Summer 2007

ACUTA Journal of Telecommunications in Higher Education

Follow this and additional works at: http://digitalcommons.unl.edu/acutajournal

http://digitalcommons.unl.edu/acutajournal/44

This Article is brought to you for free and open access by the ACUTA: Association for College and University Technology Advancement at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in ACUTA Journal by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
Do more than just talk to students. Really connect.

Reach them in an instant to enhance safety and build a stronger community with the mobile campus solution from Sprint and Rave Wireless.

Introducing the mobile campus solution from Sprint and Rave Wireless, the all-in-one wireless application suite that can create a more integrated university experience for students, create a more productive working environment for faculty and staff, and ultimately, strengthen on-campus community.

- Students can receive broadcast text messages, access university email, view student/staff directories, and get extracurricular campus group announcements

- Students can access course announcements like homework or quiz reminders even on the go

- GPS-based application enables students, faculty, and staff to view the location of campus shuttle services right on their mobile device

- GPS-based tracking application helps you assure that students remain safe and sound while on campus

For more information, go to www.sprint.com/rave
## Events Calendar

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Conference</strong></td>
<td>July 29–August 2, 2007</td>
<td>Westin Diplomat Resort &amp; Spa Hollywood, Florida</td>
</tr>
<tr>
<td><strong>Fall Seminars</strong></td>
<td>October 14–17, 2007</td>
<td>Minneapolis Hilton Minneapolis, Minnesota</td>
</tr>
<tr>
<td><strong>Winter Seminars</strong></td>
<td>January 27–30, 2008</td>
<td>Disneyland Hotel Anaheim, California</td>
</tr>
<tr>
<td><strong>Spring Seminars</strong></td>
<td>April 6–9, 2008</td>
<td>Sheraton St. Louis City Center St. Louis, Missouri</td>
</tr>
</tbody>
</table>

### ACUTA's Core Purpose
ACUTA's Core Purpose is to support higher education communications technology professionals in contributing to the achievement of the strategic mission of their institutions.

### ACUTA's Core Values are:
- Encouraging and facilitating networking and the sharing of resources
- Exhibiting respect for the expression of individual opinions and solutions
- Fulfilling a commitment to professional development and growth
- Advancing the value of communications technologies in higher education
- Encouraging volunteerism and individual contribution of members
VolP: Can You Hear It Coming?

INTERVIEW

To VoIP or Not to VoIP
Elwyn Hull
Is VoIP really ready for prime time? Hull says that's the big question facing all of us right now, and his answer is yes...and no. The reason for this ambiguous answer has less to do with VoIP technology itself and more to do with everything around it, explains Hull.

Preparing Your Campus for a VoIP Conversion
Walt Magnussen, Ph.D.
Every campus needs to be considering a timeline for conversion to VoIP, says Magnussen. He describes organizational, financial, and infrastructure considerations that will make the ultimate conversion go much more smoothly.

Preparing Your Campus for a VoIP Conversion
Walt Magnussen, Ph.D.
Every campus needs to be considering a timeline for conversion to VoIP, says Magnussen. He describes organizational, financial, and infrastructure considerations that will make the ultimate conversion go much more smoothly.

Going Wireless at Fiber Speeds
Curt Harler
The converged campus of the future will have an expanded wireless component. Harler looks at two campuses that have already implemented wireless solutions to some common problems.

Open-Source VoIP for Colleges and Universities
Chad Agate
What are the rewards and risks of VoIP in a university setting, and how can open-source VoIP solutions maximize an institution's return on investment while overcoming many implementation obstacles? Agate offers his perspective on these and other questions.

Strategic Planning in the College and University Ecosystem: The Common Denominators
James S. Cross, Ph.D.
Linda B. Wright, Ph.D.
What is the value of a strategic plan, how is it different today, and why is it critically important for the success of your department in the years to come? In a follow-up to the article in the Spring ACUTA Journal, Jim Cross and Linda Wright examine some specific characteristics of an effective strategic plan.

Institutional Excellence Award
Honorable Mention
The Naval Postgraduate School

Advertorial:
George Kassas
Cedar Point Communications has purchased advertorial space to tell you about their products that will help you make VoIP an effective choice for your campus.
Upgrading to converged communications doesn’t have to be a painful process. No need to tear out legacy voice solutions just to gain the benefit of VoIP, meet E-911 compliance and handle increased call volumes. Carrier Access can help you gain the real benefits of VoIP by bringing the new features and functionality you, the faculty, students and administration want and need. We provide you the ability to gracefully migrate, when you want.

Give us a call. Carrier Access knows what it takes to create a robust, cost-effective communications solution for college and university environments. Our carrier-grade products withstand the abuse of extreme environmental conditions, high call volume and throughput pressures, at the cost of lesser solutions. You gain the benefit of our experience without the painful learning curve.

So the task at hand is to deliver high-quality (can you hear me well?), reliable voice services using the data network and IP protocol. Voice is a mission-critical application and your network must be ready to support it.

Ron Walczak
Page 48
VoIP Campus Phones by GAI-TRONICS

Features:

- No Additional Interface Required!
- Embedded Web Browser Configuration
- Power Over Ethernet (POE) or 48 Vdc
- SIP Compatible
- RJ45 LAN or WAN direct connection
- Real Time Event Monitoring

Worldwide Emergency Communication System Solutions for over 60 Years

GAI-TRONICS®
A Hubbell Company

1-800-492-1212
www.gai-tronics.com
VoIP Is Coming to Providence (One Step at a Time)

Recently ACUTA held its first summit, a very interactive exchange of experiences with VoIP. We attribute much of the success of this event to the topic—IP communications has been on the minds of both our institutional members and corporate affiliates a lot lately.

Like many of you, I have been charting the progress of voice over Internet protocol for several years. It makes great sense for schools with multiple campuses, schools retiring their Centrex contracts, schools needing to invest in a new PBX, those with limited underground conduit space, and large research schools that collaborate with other entities both domestically and around the world.

At a small- to-medium-size school like Providence College, none of these scenarios existed. So for a few years I asked myself why I would attempt to convince senior management that I needed to invest precious capital to “re-invent” dialtone. Why would I want to tamper with the 99.999 percent reliability our campus was accustomed to? My PBX was at the latest version of software and even had the capability to do VoIP. And there were other physical requirements to implement the technology properly that would require significant funding.

As an ACUTA officer over the past few years, I have had the unique opportunity to attend numerous presentations by my peers, and I have listened intently to how they deployed this new technology. I have been impressed by the ways presenters have thought the process through, then put their plans to work. I admit I have also been a bit envious as I have no such story to tell, but it has motivated me to want to do it as well. I decided that I would seek funding for a simple trial by deploying a few phones on a trial basis to get my feet wet.

With none of the compelling reasons to go VoIP, I decided to query other departments on campus to learn how the new technology could contribute to recruiting better students, improve the teaching process, or facilitate fund-raising—things that are especially important to upper-level administrators. With no “killer application” to back me up, my request for funding was turned down.

What I needed to do was step back, look at the industry as a whole, and recognize that the successes of my peers and the vendor community will eventually determine the speed at which IP technology will become pervasive and displace the tried-and-true (but not as feature- and application-rich) TDM technology. I’m now of the opinion that VoIP’s applications and benefits will be evident once it is being used successfully on the campus network; no killer application will bring it to the campus.

Meanwhile, a funny thing has been happening: Senior higher education leaders are being introduced to VoIP technology and its capabilities through their own publications and seminars. In addition, other communications resources such as video, video surveillance, card access, energy management, and more have begun to migrate to the IP data network, and I have begun to hear, “When are we going to do VoIP?”

So as I write this, you all should know that my most recent request for funding was granted, and I have placed my first order for the equipment necessary for a VoIP trial project within the information technology department this summer. I’m looking forward to having my own story to tell very soon.
EMERGENCY COMMUNICATION
WEBS™
BY TALK-A-PHONE

At Talk-A-Phone, we have developed technologies that have made us good listeners and talkers. With WEBS, we have given you the ability in an emergency situation, to broadcast security over a wide area. WEBS™ (Wide-area Emergency Broadcasting System) can be heard 1000 ft in every direction. All call paging, zone paging, or single location paging. Wired or wireless. Integrated emergency phone. Listening is a skill but sometimes it's good to be loud, really loud.

WEBS® & Talk-A-Phone are registered trademarks of Talk-A-Phone Co. *Patent pending
ACUTA Survey on VoIP Draws Wide Interest

ACUTA's recent survey on the deployment of VoIP at colleges and universities has drawn the attention of higher education and technology media throughout the country. This is clearly a topic of major interest and has generated many interviews highlighting the state of VoIP implementation at many of our member campuses.

The survey was created by the Program Committee as a tool to measure member attitudes about VoIP leading into the (very successful) ACUTA Summit on IP Communications held April 1–4 in Baltimore. An executive summary of the survey report is available on the Web at www.acuta.org?1779. The full report is available free of charge to member institutions and companies and at a nominal charge of $15 to non-members on the ACUTA website.

I believe that the survey results and the record-breaking participation in our Summit on IP Communications demonstrate that colleges and universities are seriously considering the benefits that VoIP can provide for their campuses.

Our members are doing their due diligence in learning about the technology and what applications might benefit their campus, investigating all the related costs, and learning how their networks and organizations need to be retooled for implementation of VoIP technology.

They are learning from each other and from the vendor community about this technology, experimenting with it through pilot projects, and deploying VoIP systems where it makes sense in their particular situations. While our members do not accept vendor claims at face value, they do look to vendors (particularly those with whom they have an established relationship) for valuable information and insight.

The survey also shows that many colleges and universities are engaged in planning and budgeting to pay for the new technology, and figuring out the business models that will work on their campuses to allow them to deploy and maintain VoIP, if and when it makes sense for their institution.

Here are some highlights of the survey results:

- **What percentage of desktop phones at your institution are VoIP?** Somewhat surprisingly, only 35 percent reported no VoIP use on their campus. The majority of campuses have deployed VoIP on a limited basis, with fewer than 25 percent of their phones.

- **In what types of facilities have you tried VoIP?** VoIP is being used most frequently in the offices of IT employees. The other most frequent uses are in pilot projects, remote buildings, and new construction.

- **What are the most likely results from deploying VoIP at your institution?** Members reported that reduced cost for moves, adds, and changes; greater flexibility and mobility for faculty, staff, and students; and reduced cost of wiring are the top three most likely results.
Members expressed interesting views regarding the information they receive from vendors about VoIP. A striking 92 percent believe that vendors frequently overhype the benefits of VoIP. However, 52 percent feel that vendors with whom they have a good relationship have influenced their choice of VoIP. Sixty percent feel that the end of life of traditional phone products and the end of support services by vendors are prompting them to seriously consider VoIP.

When asked what factors have caused institutions to avoid or delay widespread VoIP deployment, members named the unnecessary expense of replacing equipment that currently functions well as the primary reason. The need for network and wiring infrastructure upgrades, E-911 compliance, and lack of financial support were the next three major concerns.

When asked about the potential benefit of various IP applications, members named unified messaging, emergency notification, business continuity, voicemail, and voice over wireless as the top five potential benefits. Desktop video and videoconferencing, audioconferencing, IP-based security cameras, collaboration and productivity tools, and adaptive devices for individuals with disabilities were also named as potential benefits by more than 70 percent of respondents.

When asked whether VoIP will save their institution significant money over the next five years, most respondents either disagreed or were neutral. Only 19 percent felt that significant savings would result.

I would encourage you to obtain and share the full report with colleagues on your campus who are interested in this subject. I hope you will find it a valuable source of benchmark data as your campus considers and plans for implementation of this technology.

Like the hovercraft, Mohawk gives you versatility. In Open Architecture it's all about choice. Now Mohawk's ChannelMate™ warranty lets you match their cable with any TIA/EIA-568-B verified compliant hardware.

Have it your own way, from backbone to outlet fiber and copper, vertical to horizontal, by creating your own customized network infrastructure. Mohawk accredited contractors ensure high-performance with end-to-end interoperability with a system warranty from 15 years to a lifetime.

One cable company, many system options. The choice is yours. The guarantee is ours. To find out more, visit us at www.mohawk-cable.com or call 800-422-9961.
To VoIP or Not to VoIP

Elwyn Hull
University of Texas
Southwestern Medical Center at Dallas

One of the classic devices of great literature is the ominous rumbling in the distance. Whether the rumbling is the sound of thunder, armies marching, or an earthquake about to shake the earth, you know that low, quiet sound will soon be replaced by a very loud clamor that signifies a turning point.

For years in the telecom area we have had our own kind of rumbling. It is the sound of the voice over Internet protocol (VoIP) movement gathering momentum before it supposedly engulfs us like a tsunami. We’ve been told that VoIP will replace conventional telephone service as the standard for voice communications. We’ve been told how it will save money in reduced infrastructure costs; in move, add, and change (MAC) costs; and especially for frequent long-distance callers. And we’ve been told how it will give us a level of connectivity we’ve never had before—even when we’re away from the phone.

But is VoIP really ready for prime time? That’s the big question facing all of us right now. The answer is yes … and no.

