

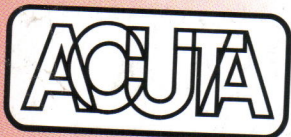
Summer 2000

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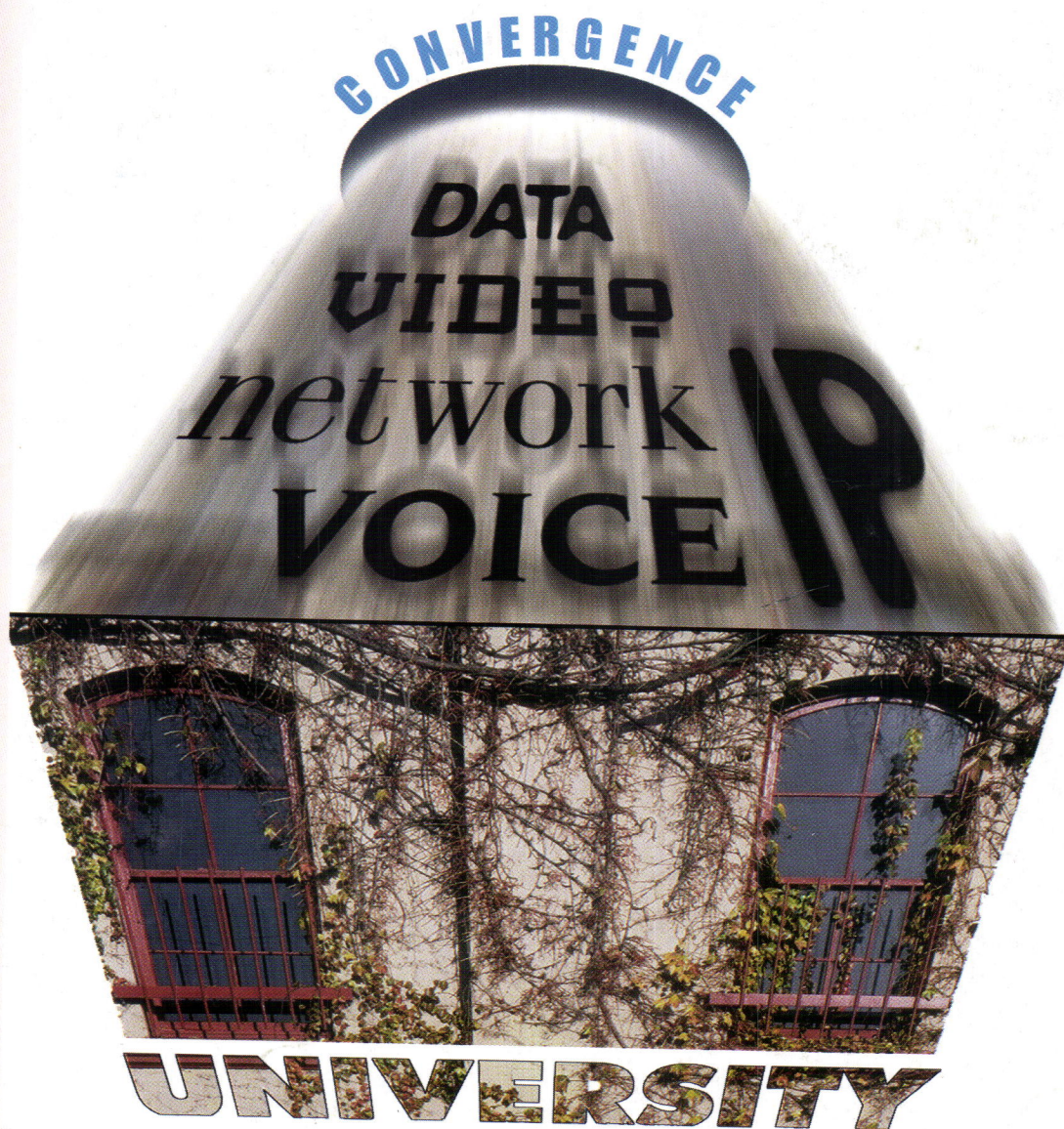


