification of calls that exceed performance thresholds on call quality
- Work through the existing IP data network
- Be useful in identifying possible security problems
- Report status and configurations of registered devices

Management Goals for Distributed VoIP/IPT

Organizations must be able to manage their environments both locally and globally. After identifying a particular problem in a remote campus, organizations must then go one layer higher to determine whether other locations in the region have the same problem. Knowledge of the problem can be aggregated to form a global view. Schools must be able to discriminate and give different views—a local, simple, or in-depth NOC view—based on the skill level and management policies for each site. The management product requires out-of-the-box features, auto discovery, and central configuration. These functions will enable remote

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office personnel with limited expertise in deploying and maintaining IPT systems.

**Managing Distributed IPT**

As VoIP and IPT devices have become more intelligent, the ability to include management functions in the devices has increased while the cost of providing these management functions has decreased.

An IPT management system must do the following:

- Help manage resources efficiently and inexpensively
- Alert managers to problems quickly
- Provide information in a useful and easy-to-read format
- Reduce the time required to diagnose and resolve problems
- Help reduce problems in the future
- Measure the performance of the IPT devices
- Determine the configuration and update status of all devices
- Provide information about the users’ operation of features and functions

Figure 1: Example of how schools can view the status and performance of all phones at a particular branch site (PROGONIS screen shot courtesy Integrated Research)

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What to Manage

Managing an IPT environment is not limited to monitoring the calls and the traffic that the calls produce. There are three general layers of management:

- **Service assurance.** Service assurance is composed of all functions that deal with infrastructure problems in real time and quasi-real time. These functions usually provide monitoring of availability, performance, and accuracy; alerts; root-cause identification of problems and suggestions for corrective actions; and, finally, security.
- **Service verification.** The verification layer is the keystone in the liaison between business and IT operations. This layer is where service levels are agreed upon and specific performance targets are assigned to the infrastructure management groups.
- **Service forecast.** The forecast layer is concerned with the changes to fundamental IT services. The changes may be needed immediately as a reaction to unforeseen problems in architecture and infrastructure capacity (performance management). This layer also includes planning for changes (capacity planning).

Remote and Central Site Management

Because different remote offices have different people using the IPT phone system, the offices will need to be able to set different service levels and thresholds for their particular locations. As mentioned earlier, organizations cannot expect or afford IT-trained individuals to reside at each of the remote locations.

Managing from a central location can provide insights into problems that span multiple sites. Problems may be occurring in a network region that is beyond the view of local personnel. The central site can determine where network resources (for example, bandwidth) need to be increased or QoS capabilities need to be installed in the network. In a sense, local management can be outsourced to the central site when the local site cannot deal with the problems.

IT management has a series of “pain points” that will drive the decision to procure a well-designed IPT management system. The following lists highlight goals and questions that will be part of the management decision for distributed telephony.

**Questions:**

- How does the organization ensure call quality?
- When is QoS dropping and why?
- Are any devices unavailable and why?
- Are there IP phones and gateways that cannot register?
• What are the hardware and software inventories at the remote sites?

Goals:
• Effectively manage thousands of devices
• Receive alerts when thresholds are breached
• Provide access to call usage information
• Proactively monitor voicemail usage
• Control moves, adds, and changes for asset management and security

The answers to these questions and the defined goals can then be applied to the management elements puzzle, which is made up of the following pieces:
• Call quality. Although call quality is subjective, there are methods for calculating it by using packet loss, delay, and jitter measurements on a per-call basis and reported in real time. Calls for which the measurements fall short of the preset thresholds can be flagged. The central site as well as local sites can obtain this information immediately.
• Bandwidth utilization. The bandwidth available to and from the remote sites will affect call quality. Insight into bandwidth use provides the ability to operate in the most effective way while providing visibility into capacity issues.
• Change management. In distributed environments, when employees move from office to office or change their campus locations, they take their handset with them. This situation creates an asset management headache. The IPT management solution should monitor the devices and endpoints that are registered, connected, and disconnected so that organizations can keep a registry of IP phone assets—assigning people to the phones.
• Alerts. Alerts can reduce the time to diagnose and repair problems. Alerts can also notify the school of performance problems that are not caused by a failure.
• Gateway utilization. Schools can monitor gateway utilization to reduce costs. There may be overcapacity for the PSTN access from the gateway. Reducing the number of PSTN ports or channels will reduce the ongoing carrier costs. Insight into calling patterns between offices will also allow an organization to optimize the trunking among the sites.
• Security management. Monitoring the router configuration changes, such as who has logged on to routers over time and who has tried to log on and failed, is extremely important. This information can be used to observe patterns that may be attempts at breaching router security.

• Device availability. Schools want to be able to identify whether a problem relates to the device or network congestion. Monitoring key systems parameters of the router—CPU utilization, process memory, network interface performance, and systems uptime—will provide insight into its health, status, and performance.
• Asset Management. Organizations phase in new technology and resources slowly. The software and hardware will become inconsistent with other locations and different routers will perform differently. Schools must be able to keep an asset register of different versions of products used in sites. They must be able to set up service levels and performance thresholds that are unique to the versions being used.

The Simple View
Distributed remote campuses need a simple, out-of-the-box solution to manage their IPT systems. The health of a site’s local IPT system can be provided with green light, amber light, or red light status updates that are easy to interpret. The IT department cannot afford to deploy trained IPT staff to

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the remote sites. The information provided to the unskilled staff at the remote site must:

- Be simple to understand
- Provide an intuitive and simple information display
- Require little training to use
- Allow nontechnical personnel to understand the meaning of the information and take appropriate action

Some elements that should be managed in the simple view include:

- Availability of the device at a local level
- Number of phones registered
- Number of phones failed
- Asset register (local)
- Basic utilization reports (local)
- Alerts to phone problems
- Alerts to network congestion
- Ability to escalate local alerts to the NOC (or MSP or local technical personnel)

The interface for the simple view should be “locked down” so that people cannot change access rights and thresholds unless allowed by the central site management system. The central site must have the ability to override the local personnel’s operations. The local system should also automatically escalate/forward problems to the central site based on thresholds or problem aging. (See Figure 1 on page 16.)

The In-Depth View

The management system must be able to collect historical information for each distributed office, then take that information and aggregate up a level for a regional view, then again for a global view. The in-depth view should provide the ability to map the environment into a hierarchical view comprising diverse geographical regions.

This view should deliver metrics for active call quality and historic call quality, both locally and globally, and provide reports about inbound and outbound calls, calls to the PSTN, and office-to-office (intranet) calls. It should also include dial peer metrics, such as successful calls, refused calls, failed calls, and disconnected calls. (See Figure 2.)

Managing beyond the Obvious

In addition to managing voice, the organization needs to manage associated applications such as Cisco Unity Express, Cisco's voicemail messaging system. This router-based solution resides locally on the network. As with any application, the Cisco Unity Express solution can suffer from the same performance fluctuations as the servers and systems on which it resides. Hence, obtaining a view of the router's performance is essential to understanding the performance of the voicemail resident on the router. This information should be supplied in a simple view or an in-depth technical view for NOC.

Summary

Managing resources, especially remote resources, presents many staffing, equipment, and software problems. Effectively managing IPT systems produces satisfied users and efficient operation. Thus, a school must invest in managing its IPT system investments.

Management systems can filter information, thereby reducing the administrator's management burden. There is no truly self-managing technology. Effectively managing resources, such as bandwidth, can reduce carrier costs while ensuring user satisfaction. Management system information can catch security problems early, help anticipate performance issues, and diagnose and resolve failures quickly.

Gary Audin is president of Delphi, Inc., a consulting and training firm based in Arlington, Virginia. He has spoken at numerous ACUTA events, contributed often to ACUTA publications, and delivered more than 2,000 technology seminars. Reach Gary at delphi-inc@att.net or by phone at 703/908-0965.
Cellular Service at the University of Toledo

by Carole Sedlock
University of Toledo

The picturesque campus of the University of Toledo is home to some 21,000 students and employs about 1,300 faculty and staff. At this point in our 133-year history, we offer more than 250 programs of study in eight colleges.

Educational and Information Technology’s mission is to help create and achieve a technology vision for the University through effective collaboration, planning, organization, execution, and innovation; while simultaneously maintaining the effective ongoing operations of our enterprise-class learning, research, and administrative systems.

On July 3, 2002, the University of Toledo (UT) launched a resale program for cellular service to our students. We began selling to our employees in October 2003. Since we began this program, my life has changed dramatically. I went from mild-mannered telecommunications coordinator promoting any type of long-distance resale with a variety of other telephony-type duties to super-motivated cellular sales agent responsible for marketing, billing, and customer service.

UT, along with almost every other university, sold long-distance service in our residence halls, and we still provide this service. Even though usage has declined, ongoing sales still generate revenue. Because we depended on this revenue, along with modest monthly service charges, to service debt from our campus fiber network project, we needed to pursue additional revenue opportunities. Cell phones were so prevalent on campus that it just seemed to be the logical choice for expanding and growing our business to replace dwindling landline long-distance revenues. We have been using Pinnacle since 1994, and it is well suited to manage this type of in-house billing.

**Behind the Scenes**

We had no idea how much more customer service would be involved with cellular sales versus landline long distance. From August through October 2002, we literally did nothing but sign up new cellular customers. At that time we had a permanent part-time clerk, and the two of us signed up, set up billing, and provided customer service for more than 500 customers. Our numbers have grown to more than 700 students and 700 employees. Many customers have come and gone. However, including our administrative customers, we service more than 1,500 lines each month. This type of resale is very demanding on a daily basis, but for those who understand the phrase “no pain, no gain,” there are great gains to be made.