The reason for the ambiguity has less to do with VoIP technology itself and more to do with everything around it, from the backbone it rides on to the ability to manage it and support it with the users. A great many issues have to be factored in before you can make a decision. Not all of them are readily apparent.

My beliefs on this issue have come from two vantage points. One is my day job as director of the Division of Telecommunications at the University of Texas Southwestern Medical Center. The other is as the newly installed president of JUST-US (Joint Users of Siemens Technology).

In the former position I have faced many of the same issues we all have. I have looked into the technology, studied it carefully, and even piloted it in some cases. I am cautiously optimistic about what it can do in a number of areas.

In my position with JUST-US I have had the opportunity to speak with telecommunications professionals at dozens of other organizations of all types. They have shared their experiences, successes, and concerns with me. This, in turn, has given me a much broader view of the challenges facing all of us.

From all of this I have gleaned some pretty clear insights into where VoIP is and what it’s all about. That rumbling you hear in the distance isn’t just the technology. It’s also coming from the people who are facing the decision of whether to convert to VoIP.

If It Ain’t Broke ...

One of the cardinal rules that plays into any technology decision is the old saying “If it ain’t broke, don’t fix it.” And for most of us, plain old telephone service (POTS) and those old “iron horse” PBXs we’ve been using are about the most “unbroke” systems we have.

Every day users make hundreds or even thousands of calls, and everything works beautifully, with little thought or effort. That raises the question of why you’d want to replace something that works so well with a technology that has yet to fully prove itself. After all, they don’t call it dialtone reliability for nothing.

There can be any number of reasons to consider VoIP. Cost savings certainly are one. If your school makes a lot of long-distance calls, the savings may be substantial. For
Everything looks great from here.

Go ahead and get a jump on the 3Com® Summer School savings event. It's your chance to realize exceptional savings on 3Com's Solutions for Education—from networking to wireless to IP Telephony. So why wait?

If you're eager to improve your school's performance and enhance your learning environment, now's the time to dive right in.

3Com Summer School 2007
Spring Price Break

www.3com.com/summerschool/3
example, if you have a research group that is collaborating with others in universities around the world, it may need to have frequent voice conversations. Those calls, especially if they go on for a long time, can add up quickly. VoIP technology may drive those costs way down.

If you frequently need to extend connectivity to a number of small remote locations, moving to a VoIP system also might make sense. Rather than having to run expensive T1 service out to each location, users can take advantage of locally provided DSL or cable systems to connect to the Internet for both voice and data. They get full connectivity without adding phone charges, line maintenance charges, and other fees to your monthly cost.

For remote locations requiring a number of stations, a separate key system or remote PBX may have been the solution in the past. With VoIP, stations off the main campus VoIP PBX can now be installed at the remote site. The services and features provided for these remote employees are then no different from those enjoyed by the rest of the university staff. And the main campus telecommunication support staff require no additional skills or training to support these remote locations.

At UT Southwestern we have clinics and offices all over campus, as well as a few close to, but off campus. We are using VoIP to connect these remote sites to the university as though they were in one of the main buildings. We’re able to manage their connections remotely, and from a quality standpoint you really can’t tell the difference when you’re on the phone with them.

Another reason to consider VoIP, of course, is for users who frequently change locations throughout the day, such as a professor going from her office to a lecture hall and then to a lab. The potential is to have these users take advantage of a unified communications system that allows phone calls to their offices, e-mail, faxes, and other message systems to follow them wherever they go, with real-time accessibility. To achieve true unified communications, you need VoIP.

Telecommuters are another group that can benefit from VoIP. The challenge with telecommuters is getting both voice and data information out to them. Although they could use their own phone lines and just log in for data through a VPN, it’s a hassle for them to submit expense reports each month for their authorized phone usage, and nearly impossible for managers to keep tabs on what they’re doing. With a VoIP system you can deliver voice and data services together, and use the same management tools to monitor both telecommuters and in-house workers. All while controlling costs.

Then there’s the practical side. If you have one system for voice and another for data, that makes two systems you have to support. Rolling voice traffic into the data network reduces training time for your IT and help desk staff. It also simplifies user support by eliminating one source of potential problems.

Finally, the reality is most of the vendors of telecom equipment are looking to move away from traditional phone services and into VoIP. As a result they have either discontinued support for PBX and other, older phone systems or are in the process of scaling back. If you want vendor support in the future, you’ll need to start looking into VoIP.

Slings and Arrows

Those are some of the many reasons to make the move to VoIP. So what are the technology risks?

Probably the biggest one is whether your data network is robust enough to handle the special requirements of voice traffic. Unlike bursty data traffic that can accommodate a few lost packets here and there or retransmissions that might add a little delay, those situations cause havoc with voice traffic and can create a huge disruption or, at a minimum, degraded service. Any mobile phone user can attest to that. Higher overall network latency or delivery of packets out of order can lead to a loss of quality or echoing during calls, particularly during peak usage times.

One definite weakness with VoIP comes with fax machines or other analog devices such as credit card terminals. Unlike voice traffic, where connections are primarily made point to point, faxes and other analog-connecting devices require several steps before a connection is made. First the machine on one end has to negotiate a connection with the machine on the other end, and then they have to complete a "handshake" before data can be transmitted. Any glitch during this process means the analog transmission won’t complete. Handling analog ports on a VoIP PBX, with analog adapters, can provide a new set of challenges—including configuration changes that often have to be made to the analog devices themselves. Some of these older devices cannot be supported with the new analog adapters.

Once the connection is made, packet loss becomes another risk. The loss of a few packets during a voice transmission is an inconvenience and may require the listener to ask the speaker to repeat what he said. There is no repeating with a fax or other analog device—just a loss of connection and the need to start all over. The bottom line is if your users transmit large amounts of data via fax or use
other analog devices on a regular basis, you may want to reconsider a VoIP installation for now. Or, at a minimum, analyze thoroughly how fax transmissions navigate the VoIP systems you are considering. Medical personnel, HR departments, lawyers, and business offices are some of the groups that rely most on faxes.

System availability is another concern. Your IP network may be redundant at the core. But do you have complete redundancy throughout campus? If not, and the network goes down, you’ve just lost all communications at every location not served by the redundant components. With so much dependency on network drives, not only is the user’s PC virtually useless, but his phone is dead as well. You always have to be prepared for the worst-case scenario and have the plan and equipment in place to manage it. Otherwise the entire campus can come grinding to a halt.

One last concern is what happens during a power loss. Some traditional phone systems do not require local power to operate as they draw their power from the telephone company central office. Traditional TDM PBX systems powered the instruments from the main switch that often has anywhere from two to eight to even twenty-four hours of backup battery power. Not so with a VoIP system, where the servers and even the stations depend on AC power. If the power go out, without backup and UPS service, the phone system goes out with it. Main servers may have backup power, but what about the stations? With the proliferation of mobile phones, however, this is much less of a problem, at least for outbound calls. For inbound calls, if you are moving to VoIP, you will want to make sure you have a backup power source available throughout the network.

Where to Start
One of the toughest parts about making a major technology change such as a move to VoIP is knowing where to start. Obviously, you’ll want to pilot it first before committing to it across the board. Even then, however, the strategy leaves a lot of possibilities open.

One idea is to start from the periphery and move inward from there—not necessarily geographically (although it may wind up that way) but in terms of what services are core to the school and which ones play more of a supporting role. For example, if you have satellite locations that tie into the main campus network you may want to start there. That way, if there’s a glitch, the learning curve affects only an ancillary location. It’s inconvenient for them while the system is down, but it’s definitely much easier to isolate the problem—and also a lot less risky to the school as a whole.

Another approach is to look at your users and see if there is a cluster who are more risk-tolerant or more “early adopters” than others. They could be grouped by job description, department (IT professors or staff will likely be willing to try it), location, or some other criteria. A cluster like that will not only be more willing to take a chance on a new technology; they will likely be more willing to provide you with feedback you can use to move the entire VoIP project forward later.

---

_Mutare Software_  
-www.mutare.com-

_When it comes to choosing a mass notification system, you don’t need a Communications Degree to make the right choice!_

Due to recent events, addressing your organization’s Emergency and Event Notification concerns is now an operational imperative. Finding the right solution in a “one size fits all” market place of providers may not be the best approach for you. Consider the following:

- Will a shared hosted solution meet your security and privacy standards?
- When the time comes for a broadcast, will a shared resource be reliable?
- Does the solution leverage your existing IT investment?
- Finally, can your needs truly be achieved with a “cookie cutter” approach?

Just as every college is not the same, not every provider of Emergency and Event Notification applications is the same. Look to Mutare (a Platinum DevConnect Partner with Avaya) to provide the education that you need to customize an affordable solution that is right for you. Stop by our booth at the National Conference or visit us on the web at www.Mutare.com.
User group meetings are a great place to pick up ideas for additional rollout strategies. At the JUST-US Conference in Orlando, there will be several formal presentations by users who have installed partial or full VoIP solutions. As at an ACUTA conference, you will also have ample opportunity to discuss various VoIP-related topics informally at cocktail hours, breakfast meetings, or even in the hallways between sessions. This kind of first-person feedback can be invaluable in helping you determine (1) if VoIP is the right choice for your campus and (2) how to go about implementing it if it is. User group members in general love to talk about their successes and share them with others. It’s helpful if they will also discuss their problems and failures. You can learn a lot just by being there.

Vendors of VoIP equipment can also be very helpful. You have to sift through what they provide to separate their commercial interests from the factual information, but that’s not too difficult. The VoIP market is still young enough that all of them have an interest in promoting the category as well as their own products. Webinars, white papers, technical documentation, and more are readily available and often free. Put your filters in place and take advantage of all you can.

One last source of information is certification classes. Not only is the information they provide helpful in providing context, but the instructors often have hands-on experience with VoIP technology and can share their experiences. Classroom discussions can flesh this information out further as your classmates share their ideas, stories, and questions. You’ll walk out knowing much more than you did before and will be armed with a better background to use in making decisions. The JUST-US Conference has added certification classes to its program for that very purpose. Other user groups are doing so as well.

Perchance to Dream

There is much more to consider regarding the implementation of VoIP. Financial considerations—your current investment as well as new costs to upgrade closets and the network—must be part of any investigation. Also worthy of discussion are many organizational issues: Who is responsible for maintenance, training, customer service, help desk? And there are personnel issues involved in converging departments. We have just scratched the surface here.

VoIP technology offers a great many benefits to colleges and universities. But there are also some major risks to address, in terms of both the technical side and the practical aspects to the users. Not the least of those risks is replacing something that works perfectly well right now with a system that has yet to prove itself in your environment.

Just as Hamlet came to realize, there is no simple answer. You can be assured, however, that VoIP is the way of the future; the sooner you become familiar with it and understand its nuances, the better prepared you will be for that future.

Elwyn Hull is director of the Division of Telecommunications at UT Southwestern Medical Center, a past president of ACuta, and the newly installed president of JUST-US. Reach him at elwyn.hull@utsouthwestern.edu.
Preparing Your Campus for a VoIP Conversion

Walt Magnussen, PhD
Texas A&M University

As you, your department, and your campus prepare for conversion to VoIP, there are many factors to consider. In a few cases, the conversion is just another speed bump; but for many of us it can represent an entire paradigm shift with organizational, financial, and infrastructure considerations. While the conversion can be a challenge, it should also be viewed as an opportunity for your department to ensure that critical services will always be available, and at the lowest cost possible.

In March 2007, there was an exciting thread on the ACUTA listserv that posed the question “Why should I fear VoIP?” A host of responses came back ranging from “Why do you need to do it in the first place? There are reasonable traditional solutions,” to “You may just as well do it now since it is inevitable.” While no single answer is right for everyone, the facts remain that (1) all electronic equipment has a finite life span and (2) manufacturers either have abandoned all development of traditional architectures or are planning to do so. If those two statements are true, then it is logical to assume that the change will happen sometime during our careers.

Organizational Issues

In most cases, converged networks involve some sort of reorganization. Historically, many telecommunications departments reported to either the physical plant department as a utility or to business services. Most campuses have already gone through some sort of reorganization that more closely aligns the providers of telecommunications services with the rest of the information technology functions. In some cases it is two separate directors (telecommunications and network infrastructure) reporting to the same vice president, and in other cases both functions report to one director.

Even if they report to the same director, telecommunications technicians and network infrastructure technicians often remain as two separate business units. A strong argument can be made for keeping these two entities separate (especially if they operate under different funding models) since, in the converged environment, the job description of the network infrastructure group includes the installation of wire, jacks, patch panels, switches, and routers, and the telecommunications group is primarily responsible for the provisioning and support of end-user devices on the desktops. Furthermore, as separate entities, the two groups still need to be closely aligned since the network infrastructure group owns and manages the network that voice over IP services depend upon.

The key to a successful integration is establishing processes that allow the telecommunications group enough access to network resources to enable them to turn up a new service. This will eliminate the need for a separate work order and two technicians to do a single installation.
Areas that do allow for tighter integration are the help desk and customer support functions. Since most VoIP devices now support SNMP, it is fairly straightforward to enable existing network-monitoring systems to monitor the VoIP systems as well, although for a true picture of voice quality and functionality, more specialized monitoring systems are necessary.