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Journal

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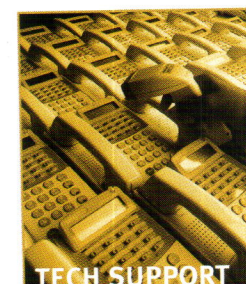
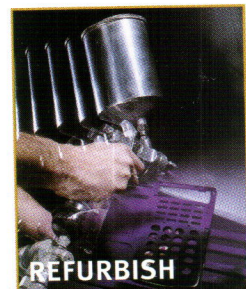
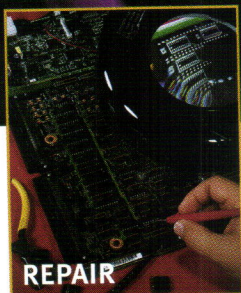
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This Issue: Convergence: Dealing with Change



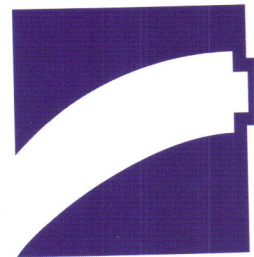
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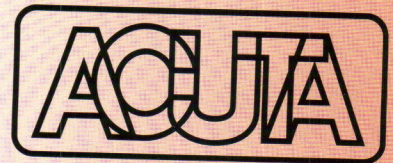
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Perhaps the most important challenge so far lies ahead: how to remain vital in an evolving environment where voice, data, and video are perceived as indistinguishable; where the "ownership" of voice services no longer comes with a clear-cut mandate; where ultra high speed campus backbone networks feed into lower speed local networks, and the demand for that "lower speed" to increase is continual; where demands for more bandwidth at the desktop to accommodate multimedia applications is accompanied by demands for more mobility and flexibility through the seamless integration of wired and wireless media.

Mal Reader

*Western Telecommunications Consulting
page 14*

The ACUTA Journal

of Telecommunications in Higher Education

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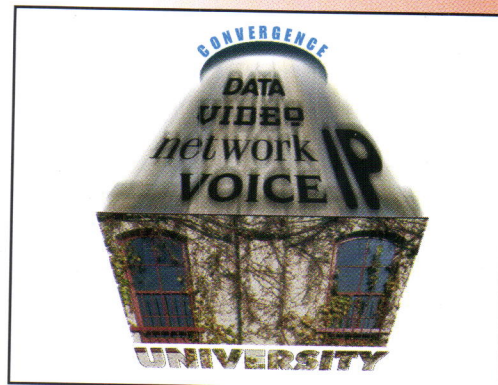
Clarion University now provides Internet access and a host of other technology services to the university community after some creative thinking and cost-conscious partnering with vendors opened new doors.

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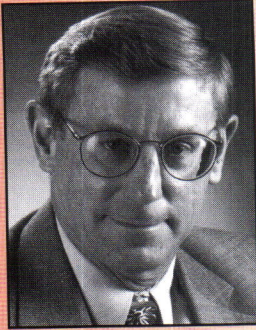
Called to Serve: The Conscripted Consultant

Mick McKellar

Telecom professionals often find themselves cast in the role of technology consultant to faculty and staff. If you have been *conscripted* yourself, here are some suggestions for lightening your load.



Focus: Convergence: Dealing with Change



Tony Mordosky
Bradley University
ACUTA President
1999–2000

President's Message

Convergence—More than Data, Voice, and Video

Within this issue of the *ACUTA Journal*, you will find articles looking at a myriad of issues associated with convergence. I believe it is important to look at all aspects of convergence that will impact our campuses. Convergence is more than merely combining the bits that form a stream of an e-mail, telephone call, or a videoconference onto a common infrastructure. It is not just a technological issue but a financial and organizational issue as well.

From the technology standpoint, there is no question that convergence is here today. Just look at the daily dose of alphabet soup in the news media: VoIP, VoP, VoATM (voice over asynchronous transfer mode), VoD (voice over data), and VoDSL (voice over digital subscriber line)...and the list keeps growing. The question is, how do you classify a technology that the vendors are implementing in so many ways? If you call it VoIP or VoP (voice over Internet protocol or voice over packet), today you're not quite right, because much so-called VoIP traffic still runs over PVN (private virtual networks) implemented via frame-relay networks. Most VoIP traffic currently does not use the Internet at all. With the exception of some limited application and trials, the vast majority of VoIP never really touches the Internet. Use of services like Dialpad.com by our students and the Internet2 working group on VoIP are notable exceptions.