Carriers in our area include ALLTEL, Cingular, Cricket, Nextel, Sprint, and Verizon. We purchase services from ALLTEL. In addition to wireless service, ALLTEL provides local telephone, long-distance, Internet access, and high-speed data services to residential and business customers in 26 states. We modify their program offerings and negotiated discounts to provide rate-plan options for our students, employees, and administrators. ALLTEL is our only vendor for a number of reasons, including the following:

- Multiple carriers would add significant time spent with customers explaining different products, plans, and equipment from multiple vendors.
- Our staff would have to be familiar with various types of equipment, services, and programming.
• Our inventory would be difficult to manage with multiple phones and accessories from various vendors.
• The many different brochures, maps, and other graphics along with applications and contracts would be very confusing to staff as well as customers.
• It's difficult to build satisfactory business relationships with multiple vendors in such areas as mobile-to-mobile minutes, text messaging, picture sharing, and roaming.

Over the last two years ALLTEL has received revenues from the University in excess of $330,000 each year.

ALLTEL provides us with excellent discounts on programs and on optional features such as text messaging, picture sharing, and accessories. We use these discounts to formulate programs that provide value and flexibility for our customers. The average profit margin is $10 per month per account. Additional revenues are generated from billable features such as text messaging, picture sharing, downloaded ring tones and games, directory-assistance calls, and roaming fees when applicable.

As part of our negotiated terms with ALLTEL, we receive one of its phone choices for free and then receive special discounted pricing on three other models that we offer to our customers. Changing our offerings as new phones become available keeps us current with the latest available phones.

Our pricing from ALLTEL allows us to offer a quality selection of phones with the current popular technologies for our customers at prices well below retail rates. We estimate our customers save 5 to 10 percent per plan over other carriers. There are further savings because we do not pass along any charges for Universal Service fee, regulatory fees, or state and federal taxes since we are not charged.

Other values add to the popularity of our service such as our overminutes being priced well below those of other carriers. Some other carriers have special plans for overminutes, but when you read the fine print, the offer only applies to high-end users, those with plans above $70 per month. Overminutes on their lower priced plans average 40 cents per minute. We offer more anytime minutes up front, reducing the potential for overminutes, and flexibility to move within the plans to save money on over usage. Our built-in values apply to all of our plans, not just those above a certain monthly limit.

Cellular Programs Features

For our Rocket Freedom programs, we have homegrown collateral materials describing our plans and terms in detail. This is important because the students are signing a contract for service. We provide them with as much printed detail as possible and require them to sign or initial almost everything. Poster-sized maps and plenty of general information plaster the walls of our small lobby area. We place information on the walls outside the office as well.

Waiting customers can read the materials and, of course, listen to the ongoing customer interactions.

Students choose from six different plans, including one local and the rest national. All the plans include unlimited night and weekends, unlimited mobile-to-mobile minutes, caller ID, voicemail, call waiting, call forwarding, and three-way calling. All overminutes are only $.15 each. All contracts are only nine months, after which customers continue on a month-to-month basis. Some use the service year-round. If a customer leaves before nine months, we apply prorated termination fees.

Students signing up for Rocket Freedom services understand the following:
• They must be registered for classes.
• They must provide proper campus ID along with driver's license or valid state ID.
• They must be over the age of 18.
• They must have a zero balance with the bursar.
• They must pay the promotional costs of equipment on the day of sale.
• For no charge, actual call detail can be provided upon request as our monthly invoices show only the actual number of minutes used.
• Multiple accounts may be purchased, but combined plan prices may not exceed $200 monthly.
• Balances must be paid each month.
• Any unpaid balance more than 30 days past due to UT is cause for service suspension, and a late fee is applied by the bursar.

Sign-Up Procedures

Once proper identification is presented, we verify registration and balance information in the student accounting system. The student chooses a plan and equipment and then is given a Rocket Freedom service contract to complete with terms and conditions approved by our general counsel. The student is given our Rocket Freedom prorate calendar. Based on the date of sign up, this
calendar shows exactly what the amount of the first bill will be including processing fees. We charge a small processing fee for signing up or renewing a contract or to change a plan.

While the students complete our forms we pull their phone selection from our stock. The phone is already numbered and activated. We actually make a copy of the box showing the serial number and the student identification. These copies have come in very handy in a number of situations for a variety of reasons.

We explain the program that the student has selected; we explain the contract terms and cancellation fees. We explain the payment policies; we explain how to check the minute usage to help keep bills under control and how to change plans to avoid unnecessary overtime charges. We make copies of all the forms for the student to keep, and we provide another packet of information that includes program details, maps for the chosen plan, explanations of included features and extra features, equipment explanations, and instructions on how to set up voicemail.

We pull the new phone out of the box and turn it on to make sure it is in working order. We check to be sure the wall charger and phone clip are in the box. We remind the student that he is a customer of the University and to contact only us for service or billing questions. Our vendor will not service an individual account because our vendor considers the University its customer, not the individual student.

Finally, before sending our new customer on his way we ask which free gift he would like to choose: an umbrella with our school colors or a universal headset that will work with the cell phone.

This interaction takes anywhere from 10 to 45 minutes depending on the student. The process is similar for employees, except they sign a form that allows us to deduct charges once each month from their paycheck.

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Other daily customer service activities include troubleshooting malfunctioning phones. We are not technicians, but we have the authority to replace phones or issue loaner phones while sending the original phone back to the technicians at ALLTEL for inspection.

Phones are not repaired by ALLTEL unless the problem is clearly a manufacturer's warranty issue. All instances of customer damage are returned to our office, usually within one week. The customer is contacted and we explain the options. He may purchase a new phone, or, if insurance was selected, then that replacement process is put in place. If the customer does not have insurance but has completed the nine-month contract, then he could choose to sign another nine-month contract to take advantage of the promotional pricing on our current phone selection to replace the damaged phone.

Some of our customers stop in just to see if we've changed phones, and then they renew contracts to have the latest technology. Other customers stop in to add accounts or delete accounts depending on their needs. Customers come in to report lost or stolen phones, which are immediately suspended, and the replacement process is discussed. We change mailing addresses, reprint invoices, and add services like text messaging and picture sharing. We explain billing and minute usage, provide detailed minute usage, change plans, explain phone functionality, and sell accessories such as car chargers, wall chargers, leather cases, and plastic clips. We communicate all these adds, changes, and purchases to our vendor via e-mail. ALLTEL normally provides same-day service, and only on rare occasions 24-hour turnaround time, to respond to our request.

All customer interaction generates some sort of paperwork that is kept in the customer's file. A customer's file will contain the original contract and terms along with the prorate calendar. The customer's identification copies and phone box copy are included. The hard-copy paper bill received from ALLTEL is filed each month in the customer file. Any changes or additional purchases generate a signed form, and these are kept in the file as well. Once a customer cancels services or is disconnected for any reason, the file is pulled and placed in numeric order with all other cancelled accounts. Our call accounting system keeps an electronic history of the customer's services, but hard-copy information shows signatures which are legally binding. We handle all customer billing via the call-accounting system. Customer notes are entered to track interactions, and specific fields are used to identify the type of customer and his or her current status.

Impact on Staff

When we began our program we had two full-time telephone coordinators and one permanent part-time clerk. Due to demand and program popularity, we increased the permanent part-time clerk position to a full-time telephone coordinator. All three coordinators have other duties that are necessary for the smooth operation of UT's telecommunications infrastructure. Duties include issuing requisitions for various vendors for long-distance and local landline services, work-order origination, directory updates, administrative billing for monthly phone service, billing for local calls and long distance, financial analysis, and financial reporting. These duties are balanced between the three of us according to skill sets and daily schedules.

In the Future

Many of our customers want to continue using our cellular service after leaving the University. Our Rocket Freedom programs provide a good value, availability of new equipment choices, new plan types that are flexible, and no additional fees or taxes. We are going to launch the program to our alumni and retiree associations in March 2005. We anticipate the demand will be heavy at first, and we will bring on one more permanent part-time telephone coordinator to assist in the daily duties these new customers will generate. We will create Web forms for ordering service, we will ship equipment to these new customers, and we will automatically deduct monthly charges from their checking accounts. I am excited to be able to provide service to these new customers and know that we are helping our University generate revenue to offset declining state funding.

Carole Sedlock is telecommunications coordinator at the University of Toledo. Reach her at carole.sedlock@utoledo.edu.
Working with Wireless

by Curt Harler
Contributing Editor

Things happen at the edges. In the woods, birds and wildlife gather at the boundary between forest and field. In rowdy crowds, problems flare up where the edge of one mob comes in contact with another. And in networking, a common place for security glitches is where wireless and wired networks converge.

Even on networks where lockdown security is not the first consideration, it helps to know where your wireless traffic originates. The University of Georgia (UGA) and Louisiana State University (LSU) are among those working with wireless. Both are working at the edge of campus and beyond into downtown.

At UGA, the Mobile Media Consortium (MMC) is one such project. The New Media Institute (NMI) is an interdisciplinary teaching and research resource dedicated to the exploration of the critical, commercial, and creative dimensions of innovative digital media technology. It is a focal point for people (students, faculty, staff, business owners, everybody) who want to test the potential of technologies like the Internet. And the New Media Institute houses the MMC project (www.nmi.uga.edu).

As a department under the Grady College of Journalism and Mass Communication, NMI is interested in what people will want to do with emerging communications technologies. Located in downtown Athens in the Bank of America building, MMC is dedicated to building tomorrow's mobile media with today's technology.

Part of the project is the Wireless Athens Group Zone—WAGZone. It has numerous Wi-Fi access points throughout downtown Athens. General users get access to WAGZone information. If they are part of the UGA student body or faculty, they also get Internet access.