Financial Aspects

The early VoIP thought process was that VoIP would result in significant savings. Savings would come from being able to use off-the-shelf hardware, being able to reduce staff, and combining two wiring systems into one. The fact is that VoIP by itself will rarely result in a cost reduction. It will allow for a more robust, distributed deployment (better for business continuity), it will ensure a supported platform for years to come, and it does offer more cost-effective solutions for connecting remote offices. It also appears that many of the network-enabled peripherals such as voice mail, auto attendant, and automatic call distribution are becoming much more feature rich with VoIP solutions.

It is important to structure a cost-recovery model for VoIP solutions that will ensure continued financial viability. Some considerations that set VoIP apart from more traditional solutions are:

- Life cycle of hardware. While for the most part VoIP instruments and time division multiplex (TDM) instruments should have about the same life cycle and cost, this will not be the case for central hardware (key systems, PBXs, and call proxies). It was not unusual to keep a PBX in operation for 10 to 20 years. Since all of the new hardware is built on standard servers and routers, which typically have a four-to-five-year life cycle, it is going to be important to factor in capital cost recovery based on a shorter duration. On the positive side, the migration to the industry standard session initiation protocol (SIP) should result in lower-cost instruments resulting from competition in this space.
- Software costs. With traditional telephone switches, a campus could purchase a telephone and there were no ongoing software costs associated with it. Many campuses self-maintained the instruments. For repairs, they could be sent into the manufacturer or a third-party repair shop. Some repairs were done in house, resulting in little recurring costs for instruments. The current trend seems to be to add an annual license cost for VoIP instruments, which will have to be factored into the cost of provisioning VoIP services.

In addition to the instrument costs, with traditional telephony many universities chose not to keep all the central hardware under maintenance and then to pay for upgrades as they were needed. Since VoIP is based on standard operating systems, which are subject to issues such as viruses, it is important to keep all the central applications under some sort of maintenance so that patches can be quickly applied as needed.

It is also important to remember that the VoIP servers not only consist of the voice applications but also have an operating system (typically Linux, Solaris, or Windows) and may also have a database component (Oracle, SQL, or some other database). One advantage with VoIP is that these costs can often be unbundled from the VoIP application if the campus has an appropriate campus site license.

- Infrastructure. The most significant difference between VoIP and traditional voice services is in the area of infrastructure. In this case, the infrastructure is defined as the medium between the calling parties. In the case of traditional telephony, the infrastructure is typically copper wire and a PBX. In the case of VoIP, it is the Cat 5/6 wire, switches, and routers that make up the data network. One problem is that the VoIP and other real-time applications have more stringent delivery requirements than other allocations. The provisioning of these requirements will have cost implications that should be factored into the cost of serving VoIP customers.

Infrastructure Considerations

The International Telecommunications Union–Telecommunications Standardization Section (ITU-T) has defined, in the G.1050 specifications, delivery requirements for real-time applications. The specifications contain maximum parameters for packet loss, jitter, packet reordering, latency, and other critical factors. The provisioning of the network can be accomplished in one of three ways: (1) by the establishment of a separate network; (2) by the establishment of a separate virtual network through either virtual LANs or through prioritization of voice traffic over the existing network (QoS); or (3) by overprovisioning of bandwidth. Infrastructure issues that relate to VoIP services include provisioning the VoIP network, documentation, and network monitoring.

- Provisioning. What is the best method of provisioning the VoIP network? As is often the case, there is no one best answer for all campuses. For example, in the case of a small campus or remote office, gigabit connections between
communications closets with 10/100 megabit connections to the desktop should suffice (over provisioning). For large campuses, either VLANs, implementing QoS, or a separate physical network may prove to be the most effective solution, depending on the state of current infrastructure.

- Documentation. Current E-911 systems that involve utilization of automatic location information (ALI) databases can easily support fixed VoIP. One of the advantages of VoIP, however, is the mobility that IP-based services offer. As the leaders in 911 services, the National Emergency Number Association (NENA) is currently in the process of defining methods of locating mobile VoIP devices even in mobile environments in the proposed NG911 (next-generation 911) solutions.

One device that appears to be a key component for enterprise networks will be the location information server or LIS. This device will ultimately map the geographic location (building and room number) of the jack that a phone is plugged into or the wireless access point to the MAC address of the device to the IP address to the telephone number. While the equipment that will ultimately accomplish this mapping does not exist today, one thing that is certain is that it will require accurate records of the locations of all jacks and access points. Since this can be a large task for large networks, it is incumbent upon all of us to begin the documentation process now so that it will not be overwhelming when we get to the point it is needed.

- Network monitoring. One significant difference between current infrastructure (basic wire) and the infrastructure necessary for VoIP is the dynamic nature of the network that carries VoIP services. Once copper wire is placed, it rarely

changes. Our data networks, on the other hand, are extremely dynamic. This difference mandates a proactive network management system that detects network impairments specific to VoIP and reports them, or better yet, corrects them in real time.

While such issues may seem overwhelming, the fact remains that the transition to VoIP for telephony is inevitable. Many institutions are choosing not to make the leap yet; however, a basic understanding of the issues will assist IT managers in making decisions, ultimately making conversion easier. For those of you who have decided to begin the conversion, it appears the time is right in terms of technology maturity. This leaves institutional issues to resolve. With heightened communication, planning, and education, institutional issues as well can be overcome.

Walt Magnussen, president-elect of ACUTA for 2006-07, is the director of telecommunications at Texas A&M University in College Station. He also co-chairs the VoIP SIG for Internet2 and directs the Internet2 Technology Evaluation Center, a VoIP research center at Texas A&M. At ACUTA's 2007 Annual Conference, he will present a preconference seminar titled "A Checklist for Implementing VoIP." Reach Walt at wmagnussen@mail.telecom.tamu.edu.
Strategic Planning in the College and University Ecosystem—The Common Denominators

The pervasiveness and complexity of communications technologies within the college and university ecosystem are largely responsible for the need to rethink, revise, and refocus strategic planning efforts. The widespread use of digital communication technologies has exposed the many perils and pitfalls in the life cycle of this strategic resource. Smart and good, status-quo type thinking isn’t enough anymore, as we said in part 1 of this article in the spring 2007 ACUTA Journal. More responsive strategies, innovative management methods, and creative products and services re-engineering are required for success as the university ecosystem is being transformed.

The vision for 2008 and beyond is to empower stakeholders by exploiting the capabilities and potentials of a wide array of information processing technologies; i.e., high performance processing systems, converged VoIP networks, hypervisors, networks with speeds of billions of bits per second, multi-megabit bandwidth on demand, and exabyte databases.

The magnitude of technology challenges was recently addressed by John Gantz, a technical research analyst at International Data Corporation (IDC), as he observed that this year for the first time, there won’t be enough storage capacity in the world to hold all the stuff being created. To illustrate, researchers at IDC indicated that 161 exabytes of data were generated in 2006. That’s the equivalent of 36 billion digital movies, 43 trillion digital songs, and 1 million digital copies of every book in the Library of Congress. The growth is projected to increase to more than 988 exabytes by 2010. Our technology resources are essential, but they must be strategically managed and guarded, not taken for granted.

In today’s competitive era of rising expectations, escalating user demands, tight budgets, and soaring security expenses, college and university administrators are challenged as they seek to create value for key stakeholders. While technology is valued in and of itself, its value is magnified through application and integration with other resources within the university environment. Sandra Roberts, director of telecommunications at Wellesley College, says, “Our goal is to come up with a purpose statement for the IT organization, which at Wellesley is a merged organization with the library. A statement that identifies who we are, our purpose, vision, values ... and what makes us proud.”

The strategy is to provide stakeholders access not only to their own personal information but also to the seamless web of heterogeneous computing resources anywhere. The complexities of making the transition in an Information Age college and university will be disconcerting to many. Realization of the demands inherent in the Information Age as applied to the education ecosystem is critical to commu-
nicate and work effectively in the future. Creative and successful application of the technology will mean assessing its impact on the curricula, faculty, staff, students, facilities, finances, and decision making. The preparation of the next generation of faculty and students to effectively use the information appliances of tomorrow to overcome time, distance, and location constraints is disruptive, time consuming, and costly. Add to this the complexities involved in designing an effective instructional unit for a complex, multi-tasking, increasingly multicultural student population, and the challenge seems almost insurmountable.

**Strategic Planning**

In the general sense, strategic planning is the disciplined process used by organizations, including colleges and universities, to guide decisions and actions to shape the direction of the ecosystem with a focus on future goals and objectives. It is a complex, thought-provoking, challenging, messy, and sometimes controversial process with many unknowns, and through it, the insights gained today might very well alter the decisions made yesterday. A review of the literature and an evaluation of various strategic plans of colleges and universities indicate that the strategic planning process is driven by the mission, vision, values, goals, and objectives of the institution as it strives to develop the citizen leader of tomorrow and the workforce of the 21st century.  

Of particular interest in today’s environment is the strategic planning process as it applies to educational systems and the use of technological resources. In its IT strategic plan, Northwestern University states, “As Northwestern University continues its prominence in global higher education academics and research, information technology and high performance information resources are essential to the university’s mission and its ongoing operation. The strategic initiatives outlined are designed to advance research, scholarship, and administrative endeavors in the following university-identified areas:

- Faculty and the environment for creative work
- Students and the environment for learning
- The technology-enabling infrastructure
- Staff and the environment for effective administration.”

Keene State puts IT at the core of the university’s mission: “Information technology is a catalyst for change providing the foundation, direction, and impetus to improve services at the college.”

Texas A&M’s strategic plan also identifies IT’s role in the success of the university: “Information Technologies (IT) are increasingly important to all parts of the university. The aspirations of Vision 2020 cannot be realized without a high-quality IT infrastructure. Not too many years ago computing and computer networking were of importance primarily to the sciences, engineering, and the business operations. Today, however, all segments of the university depend on desktop computing, network connectivity, and access to the Internet and strategic administrative systems.”

---

**RED ALERT**

Notify, Respond, Communicate, Instantly!

Use RED ALERT for instant large-scale and everyday notification needs!

- A must when an immediate response is vital
- Send alerts automatically via pager, e-mail, mobile phone, SMS, home phone – any or all
- Monitor progress in real time

A hosted or purchased solution to notify personnel for:
- Meeting Reminders
- Scheduled (and Unscheduled) Events
- Staff Shortages
- Maintenance Dispatch
- Outages
- Alarms

(800)356-9148
www.1call.com/acuta2
info@1call.com
4800 Curtin Drive
McFarland, WI 53558
(608)838-4194

---

A Division of
Fifty years ago the planning focus was how America would prosper in an era of relentless global competition. Today, knowledge and information have become the focus and valued commodities in developing the citizen leader.

The manner by which we acquire, process, disseminate, and use information continues to change dramatically. The introduction of new technologies and the rapid changes thereof and therein have changed the landscape. Fifty years ago information was primarily packaged, printed, and distributed manually in hard copy. Today, it is distributed electronically in various formats, including the use of multimedia. Recipients are provided with many alternatives, including the option of printing, data mining for knowledge nuggets, archiving, passing information along, or synthesizing and reengineering what they have received.

Timeliness, ease of use, and dissemination are critical success factors in this environment. They are the deciding factors in the brain-powered Information Age of today and tomorrow. Information and its use provide the commodity, capital, and expertise that cross and recross borders at will to maximize benefit.

The successful strategies for the future college and university ecosystem must be aligned closely with the mission, vision, values, goals, and objectives of the specific institution. These are the common denominators of the college and university ecosystem and the attributes used to characterize an institution and its focus. For example, the mission, vision, values, goals, and objectives of Wellesley College, a premier women’s liberal arts private institution, will be quite different from those of Northwestern, Keene, Duke, Texas A&M, or Longwood University. Although Longwood and Texas A&M are both public universities, they differ in both size and focus as they develop students for meeting the challenges of tomorrow.

The Longwood University College of Business and Economics strategic plan states that “as a part of a growing university, the College of Business and Economics seeks to be known by employers as a preferred source of business graduates.” The college’s vision of a business school of choice for employers and students is based on a mission of preparing students to have a positive impact on our world. The plan is built around five strategic goals:

- Attract and support a diverse faculty, staff, and student body recognized for their quality.
- Deliver a distinctive discovery-based learning experience and environment.
- Promote interdisciplinary initiatives to expand knowledge and address societal needs.
- Expand the business outreach and student internship program.
- Broaden the scope of employers who hire CBE graduates.

The Baylor University Hankamer School of Business strategic plan states, “Our business strategy is something we’ve been analyzing and working to improve through a collaborative planning process spearheaded by our Strategic Development Council. We have crafted a set of goals that considers our heritage and strength, along with our relationship with the university, while embracing the opportunities presented by the 21st century. The strategic direction of the school is shaped by seven goals:

- To be acknowledged as a premier and innovative source of active learning
- To produce highly regarded researchers
- To attract, support, and retain diverse and highly qualified participants
- To be recognized for our learning, service, thinking, and research outcomes on ethics in business with a focus on Christian perspective
- To develop, support, and produce faculty and graduates with experience in international business and culture
- To foster opportunities for career development for our students and to enhance their initial placement
- To establish and nurture ongoing, mutually beneficial relationships among all relevant communities."