While I freely admit that VoIP—or whatever you choose to call it—is here to stay, I must question if it ready for *prime time* usage on our campuses. My father-in-law calls us from Texas using one of the Web-based services like Dialpad.com, Net2phone.com, Deltathree.com, or

MediaRing.com. His calls demonstrate the main usage issues we as telecom/IT professionals will face if we are to move our institutions' voice services into a VoIP or VOP environment. The primary usage issues are quality and reliability. Because my father-in-law is able to call his children around the country "for free," he tolerates both erratic call quality and the periodic inability to place a call or having the call drop while in progress. Our institutional users are not so tolerant.

In his article "Free Long Distance Via the Net" (*USA Today*, February 28, 2000), Peronet Despeignes says Dialpad sees itself as more of a "complement to normal phone service."

"I wouldn't recommend Internet voice for most people, but it's great for college students on a budget," said Rusty Luscombe, a freshman majoring in computer science at Michigan State.

I firmly believe that the quality and reliability issues will be resolved soon. For us in higher education as well as large commercial customers of telecommunication services, one key issue is going to be cost. The cost I am referring to is that cost already incurred in providing voice services via a PBX. We are not so converged that voice and data networks are fully merged on most of our campuses. When voice runs over the data network, we won't require a traditional PBX or Centrex type phone-line network. The voice/data network will be provided as a single package, thereby simplifying network maintenance including adds, moves, and changes required with existing voice services, and reducing access costs required to support two separate networks as well as reducing LD

charges. Currently, the cost savings arising from simplified network maintenance, reduced access, and LD charges are unlikely to offset the cost of replacing a functional PBX. For many of our institutions the breakeven point of a full-scale replacement may well be three to seven years from now. However, new implementations that are designed to serve new areas of our campuses and/or branch campuses may be ideal candidates for VoIP.

Key to the organizational issue is identifying all the functions that are still required under a converged organization. My first experience in merging the voice and data units under a single umbrella structure occurred more than ten years ago. At that time I still maintained units with the designation of telephony and networking even though they

reported to the same manager. This was done primarily for business reasons. The traditional telephony unit handled functions like customer service and billing that were new to or not required of the networking group.

Today, we see converged units being fully integrated. Information service organizations are being created that attempt to eliminate all distinctions between the traditional voice and data staffs. However, the business functions still exist. Our task as telecom/IT professionals is to recognize the strengths of the various units being combined into an integrated unit.

Higher education has traditionally offered a unique environment in which the telecom professional has had the opportunity to acquire a broad spectrum of skills. We usually work with limited budgets.

We must know the technology. We deal with human resources issues. We have become experts in customer service. We know the importance of good communications. Through ACUTA educational programs and networking opportunities, we continually hone our skills, allowing us to stay abreast of change and become lifetime learners ourselves.

It is critical to our success that we learn to recognize and articulate our strengths and not underestimate our value to the institution. We bring a unique skill set to the emerging organization, and are well equipped to lead.

If convergence hasn't already arrived on your campus, it is coming. If you want to succeed, you must be willing and able to join the team in supporting the concept of convergence.

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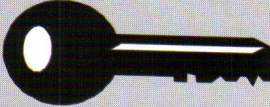
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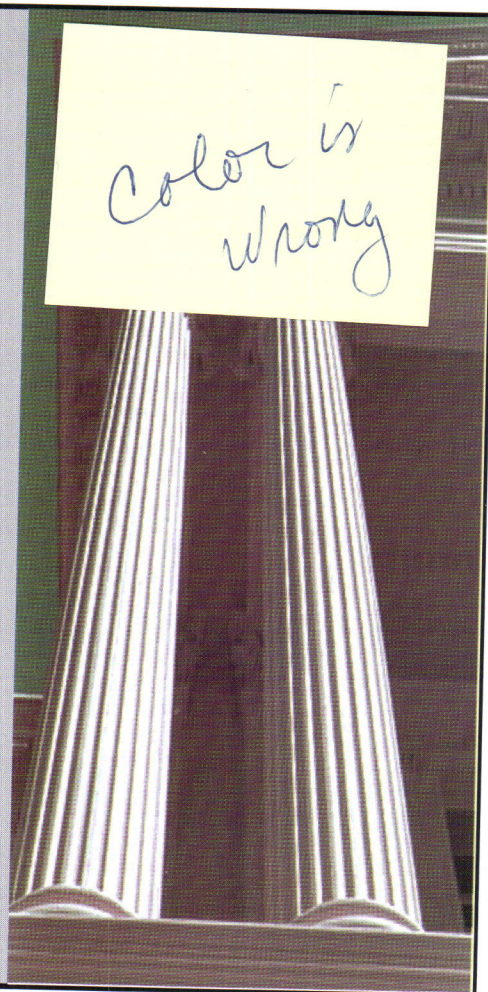