Whether as ambitious as UGA's project, or a simple Wi-Fi hotspot at the student union, there are plenty of considerations beyond the impressive gee-whiz aspects. Among them are challenges in the security and management area.

Security Issues

Increased WLAN use exacerbates these serious security challenges. Intel announced Centrino, which embeds WLAN chipsets in laptop motherboards. Centrino couples with Microsoft's XP operating system to detect 802.11 networks automatically, dramatically changing the way users log on to their school networks—or, more important, someone else's wireless network.

In a traditional wired network, every laptop accesses the network through a designated port. With a WLAN, it's impossible to determine where the user or network equipment actually resides. Michael Maggio, president and CEO of Newbury Networks (www.newburyworks.com), mentions some likely, yet unpredictable, security breaches that can occur in a campus setting:

Scenario #1—Rogue Access Point. User plugs an off-the-shelf access point into a wired network port.
Cellular Security

Cellular systems are getting more attention from ACUTA members as they promise to replace some of the lost long-distance revenues and as users demand core network access through their cellular phones.

Telecom directors deal with two groups: faculty, over whom they have a lot of control; and students, who tend to use a variety of devices from several third-party providers who have a slew of standards.

According to Student Monitor (studentmonitor.ecnext.com), a market research firm, the number of students who own a cell phone grew from 26 percent in 1999 to 78 percent in 2003. Statistics from 2004 will surely reflect additional growth.

"Engage your carrier first to be sure their backbone can support third parties," advises Chris Hill, Cingular's vice president of government solutions. He oversees the new group within Cingular devoted to the college market. "Look at how they support frame relay, which VPNs they support with delay or overhead," he continues.

The next step is to decide on static or dynamic, public or private IP addressing. Hill notes that newer systems typically run on dynamic protocol, but most carriers can work with either—as long as they know what they face.

Carriers typically have 64-bit over-the-air encryption. However, some states have regulations and specific applications, such as campus security or NCIC lookups, require a 128-bit solution. Good offerings are available in IBM's wireless connectivity manager, or from companies like NetMotion Wireless (www.netmotionwireless.com) and Padcom (www.padcom.com).

A security upgrade should not be difficult if the college's infrastructure is current. If the school has a Microsoft 2003 environment or higher, it will be easy. "If you are still on early Novell, you are going to have a hard time applying third-party solutions," Hill says. With Unix, common on campuses, it depends. Solutions are available. "But don't be a guinea pig," he advises.

"The key is to understand what applications your university is running so the carrier can configure the network properly," Hill concludes. "That will make the implementation smoother."

Scenario #2—Ad Hoc Mode. User turns the wireless access from her network card on her laptop into ad hoc mode—purposely or mistakenly.

Scenario #3—Connection Hijacking. Hijacker plugs an access point into his laptop; access point has DHCP and bridging but no WEP capabilities turned on.

Scenario #4—Neighborhood Nuisance. Someone with a cordless phone chatters over your wireless bandwidth.

LSU Community

Students, residents, and businesses near LSU are linked wirelessly with BelAir Networks' (www.belairnetworks.com) Wide Area Wi-Fi solution. Super Net, a wireless and wired Internet communications services company, and V Link Solutions, a leading Wi-Fi services provider, integrated BelAir Networks' Wide Area Wi-Fi solution to create a combined Power Line Communications (PLC) and broadband Wi-Fi network for the residential and business communities adjacent to LSU.

The deployment delivers high-speed Internet access over 2 square miles of open areas and buildings around LSU, including 2,200 apartment units that are currently underserved by broadband providers.

Super Net connected the BelAir Wide Area Wireless system to its PLC Internet service, which delivers broadband over electrical power lines throughout the areas surrounding LSU. The entire system is managed by V Link's PASSYM back-end network provisioning and monitoring platform. PASSYM provides important user billing and authentication services, over both the Wi-Fi and the PLC segments of the network.

As a customer logs in to the system, V Link's PASSYM platform ensures that the users are authenticated against their profiles in a database to maintain proper usage as well as monitor the length of time the system is used. V Link also provides 24/7 phone-in technical support to end users and network administrators.

"Broadband wireless access is an increasingly important collaboration tool for both business and academic communities," says Phil Belanger, vice president of marketing for BelAir Networks. "We are pleased to partner with two innovative companies to provide a creative communications solution for the community around LSU."

The four BelAir200 nodes installed around the LSU region enable high-speed access to the entire network at conveniently located hot zones throughout the surrounding area. Built specifically for outdoor deployment, the BelAir200 can be mounted directly on buildings and on light poles in parking lots and city streets. Each BelAir200 includes up to three
backhaul radio modules that create 5 GHz point-to-point links to form the wireless backhaul mesh that interconnects all of the BelAir200 nodes. The BelAir200 access radio module supports Wi-Fi client access in the 2.4 GHz band and includes integrated antennas that project Wi-Fi signals over a large area outdoors or into multistory buildings from the outside. The resulting system delivers unmatched capacity, security, and scalability for multiapplication Wi-Fi networks.

"The good news about the college campus is you don't have to convince them about Wi-Fi. If the university does not put in Wi-Fi access points, the students will," Belanger says.

More to the point, Belanger says most college IT departments want to install and manage Wi-Fi without it becoming a hassle. The biggest hassle, of course, is rogue access points. Not all are ill-intentioned.

As recently as four or five years ago, it was common for a campus department (or even a business division) to put in its own Wi-Fi. More recently, control has been assumed by the central IT department, making it a campuswide resource.

"The first step in Wi-Fi is to understand what is out there and to discern whether they are authorized."

Belanger says, BelAir has modified its equipment several times to meet the needs of the university market.

They found out in an RFP from Stanford University that rogue access point identification was a major requirement of the market. In September, they added that feature to their system.

Finding rogue access includes scanning the radio environment to determine which channels are most used so the network can use the less crowded ones. "Once the network is up, you will find rogue access points. You scan to see which of your nodes 'hears' the point the loudest and track it down," Belanger continues.

Some products will actually find where on the wired network rogue access points are and will automatically disconnect them.

A common scenario is a student who has wired Ethernet in a dorm room. He puts in a store-bought access node and provides wireless links for everyone on the floor.

Belanger says schools should be most concerned about the security issues raised. "If these points are not controlled by IT, they leave the door wide open," he says. "They are a huge security hole. You have to find them and stamp them out."

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1It is important to note that unlicensed devices are subject to the same consumer protections for the installation and use of consumer antennas under the FCC's Over the Air Reception Devices rules as, for example, satellite TV dishes. While colleges and universities may legally prohibit students residing in campus dormitories from placing unauthorized antennas for licensed (such as broadcast or satellite TV) or unlicensed services (such as WiFi) in their dorms, this does not apply to apartments or other leased residential property. The FCC rules give residents the right to place antennas within their leased property such as student apartments or faculty homes.
Impact of Handheld Devices at Washington State University
by Dave Ostrom

Washington State University built its wireless data network over the last two years. At the start it was decided to include a robust wireless security infrastructure, and Cisco 3030 VPN appliances were acquired in order to run an IPSec VPN. Due to a concern with unencrypted passwords being transmitted over the airwaves as individuals signed on, a digital certificate was required to establish the initial session. The wireless access points were all placed on a separate VLAN, and individuals were required to authenticate using a Cisco Secure Access Server and establish a VPN tunnel in order to access network resources. The solution worked fine, and no security problems were encountered.

However, once the first few buildings were equipped with wireless capabilities, the complaints from the handheld customers began to come in. Most wanted access to their e-mail, and they could not connect through the wireless network. Those using Palm handhelds had no option, while a few others using Compaq iPaq’s discovered the Movian VPN product and were successful. Most just gave up in frustration.

WSU has recently switched to the Microsoft Point-to-Point Tunneling Protocol (PPTP). The handheld devices that have been tested so far all support PPTP, and no additional software is needed. The use of the certificate was abandoned as unnecessary after the use of a network sniffer showed no information being transmitted in the clear. As a side benefit, it appears that the PPTP client is less stringent in its synchronization and therefore performs better in areas of weak coverage.

The handheld users now complain not about no access but about a lack of access in outdoor areas. While it was felt that there would be little requirement for outdoor access from laptop users, the handheld users are asking for access as they move from class to class. This requirement has yet to be addressed.

In addition, such rogue access points degrade network performance.

A few years ago, Wi-Fi got a black eye due to its low level of security. Hackers even posted tools on the Internet that allowed others to break Wi-Fi security. Wi-Fi developed WPA-1, which put in some software fixes that closed the door and, when coupled with best practices and 802.1x verification, took care of the problem.

In late 2004, the low-level encryption was improved. Now WPA-2 uses 802.11i with authentication. Products using 802.11i are just starting to hit the market. The good news is that it seems to work. The bad news is that, especially at the access points on older networks, it may require forklift-like hardware upgrades both on the network and the client side.

“This is something universities want to do,” Belanger emphasizes. With a product like theirs, a college can cover large areas like quads and arenas with Wi-Fi and even project the Wi-Fi into a building like a dorm. That is just one of the many features of the booming wireless market.

Where the Market is Headed

The number of WLAN hotspots worldwide is projected to grow from 14,242 in 2002 to more than 135,000 by 2007, according to Mike Roberts, analyst at Baskerville's Planet Wireless (www.baskerville.telecoms.com). Growth like that almost guarantees problems, both for technology and for security.

Roberts continues, “Mobile Wi-Fi devices and new vendor platforms will also make Wi-Fi voice services far more widespread by 2003, which means that now is the time for mobile operators to assess how VoIP over WLAN will impact cellular revenues.” Rest assured that college campuses will be a major nexus for wireless.