In an age of profound social, economic, and technological transformation of the education ecosystem, there is almost total acceptance of the proposition that new technological developments will continue to define the landscape of our institutions, nation, and the world. Chief information officers and telecommunications directors and their teams are more and more expected to manage an expensive strategic resource and service portfolio. The research opportunities are phenomenal. The ability to develop end-to-end multiservice portfolios and testbeds and to capture real-world implications of developments is limitless.

The strategic planning task should create a picture of the future of the institution’s education ecosystem, identify what future business position to stake out, provide long-term direction, and provide a strong brand identity. The plan should push the organization to be inventive, creative, and focused. It should prevent coasting and complacency. It must incorporate decisions about how to respond to a range of external factors. An organization’s reaction to the environment will determine if the factors will be opportunities or threats. These factors include
unpredictable and changing environments, shifting socioeconomic conditions, new technologies, evolving customer preferences, and political and regulatory changes.

Through successful planning, the organization can identify new windows of opportunity and provide for their growth needs over the long-term. Only through preparation can a college or university take the necessary steps to be the best-of-class provider.

A strategic plan is a management tool that focuses an institution's energy and resources to ensure that members of the organization are working toward the same mission, vision, goals, and objectives. The process involves developing strategy and exploring alternatives regarding the best way to respond to the circumstances of the perceived future desired outcomes and to be prepared for the unknown. Strategic means being clear about institution objectives, being aware of the available resources, and incorporating both objectives and resources in responding to a dynamic environment. The process involves choosing and setting a desired future, developing strategy for achieving that desired future, testing assumptions, gathering information, and anticipating a changing unpredictable future environment. The plan is ultimately a set of decisions, actions, and assumptions about how to proceed toward a desired future. Although the objective is to anticipate possible pitfalls in the future, strategy development focuses on the factors to consider in responding to the pitfalls if they should occur.

**YOUR CHALLENGE:** Implement a cost-effective, reliable, and centralized unified messaging application without stranding legacy equipment.

T3 products from T3 Telecom Software are uniquely positioned to support you today and well into the future.

Our platform simultaneously supports both TDM and IP PBXs, ensuring a seamless migration from legacy systems. Departments within your organization can manage their own unique requirements through tenanting, as well as through the creation of independent automated attendants, directory assistance, and sub-administrators. T3 products further simplify your approach by centralizing telephony applications, including voice mail, unified messaging, automated attendant, and administration.

Add to this the availability of a prompt set mimicking the commonly used interfaces of cellular networks ("7" for delete), and a platform designed to leverage the stability and flexibility of Linux, and you have a blueprint for success.

**Supporting all phases of your telecommunication evolution:**

- Mixed Environments (PBX, SIP, QSIG, DPNSS, Digital, Analog)
- Email (Exchange, Lotus, Groupwise, MAC, Linux, Unix)
- Stages of Migration (TDM and migrating, contemplating, or integrating IP; IP integrating TDM)

---

**T3’s Integrated Telephony Solutions:**

- Unified Messaging (clientless)
- Voice Messaging
- Speech Recognition
- Biometrics (voice verification)
- Interactive Voice Response (IVR)
- Fax
- Automated Attendant
• Creatively developing effective responses to those forces;
• Being attentive to the “big picture” to keep the institution relevant; and
• Being willing to adapt to changing unpredictable future circumstances.10

The critical consideration and challenge for strategic planning involving information technology is change. With certainty we know that both hardware and software will change. User needs and interfaces will change. Plans must be in place to deal with those changes.

For example, Microsoft introduces a new operating system about every five years. This is a function of marketing and planned obsolescence. New products are necessary in this area to keep up with new developments and improvements and to maintain profitability for the providers. What to do? Shift every computer in the ecosystem? Better to plan the introduction.

Longwood University is integrating Vista into the university system by creating one student test laboratory for teaching and everyday use that operates on Vista. Key faculty users, identified as innovators or early adopters, are first to receive computers with Vista installed. The university must support both the new and old technologies for a short period of time. The equivalent of a test market is conducted to ease the transition. Planning for change is an integral part of managing technology. When there are significant implications for smaller, anticipated changes such as this, the challenges created by new, less predictable changes are enormous.

Tammy Closs, assistant vice president of information technology at Duke University says, “The overall strengths of Duke's strategic plan are the inclusiveness of the university members involved in the development process and the university recognition of the critical role to be played by IT in the changing teaching/learning/research environments as reflected in the vignettes. The other strength is the flexibility in the funding of IT initiatives—it's not X amount for a specific technology, but a pool of funds has been allocated to draw from as the value-add technologies are identified to support solutions over the next 12–18 months.”11

"The plan identifies three major goals for the new planning cycle:
• Goal 1: Enrich the teaching, learning, and research environment at Duke by providing faculty and students with information technology resources and services that are easy-to-use, well-matched to their needs, and contribute effectively to achievement of Duke's institutional goals.
• Goal 2: Extend our effectiveness in our distributed environment by facilitating collaboration among departments and, in critical areas, between departments and the central technology infrastructure.
• Goal 3: Provide an enabling technology infrastructure for ubiquitous and convenient access to computing and communications capabilities, facilitating the daily work of faculty, students and staff.”12

The assumption is that the institution must be responsive to a dynamic, changing environment that is unpredictable, but that can be anticipated in part. Thus, the emphasis is on understanding how the environment has changed, is changing, and may continue to change in the future. For example, security breaches continue to dominate as the most pressing problem in the college and university ecosystem in supporting an integrated digital communications network. And, security continues to dominate as IT’s most pressing concern according to a study released by CDW Government Consultancy.13 Network access control (NAC) challenges were the focus of a major panel of security experts at the 2007 Spring InfoSec Conference, where panelists shared their views on selecting a NAC system and deploying identity management technologies. NAC is the process of performing a security check on all devices requesting network access and quarantining any device that needs remediation. Phillip Maier, vice president of the information security engineering, technology, and network group at Visa, says, "Network access control is a great concept, but it presents some obvious obstacles to overcome."14

In addition to these concerns, there is the introduction of hypervisor technology in clustering and distributed computing. "Hypervisor technology is the single most important virtualization development over the last five years," says Justin Steinman, Novell's director of product marketing. Hypervisor technology is a software layer that sits between the guest operating system and the physical server. The software controls the different operating systems that are running on a virtualized server and manages the flow of the hardware resources to harness and control dozens, hundreds or thousands of processors and servers. "That's a challenge for high-performance computing users. How do you make sure all those processors are the exact same operating system with
McDonald's, powerful networks pocket phones developed on universal college and access Internet, or phones, laptops, Thirty can steal codes Security Conference an IOActive different the mining, chip, integrated VoIP and bridges to the future. The Net and associated digital communications technologies are no longer new, but they are still momentous and experimental in many ways. It's a lot like watching an old T.J. Hooker rerun. It's packed with adventure. But unlike Bill Shatner, you can't call in a stunt double. Whenever you find yourself speeding down the information superhighway, you have to endure the consequences.

James S. Cross, PhD, a former president of ACUTA, is dean of the College of Business and Economics at Longwood University. Reach Jim at crossjs@longwood.edu.

Linda B. Wright, PhD, is associate professor of marketing at Longwood. She can be reached at wrightlb@longwood.edu.

Creative leadership means seeing the future and its opportunities—from the fingertip-sized memory chip to the low-powered LEO communication satellites to the most advanced semiconductor and multimedia technologies. Professionals in the college and university ecosystem must be visionaries, innovators, arbiters, connectors, translators, and bridges to the future. The Net and associated digital communications technologies are no longer new, but they are still momentous and experimental in many ways. It's a lot like watching an old T.J. Hooker rerun. It's packed with adventure. But unlike Bill Shatner, you can't call in a stunt double. Whenever you find yourself speeding down the information superhighway, you have to endure the consequences.

James S. Cross, PhD, a former president of ACUTA, is dean of the College of Business and Economics at Longwood University. Reach Jim at crossjs@longwood.edu.

Linda B. Wright, PhD, is associate professor of marketing at Longwood. She can be reached at wrightlb@longwood.edu.

References

4. Tammy Closs, email on Duke's consolidated IT strategic plan Oct. 6, 2006
5. Northwestern University's IT strategic plan. www.it.northwestern.edu/about/index.html
6. Keene State College's strategic plan www.keene.edu/it/themel.cfm
7. Texas A&M University's strategic plan apit.tamu.edu/about/strategicPlan.html
15. "Strategic Planning Don'ts (and Dos)," www.cio.com/archive/0606/060102/donts.html
18. "Idealist FAQ" www.nonprofits.org/npfaq/03/22.html
22. Baylor University, Baylor Business Review (Hankamer School of Business), Spring 2007.
Voice over IP (VoIP) offers tremendous opportunities for colleges and universities to reduce telecommunications costs while improving communications within and between campuses, but to truly benefit from VoIP educational institutions need to simplify telecommunications operations and drive down the cost of delivering VoIP services.

Legacy PBX platforms are expensive to maintain and operate, and telecommunications services can potentially be one of the largest line items in the budget of a college or university. But educational institutions can remove the business and technical obstacles to deploying VoIP technology in campuses by greatly simplifying operations and reducing the cost of delivery VoIP services to students, faculty, administrators, and locations.

The SAFARI C³ Media Switching System delivers carrier-grade voice networking services and is built to support future multimedia applications to address the telecommunications needs of educational institutions. Colleges and universities can replace multiple PBX platforms with a single SAFARI C³, and they can evolve from carrier-based Centrex services to their own private VoIP service, reducing both capital and operational expenses while enabling new services across multiple buildings and campuses.

Educational institutions can deploy the carrier-class SAFARI C³ platform to deliver highly reliable services to dormitories, administrative offices, and other campus facilities, and they can create peering relationships with other campuses to deliver features such as abbreviated dialing and hunt groups to multiple locations. They can also reduce bandwidth costs and support disaster recovery efforts.

Cedar Point Communications, Inc., has created and commercialized SAFARI C³, an entirely new category of VoIP-based equipment ideal for campuses offering primary line telephony services. SAFARI C³ relies on patented technology that combines the functionality of multiple distributed elements into one single system to deliver superior reliability and performance while simplifying VoIP implementations. It greatly reduces on-going support and administration costs, and creates improved economics for campuses while offering tremendous deployment flexibility. SAFARI C³ removes the complexity of deploying and managing older VoIP infrastructure and reduces the capital and operational costs dramatically when compared to alternative solutions that rely on multiple gateways, softswitching elements, and hardware platforms.
Reducing the Cost of Delivering VoIP

All colleges and universities face tremendous pressure to manage costs, and SAFARI C3 offers a compelling solution for reducing the total cost of ownership (TCO) of deploying a complete VoIP solution. It costs much less than purchasing discrete IP-PBX solutions and minimizes—or in some cases eliminates—the need for additional information technology (IT) or telecommunications personnel for VoIP deployments. SAFARI C3 requires a fraction of the resources needed for deployment, support, and maintenance of solutions that rely on complex, distributed softswitching technology.

This approach avoids the operational complexities of existing discrete IP-PBX solutions, making campus VoIP services easy to operate and economical to deploy and manage. This highly scalable solution can support from 2,500 to 100,000+ lines on a single platform, allowing educational institutions to expand VoIP services to neighboring institutions and the community without compromising service quality.

It simplifies operations by offering a single platform that eliminates the need to purchase, deploy, and manage many separate network elements. SAFARI C3 provides superior performance and reliability, and significantly reduces capital expenditures, system integration requirements, and operations costs while increasing network integrity and security.

Simplifying Campus Operations

In a distributed IP-PBX architecture model, there are many network elements that must be deployed and managed. Often these network elements are provided by multiple vendors, so IT or telecommunications organizations must make major investments in integration and must carefully manage each new software release or upgrade to ensure ongoing operations. But SAFARI C3 is the only totally integrated carrier class switch that incorporates the functions of the voice switching infrastructure, eliminating the need to purchase, maintain, upgrade, and regression test separate:

- Call management servers
- Media gateways
- Record-keeping servers
- Announcement servers
- Signaling gateways
- Ethernet switches
- Communications Assistance for Law Enforcement Act (CALEA) servers

SAFARI C3 is future-architected to allow educational institutions to leverage their initial equipment investments in voice technology as they introduce services such as video telephony and fixed-mobile applications. New applications can be integrated into SAFARI C3 or can be accessed via third-party application servers. See Figure 2.

The Availability and Reliability That Colleges Require

The integrated architecture of SAFARI C3 allows the system to deliver the availability and reliability levels needed for voice services. SAFARI C3 is designed as a fully redundant and highly available fault-tolerant system. Each card type in the switch is protected by a standby card in either 1:1 or a 1:N protection scheme, and the operator can specify the frequency with which the internal real-time database is backed up onto an external server. SAFARI C3 relies on a proven operating system designed for carrier-grade switching, and it delivers the same reliability, stability, and security of a Class 5 switch and offers hot upgrade functionality for software updates without service disruption. See Figure 3 on page 26.