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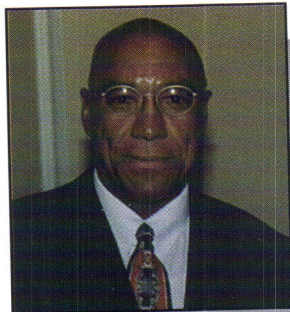


**Unlock the Magic of the Merger at the
ACUTA Conference**



Roundtable Discussion

Convergence: Dealing with Change



James S. Cross, PhD
Vice Provost of Information Technology
Michigan Technological University
ACUTA President 1996–97



Constance Gentry
Director of Telecommunications
Emory University
ACUTA President 1981–82



Randal R. Collett
General Manager
LTD Business Markets Group
Sprint
ACUTA President 1994–95



Moderator: Ruth Michalecki
Director of Telecommunications
University of Nebraska
ACUTA President 1984–85

Four former ACUTA presidents—Randy Collett, Jim Cross, Connie Gentry, and Ruth Michalecki—met recently via conference call to discuss seven questions developed by the ACUTA publications committee relevant to our focus for this issue, “Convergence: Dealing with Change.” Presented here is that conversation.

Ruth Michalecki: Our first question asks us to consider the changing organizational structure. Let’s look at the regulations, all the mergers of all the different companies, and certainly the new approach to our organization, and the technology planning that’s required of institutions. What has happened in your area? What other emerging trends and opportunities do you find from managing and assimilating these changes? What are you doing differently today from what you were doing when you were just managing voice?

Connie Gentry: That’s a really good question. Organizational structures, regulations, and technologies are changing, but also our colleges and universities are having to change. They’re looking at the way they provide services to their customer, which is the student, and that puts us on the spot to be able to support whatever they’re going to do, whether it’s offering virtual degrees or getting older students or some other program. It’s much more complex than it used to be. When we just had voice, it was bad enough; but now we can’t keep up with all the changing technologies. That’s why everyone’s a specialist. Our challenge is to figure out how to be competitive under the budgetary strictures that we have.

Michalecki: That’s right. And I think most of you do like I do, you market a lot of your services, you are a so-called profit center within

the university, and yet the opportunities are going away. We’re being asked more and more to support IT operations and we have fewer dollars to do it with. Another thing happening here, which I’ve noticed as a part of the IT operation for about five years, is the continuous turnover in the IT operations. I get people in this department and they stay for years and years, and yet you’re always working with someone new in the IT department. We have great difficulty keeping a skilled technician on staff.

Gentry: We’re finding that true in the telecommunications arena, too. Finding qualified individuals to do the work is difficult because the pool is just not there anymore.

Jim Cross: I think the challenges have come from the fact that the talent and skill levels that we are looking for in terms of professionals are changing. More and more we are finding that products and services we used to deliver are no longer applicable, and we are being asked to put on different hats and be innovators and creators and visionaries who can come up with that next great opportunity or product that’s going to be attractive to our constituents, whether they be faculty, staff, or students. That’s a role very different from the one most of us have played in the past. We are having to be the architects of new products and services to our constituents. In the past, we were never invited to the table to participate in those discussions, and it’s a whole new world for us. The value proposition for that takes on an entirely different dimension for many of us who have been accustomed to being the implementers and doers but are now expected to be the inventors and engineers and architects of that next new “bang.” That requires a whole new skill set, a different way of thinking and looking at the world.

Michalecki: It really does, and it has really had an impact here. We have always run a profit center. In the past I reported to the business and finance side of the house, which is much more tactical and strategic. Now with the IT organization, I report to the vice chancellor for academic affairs. It was very difficult for the first year or so to get them to understand the business side of my operation.