The U.S. market for broadband wireless access (BWA) services based on technologies such as WiMAX will hit $3.7 billion by 2009. A study from BWCS and Senza-Fili Consulting (www.bwcs.com) estimates that fixed wireless services will account for 3.6 percent of all broadband connections in

“We have seen a growing number of vendors and service providers throwing their weight behind WiMAX as the leading standard for broadband wireless access,” report author Monica Paolini says. “Navini’s decision to join the WiMAX Forum after being a long-time supporter of the rival 802.20 standard confirms the growing industry support for WiMAX.”

Largely thanks to strong backing from Intel, WiMAX has rapidly emerged as the front-runner from the raft of new-generation BWA technologies. Although a handful of pre-WiMAX proprietary technologies are already being commercially deployed by service providers in the United States, Asia-Pacific, and Europe, the BWCS/Senza-Fili study concludes that only a standards-based approach will bring BWA to the masses.

Paolini argues, “Until now BWA has failed to achieve widespread adoption due to a lack of convergence of vendors toward a single standard. As we have seen with WiFi, standards help to drive down hardware costs and promote interoperability among manufacturers.”

Cost and usability will be critical factors in the highly competitive U.S. market if emerging BWA services are to provide a realistic alternative to competing fixed broadband (DSL and cable) services. Established BWA services based on LMDS, MMDS, and satellite have so far failed to do this. According to market data from the Federal Communications Commission, between 2000 and mid-2003 BWA and satellite share of the broadband market declined from 1.6 percent to 1.3 percent.

Despite the growing support for WiMAX, Paolini agrees with Roberts that mass adoption of broadband wireless access won’t gain momentum until 2007.

She says the next few years will largely see small-scale trials and proof-of-concept technology pilots for fixed-broadband access. Initial deployments will address the fixed access market, as WiMAX PCMCIA cards or WiMAX-enabled laptops are unlikely to ship until 2007–08. The ratification of 802.16 Rev E will pave the way for support of mobile access, but it is still too early to know whether WiMAX will be able to dominate the mobile market, where solutions offered by Flarion and IPWireless are already commercially available.

“The downside to a standards-based approach is that the process of definition, ratification, and product certification is time-consuming,” Paolini says. “In the meantime service providers must either wait or adopt competing technologies.”

In short, forget running along the bleeding edge. Keep your network finely in an organized, secure manner.

Curt Harler is a contributing editor to The ACUTA Journal and a frequent speaker on technology topics. Reach him at curtharler@adelphia.net.
Presence-Aware Communication Tools

by Luci Norlin

Picture this: In an off-campus laboratory, graduate student Julia has just stumbled upon the missing link that will make her university the prime research center for a partnership of local pharmaceutical companies. The companies are willing to stake millions on this exciting new medical advancement, but time is of the essence. Another university is also closing in on the research grant. A decision from the corporate partners is expected tomorrow. Lose this relationship and years of research and expenses go down the drain for the university—not to mention a missed opportunity to further establish the institution as a leading medical research partner. Trouble is, the Project X research team is scattered throughout a number of campuses and they must collaborate—now—to update the research proposal with the breakthrough research discovery.

Frantic dial-around begins. Office phones and cell phones are called, but much of the team is unavailable. Voice messages are left. Assistants are called. More messages. High-priority e-mails and instant messages are also sent. Essential team members are still not located. Time is ticking.

Whether it is millions of dollars of research funding that is at stake or just getting a student registered for classes, such time-wasting communication scenarios are played out every day. In fact, a recent survey by Siemens found that 74 percent of enterprise knowledge workers say that the “lack of immediate response is crippling for the completion of important tasks.”

Although today’s university professionals are armed with myriad new communication devices and applications, contact chaos remains the norm. In spite of their convenience, cell phones, landlines, e-mail applications, and other communication tools exist on a choppy sea of disconnected communication islands and network architectures.

The good news: Emerging presence-aware applications are now available to end the hit-or-miss nature of communicating one-to-one. With presence technologies, universities gain a substantial advantage with the ability to resolve problems on demand, the first time, with instant access to required information and subject matter experts.

The Next Killer Application

Experts are calling presence-based communication the killer application of the second generation of converged voice/data IP solutions. As part of the next generation of VoIP solutions, presence awareness takes communication systems a giant step beyond traditional telephony infrastructures. Vendors have already begun to integrate presence into their products to provide users with fine-tuned, call-routing control. According to Forrester, the recent surge in enterprise instant

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Accessibility: Are You Too Connected?
by Mick McKellar

Beware—soon there may be no place to hide! Although many of my colleagues pride themselves on being accessible in the widest variety of places for the greatest number of hours per day, week, and year, they also value the ability to turn it all off. However, the ability to disconnect, whether intentional or not, may be reduced by a new presence on the Internet.

Presence is a means for finding, retrieving, and subscribing to changes in the presence information (e.g., “online” or “offline”) of other users. Instant messaging and presence protocol (IMPP) is an attempt to define standards to facilitate finding and connecting to those who presumably want the connection. Products compatible with Microsoft’s Live Communications Server debuted recently, bringing even closer to reality the concept of complete connection, 24/7/365. However, presence-based or presence-aware communication may offer much greater connection than we are ready or willing to accommodate and manage.

Although the possibilities for VoIP, instant messaging (IM), and videoconferencing are stellar, the dark side of this force has to be considered. One should carefully ponder the ramifications of rapid adoption of presence-based technologies. There are several major considerations.

Can It Ever Be Reliable and Secure?
Anyone who uses a cellular telephone when traveling has experienced the frustration of business deals lost, messages transported into null space, and connections abruptly dropped in mid-conversation. Despite years of service and major upgrades to the technology, it is still rather delicate compared to the POT system.

Presence awareness speaks directly to the concerns over letting your clients, colleagues, and friends know where you are and that you are available. It does not speak to the issues of hardware reliability; nor does it address security concerns of any messages, voice or instant, that connect wirelessly to a variety of networks. It may be much easier for your friends to find you, but that also holds true for those who may have ulterior motives.

As with e-mail, these technologies may be slow to grow because of concerns like the above, mingled with confusion and misunderstandings about how, for example, VoIP and IM might work together safely and securely. On the other hand, they may grow quickly beyond our capacity to manage and secure them. As Brian Hooks reports in TechNews World (1/6/05), International Data Corporation, a technology research firm, estimates that the number of corporate IM users will grow from fewer than 20 million in 2002 to more than 200 million in 2006, in spite of the fact that IM can

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technology, STAR IT reports slashing 40 percent off its conferencing costs and estimates more than 35 percent reductions in product cycle time and travel expenses.

The Presence Evolution

Presence communication, initially, has been associated with devices (i.e., telephones and personal computers) and applications (such as e-mail and instant messaging). While device and application presence is effective, it often falls short of providing higher levels of communication efficiencies in a mobile world where the preferred communication device or the tool used by a contact, at any given moment, is often unknown. The result: continued communication confusion with multiple dial-arounds, e-mails, and voicemails.

The real power of presence communication lies in two emerging concepts: user presence and group presence.

User presence aggregates device presence to allow a worker to connect quickly with a colleague regardless of the device or application. This sets the stage for more natural, ad hoc interaction. Applications that incorporate user presence allow individuals to see a unified view of a colleague's presence state in association with all of their devices and applications. Presence-enabled applications also allow users to easily define rules, either explicitly or via automated links to utilities like calendars, to dynamically set accessibility preferences through different devices or applications. These attributes can vary based on time of day, work location, who is attempting to make contact, and other variables.

To illustrate: A faculty member can specify "on travel" rules that allow only colleagues and the dean to reach him live via his cell phone and others to contact him live via instant messaging. All other communications are routed to his e-mail box.

Group presence generalizes the user-presence concept across groups, thus aggregating individual presence states into a work group. Likewise, presence aggregation rules can be set according to the needs of a specific work group: individuals, quorum, majority, or all members.

Organizational Impacts

The organizational impacts of presence-aware communication include greater efficiencies of day-to-day tasks as well as strategic improvements in business processes that improve the speed of decision making. Sample scenarios include the following:

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messing deployments is "visible testimony to the early success of presence-aware communication."

However, instant messaging provides only a small hint of the power provided by presence-enriched applications. Emerging are complete collaboration portals that, via simple Web interfaces, can provide a user with a complete dashboard of tools. From such dashboards, a user can easily manage multiple levels of availability, including the option to be available to some contacts and unavailable to others. The industry's best tools also allow a user to select, at any given time, a preferred communication device (i.e., mobile phone, desk phone, home phone, or e-mail). Finally, best-of-breed applications also bring presence to teams, making it a one-click option to establish ad hoc or meet-me conferences with multimedia collaboration tools embedded in portals.

This is only the beginning. Advancements continue to come forth providing, for example, ways to embed more presence features in all kinds of applications such as customer relationship management and other back-office systems. Such applications are a natural fit in educational settings where call traffic is high. Presence-empowered call agents can see the real-time availability of other agents and important subject-matter agents who may be needed to complete or finalize the approval of transactions.

While most enterprises have not yet embedded new presence technologies into their business processes, a recent Nemertes Research survey found that 57 percent of organizations plan to embed presence throughout their organizations within three years, and 21 percent say they are working on that process now. Also, more than 90 percent of companies say that instant messaging, one of the earliest forms of presence-based communication, is informally used within their organizations.