Leveraging SIP

Educational institutions can meet both the availability and reliability expectations of voice services, and they can offer innovative new services. Session initiation protocol (SIP) end points can be deployed in dormitories, administration buildings, and instructional facilities, providing colleges and universities with the opportunity to take advantage of new telecommunications services. SAFARI C3 also supports SIP.
peering, so colleges and universities can bypass the public network and interconnect multiple campuses over the same phone network and reduce equipment and bandwidth costs while offering integrated, easy-to-use services such as abbreviated dialing across multiple campuses.

Fixed-Mobile Convergence

Students, faculty, and staff can also access advanced telecommunications services over campus wireless networks. SAFARI C³ is architected to support seamless roaming and handoffs between WiFi and mobile cellular networks through a SIP interface to an external application server. Educational institutions can provide additional value to students, faculty, and staff by providing them with one phone number and allowing them to save money on cellular minutes by making calls from any on-campus wireless hotspot. With SAFARI C³, educational institutions can embrace—not compete with—cellular services.

Multimedia Services

The evolution of the converged IP network is widely recognized as uniquely capable of addressing many critical campus challenges, including the need to reduce costs, enable disaster recovery planning, support remote collaboration, and accommodate increased student demands on the network. Powerful and efficient voice switching is essential today, but educational institutions also need the ability to support emerging multimedia demands. SAFARI C³ has a full-duplex, 80 Gbps redundant switching fabric with an optical backplane that provides the capacity and performance needed for multimedia applications. In fact, for 100,000 lines of VoIP traffic, SAFARI C³ will use less than six percent of the 80 Gbps switching fabric.

Flexibility

SAFARI C³ is a flexible solution that supports regulatory requirements and integrates smoothly with existing infrastructure. Native support for industry standards allows SAFARI C³ to provide smooth connectivity with the PSTN. Native support for Channel Associated Signaling (CAS) trunks in SAFARI C³ enables simple implementation of all regulatory features, such as E911 emergency services.

Disaster Recovery

In the event of a disaster that disrupts telecommunications services, an active SAFARI C³ platform can be backed up by an inactive SAFARI C³ potentially located in another building or campus. This allows subscribers to be administratively re-homed to the inactive SAFARI C³ and allows educational institutions to quickly and seamlessly restore telecommunications services.

Security

SAFARI C³ provides a single point for firewalling. Using SAFARI C³ it is possible to hide user addresses from each other. SAFARI C³ supports lawful intercept standards such as CALEA so campus police and other law enforcement agencies can place legal wiretaps when necessary.

Management

Operations staff can centrally manage SAFARI C³. The SafariView™ Element Management System (EMS) supports the full FCAPS suite of management functions (fault, configuration, accounting, performance, and security) and integrates them into a feature-rich GUI platform for complete management of Cedar Point’s SAFARI C³ Media Switching System.

SafariView EMS allows for a single point of command and control for one-or-more SAFARI C³ platforms. Using a simple Web browser, an operator can set up a simple SOAP/XML based client-server HTTP(s) session with the SafariView...
server that, in turn, has access to the individual SAFARI C³ switches. The easy-to-use, intuitive interface allows operators to swiftly learn how to effectively administer and operate SAFARI C³ platforms.

Relying on a Converged Campus Solution

Cedar Point Communications has teamed up with PAETEC and Sentri, Inc., to develop a comprehensive IP communications solution that addresses the unique needs of colleges and universities in realizing the full benefits of a converged IP network, including the migration to VoIP.

With the Converged Campus solution, network managers are provided with proven world-class products and services that allow them to painlessly migrate costly and service-limited PBX systems or carrier-based hosted solutions to a true carrier-grade network capable of achieving the full technology and operational benefits promised by IP. The result is a greatly simplified and highly cost-effective network that virtually eliminates technology uncertainty and implementation complexity while ensuring the full value of IP convergence.

Implementing and managing a converged IP network has caused apprehension and delay due to questions about technology complexity, economic uncertainty, service continuity, and IT integration. The Converged Campus offering is a comprehensive network solution from three of the leading providers of converged IP networks that reduces technology risks, ensures continuity of services and allows campuses to benefit from advanced IP services.

Centered on the SAFARI C³ carrier-class switching platform, the Converged Campus solution offers telecommunications quality, reliability, scalability, and performance in a revolutionary, integrated design. This means that the same switch that conforms to the demanding and standards-compliant requirements of the PSTN can be placed on campus with less complexity than alternative solutions. By utilizing IP carrier connectivity, networks gain significant efficiencies in off-net and remote interconnection, enabling the full value of advanced IP services.

The Converged Campus solution includes a set of technical services that support the campus implementation from start to finish, including network analysis, back office integration, operations management and IT consulting. The Converged Campus solution applies the best products, services and support capabilities to allow educational institutions to realize the maximum value of converged IP networks.

A Proven Solution for Educational Institutions

Designed to accommodate not only current voice service needs but also the anticipated migration to video telephony, multimedia services, and fixed-mobile convergence, SAFARI C³ provides superior performance and reliability and significantly reduces capital expenditures as well as system integration and operational costs for colleges and universities. The SAFARI C³ totally integrated voice and multimedia switch from Cedar Point Communications provides educational institutions with a cost-efficient, less complex VoIP softswitching solution. For more information on deploying SAFARI C³ to simplify the delivery of VoIP across colleges and universities, please visit www.cedarpointcom.com.

George Kassas is founder and executive vice president, business development, at Cedar Point Communications. Visit Cedar Point online at www.cedarpointcom.com.

Printed with permission from Cedar Point Communications. SAFARI C³ and SafariView are trademarks of Cedar Point. Any non-Cedar Point trademarks are properties of their respective owners.

---

This advertorial was purchased and produced by Cedar Point Communications. ACUTA, as an association, does not endorse or recommend any company or product.
Going Wireless at Fiber Speeds

It takes little more than a few minutes on Old Main lawn to realize the future of communications on college campuses is wireless. Cell phones, BlackBerrys, WiFi, and wireless broadband access all are part of the mix.

Schools from Boston University Medical School to Dartmouth College in Hanover, New Hampshire, are moving ahead with their wireless strategies, as well. The impetus can be network backup, as in BU’s situation, or to work around some ticklish access restraints, as at Dartmouth. In both cases, the school chose a WiFiber link—a wireless system that allows throughput at fiber speeds.

“For us it was the belt-and-suspenders approach,” quips Paul Sheehan, director of networks at Boston University Medical School. The school does not want any part of the network falling down on the job. It went with a gigabit wireless backup system to provide redundancy for a fiber link after a disaster showed just how vulnerable any part of the network can be.

“A few years back there was a manhole fire that melted the fiber that our leased line ran on,” Sheehan says. Luckily, the disaster happened on a weekend. “We were up and running again by late Sunday night.”

But that was a clear warning signal that anything can happen on any link. “In looking at a backup link, we wanted to ensure that we had a diverse path. A wireless link gave us that option,” he continues.

The BU wireless run is a single point-to-point link from the BU School of Medicine to BU’s main undergrad campus. The link spans about two miles.

Backing Up Fiber

The link at BU’s Medical School has been up for about 18 months.

“When we first put it in, it was providing us 10 times the throughput of our leased fiber,” Sheehan recalls. They were leasing a 100 MBps fiber line. The wireless link provided a full gig.

The WiFiber comes from a company called GigaBeam (www.gigabeam.com, Herndon, Virginia). It is a point-to-point wireless solution that provides ultra-high-speed communications at one gigabit per second—equivalent to 647 T1 lines or 1,000 DSL connections. It is as fast as terrestrial fiber with high availability in Boston University Medical School’s setting, where it was installed to back up a traditional fiber link.

That link is vital. It carries all of the campus’s Web traffic and e-mail, and is the link back and forth between the medical school and the main Charles River campus for anyone who needs to access information at the other site.

WiFiber utilizes radio frequency authorized by the FCC within the 71–76 GHz and 81–86 GHz spectrum.

With the widespread deployment of WiFi access hubs and similar bandwidth-eaters on campuses, many schools find themselves starved for capacity that can be deployed quickly.
**Q: What's the best replacement for your old Octel®, Centigram or VMX voice mail systems?**

**A: CallXpress® from AVST.**

---

When it comes to higher education, AVST has all the answers for replacing your voice mail system. And you’ll find many of them on our website, which provides you with white papers, cases studies and other practical information to help you make that crucial “what-next” decision. AVST has been transforming learning environments for 25 years with CallXpress. It’s not only the most economical solution, but also the smartest because it works with all the legacy systems on your campus. For more information, explore [www.avst.com/education](http://www.avst.com/education) where you can order our Education Resource CD or contact our educational experts with one click. Or, call **949.699.2300** today.

---

Unifying Communications [AVST](http://www.avst.com)
There are several similar products available to colleges. The GE-80X and AR-80X from BridgeWave Communications (www.bridgewave.com) are 80 GHz link products. The former is good to 8000 meters (five miles) and the latter has a range over 9,600 meters (six miles).

Terabeam (www.terabeam.com) is a large corporation that controls Proxim (www.proxim.com), which provides WiMAX solutions and similar wireless solutions. Proxim’s GigaLink Series gives schools full-duplex point-to-point wireless bridges. Their links are mainly intended for short and medium range outdoor links on fast Ethernet, OC-3 (155 Mbps) and Gigabit Ethernet (1.25 Gbps) interfaces. They operate in the 57-64 GHz unlicensed frequency band and the licensed 71-76 GHz frequency band.

Note that the cost of a unit will vary with the distance it can reliably bridge and with the reliability of the band in which it operates. As a rule, licensed is better, but more expensive. In a rural setting, a licensed frequency might be unnecessary. At an urban campus, it will be a must.

Boston University installed GigaBeam’s WiFiber2 model to link the two campuses.

Weathering Reliability

If Sheehan could do one thing over, it might be to use shorter hops. The two-mile wireless run has occasional weather problems that Sheehan does not see on some of the short, unlicensed microwave links on campus.

“As it is, we get 3-nines (99.9 percent) reliability,” he says. Sheehan knew that the weather, in stormy Boston, could be a challenge to any wireless system ... much less one that was a relatively long-haul link.

“We brought it up, got it running, tweaked it some, got comfortable with it, and then waited for the weather to hit,” he says. This was in December 2004.

The weather hit. First it was a blizzard. In winds of 60 mph and fine snow, the system did just fine. There were other snowfalls. Everything was great. Only a heavy rain will take it down.

“Showers are fine,” Sheehan says. “It can handle them.” In fact, they made the wireless link their primary for a while until the heavy rains hit. As luck would have it, the vice president’s office was affected by the rain fade. But the link works well at any other time, and Sheehan is pleased with the link. And, he points out, any wire-line link is susceptible to cable cuts and the myriad other disasters—including manhole fires—that can interrupt service.

“It’s great to have it,” Sheehan says. “It works.”

He likes the licensed bandwidth. While his short-run, unlicensed microwave hops seem to handle the heavy rain situations better, they do pick up interference from other devices, even though their runs are short—typically two or three city blocks. Those non-licensed runs are the only links to the administration buildings at 560 and 580 Harrison, so they are key parts of the network.

The wireless link was added to the Boston University management system like any other piece of networking equipment. “This includes ‘ping’ polling and SNMP monitoring,” Sheehan says.

Pushing Pencil

A link like the one at Boston University Medical School listed out at about $75,000. That’s not small potatoes.

“When I first went into this, I really looked hard at the numbers,” Sheehan says. “We are a university. We are not rich. We put a lot of thought into it before we spent the money.”

He was also aware that, two years ago, he was looking at cutting-edge, gigabit technology. “We were using it as a backup on a critical link,” he points out.

Some pencil-pushing showed that the payback on the initial investment would be under two years. “That’s good,” he says.

In addition to the initial cost of equipment and installation, there is a $4,000 annual maintenance fee plus the license.

Contrasted to the lease fee for fiber from RCN—which runs in excess of $3,000 a month—the wireless link is almost cheap.

“We expected to get four or five years out of the equipment, at least, so the cost of the wireless units over that time frame was much more attractive than another leased line,” he says.

Installation went well. Even though BU Medical School is in the middle of a big city, they were able to get the line of sight it required. “With any wireless system, you have to watch out that nothing comes up that interferes with transmission,” Sheehan says. That includes the initial installation and any future construction that could block the link. The college has some tall buildings and Sheehan was able to run the hop
from the top of one 15-story building to the top of another 10-story building.

"One end is on the roof of a research building, and the other is on the roof of a dormitory," Sheehan explains. "Locating the radios wasn't much of a challenge as we own the buildings and have access to the rooftops." Once the locations were established, Sheehan wanted to be sure the radios stayed in place.

"We installed a four-inch diameter pole—a nice, sturdy pole—in concrete at the edge of the buildings," he says. "We wanted to keep it steady in the wind." From there, it was a matter of adjusting the radios so they could "see" one another. "The system came right up," Sheehan continues.

While Boston University Medical School uses the wireless fiber as a backup, it also can be used to create ubiquitous high-speed campus networks in addition to virtual private networks. It can provide access and backhaul between buildings and also to points of presence in metropolitan area networks.