Gentry: We’re facing that here at Emory, too. They operate with a totally different model than we have.

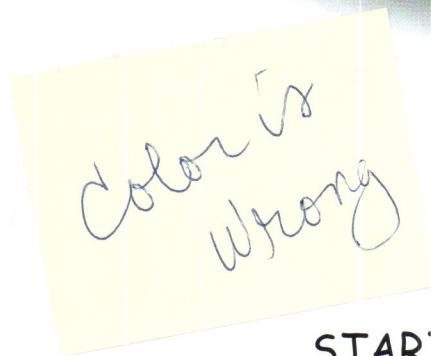
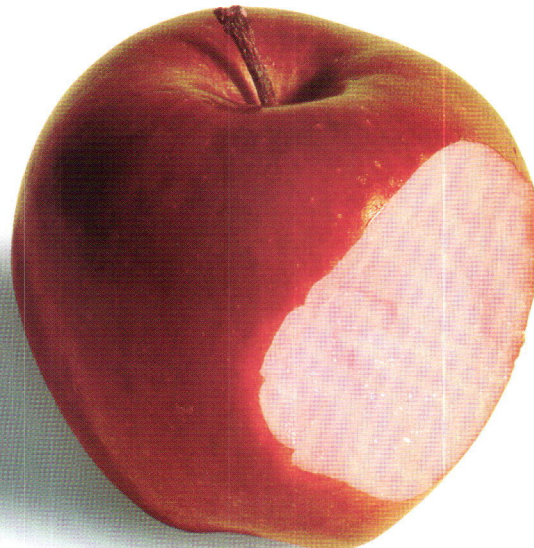
Randy Collett: I agree with Jim. Having been on both sides of the table, I recognize that we’re ultimately driven by the consumer. The challenge is that consumers and their demands and expectations sometimes exceed our best abilities to deliver, and those demands are increasing logarithmically on a daily basis. At least from my perspective, it looks like we’re having a hard time getting in front of the wave of the expectations and matching that with deliverables.

Michalecki: And I certainly would have to agree with Jim when he says that we have to be more visionary and that’s a role that we traditionally have not played. We have to be a lot more proactive because of what we’re being asked to accomplish.

Our next question says, “Change by its very nature is constant, and yet the process strikes fear in the hearts of those who are exposed to it. That includes everyone from the bottom to the top of the organization. Change can also be measured in degrees or intensity or depth. The less the change, the easier the adjustment—or so it would seem. Is the price of progress tied to the inevitable and ubiquitous process of change, and is there some way



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to measure the cost in terms of skills that are obsolete or technologies that no longer serve the needs of an evolving society and are then cast away?"

Gentry: I'd like to respectfully disagree with the statement that change by nature strikes fear in the hearts of those exposed to it. I think people in the telecom organization especially live with change on a daily basis, and it's not something that strikes fear into their hearts. It's something we have learned to cope with in a variety of inventive ways as we offer changes or new technology to our various campuses.

I think where the fear comes in is when the *organization* is changing, not when the technology is changing, and not from us having to be quick on our feet to deploy technology or to roll it out to our campus. It's when we are in an organizational change within our universities, such as merging telecommunications with IT, or, as we are right now, coming up with a network communications group.

The only model I can think of would be something like what Northwestern did with their Northwestern Technologies Group where we're pulling together an enterprisewide group that will bring together three telecom departments and two information technology departments from healthcare and the university. That's what's scary—it's not the technology that's scary, it's not the change in the technology. It's having to bring all those disparate philosophies together, merging the telecom philosophy with the IT philosophy, and that's not just billing. I think the telecom organization is a lot more customer oriented than the IT organization.

Cross: We're going to have to move beyond whether it's telecom or IT. We are the technology organization on our campuses. And as the players who are expected to make it happen, we're going to

have to be sort of like good marksmen. We don't shoot where the target is, we shoot where we expect the target is going to be by the time the bullet gets there. We have to look at our services and our clients and ask where they are going. Where is the institution going? How do we aim a set of products and services to be where they are going to be when they need it, not where they are now but at some point in the future? We are a part of very dynamic organizations. People are going and coming like crazy, and they're not staying very long. You have to deal with the next player, and so our culture has to embrace that dynamic that people are not going to stay for long periods of time like they used to.