"With presence, we've dramatically improved productivity, business processes, responsiveness, customer interactions, and employee satisfaction," said Gene Rodgers, president and CEO of Boston-based STAR Information Technology, a management consulting and systems integration company. "Our investment is expected to pay for itself in the first year." As an early adopter of presence-based
make many open, unsecured doors—including access to desktops and institution computers—available to unauthorized, prying eyes.

Can It Be Shut Off?

Everyone knows you can shut off a cell phone or a pager. However, most providers offer voicemail services that allow callers to leave packages on your digital doorstep. It’s still up to you to sort through the collection and decide what to do with each message.

As with e-mail, if someone sends (or leaves) many messages, and no response is received within a reasonable time, that someone may simply move on to more lucrative contacts. If that someone is potential business, you lose. So turning off the phone may not be a solution with which you can live. The alternative, however, may be to become even more available than you can comfortably accommodate, especially if you need a breath of time to consider options before answering.

Can I Deal with Time Slip?

E-mail is asynchronous communication. Few expect an immediate response. In the past, you sent e-mail if security was not a major concern and the answer could wait until the recipient read the message and replied. When synchronous communication was needed, you used the telephone—which could be secured by a variety of methods.

New technologies are blending these very different communication processes into a hybrid that is at once exciting and frightening. It is exciting because of the capacity to work with text, images, video, and audio synchronously in any combination. This is great if you are prepared to act at once on the information provided. However, what if you need time to review, revise, and rewrite? The pressure to act immediately cannot be relieved by the convenience of built-in time delays. This “time slip” can increase the stress you feel with any communication, and can rapidly propagate any error across a wide variety of communications media.

How Will This Change My Work Methods?

Calling corporate offices (especially cold calls) most often yields access to someone’s voicemail. My own experience has been that the return rate on most of these adventures is abysmal. The integral barriers to access that we all worked to overcome in the past have begun to evaporate, and now we seek alternatives that limit access when necessary, yet do not alienate clients, colleagues, and friends.

We also need to ask ourselves if the group presence maintained by face-to-face collaboration on projects can be helped or maintained with these new tools. Could heavy reliance on technology short-circuit the close understanding obtained across a coffee-stained worktable?

The threats to both security and privacy are very real and cannot safely be ignored; yet the expectations on the part of clients and coworkers may force one to embrace the technologies with both hands and heart.

How Do We Deal with the Pressure to Adopt New Technologies?

Be a pioneer on the trailing edge of technology. Rely on established technologies, and find ways to make it easier for your clients, colleagues, and friends to connect with you via the old reliables. Then test the new technologies, looking carefully at the results.

Continued on page 33
• **Uniting dispersed campus settings.** Institutions with employees scattered across different geographic locations are natural fits for using presence communication to link faculty and administrators. Students, institutional partners, and employees are more empowered to weigh in on critical decisions as well as have on-the-spot access to available experts.

• **Student course registration.** Using a presence-aware solution, students get immediate approvals or disapprovals from professors, department heads, counselors, and others for class registration exceptions. In addition to speeding up the approval process, administrative changes to schedules and class rosters are updated in real time instead of waiting hours or days for students to get approvals via phone or office visits.

• **Financial aid.** Using audioconferencing, financial officers from satellite campuses accelerate student loan and scholarship approvals through instant review processes, including second opinions from senior managers at main campuses. The university benefits from improved productivity, decreased administrative costs, and improved employee satisfaction levels.

• **Campus emergency preparedness.** An integrated messaging application allows immediate access to emergency team members, including the ability to initiate ad hoc conferences and the sharing of documents and important new information via collaboration tools. With the ability to make decisions in real time, campus risks are minimized.

With applications that support user and group presence, these are just some of the efficiency and business-process gains that result when person-to-person interactions are instantaneous, with successful contacts made on the first try. In the campus setting, numerous communication-intensive tasks can benefit from presence-aware tools that take the guesswork out of making contact with colleagues and other subject-matter experts.

**Deployment Considerations**

Presence-aware communication functionality remains a relatively new technology. Campuses should critically assess deployment and operational factors, including existing enterprise client/server application infrastructures. Some key considerations include the following:

1. **Scalability.** Microsoft and Reuters are among the largest deployments of presence-powered IP communication solutions based on the Microsoft Office Live Communications Server 2003. IT organizations can design distributed presence server clusters using architectural approaches like Microsoft’s Forest. The Forest approach allows IT architects to build scalable server clusters.

2. **Security.** Presence-powered communication solutions that are deployed over industry-standard platforms such as Microsoft Windows and session initiation protocol fit cleanly into the existing security framework. IT should leverage industry-standard best practices for enterprise security, management, and logging and alerting mechanisms to handle security issues with presence-aware communication solutions. IT should also develop simple Web-based presence management tools to allow employees to specify the individuals or teams who can view presence preferences and initiate unscheduled communication interactions based on constraints such as employee levels, time of day, locations, and job functions.

3. **Reliability.** IT should address reliability considerations through architectural means such as using server redun-

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dancy and load balancing. IT should engage systems integrators, working in conjunction with the professional services and consulting unit of IP communication vendors. IT may also want to establish a specialized disaster-planning organization to account for disaster-recovery scenarios and incorporate legacy communication systems in the event of outages.

Conclusions

The explosion of communication devices, applications, infrastructures, and remote work settings has led to rapid increases in personal and work information received from e-mails, voicemails, instant messages, and other sources. Presence helps university employees cope with the exponential increase in information by allowing them to specify their choice of preferred device or application for communication interactions.

By making real-time communication possible, presence awareness also helps campus users eliminate wasted time spent on retrieving and sending repetitive messages and synching the calendars of team members.

On behalf of the university, faculty and administration can make more expeditious business decisions when communication is instantaneous. The result: lower overall business costs, more satisfied students and university partners, and a more satisfied team of employees.

Cost constraints will continue to drive higher-education institutions to adopt the next generation of communication systems and applications that enable more efficient and more flexible collaborations among constituents who are both on and off campus. Within the framework of the new generation of VoIP solutions, campus technology and applications such as presence-enabled communication will continue to grow, and, ultimately, these applications will generate new competitive advantages for higher-education institutions and other enterprises.

Presence awareness—across devices, infrastructures, and applications—will have a profound impact on the way universities work, live, communicate, and collaborate. It’s not a matter of if; it’s a matter of when.

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Find your own methods to coordinate communications. For example, use e-mail to schedule phone calls. Use this technique to avoid callbacks and phone tag—and to avoid visits to voicemail boxes.

Build in time cushion/control. For example, when possible, use e-mail to respond to low-priority voicemail messages. Try to move these communications into the asynchronous world, where you can deal with them in your own time.

Manage expectations. For example, be up front about how you use your voicemail box. If you don’t return most calls immediately, be sure to say in your message that there may be a delay in your response. That way, if someone gets an immediate reply, he or she will be pleasantly surprised.

Be aware of what effect your level of connectedness is having on your health and well-being. It may be fun to swim in that ocean of information today, but tomorrow, you may be very tired and treading water.

Conclusion

Embracing the wonders of new technologies may be a thrill, but thrills come at a price—paid in either preparedness or pain. Being plugged in is exciting and profitable. Just be certain you can unplug when you need rest or just time to think. Presence-based communication may well be the next killer application, but for those not willing or not ready to manage the change and the pressure, the killer part may well be all too real.

Elwin "Mick" McKellar recently retired from Michigan Technological University, but not from technology. Reach him (when he wants to be reached) at mckellar@chartermi.net.

Interview

Larry R. Faulkner, Ph.D.
The University of Texas at Austin

ACUTA: We would, first of all, like to commend the University of Texas at Austin for your leadership in statewide communications and you personally for your leadership role in Internet2. Would you talk a little about the role that being on the leading edge of technology plays in recruiting the best students, researchers, and faculty?

President Faulkner: At UT, we believe that leading-edge IT infrastructure and facilities can be important attractors for faculty, graduate students, and, increasingly, undergraduates. This has been true for some years in specific research disciplines, such as bioinformatics, high energy physics, and chemistry. Increasingly, however, faculty and students in all disciplines expect not only state-of-the-art technology in support of their research, but also access to digital instructional resources and 24/7 online administrative services.

Creating a leadership reputation is challenging; maintaining it is harder still as other universities raise the bar, as public funding declines in real terms, and as our users’ expectations rise with every Google search. Interestingly, one response to this competitive challenge has been interuniversity collaboration and resource sharing. Nowhere is interuniversity collaboration more evident than in advanced networking.

In 1996, UT was one of 32 universities that joined at O’Hare Airport to form Internet2, the nonprofit consortium that now operates the nationwide 10 Gbps Abilene network and fosters advanced networking applications and technologies on behalf of more than 200 member institutions. More recently, UT helped to organize a new Texas-wide initiative, LEARN, the Lonestar Education And Research Network, which will establish an advanced network covering 2,100 miles and provide connectivity to the commodity Internet, Abilene, and National LambdaRail (NLR). Through LEARN, other universities in Texas will also be able to connect via UT to the NSF TeraGrid, which we joined in October, 2004.

There is another important constituency that your question overlooks, and that’s the public at large. In 2002, I announced a new initiative to provide a “digital knowledge gateway” to provide broad access to digitized resources from our museums, libraries, and instructional and research programs. Thanks to generous foundation and corporate support, we launched UTOPIA (utopia.utexas.edu) in March, 2004, and it is helping to reinforce UT’s reputation for public service among K-12 teachers, students, parents, and others who might not otherwise benefit so directly from a major research university.
ACUTA: State and federal telecommunications policy and regulation are an ever-increasing part of our daily lives. The requirements of FERPA and HIPAA alone have had a significant impact on all of our institutions. As a leader in the implementation of advanced communications, what do you think should be the role of higher education in working with regulators in setting that policy?