It is also ideal for backhaul of data, voice, video, and images from cell towers and WiMAX cell sites.

With the proliferation of many new and data-intensive applications provided with cell phones to the campus community, many existing cell towers—especially those serving colleges in urban areas—will require fiber-speed backhaul. This technology could be a practical alternative to expensive and time-consuming trenching to lay terrestrial fiber to cell towers. It also has some interesting, backward-looking applications—backward in time, that is.

Historic Preservation

Dartmouth, the nation's ninth-oldest college and a member of the Ivy League, is a private, four-year, liberal arts, coeducational college with schools of

---

**Future Proof Your Campus Voicemail System**

**Communíte®, the Next Generation Voicemail Replacement Solution**

**Future Proof Solution**
- Open standards SIP-based software-only solution
- Cost-effective migration path to IP telephony
- Broad feature set including voicemail, unified messaging and enhanced messaging

*For more information, please contact Tier's Communíte Sales Team at 800-476-3767*
business, engineering, and medicine as well as 18 graduate programs in the arts and sciences. Its 200-acre main campus features state-of-the-art academic facilities.

As an old Ivy League school, Dartmouth has several historic buildings that require modern communications. Like Boston University Medical School, Dartmouth turned to high-speed wireless to link the buildings. One interesting aspect of the installation is that there are no radios on the outsides of the buildings.

“We penetrate 80 percent of glass,” says GigaBeam vice president John Krzywicki. “In this case, we are dealing with 100-year-old, historically preserved, leaded glass.”

Dartmouth College installed three of the ultra-high-speed WiFiber wireless fiber links.

The installation of the initial link at Dartmouth was started two years ago. This gigabit Ethernet link was deployed between the data center and Baker Hall, the campus administration center in Hanover, to enhance networking among campus buildings, improve the college’s network resiliency, and enable new applications.

The second link ties the Mary Hitchcock Hospital back to Baker Hall. The third is a short hop between two other buildings.

Dave Bucciero, director of technical services at Dartmouth, said the original reason for the deployment was to help Dartmouth address the rapidly growing high speed network demands of its advanced information environment. He noted that the solution is appropriate for Dartmouth, in that it maintains one of the most advanced university IT infrastructures in the country.

That infrastructure serves a number of old buildings. To avoid tearing into walls and the other disturbance necessary to run hard-wired links to the buildings, Dartmouth went with the high-speed wireless. This allowed them to both keep the historic structures intact and provide 21st-century connectivity.

Whether for backup or for deployment convenience, the schools with ultra-high-speed wireless seem happy with the solution.

At Boston University Medical School, the link now operates in a backup mode to the existing leased line. “When we do fail-over to the wireless link, all data campus traffic to the Internet and between campuses flows over that link,” Sheehan says.

He says the gigabit wireless is perfect for their redundancy requirements. “It depends on how much redundancy you need. This is more than an acceptable design with the fiber and the gigabit wireless,” he concludes.

Curt Harler is a freelance writer and contributing editor to the ACUTA Journal. Reach Curt at curtharler@adelphia.net.
Eliminate the complexity and challenges associated with a Voice over IP (VoIP) migration with PAETEC.

Preparing correctly for a technology migration involves network design and integration planning, Business Continuity preparations, and a comprehensive team of technical experts.

Voice over IP
- IP Hosted Telephony
- Dynamic IP Service/SIP trunking
- MPLS IP network with QoS
- VoIP Network Design and Integration

Business Continuity / Disaster Recovery
- Carrier Diversity
- Facilities Diversity (Wireline and Wireless)
- Central Office & Switch Diversity
- Protocol Diversity (TDM and IP)

Contact PAETEC to discuss how we can support your institution through a smooth transition to VoIP.

Higher_Education@paetec.com / www.paetec.com
Interview

Shirley C. Willihnganz, Ph.D.
Executive Vice President and University Provost
University of Louisville

ACUTA: What drove the University of Louisville to embrace VoIP? Was it the economics, future-proofing of the university infrastructure, or emergency response options that it provides, or are there other reasons?

Willihnganz: The University of Louisville chose to embrace VoIP as part of our strategy to create and maintain a state-of-the-art technology infrastructure, continuing to build a strong foundation for the recruitment of top research faculty. While this initiative began as a strategic one to convert our campus to a converged voice/data network, we found considerable savings from replacing our previous Centrex environment with VoIP.

In addition, we found that the return on investment for the conversion was enough to self-fund the project. We recognized that VoIP applications such as E911, broadcast alerts, and more would be beneficial to the university. Our strategy to implement E911 to the location of the port and the ability to issue emergency broadcast messages through VoIP phones for campus safety was validated even more by the tragedy at Virginia Tech.

ACUTA: VoIP and its implementation provide a lot of options for universities. First and probably foremost is the integration with unified communications around and through campus. Was this a determining factor in your commitment to this technology? Where is UofL in its implementation of VoIP and these special features?

Willihnganz: While integration with unified communications is part of our long-term strategy, it was not a driving factor in our decision to choose VoIP. At this time, we have focused on aggressive implementation and conversion of more than 7,500 faculty and staff phones to VoIP technology. In addition to applications that will help us make our campus safer, we are exploring IP video and integrated messaging.

ACUTA: What blueprint did UofL follow to implement VoIP? How much assistance was provided by the vendor, other universities, or other sources, or did you create your own blueprint?

Willihnganz: Through an RFP process, UofL formed a strategic partnership with BellSouth and Cisco so that we could achieve an aggressive 14-month implementation of the campus deployment. While we relied on the vendors to assist us through the implementation, most of this project was led with university expertise. Our in-house technical team worked with each vendor to form a detailed project plan for deployment. We are currently on schedule and on budget to meet our June 2007 completion date.
ACUTA: What were some of the economic, technical, and political hurdles you encountered in making your converged system (VoIP especially) operational?

Willihnganz: Our migration to VoIP required substantial funding. In a time when many public universities were suffering cutbacks, receiving approval for this type of expenditure was extremely difficult. Many did not understand the long-term benefits of the technology and questioned some of the initial deployment expenses, such as the cost of handsets.

To overcome these hurdles, we made the decision to self-fund the project using a combination of savings from reduced Centrex costs and long-term financing. In addition, we experienced some technical hurdles such as providing adequate standby power to the handsets during electrical outages.

ACUTA: In regard to the thousands of faculty/staff/students at UofL, was the implementation seamless or was extensive training required? How was the user training done, and what glitches happened with regard to this aspect of the implementation?

Willihnganz: We were pleasantly surprised at the minimal issues we experienced and the quick adoption rate by our university community. An extended pilot, which included our own technical community, allowed us to streamline processes and address communication and training issues before our full implementation. During conversion, we provided several hands-on training sessions with a dedicated in-house trainer on site at each cutover location. The more advanced, multiline users, such as office administrators, required additional in-depth training.
We continuously monitored customer satisfaction through surveys and have achieved overall satisfaction approaching 90 percent.

ACUTA: UofL is moving toward a converged network on campus. Describe what this converged voice, data and video campus will provide from a user perspective and from a technical perspective.

Wiihnganz: Our goal is to make the move to a converged campus network completely seamless to our users. From a user standpoint, they will notice fewer cable and wires at workstations and the ability to access new features without interrupting daily work activities. We will be able to add new features and applications such as IP video, broadcast alerts, and more to any data port using network programming.

ACUTA: How long has this project taken? Does it really have an end, or is it a perpetual work in progress? Are there discernible phases for an initiative of this magnitude?

Wiihnganz: After a multi-year pilot, the main conversion phase—providing VoIP to faculty, staff, and administrators—began in mid-2006. We are on schedule to complete this phase in June of this year. The last phase of the conversion—upgrading 1,800 resident housing lines to VoIP—will be completed prior to fall semester 2007.

Our project has very distinct phases and definitely has an end. Phases included: planning, infrastructure preparation, piloting, campus deployment, and resident housing conversion. Application development and network maintenance, of course, will be ongoing efforts.

ACUTA: With converged networks and especially VoIP, what security and regulatory issues were problematic? For example, E911, especially with wireless service. How was that overcome? Was security for core services impacted?

Wiihnganz: Security concerns were important to us. We implemented our system with firewall protection and redundancy for security purposes. We also worked closely with UofL’s Department of Public Safety and our legal counsel to ensure that concerns about campus safety and security were addressed.

To meet future regulatory requirements, our E911 capabilities are able to pinpoint the location of a 911 caller down to the port. In addition to local law enforcement, our campus public safety department is notified so that they may properly respond as well.

ACUTA: If you could do anything differently, or if you were asked to advise another campus, what important lessons could you share from your experience?

Wiihnganz: You can never communicate too much. Effective communication is critical at all levels. Senior administration needs to understand the financial impact and potential return on investment. In addition, communication to the departments on a regular basis, especially during the cutover, is essential. The more informed your community is, the more successful the migration will be.

ACUTA thanks Dr. Wiihnganz for taking the time to respond to our questions and share her insights into UofL’s VoIP conversion. Visit UofL at http://louisville.edu.

---

Do a friend a favor: Invite them to join ACUTA today!

If you are not an ACUTA member, or if you know someone on another campus who is not a member, I encourage you to consider the many benefits of membership in this organization. Participating in ACUTA has helped me grow professionally and contribute more effectively to the mission of my school in so many ways. ACUTA offers opportunities to serve in governance of the association, to make presentations, to write for the various publications, and especially to learn from your peers on other campuses. I consider the dues an investment with a very high return.

Mary Lou East-Emmons, Indiana University at Bloomington
ACUTA Membership Committee Chair
Open-Source VoIP for Colleges and Universities

Voice over Internet protocol (VoIP) telephone systems are attractive to colleges and universities for their potential to reduce total telecommunications costs and for many advanced features they offer faculty, students, and staff. VoIP saves money by reducing recurring monthly telecommunications provider charges and maintenance and support costs. The advanced feature sets of VoIP, including conferencing capabilities and unified messaging, work well with university cultures that tend to embrace new technologies.

However, a recent survey conducted by ACUTA shows that while VoIP is a frequent discussion topic among technology professionals in higher education, the deployment rate is low. One of the reasons might be that VoIP solutions still have implementation risks for colleges and universities.

Open-source VoIP solutions minimize many of the risks associated with VoIP but also introduce other issues universities must consider when deploying VoIP. What are the rewards and risks of VoIP in a university setting, and how can open-source VoIP solutions maximize an institution’s return on investment while overcoming many implementation obstacles?

VoIP Savings and Features Encourage Higher Education Adoption

With open source, VoIP savings are achieved in two primary areas—reduced monthly telecommunications service charges and reduced service and support costs for the PBX system. Reduced monthly service charges can be achieved because some calls are exclusively routed over internal data networks within the university system.

More substantial savings are generated from reduced annual maintenance charges. Time division multiplexing (TDM) systems are primarily based on hardware and hard wiring, so moves, adds, or changes of an extension require a visit from a PBX vendor or a technician on staff. The cost of service calls adds up. In contrast, the management of extensions in a VoIP system takes place through changes to the software configuration, accomplished internally with intuitive graphical user interfaces.

More than cost savings, VoIP enables many new or expanded feature sets that technologically savvy constituents demand. Open-source PBX software is built with the session initiation protocol (SIP) as one of the many signaling standards between telecommunications devices. SIP enables a range of previously disparate applications to be unified. For example, with SIP, users can create unified messaging environments, integrate into existing directory services infrastructure, and enable integrated desktop videoconferencing.

VoIP Risks Demand Careful Attention to the New PBX Platform

Savings and advanced features aside, universities need to consider VoIP carefully before implementing it. VoIP implementations frequently go wrong because administrators do not understand where and how to achieve savings, do not invest in critical infrastructure upgrades to ensure a quality system, or implement a complete VoIP convergence with a single vendor that can create an unhealthy product dependence and/or an inflexible, long-term relationship that cannot be easily terminated.

Savings from VoIP are dependent on sensible network design, selection of cost-effective vendors and products, and the ability to manage changes internally. First, it is important to realize that VoIP can be imple-
VoIP implementations often fail because the network infrastructure does not support quality of service. While VoIP does not require a separate network for telecommunications, it does require enhanced switching capability to enable virtual local area networks, quality of service, and power over Ethernet.

Finally, VoIP PBX system inflexibility is a significant risk for VoIP convergence. PBX systems that cannot work with other systems create two distinct problems. First, these systems require total convergence from the old system to the new system at once. Thus, universities do not have adequate time to evaluate and experiment with the new system in real-life circumstances. The investment in the new system is total and absolute once the decision has been made. Second, this lack of interoperability and large upfront investment creates significant dependence between the university and the product and vendor. The university has little control to influence incremental product and service pricing because it has a large fixed investment in an inflexible PBX system.

**How Does Open-Source Maximize Benefits and Minimize Risks of VoIP?**

Open-source VoIP maximizes many of the core benefits of VoIP, while minimizing some of the risks. Compared with proprietary VoIP solutions, open-source VoIP PBXs are developed by a community of software developers through free and transparent exchange of code, while proprietary VoIP PBXs are developed by private companies and are more commonly based on proprietary standards developed with intellectual property protection. R&D cost of these companies is built into the cost of the products. Open-source PBX solutions are available to the general public at little or no cost, and are based on transparent open standards that are established by the developer community.