Michalecki: I couldn't agree with you more. I see that all the time. In fact, we even see it in our faculty. They're being hired by private industry so fast we can't keep them. As soon as they get a little experience, they're gone. And that's going to hurt the upcoming generation, especially right now when they can make so much more money in private industry and their skills are badly needed.

Collett: Power disparity is the biggest thing. The public institution is always limited by the actions of the legislature, and legislators are loath to try to keep up with the private sector in terms of salaries. The taxpayers won't necessarily stand for it.

Michalecki: That's right.

Let's move into our next question, which deals with cost. "In preparing for convergence of voice, data, and video onto a single infrastructure, where should we expect to find the bulk of the cost and design effort? Is it related to the provisioning of the new technology, or rather in joining the existing systems and functionalities together with new technologies? Is the legacy interoperability issue a serious

inhibitor in making the first small steps toward convergence?"

Collett: The answer to the last question is a definite yes. Cutting-edge technology, the latest and greatest of the new introductions, is usually—at least initially—proprietary to the vendor who's launching that particular technology. And there's always a significant amount of time from the introduction to general availability. Then there are costs associated with that from the day the product rolls out to the day when it becomes generally available in an open-network model. There is a huge amount of cost (which decreases over time) at the front side of that curve.

Cross: I'd like to take a slightly different perspective. I think the tremendous cost is going to be on the people side. We have to be willing to recognize that the old must coexist with the new. And we have to look beyond the barriers and accept that some things have to die and go away and be replaced by the new things. We have a tendency in academia to be unwilling to cut loose things that have outlived their usefulness, and I mean degree programs as well as products and services. It's very hard to get a group of constituents to embrace the dynamic of the new society that cannibalism is good. That's very tough. We like to hold onto the old traditions—not that tradition is not good, but we have to be dynamic and agile, and that means coming up with and accepting new things.

Michalecki: I think one of the hardest things for us here in IT at Nebraska is making our clients understand there is continually going to be a cost in keeping current with this technology, not just rewiring the building, and not just putting in new fiber. It's continually upgrading electronics, and people don't realize that. Look at the cost of buying a new com-



puter every two or three years, even if the price is lower. And what do you do about the old ones?

Cross: It's that mindset that we've got to change.

Michalecki: You bet it is. It's hard to make them understand that. We rewired every building on the campus four years ago and put all Cat 5 or Cat 6 wire in. I insisted on trying to get one wiring closet in the center of the building someplace so we didn't have to put one on every floor and upgrade electronics in a 12-story building 12 times. Do it once. I finally won that battle, and now they're beginning to see the economics of that. It's much cheaper if you can possibly do it from one closet, especially when you see upgrades coming. They have always come regularly, and they're going to come more frequently.

Gentry: But that's it. You have to fight one battle at a time. And it's like constantly fighting a battle. It's not suddenly as if a light goes on over someone's head that says, "Oh, I see what you mean. Yes, we need to plan for this and realize that cannibalism is good." We utilize what we have, and we move on to what's new, continually. We work case-by-case, like reinventing the wheel all the time. And I don't know whether it's going to take having administrators who are more technologically savvy than perhaps some of them are now or what. It seems like, at least here, fighting the constant battle to say yes, this is going to be an ongoing cost, and you need to plan for that. It's not put it in one time and that's it.

Cross: Time will fix some of it because more and more administrators on the pure academic side will come to the table being technologically savvy, trained, and adept at using all of the technology. They're going to be used to that technology being accessible and they're going to expect it to be there. They will understand to some degree that it is expensive, so we

just factor it into the equation like we did air-conditioning and electricity. We don't tell people to ration electricity. We just say use what you need. So I think more and more that mindset will evolve and just become an integral part of the fabric.

Gentry: But when you're dealing with people in an academic environment who think that access to the Internet is a God-given right and they don't realize there's a cost to that access, it's hard to translate that thinking to other services. They have the attitude that we should just provide that. This is what we need to exercise our academic freedom and do all this stuff. Sometimes it takes leaping that gap to say, "Oh, you mean I have to pay for it? I see."