Faulkner: It is essential for higher education to have a well-researched and well-articulated stance on telecom policy and regulation, not only to ensure that the particular needs of research and instructional institutions receive sufficient attention in our state houses and in Washington, but also to assure that society benefits optimally from the resources and services that a robust higher-education sector can offer. Several policy domains call for special attention by our community:

- Advanced networks dedicated to research and education require federal and state funding, as well as a wise regulatory environment. It is encouraging to see such developments as LEARN in Texas, LONI in Louisiana, and NLR at the national level, but we are challenged to keep pace and interoperate with the leading R&E networks in Canada, the Netherlands, and elsewhere.

- Beyond our dedicated backbones, higher education is wise to advocate more ubiquitous deployment of broadband networks to residences, public libraries, and other institutions. A well-prepared work force and an educated citizenry require lifelong access to educational resources. Leading universities and colleges have powerful resources on their websites and in their distance-learning programs, much of which is media-rich and essentially undeliverable via slow-speed networks.

- Cybersecurity is a growing concern on our campuses. To permit—indeed, to foster—innovation, our computing environments must be less tightly managed than in other sectors. In addition, our networks tend to be more open in order to facilitate interinstitutional collaboration. We welcome students and faculty to connect their laptops to our networks, but that very liberty exposes us to whatever viruses, worms, and other problems they acquired outside our institutions. Although Internet security is an inherently international concern, higher education should engage proactively with both government and industry to prevent what is distressingly becoming a "tragedy of the commons."

ACUTA: Personal communications devices are becoming more widespread on campus everyday. Devices from PDAs and iPods to cell phones with cameras are creating both opportunities and challenges on campus. What strategies could universities take that would strike a balance between promoting the use of these devices and mitigating the abuse of them, specifically in the classroom?

Faulkner: I doubt that these devices need much promotion among current
college students, although we are probably not being as creative as we could be in harnessing them for educational purposes. For example, few institutions have students' cell-phone numbers in central databases, so neither routine nor emergency communications can proceed through that channel. Do our Web resources display properly on PDAs and cell phones? Is the IT help desk or library reference staff reachable via Instant Messaging? What is Duke University learning from its program to distribute iPods to all freshmen?

Wireless devices with cameras can be a distraction in class, or worse, a new way to cheat on exams. We have been well-served over the years by granting authority to the instructor to decide how the classroom will be managed and what tools and resources are permitted at exam time. Ideally, faculty are supported by a campus honor code, such as the one we have at UT.

ACUTA: A number of the service providers that support these personal communications devices are merging as we speak. How do you think the recent AT&T and Cingular or the Sprint and Nextel mergers will impact delivery of these services to campus?

Faulkner: Prediction is notoriously difficult, especially about the future. Forecasting the impact of specific corporate mergers and acquisitions is perilous, indeed. Too few competitors could lead to reduced innovation or higher prices, both of which would be very detrimental—and not just for universities. But some consolidation seems necessary in the interest of the financial stability of the industry, and it could lead to other benefits, such as improved coverage and service quality, if the basis of competition begins to turn more on performance than on marketing.

Both individual and enterprise customers would surely value more robust services, which might be a welcome result of having fewer but better capitalized providers. Such a scenario also could simplify our plan to provide a common campus cellular infrastructure with interfaces to commercial carriers. Finally, one might speculate that consolidation, while creating barriers to entry in the traditional cellular industry, might drive innovation to other sectors, such as wireless data and voice over IP.

ACUTA: It also appears that delivery of these services will, to some extent, require an investment by the university in its own wireless infrastructure. Would you talk a little about the wireless deployment at the UTA campus?

Faulkner: To date there are more than 850 wireless data network access points deployed at indoor and outdoor locations across campus (http://www.utexas.edu/its/network/wireless/coverage/map/index.html). We expect that number to grow to more than 1,200 by next fall, based on current surveys and new orders. This expansion will support coverage in 60 to 70 percent of our indoor spaces.

We are also exploring the prospect of enhancing indoor and outdoor cellular voice services by building and operating a common cellular network on campus that would provide interconnects to all the leading cellular providers. Finally, we anticipate that wireless data and wireless voice services will converge, with dual-mode phones and our campus 802.11 wireless data network supporting Voice over IP.

ACUTA: From a more personal side, if you could look five or ten years into the future and describe your perfect personal communications device, what would it look like and what would it do?

Faulkner: Weigh nothing, last for a week on a charge, require neither a stylus nor coordinated thumbs, support versatile entry of information by dictation, and provide quick, functional access to most of the Internet.

ACUTA appreciates President Faulkner taking the time to share his thoughts with us. UT Austin's primary ACUTA representative is George Denbow. Reach him at g.denbow@austin.utexas.edu.
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IP Telephony and Portal Integration Payoff at Adelphi

by Chris Vuillaume
Alcatel

One of the most important criteria for choosing an IP telephony system to serve an institution of higher education is the ability to leverage the Internet-enabled nature of the system to deliver targeted information to students and faculty. For higher-education institutions this can be an important tool to streamline administration procedures and facilitate the communications and collaboration between faculty and students that are essential to a great education.

That was the challenge facing the IT team at Adelphi University as they looked for new technologies to Web-enable key processes and improve communications at the 8,000-student campus. Established in 1896, the University was the first institution of higher education for liberal arts and sciences on Long Island, New York. As part of a broader renovation and expansion of its housing and school facilities, the University decided also to upgrade its communications infrastructure to replace a hosted Centrex system.

Jack Chen, Adelphi’s CIO, led the overall strategy and implementation of the system. “It was our vision,” says Chen, “for the new communications system to use the Web as the primary interface, so individuals could access information that could be tailored to meet their needs. As a result, the Web service on our enhanced communications system provides increased services and additional communications tools for Adelphi’s population.”

It was a broad vision: students using computers, PDAs, and IP telephones to access class information, register for classes, pay tuition, check grades, and be informed of class changes; students and faculty collaborating electronically via the system to accommodate off-campus students and after-hours inquiries; and phone calls being rerouted across IP trunks to substantially reduce costs.

The move to a Web-based solution was driven, in part, by Adelphi’s recent increase in student population and the high percentage of off-campus students. Nearly half the 8,000 students are graduate candidates who commute to the campus each day. In addition, many undergraduates are also commuters, which creates a unique set of considerations for deploying advanced voice capabilities.

The starting point for the entire project is a Web portal that gives students, faculty, and staff access to data over a password-protected Internet interface. The site (http://ecampus.adelphi.edu) offers message boards, e-mail, campus news, access to network drives, and secure access to personal information. The Web integration was done using Novell’s GroupWise software. With this platform as a start, the IT team can roll out new services such as degree audit and academic warnings.
With this portal established, the IT team realized that to reach its goals it needed to ensure that the system was utilized. The solution to this was twofold: Use IP telephony to increase user convenience and increase communications with users to ensure that the services meet their needs.

Implementing IP Telephony

To implement IP telephony, Adelphi realized it needed to upgrade the capacity of the campus network by replacing its Centrex telephony system with a communications network that would accommodate ever-increasing usage from students as well as the proliferation of online applications. Moreover, the network infrastructure would need an upgrade in capacity to eliminate interrupted usage and connection failures.

After evaluating a number of alternatives, the University selected an Alcatel OmniPCX Enterprise network solution. Through a phased implementation, this comprehensive network is enabling the University to attain its goal of providing enhanced communications, seamless integration of learning initiatives, and administrative efficiencies for students, faculty, and staff.

Adelphi selected the solution for its open standards support, solid redundancy, built-in call processor, interoperability, ability to provide a timely transition from traditional time-division-multiplexing communications to IP telephony, and ability to bring a broad range of communications capabilities into the Adelphi portal and the applications it uses. Today, the server provides student residence halls and all University facilities with voice capabilities.

In a future phase of the implementation, special IP application phones will be deployed throughout the campus to deliver advanced services. The phones feature large graphical displays, high-fidelity sound, an integrated keyboard, and an open XML interface, allowing them to become a convenient way to access Web-based services. Multiple applications exist, including instant

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computer notification of class cancellations via the phone. The ability to use the keyboard and XML capabilities allow access to registration information, class schedules, faculty calendars, and other data.

The system was also implemented as a cost-saving measure both to reduce management costs and to cut toll charges. Each fall, the university must establish service for its residential students. This past fall, using the new technology, it took Adelphi's IT staff several hours to program the system for the 1,100 entering freshmen compared to nearly a week with the old system, which also incurred service charges from the service provider.

"The initial management capabilities delivered significant improvements," said Joseph Battaglia, who directs Adelphi’s IT department. "Changes no longer take weeks but are now made within seconds using simplified text-editing tools and are done through our own department instead of a provider."

Additional savings came from routing regional calls over IP. The University analyzed its phone costs and found that most of its regional calls go to Manhattan. By routing the calls using VoIP to its Manhattan campus and then sending them out across the telephone network as local calls, the University expects that it will see a substantial savings in telephone services costs.

Other administrative cost savings are expected from the total system, including reduced staff intervention for class scheduling and information updates, but costs for these are hard to estimate.

Following the server and phone implementations, the University focused on deploying applications over the network including an Alcatel OmniTouch Call Center, which offers the faculty, staff, and students increased efficiency in accessing registration and financial aid information.

Another key application in progress is class-related collaboration among students who do not reside near each other physically—a challenge at Adelphi due to the number of commuter students. Using Instant Collaboration System, Adelphi can offer a wide range of conference calling, secure instant messaging, presence, Web presentations, and other broadcast services without the need for additional infrastructure. The system is all hosted on the school’s servers with the student needing only to have a Web browser, Internet access, and a telephone.