Open-source solutions are more often interoperable with a wide range of technologies. The primary reason behind this increased interoperability is its reliance on SIP. Interoperability of proprietary solutions tends to be much more limited because their protocols are more often privately developed for specific product lines.

The core advantage of an open-source application, of course, is price savings. The reduction in cost for an open-source PBX has many different useful features for universities. First and foremost, it increases savings from the new system. A proprietary PBX solution generally requires new hardware, new software, and the services of an approved integrator to make sure the system works on the network. An open-source PBX generally requires new

---

**36th Annual Conference & Exhibition**

It’s important that I, as an IT Director, keep up with what’s new, and ACUTA provides that. I have yet to go to an ACUTA event where I did not learn at least two new things in every session I attended that I could use in my office. In addition, informal conversations give us opportunity to discuss challenges we all face. We return to our campuses with workable solutions, better prepared to share this knowledge and to be leaders.

—*Bill Vereen, University of North Carolina, Wilmington*

Register Today at: [http://www.acuta.org](http://www.acuta.org)
hardware and the services of an integrator to design a system that ensures the hardware and software function together. Because software costs are reduced from an open-source application, there is a more pronounced impact on the cost of large projects because software is commonly priced on a per user basis.

The price savings from open source also encourage the adoption of advanced VoIP PBX feature sets. Proprietary PBX solutions generally require additional licensing fees for each new feature such as voicemail to e-mail, find me/follow me, or other advanced unified communications applications.

Finally, open standards through protocols such as SIP allow interoperability of applications and incremental growth in a large university’s PBX system. Open-source PBXs provide the most interoperable platforms as well as the most robust SIP platforms to build an ever expanding set of telecommunications features. Open standards implemented in open-source software allow most open-source PBXs to integrate with existing TDM, digital, and other VoIP PBX products. This enables universities to integrate their new PBX systems into existing systems and eliminates the need to commit to a huge capital and technology investment.

Universities Must Balance Open-Source Risks Against Its Advantages

Open-source VoIP PBX implementations still have meaningful risks for universities. First, the open-source integrator market is not nearly as well developed as the reseller market for proprietary products. Second, open-source integrators tend to specialize in software application development more than total VoIP network management. Finally, too many open-source applications lack basic graphical user interfaces that allow non-technical staff to manage simple PBX administrative functions.

While the open-source community has developed robust PBX applications
based on flexible, future-proof open standards, there are fewer companies integrating open-source solutions. Moreover, open-source integrators commonly lack basic financial and insurance support that is common among proprietary vendors. Too often, open-source integrators grow out of the open-source software development community, so their expertise is heavily weighted toward software expertise, rather than network design and management. A quality VoIP implementation demands as much expertise and attention to network design and management as it does to VoIP PBX software. Finally, universities cannot realize the benefits of reduced support and maintenance costs if day-to-day management cannot easily be executed by nontechnical staff.

All of the risks associated with open-source VoIP solutions can be mitigated by how a college or university selects its VoIP products and services. Open-source and proprietary VoIP integrators should both meet basic financial and technical qualifications that are part of any sensible business evaluation, including bid and performance bonding as well as commercial certification on the systems they sell. Frequently, the best way to qualify potential vendors is to seek multiple references from existing and similar customers. Similarly, universities are wise to review the network qualifications of both proprietary and open-source vendors as well as their experience with the relevant software. Finally, universities should experiment with the graphical user interfaces of all the solutions they are considering so that administrative staff can confirm their ability to manage the new system efficiently.

**Conclusion—Intelligent Open-Source VoIP Solutions Maximize Results**

VoIP is no communications panacea for colleges and universities, but it is a valuable new approach that when correctly implemented, yields more unified communications and savings. VoIP implementations succeed only when the network is designed and configured to prioritize voice traffic on a network. VoIP savings materialize only if the VoIP convergence does not involve unnecessary network hardware expense and avoids burdensome per user or per feature software licensing fees. Savings are realized only if support and maintenance of a TDM system is reduced or eliminated, rather than merely replaced with similar support and maintenance of a new VoIP PBX system. VoIP’s promise of advanced features is apparent only when these advanced features are affordable and offer a level of flexibility integrated with open standards used across the industry.

Open-source VoIP builds on the core advantages of a VoIP implementation. It yields more savings and it produces more accessible advanced features that work with yesterday’s, today’s, and tomorrow’s technology. Seeking a knowledgeable, financially stable open-source integrator is key to any successful implementation. Open-source and proprietary VoIP implementations alike must be supported by a fully insured, bonded integrator with demonstrated network design and software management expertise.

Chad Agate is CEO of NeoPhonetics, a telephony provider that designs, implements, and supports custom VoIP systems for enterprises and universities. Reach Chad at chad.agate@neophonetics.com.
Institutional Excellence Award

Naval Postgraduate School
Monterey Peninsula Department of Defense Net

The Monterey Peninsula Department of Defense Net is a fiber-optic telecommunications transport system that interconnects the Naval Postgraduate School and its Annex, the Naval Research Laboratory, the Fleet Numerical Meteorology and Oceanography Center, the Defense Manpower Data Center, the Defense Language Institute Foreign Language Center and Presidio of Monterey, and Ord Military Community at six hub sites on the Monterey Peninsula. The project is the result of a vision that evolved from efforts at the Naval Postgraduate School and the Defense Language Institute Foreign Language Center and Presidio of Monterey to increase their operational efficiency and reduce the costs of communications.

The city of Monterey recognized that a communications infrastructure is a strategic investment in the region's economic vitality. It leveraged its cable franchise agreement to provide optical fiber for a regional institutional network (I-Net) to support government, education, and nonprofit organizations, a distinctive model among I-Nets operating in the United States. In response to requests by the Naval Postgraduate School and the Defense Language Institute Foreign Language Center and Presidio of Monterey, the city allocated four dedicated strands of optical fiber to link all of the noted Department of Defense properties when construction of the fiber-optic network was under way in 2002. This new infrastructure, recognized as a model for federal, state, and local government as well as joint service's cooperation, provides multiple discrete pathways with higher speeds, more secure links, and telecommunications capacities that are capable of supporting both the current and the future voice, video, and data communications needs of the entire Monterey Peninsula's Department of Defense community.

Planning, Leadership, and Management Support

When the infrastructure was in place in May 2004, a working group representing the Naval Postgraduate School, the Defense Language Institute Foreign Language Center and Presidio of Monterey, and the Naval Research Lab began meeting. That group evolved into the Monterey Peninsula Department of Defense CIO Council, which oversees the progress of the Monterey Peninsula Department of Defense Net by identifying the priorities of each institution, outlining the goals, supervising ongoing projects, and initiating new members into the consortium.

The establishment of the Monterey Peninsula Department of Defense Net aligns with both the Department of Navy Information Management and Information Technology Strategic Plan and the Naval Postgraduate School Information Technology Strategic Plan, by transforming aspects of telecommunications management and acquisitions, identifying efficiencies, improving performance, maximizing return on
investments, optimizing information resources, forming joint partnerships, and continuing to support the mission-critical needs of both the Department of Navy and Department of Defense.

Promotion of Technology and Maturity of Effort

The initial working group of the Monterey Peninsula Department of Defense Net identified local communications circuits—which carried voice and data information and cost approximately $191,000 annually—that could be replaced by a private Department of Defense network. Considering that the Defense Language Institute Foreign Language Center and Presidio of Monterey had a new requirement for video transport, the Naval Postgraduate School recommended—and the working group selected—passive coarse wave division multiplexing to increase the number of discrete circuits from one to eight and resilient packet ring electronics for common-use voice and data transport.

Three circuits are currently operational on the multiplexed fiber: A dedicated analog video circuit carries foreign language television broadcasts to the language school in the Department of Defense Center, Monterey Bay, at Ord Military Community. A dedicated gigabit Ethernet circuit transports language training and administrative data between the Defense Language Institute Foreign Language Center and Presidio of Monterey locations. And a common-use resilient packet ring transports telephone and data circuits.

The Naval Postgraduate School funded the coarse wave division multiplexing and common-use electronics; dedicated-use equipment is purchased, installed, and maintained by the using organization. Coordination with NIPRNET and SIPRNET network managers is required before the local circuits supporting these networks can be migrated onto the Monterey Peninsula Department of Defense Net.

Two T1 circuits, operating between the main campus of the Naval Postgraduate School and labs adjacent to its golf course, as well as the leased T1 circuits running between the Naval Postgraduate School and the Defense Manpower Data Center, have been moved onto the Monterey Peninsula Department of Defense Net. New circuits supporting the Defense Biometric Identification System have been activated, along with circuits supporting tests of disaster recovery methods.

Because the city of Monterey’s I-Net infrastructure did not extend to several locations housing Department of Defense organizations, the Defense Language Institute Foreign Language Center and Presidio of Monterey funded an extension of fiber-optic cable to Ord Military Community, and the Naval Postgraduate School funded a similar extension through its golf course annex to both Fleet Numerical Meteorology and Oceanography Center and the Naval Research Laboratory. Construction of both extensions was completed in 2003.

The city of Monterey has a single institutional network hub in Heritage Harbor that is serviced by six strands of single-mode fiber-optic cable. The Defense Personnel Security Research Center, a Department of Defense entity with leased office space at Heritage Harbor in the city of Monterey, recognized the immediate need for the higher-speed telecommunications connections from the center to the Naval Postgraduate School and the Defense Manpower Data Center. The Defense Personnel Security Research Center currently receives Internet connectivity from the Naval Postgraduate School and e-mail services from the Defense Manpower Data Center. Leasing increased capacity from a commercial service provider and installation of fiber-optic cable from the Defense Personnel Security Research Center to one of the Monterey Peninsula Department of Defense Net hubs were examined; the cost of each was determined to be prohibitive.

The city of Monterey agreed to allow the establishment of a Monterey Peninsula Department of Defense Net hub to support the Defense Personnel Security Research Center in using the existing I-Net fiber. The Defense Personnel Security Research Center was given dedicated Layer 2 connections to the Naval Postgraduate School and the Defense Manpower Data Center. Connection to each site is capable of full-duplex 100 Mbps data transfer (TCP/IP over Ethernet); committed information rate may be limited to less than full channel bandwidth. The project was implemented in multiple steps and completed in the summer of 2006.

The Naval Postgraduate School will provide a project manager at no cost to the Defense Personnel Security Research Center, accept project funds from the Defense Personnel Security Research Center, execute procurement of project labor and materials, configure and test necessary electronics, reconfigure the Monterey Peninsula Department of Defense Net ring, and activate connections from the Defense Personnel Security Research Center to the Naval
Postgraduate School and the Defense Manpower Data Center.

The Defense Personnel Security Research Center will provide funds for all necessary labor and materials and a point-of-contact for coordination and installation of configuration details, certify attainment of desired end state, contribute funds annually to the Monterey Peninsula Department of Defense Net maintenance and repair contract, and participate in the Monterey Peninsula Department of Defense working group.

Disaster recovery assistance and off-site storage are under way, and development of additional joint projects is ongoing.

Quality, Performance, and Productivity Measurements

The project was based solely upon cost of data transfer per unit of data per second. Quality is measured in both network uptime and end-user perception of performance. The ring had zero downtime in a year of operation. One node was down for a brief period during nonwork hours but with no impact to end users at any of the nodes. End-user perceptions have resulted in comments such as, “My queries run 10 times faster now than before.” Network downtime and trouble tickets were selected for tracking; both influence end-user perception. Trouble tickets to date are requests for new circuits/services on the network and requests for tests of new applications on the network.

There is no systematic data collection; nor was any planned. The project involves reducing the recurring costs associated with leasing communications circuits.

Cost, Benefit, and Risk Analysis

The establishment of the Monterey Peninsula Department of Defense Net has increased collaboration, cooperation, and support among Department of Defense organizations on the Monterey Peninsula by:

- Removing previous bandwidth constraints
Reducing transmission distances
• Allowing the Naval Postgraduate School to provide mainframe computer processing services to the Defense Manpower Data Center 65 times faster than previously
• Extending telephone and data services to laboratories and offices at the Naval Postgraduate School Annex
• Enhancing collaborative development and testing of both inter- and intra-service applications such as FORCEnet
• Significantly reducing the transfer time of huge data sets produced in research projects at the Naval Postgraduate School and/or reports and procedures useful to Homeland Security operations, especially between the National Weather Service and the Naval Postgraduate School
• Providing alternate communications paths by permitting operations to continue during a man-made or natural disaster, by shifting communications through the Department of Defense Net’s redundant, high-speed, nationwide circuits
• Enabling direct connections for the Defense Biometric Identifications System, hosted by the Defense Manpower Data Center, to Army and Navy sites on the Monterey Peninsula, eliminating routing across multiple Defense Department networks
• Supporting increased mission requirements in education and language training by providing a point-to-point gigabit Ethernet network between the Presidio of Monterey and Ord Military Community; a foreign language television broadcast network originating on the Presidio of Monterey and terminating at the Department of Defense Center at Monterey Bay, Ord Military Community; and telephone trunks
• Eliminating leased circuit costs. The common-use equipment costs approximately $200,000, and has a yearly maintenance tail of $42,000. The annual cost of local circuits to Department of Defense organizations served by the Monterey Peninsula Department of Defense Net was about $191,000. As all local Department of Defense circuits are moved onto the Monterey Peninsula
Department of Defense Net, the cost of local communications circuits will be reduced to about $42,000, the equipment maintenance cost; the initial investment could be returned in less than two years.

**Customer Satisfaction and Results to Date**

Senior leaders, both military and civilian managers, were pleased with the initial Monterey Peninsula Department of Defense Net successes and directed the working group to establish the Monterey Peninsula Department of Defense CIO Council, which meets quarterly to assess progress, fine-tune goals and priorities, and define the agenda for the upcoming year. Ensuring that the mission, goals, and priorities of all members are addressed is central to the planning process.

The CIO Council’s goals are passed to a technical advisory committee for action. The Technology Assistance Center of the Information Technology and Communications Services division at the Naval Postgraduate School completes the budgetary estimates after it identifies the hardware, software, and processes necessary to achieve the Council’s goals. A best-value technical solution and plans for implementation are presented to the CIO Council for its approval and funding.

The Technology Assistance Center is currently addressing streaming media storage; disaster recovery, with emphasis on information assurance and availability, as well as continuity of operations; security protocols; and the transition to IPv6.

Structured, annual meetings with leaders provide reports of the year’s activities, as well as successes—and challenges not yet overcome. This ensures a feedback loop that supports the alignment and execution of all strategic plans.

Dr. Christine Cermak is executive director of information resources and CIO at the Naval Postgraduate School. Reach her at cmcermak@nps.navy.mil.
Advertisers' Index

By advertising in the ACUTA Journal, these companies are not only promoting products and services relevant to communications technology in higher education, they are also supporting our association. As you have opportunity, we encourage you to mention to these companies that you saw their ad in our journal and that you appreciate their support of ACUTA.

* 1Call, A Division of Antelco .................................................. 19, 40
  Matt Evtry (800/356-9148)
  4800 Curtin Dr., McFarland, WI 53556
  info@1call.com
  www.1call.com

* 3Com ................................................................. 11
  Colleen Foley (800/284-1972)
  350 Campus Dr., Marlborough, MA 01752
  colleen_foley@3com.com
  www.3com.com

* AVST ............................................................... 29
  Denny Michael (949/686-2300)
  27042 Towne Centre Dr., Ste. 100, Foothill Ranch, CA 92610
  dmiichael@avst.com
  www.avst.com

Carrier Access Corporation ........................................ 3
  Tom Gormley, (303)218-5707
  5395 Pearl Pkwy., Boulder, CO 80301
  sales@carrieraccess.com
  www.carrieraccess.com

* Cedar Point Communications ........................................ 4
  Jim Gayton (603/345-3154)
  24–27, Outside Back Cover
  16 Route 111, Derry, NH 03038
  jgayton@cedarpointcom.com
  www.cedarpointcom.com

Dees Communications ................................................ 14
  Louis Champain (425)865-1963
  4130 148th Ave. NE., Redmond, WA 98052
  sales@dees.com
  www.dees.com

* Dux Public Relations ................................................. 44
  Kevin Tanzillo (972/889-0577)
  5713 Maidstone, Richardson, TX 75082-4970
  kevin@duxpr.com
  www.duxpr.com

* GAI-Tronics Corporation ........................................ 5
  Linda Upton (610)777-1374
  400 East Wyoming Ave., Mohnton, PA 19540
  lupton@gai-tronics.com
  www.gai-tronics.com

* Mohawk ............................................................ 9
  Denise Markert (978/537-5233)
  9 Mohawk Dr., Leominster, MA 01453
  denise.markert@mohawk-cable.com
  www.mohawk-cable.com

* Mutare Software .................................................... 13
  David Ballins (847/612-8581)
  2060 Algonquin Rd 701, Schaumberg, IL 60173
  dballins@mutare.com
  www.mutare.com

* PAETEC Communications, Inc. .................................. 33
  Rick Cunningham (800/760-5697)
  1872 Hidden Valley Dr., Milford, MI 48380
  rick.cunningham@paetec.com
  www.paetec.com

* PowerDsine, Division of Microsemi ......................... Inside Back Cover
  Michael Petagna (631/756-4680, x409)
  290 Broad Hollow Rd., Ste. 305E, Melville, NY 11747
  mpetagna@microsemi.com
  www.microsemi.com

* Professional Computing Resources, Inc. ................. 45
  Don Ross (615/654-0000)
  4635 N. Breton Ct., Kentwood, MI 49508
  sales@pcor.com
  www.pcor.com

* Sprint / Nextel ................................................... Inside Front Cover
  Richard Marvin (972/405-3300)
  5020 Riverside Dr., Irving, TX 75039 (Mail Stop TX/VGN0301)
  richard.marvin@sprint.com
  www.sprint.com

* T3 Telecom Software ........................................ 21
  Trish Weiser Harris (212/226-8205)
  32 Broadway, Ste. 1214, New York, NY 10004
  info@myt3.com
  www.myt3.com

* TAC Centre Inc. ............................................... 17
  Sally Nadeau (718/636-0134)
  356 University Ave., Westwood, MA 02090
  snadeau@taccentre.com
  www.taccentre.com

Talk-A-Phone Co. ................................................... 7
  Jerry Nussbaum (773)539-1100
  5013 N. Kedzie Ave., Chicago, IL 60625
  info@talkaphone.com
  www.talkaphone.com

* Telecom Reseller Magazine .................................. 43
  Doug Green (360/290-9708)
  17413 SE 28th St., Vancouver, WA 98683
  publisher@usernews.com
  www.telecomreseller.com

* Telecom Technology Resellers ................................. 39
  Michael Forst (936/527-7100)
  440 Sovereign Ct., St. Louis, MO 63111
  mforst@teltechresellers.com
  www.teltechresellers.com

* Tier Technologies ............................................... 31
  (571/382-1000)
  10780 Parkridge Blvd., Ste. 400, Reston, VA 20191
  www.tier.com

* W TC ......................................................... 35
  Charlotte Bedelman (213/889-5314)
  801 South Grand Ave., Ste. 700, Los Angeles, CA 90017
  cbedelman@wtc-inc.net
  www.wtc-inc.net

For details about advertising in the ACUTA Journal, contact
Amy Burton, Manager, Corporate Relations & Marketing
Phone: 859/278-3338 x240 • e-mail: aburton@acuta.org
www.acuta.org
Here's My Advice

continued from page 48

(opinionated scores submitted by humans on actual calls) that were mathematically averaged to obtain a quantitative indicator of the system quality. Recently automated tests have been developed that perform similar analysis while providing a calculated MOS using the same scale.

One such test is the Perceptual Evaluation of Speech Quality (PESQ). PESQ was developed by KPN Research, the Netherlands and British Telecommunications. The following table ranks MOS (for reference, cell phones are typically rated 3.5–4.0).

<table>
<thead>
<tr>
<th>User Opinion</th>
<th>MOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.711 high-end limit</td>
<td>4.4</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>4.3–5.0</td>
</tr>
<tr>
<td>Satisfied</td>
<td>4.0–4.3</td>
</tr>
<tr>
<td>Some users satisfied</td>
<td>3.6–4.0</td>
</tr>
<tr>
<td>Many users dissatisfied</td>
<td>3.1–3.6</td>
</tr>
<tr>
<td>Nearly all users dissatisfied</td>
<td>2.6–3.1</td>
</tr>
<tr>
<td>Not recommended</td>
<td>1.0–2.6</td>
</tr>
</tbody>
</table>

Monitoring the Network

What degrades the quality of a call over an IP network? Your network isn’t going to remain static and performance will fluctuate as changes are made. It’s important to have a network-monitoring tool keeping track of performance and alerting you to degradations. The following events should always be followed by a retest of the network:

• Adding endpoints or changing call flow patterns (like moving a “high-use” department into a node)
• Physical reconfigurations
  • Adding buildings
  • Adding nodes/edge switches
  • Adding wireless APs
  • Changing media (swapping fiber pairs, etc.)
• Switch reconfigurations/firmware upgrades
• Router changes/upgrades
• Addition of VLANs
• After any DOS attacks or other network disruptions
• After any significant power related issues

Enhancing Satisfaction

What other steps can be taken to enhance end-user satisfaction? Once the infrastructure issues are addressed, there are still some things to consider if you want your end users to be happy with the new system.

Telephone handsets. Don’t scoff. The look and feel of a telephone handset is important to more people than you might think. Issues that I have seen affect end-user satisfaction include:

• Overall size
• Weight of base unit and handset
• Aesthetics/style
• Display size and quality

Regarding soft versus programmed keys: Soft keys cost more but save you money in the long run (labeling and training).

Analog conversion issues. You are going to be placing analog devices on your IP network—and those analog signals must be converted to IP. You can purchase individual conversion devices that hang off the back of the external device, or you can install shelves of analog ports in your telecom room. On the downside, centralized shelves require accurate port counts per telecom room, and individual units at the external device can get lost, stolen, or broken. Also, conversion adds delay. You will have to test fax machines, time clocks, and credit card readers to ensure they can “wait” for dial tone.

Wireless Voice. “Wireless telephony” is now “wireless IP-telephony” or voice over Wifi. Most 802.11 networks are not ready for voice. In fact, I wouldn’t be surprised if during the implementation of wireless someone said something like, “This is just an overlay to the real network—it’s a convenience with no service level guarantees.” If they did, someone better go back and do some redesign before you add voice.

Session initiation protocol (SIP). Herald as the standard that would free us from proprietary handsets, SIP has yet to impress. To be fair, standards by their nature are based on components that can be agreed upon by those writing the standards. Employing standards always guarantees interoperability at the expense of features. The current SIP standards offer a significantly reduced feature set when compared with the proprietary telephones, but this can be acceptable, especially when you desire a relatively low-cost device at the end point. You must take care to understand each system’s ability to support SIP and which features work and which do not.

The bottom line is that IP is here now. You cannot ignore it and you can’t go back. If you are in the enviable position to not have to make any changes to your system right now, then now is the time to plan for the next life cycle of your voice systems—and it will be IP.

Ron Walczak is principal consultant at Walczak Technology Consultants. Reach him at ron@walczakconsultants.com.
Preparing Your Network

Before you begin a VoIP rollout, implement end-to-end QoS and VLANS following IEEE 802.1p/q. Your data switch vendor will be happy to provide you a quote if your system is not compliant. Voice should be on its own VLAN(s), and you should limit voice connections to about 100 per VLAN. Yes, you read that right. Someone has to create all those VLANs and someone has to reprogram static IP devices (printers, etc.) to meet the new IP addressing scheme.

Next, conduct a baseline traffic analysis of your network before you roll out. You may be very surprised when you get the results. This will require the insertion of traffic generators across your network—and like all voice trunking exercises, you want to study the traffic during peak times and over the course of at least a week. This effort is typically offered by the various equipment vendors for a fee (negotiate it to be refundable if you buy their VoIP product). It's worth the cost even if you don't get a refund. Consider it continued employment insurance.

Baseline Testing Parameters

- Jitter less than 20 ms
- Packet loss less than 1 percent
- Delay (or latency) should be less than 100 ms for toll-quality voice

The most popular measurement of voice quality is the mean opinion score (MOS). The MOS provides a numerical measure of the quality of human speech at the destination end of the circuit. The original scheme used subjective tests

continued on page 47
Simple
Fast
Affordable

A Single Connection for Video, Data, Voice and Power.

PowerDsine® Midspans are the cost-effective way to upgrade your network with the latest PoE technology.

They can fit easily into your budget whether for IT, infrastructure or specific applications including IP phones, wireless LAN access points or IP security camera systems.

With PowerDsine Midspans there’s no downtime, no need to replace existing switches. They’re plug and play fast and enhance the investment you’ve already made in your network infrastructure.

PowerDsine engineers pioneered the technology and are driving next-generation industry standards. So you can be confident with PowerDsine that you’ll rise to the top of the PoE upgrades class. Worry free.

PowerDsine Midspans: the simple, fast and affordable way to send voice, data, video and power over a single wire. See how easy at www.powerdsine.com.

PowerDsine PoE Systems are now a product line of Microsemi Corporation
Introducing Cedar Point SAFARI C³, the next generation multimedia switch

They’re out there and they know who you are. Those multimedia craving students. Are you ready for them? It’s time you listened to this enlightened crowd and prepared for the onslaught of multimedia applications with the only carrier class, VoIP solution, that features seamless evolution to Fixed Mobile Convergence: SAFARI C³ Multimedia Switching System from Cedar Point Communications.

SAFARI C³ has some impressive credentials, including superior performance, unmatched reliability and renowned scalability to handle whatever those mobile connected masses desire. So, if you want to be all things to your students and faculty, at least on a multimedia level, let Cedar Point SAFARI C³ show you how.

Visit www.cedarpoinntcom.com for more information.