Feedback Helps to Plan High-Value Services

The second key to ensuring that the system is used frequently by all users is to know for a fact what they want from it. Through preinstallation research, Chen, Battaglia, and their team found that faculty and staff liked having a message board to know what is happening in other parts of the University and that many analyze their research from home. So having access to network-based storage and servers was a high-value option that would help ensure the system was being used.

Students had some dramatically different needs, and those weren’t at first obvious. The popularity of e-mail among students had the IT team thinking this might be a “killer application” for driving students to use the portal. But after extensive surveys, the Adelphi team learned that most students have other e-mail accounts that they use and wouldn’t use the portal solely for e-mail. For students, access to class information and collaboration are critical.

With the portal running and the IP telephony features beginning to roll out, Chen offered some advice for others launching these services.

(1) Budget enough time to get the project done correctly. Adelphi kicked its project off more than 18 months ago, and having that amount of time has allowed Adelphi to implement the right services and to deploy them with minimal service interruptions.

(2) Maximize ongoing communications with users to let them know the status of the project and to help plan their expectations accordingly—especially if it’s a multiyear project.

(3) One group must take control. At Adelphi, all IT is centralized under Chen’s leadership, giving him the authority to make campuswide decisions. This ensured the University interoperability between key applications and standards. This is possible in higher-education institutions where each department or school makes its own decisions, but someone at the CIO level must still broker key decisions between the different organizational units.

As for the future, Adelphi has big plans to offer support for PDAs and other handheld electronics, as well as extensive plans for broadcast video distribution and online learning to push the University’s reach even further into the community. With a strong networking foundation and the support of open standards that allow new applications and equipment to be easily integrated, Adelphi has built the infrastructure to realize these goals.

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eliminate, or at least reduce, the amount of overhead paging that occurs, a quieter, more peaceful environment would be a welcome relief.

The first attempt at addressing this problem was to give the nurses access to a wireless phone. The primary problem with this solution was that the phone was too bulky for a nurse to carry around conveniently. In addition, it was difficult to place or answer a call in the middle of a procedure. While still testing the wireless telephones and pursuing viable alternatives, SUNY Upstate came across a new technology—a communications “badge” from Vocera Communications.

Users simply wear the badge, a lightweight device measuring about 4 inches in length, either on a lanyard around their neck or clipped to their scrubs or lab coat. Users communicate with one another by pressing a button on the front of the badge and issuing simple calling commands, like “call Dr. Smith.” Because the system uses voice recognition for call processing, the recipient of the call can answer a call from another user by simply answering, “yes.” The recipient of the call does not have to touch the badge.

The original 90-day pilot began late in 2003. Since the end of the pilot (which is described in detail in the spring 2004 ACUTA Journal), several things have happened:

- In spring 2004, hospital management gave the approval to deploy Vocera throughout University Hospital. In June 2004, a person dedicated to managing the Vocera deployment was hired into the telecommunications department.
- The original pilot phase consisted of about 200 users in four departments, with a maximum of about 50 users active on any given day. Since June 2004, the system has grown to more than 700 users across 12 departments, with about 130 peak active users.
- During December 2004, more than 29,000 calls were placed by Vocera users.
- As of January 2005, there are 12 more departments with approximately 400 more users who have expressed an interest in using the Vocera system. Just deploying to these departments will take us until the summer of 2005. From there, it is expected the system will continue to branch out into other areas in the hospital.

Some changes we’ve made to help support the system’s users include the following:

- Vocera training has been made a standard part of new-employee orientation (a two-hour session every two weeks).
- A new internal Web page was developed for user support with FAQs and training documentation.
- A training video was produced internally, which is geared toward improving existing users’ success with the system.

For more information about SUNY Upstate’s application of the Vocera technology, contact Joe Ziemba, manager of telecommunications, at ziemba@upstate.edu.
GIS Technology Brings the Layered Look to Campus

by Jim Romeo

Geographic information systems (GIS) have been touted as a technological advancement of interest to cartographers and geographers around the world. But as word of the powerful analytical capabilities of GIS technology has spread, it's beginning to show up in some unexpected places—including college campuses.

What is GIS Anyhow?

According to Redlands, California–based ESRI, one of the foremost leaders in GIS software and applications for the worldwide GIS industry, "a GIS combines layers of information about a place to give you a better understanding of that place. What layers of information you combine depends on your purpose—finding the best location for a new store, analyzing environmental damage, viewing similar crimes in a city to detect a pattern, and so on" (http://www.gis.com/whatisgis).

A full GIS, says ESRI, requires hardware, software, data, trained users, and sound analysis methods for interpreting the results it generates. GIS software "links information about where things are with information about what things are like," says ESRI.

Unlike a paper map, a GIS map can combine many layers of information. A digital map created by a GIS will have dots, or points, that represent features such as cities, lines that represent roads, and small areas that represent features such as lakes, just like a paper map. "The difference," according to ESRI, "is that [with a GIS] this information comes from a database and is shown only if the user chooses to show it. The database stores where the point is located, how long the road is, and even how many square miles a lake occupies."

Each type of information in the map has its own layer, and users turn layers on or off according to their needs. One layer could be made up of all the public roads in an area. Another could represent all the private campus roads in the same area. Another might represent buried cable.

"The power of a GIS over paper maps," says ESRI, "is your ability to select the information you need to see according to what goal you are trying to achieve."

So what can a GIS do for a campus?

McHenry County College

For the past five years, McHenry County College in Crystal Lake, Illinois, has recorded how academic course catalogs are distributed by postal zip code and carrier route and the resulting enrollment for each geographic area. This has been the long route to achieve its marketing goals.

Last year Len Walker, director of marketing and public relations at McHenry College, proposed that the college administration curtail distribution to areas where the enrollment didn't pan out. Its marketing effort centered on careful segmentation of who students were and where they were coming from.

"Using GIS technology, I mapped the distribution of these [catalog] publications over the five-year period and overlaid the enrollment generated by year," says Walker. "Using Prizm NE consumer data from Claritas and PCensus from Tetrad Corpora-
tion, I can also overlay household demographics and attributes.”

McHenry also programmed a reader-service database called “Get Better Info” that allows recipients of unwanted mail to remove themselves from its database. This resulted in the modification of some 20,000 names. At present, McHenry has about 180,000 names in its database.

The net result of this more efficient approach: a reduction in printing costs of more than $60,000 and savings on postage expense of $40,000+.

The college licensed copies of MapInfo Professional v.7.5, MapMarker v.9.3, and PCensus v.7.5. The IT department installed them on an individual workstation, and the college’s marketing and public relations department researched and budgeted for the software acquisition.

“We are not running GIS as a networked application,” explains Walker. “We are sharing interactive map files via the Internet using MapInfo Discovery. Other file sharing is accomplished by FTP, again using an Internet browser.”

Some applications, including MapInfo Discovery, were server based, and the IT department provided assistance with some of the server-based applications that were loaded on the marketing department’s development server.

“The MapInfo software and its supplemental programs are good examples of user-researched, selected, and sponsored applications,” explains John Linehan, assistant vice president of information technology at McHenry. According to Linehan, implementing the software has required only minor assistance from IT.

At McHenry, IT support is largely centralized, but there are departments that work extensively with the technology tools of their trade. “The Office of Marketing and Public Relations (OMPR) is one of these departments,” says Linehan. OMPR created and maintains the Get Better Info component of the system using Microsoft’s SQL database management system.

“IT coordinates closely with OMPR and the other technology-intensive departments and programs at the college to make sure that infrastructure concerns, such as adequate bandwidth, are considered and addressed,” adds Linehan. “One important environmental area we are still working through at the college is ownership and maintenance of data that is shared across multiple departments.”

Clark University

Many GIS applications originate in the geography departments of colleges and universities but are used throughout the local community. That’s what happened at Clark University in Worcester, Massachusetts.

“The mayor and manager of the city of Worcester have supported work in GIS and funded specific projects so that the GIS manager can advise the city on how to revitalize brownfields,” says Robert Gilmore Pontius Jr., associate professor in the Department of

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International Development, Community, and Environment in the graduate school of geography at Clark University. The city's GIS manager, Shane White, worked with three summer interns from Clark to develop a database of properties that could be marketed for redevelopment.

"The city wants to use the GIS analysis to show potential investors how to combine parcels of land for development. In the past, these parcels were recorded on a list, but it was impossible to see which parcels were adjacent," Pontius explains. "If the information is in map form, then a variety of important analyses can be performed. For example, it is possible to overlay maps to see how close an available parcel is to utility services, such as electrical and water lines. Also, it is extremely helpful to have the information in map form, because it makes the information much easier to digest visually."

Juniata College

Neil Pelkey, assistant professor of environmental science and studies and information technology at Juniata College in Huntingdon, Pennsylvania, uses a GIS extensively for research and in the classroom. Much of the IT planning and licensing input comes from him.

Pelkey recently worked with the Foundation for Ecological Research and Advocacy and Learning, a nonprofit research organization based in India that applies research on issues in natural resource management and conservation, to develop a course called IT Applications for Participatory Irrigation Management.

"As to our licensing and networking of GIS, we have Arcview and ARCGIS licensed locally on 20 machines at a GIS lab with spatial analysts," says Pelkey. "We have a network analyst and geostatistical analysts as well.

"We have five to seven faculty machines with individual licenses installed," he explains. "We initially served our data from a central location, but that was extremely slow. Now students are assigned 40 GB USB2 drives. This leads to a substantial amount of data repetition and metadata insanity, but each student has 400 Mbps access to his data."

At Juniata College, all computers in the GIS lab run the APACHE Web server which enables students to transfer data rapidly between computers without sharing drives.

Fayetteville, Arkansas

"It really is an amazing tool," says Fayetteville, Arkansas, superintendent Bobby New of the GIS. He admits he was skeptical about using GIS technology at first, according to comments made to eSchool News. "When district technology coordinator Susan Cromwell first approached him about investing in a GIS tool for the district, New said he almost slammed the door in her face. But she persisted—and New is grateful. These days, 'I don't know what we'd do without it,' he said. 'To be honest with you, it's probably saved my job on a few occasions.'"

eSchool continues, "In the fall of 2006, Fayetteville plans to open a brand new combination elementary-middle school, the site for which was chosen based on data provided through the school district's GIS system. Michael Gray, Fayetteville's associate superintendent for operations, said administrators were able to combine different streams of school and geographic data to help plan for everything from the impact of future housing developments and traffic patterns to the placement of school athletic fields.

"By layering the different streams of data on top of one another," Gray said, "the GIS map gave school board members, developers, and other stakeholders a chance to see how different variables within the community would affect the school and, ultimately, its students."

Testing and Research

According to Mike Phoenix, manager of education solutions for ESRI, there are about 3,000 colleges and universities using GIS software in the United States, and about another 4,000 outside. Asked about beta testing on campus, Phoenix said, "A small college or a large university with only one user is not a good place to give software or technology a run for its money." He continued, "But some universities have large labs with dozens of users and production-style operations. Other universities are using the software simply to teach one introductory class."

Universities have historically been very successful at research, adds Phoenix. "With tens of thousands of researchers and grad students around the world doing GIS research at universities, we can expect the diversity of GIS applications to continue to multiply rapidly. There is no way that industry or government could duplicate the vast range of research that is occurring at universities."

"Testing of GIS within universities can be a win/win situation as the GIS vendor can get its software put through the paces by students in a technology or development class, and the students gain valuable experience," says Sabby Nayar, strategic industry manager for
government and education at MapInfo in Troy, New York. "The challenge is to ensure that the testing is full cycle and represents a real-world environment." MapInfo provides GIS services to colleges in upstate New York such as RPI, SUNY Albany, and Siena College.

The challenges that lie ahead for GISs and the campus environment include the move to student-owned computers rather than large university-owned computer labs.

"It is quite a different challenge to provide software access to 20,000 students on computers owned by the individual students, as compared to putting the software on the computers in a GIS lab," says Phoenix. "I think that GIS will continue to spread across the campus, and that as more high schools teach spatial technologies, the students will become much more spatially literate. You will have more freshmen who know something of GIS and are interested in applying it in their studies. The thousands of graduate students presently doing research in GIS will become the next generation of professors and will expose a much wider base of students to these technologies."

According to Phoenix, the future of GIS technology on college and university campuses is bright. "Around the world today about 150,000 students a year are learning something about GIS," he says. "In five years this should have more than doubled, as data becomes more available, computers cheaper, and software more readily available. I think that university libraries will become more important to campus GIS operations as they become repositories of large amounts of GIS data."

Advice from the Trenches

Could a GIS be useful for your campus? Linehan of McHenry College emphasizes the importance of considering the use and value that a GIS will have for a specific application. "My advice to other IT managers would be to make sure that the users they are supporting want the specific application under consideration and that they—the users—clearly envision how it will function in their overall processes," he says. "Few, if any, IT managers should want to acquire or install a GIS application or most other applications for their own purposes and shouldn’t try to drive or push the adaptation of technology."

Len Walker of McHenry College believes that the beauty of a GIS is that it can provide detailed geographic maps as a means of reporting. Says Walker: "One picture is worth 1,000 words."


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Here's My Advice . . .
continued from page 48

this technology? Are there enough users and savings to justify the cost and effort?

The “Why?” step is the time for excellent visuals. Can you diagram the benefits in tangible ways? Spreadsheets, graphs, diagrams? If you can’t, don’t expect those with the approval authority to “see the big picture.”

Assuming you get past “Why?,” the next question is “Who?”

Now here’s a convergence topic—the convergence of responsibilities! I’ve been sounding the “stay relevant” warning to telecom folks for years trying to illustrate that new skills are needed to remain valuable to the organization as technologies change. Phone managers must now deal with message servers; voicemail systems are now PC based; and the IP network is probably carrying at least some of your traditional traffic. Conversely (and I think more difficult), the data manager is now being expected to deal with end users who want button #3 to be speed dial—no wait, make it a forward key, no, I don’t like that. How about a line status indicator?... Some organizations have shuffled the people into combined departments to converge management responsibilities while maintaining customer service skill sets. Some have resisted. Why? Often because the number of people that report to a manager defines the manager’s importance and salary. Not many managers want to give up head count and status.

Two years ago, we worked with a college telephone office to replace a 4,000-line Centrex with a premise-based system. Of course, the IT department raised the VoIP question. After all, according to the press and the vendors, everyone was putting in VoIP and it would be foolish not to. We invited the IT department to attend presentations from all the vendors and to ask questions that were important to their own self-interests. Questions about network load, redundancy, power, security, ongoing maintenance, and ongoing support costs all surfaced. The IT department decided it wasn’t ready for VoIP on a large scale. There was no acceptable answer to “Who?” The resultant system was a hybrid that used IP technology to communicate off campus but traditional TDM on campus. An IT resource with extensive knowledge of the network and cabling was transferred to the telephone office to take over the new system. It is working beautifully.

So “What?” is the plan? And “Where” will all this new technology reside?

Space and environmental conditioning are significant issues to address. Most campuses have improved wiring closets to at least support 10/100 Mbps data switches; but what about switches that provide power over Ethernet? Increased heat and power requirements must be factored. The UPS may have to be upsized (and the voltage changed from 120 to 208). The air conditioner may have to be larger (if you even have one). If you don’t already have air-conditioning, where will the new air-conditioning unit reside? Where will it drain? Don’t ignore these “little” issues! Some AC units must run year-round; make sure it doesn’t drain directly outside (freezing condensation pipes). I know of a campus that installed a split system air conditioner with the condenser unit next to a student bike rack next to the building entrance. Code requires an unlocked emergency power cutoff switch next to the condenser. Use your imagination here—I’m sure a student will one of these days…

“When” is it going to get done? School budgets typically run July 1 through June 30, and major construction is reserved for the period between commencement and return of students for fall classes. The Christmas break is another opportunity for systems change and upgrade. So now you have to work backwards. The important considerations are as follows:

• Design timeline
• Bid timeline
• Decision timeline (bid reviews, site visits, reference checks—and the time necessary to coordinate the dreaded “committee”)
• Trustee meeting (contract signature)
• Equipment lead times
• Installation timelines (don’t forget to factor in delays due to camps and conferences in your space and vacation time for key personnel)
• Cutover weekends

Conclusion

For many, the last major technology investment was Y2K related. Systems are nearing or passing their life expectancy, and new and promising technologies are available; but at the same time, budgets are tighter than ever, and justifying new initiatives takes more work and creativity than in the past. Leverage your professional relationships for ideas, and put the vendors to work helping you to create a new vision for your campus—complete with business case and the answers to who, what, when, where, and why!

Ron Walczak is the principal consultant and owner of Walczak Technology Consultants, Inc. He is an active contributor to ACUTA publications and presenter at ACUTA events. Reach Ron at ron@walczakconsultants.com or visit www.walczakconsultants.com.
Convergence and Next-Generation Technologies—The Same Five Questions

As I read the list of topics to be covered in this issue of the Journal, it struck me that there should be no lack of things to do for the foreseeable future if you can find creative applications that can be shown to help your institution’s bottom line. Be wary of projects and technologies whose best justification is “It’s cool.”

With that said, there are some cool technologies that have benefits that go to the heart of the operation of the institution—a very good combination indeed! Since not every technology fits every institution, your approach to evaluating these new and emerging opportunities should include answering the same five questions your writing professor would require:

- Who?
- What?
- When?
- Where?
- Why?

A few of the “What” categories covered in this issue of the Journal include convergence, presence communications, wireless access, and VoIP. Assuming you already know what these technologies are, the “What?” question is already answered.

When was the first time you heard or read the term “convergence?” Probably quite some time ago. So are you converged yet? Why not? I’d wager it’s because you couldn’t get past “Why?” And for many of you, that was probably a good thing! Rushing into a new technology because it’s featured on some magazine cover or promoted by an 800-pound gorilla in the marketplace isn’t always in your best interest. Answering the “Why” is the most important step in the process. Sometimes it’s easy. Equipment at the end of its life cycle, growths in legitimate demand, and eliminating barriers to conducting business are intuitive. But what about convergence and next-generation technologies? How do you answer the “Why?” This takes a bit more work.

First define the term for your organization. Does convergence mean voice, data, and video on the same wire, on the same backbone, in the same processor? To some it means convergence of responsibility, to others it means standardization on a vendor platform. What are we trying to converge? Technology and/or people? Why are we doing this?

A next-generation technology such as wireless access brings with it security and management issues that may overwhelm your organization. We just completed the design of an 800+ radio infrastructure for a university that will provide total coverage of 140+ buildings and green spaces. Fun to design—a potential nightmare to operate and maintain. Lots of “who” and “what” questions to answer to make this a success. Why did this university decide to install the system? I never asked, as it was decided prior to my arrival; but we have been diligent in raising issues that must be addressed before going live.

Presence communications is covered in this issue—again, a great concept. Are you prepared to answer “Why?” What are you going to accomplish? What benefit will it bring to the organization and at what cost? Not to sound cynical (well, maybe a little), but all your students have analog telephones and your faculty won’t even attend training to learn how to use voicemail. Who will be using...
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