Collett: That's one of the challenges. I agree with everything that's been said. Now we're back to that demand wave again. Convincing other decision makers of the ongoing expense for keeping the network ahead of the demand wave lies squarely on the shoulder of the IT professionals. In a lot of cases, that's something new, too. It's difficult for us to project three or four or five years from now how much we think it's going to take, then turn it into financial numbers that somebody can actually make a decision on.

Michalecki: I think the bulk of the money that will be spent will depend a lot on the culture of the university—whether the university has decided that in the technology field they're going to be an early leader or early follower or a latecomer. That culture will determine how often you upgrade and how much money you spend.

Collett: Jim, you should be aware that in the corporate world we sometimes have trouble cutting loose our "dogs," too.

Cross: Yes, we do! And you know, for instance, we struggle on our campus with what to do with mining engineering. It's a degree

program that was right at the core when this institution was founded. But that is an area that has evolved and become something entirely new and different. It took a lot of debate and a lot of soul searching to say do we drop it? Do we continue it, or do we transform it into something new?

Gentry: And what was your decision?

Cross: We are trying to transform it into something new.

Michalecki: There's a Bohemian community about 30 miles from Lincoln. Many years ago this organization gave a big grant to the university to teach Bohemian. Well, I don't know how many years it's been since they had anybody in that language program. But they have tried year after year to get rid of it, and then this whole community comes down on the university and just screams bloody murder. So it's still in the course book, but I don't know if they've got anyone who knows how to teach it.

Collett: And it always affects the revenue stream from those alumni who are givers.

Michalecki: Yes, that's exactly right.

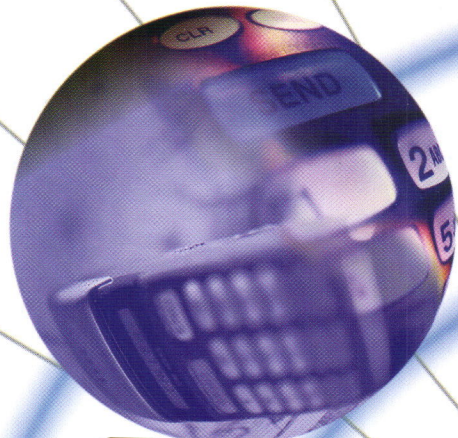
Well, onto the next question. "In the future, our primary marketable commodity may be our knowledge base. In other words, we will be selling what we know. Will protecting our assets be a challenge in a society (generation) that takes great pride in their ability to share pirated music (MP3s)?"

That's a topic that's continually debated here, the right to literature, rights to printed articles. That's probably on the agenda every month at the faculty senate meetings.

Collett: This is a dissertation topic.

Cross: Clearly we have to step back and rethink the whole digital world and look at some of the

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rules, policies, and issues that we have developed that have worked well in a paper-oriented world or a printed media world that don't necessarily apply or can't work the same way in cyberspace. It's going to take time to get through that because intellectual property in a digital world is something slightly different than intellectual property in the print media world that a lot of our old policies are based on. I think we'll get through these things and probably look back and laugh at them. I don't know how, for instance, I did my dissertation with a typewriter!

Gentry: Yes, and how many offices have a typewriter in them now?

Cross: None!

Collett: There's usually one, back in a corner somewhere that every once in a while somebody needs to go type a mailing label or something.

Cross: But you know, the other piece of this is more and more basic research is occurring at universities. Intellectual property is a growing function that's taking on big bucks, and more and more resources have to be put into those areas to protect those rights.

Collett: I think a lot of this is going to be sorted out in the courts. It's

like you said, Jim, the definition of intellectual property is different from what it was 10 or 15 years ago—maybe even 5 years ago. Some of this stuff will be defined and sorted out through the courts, and in some cases it will be dictated to us what we can and can't do with those digital assets.

Michalecki: Our next question says, "So far the Internet has been tax free and basically free from federal and state regulations. Due to recent circumstances, this will probably change. How will the policies be developed? What implications

does taxing and regulating the Internet have for its users, especially the public education sector?"

Collett: This is a sticky question. It seems to me that we have to ask what the tax dollars are being used for. And part of me says that while right now we're enjoying relatively good economic times, they're not going to continue forever. We don't have a lot of governmental entities in dire financial straits who are clamoring for more of this tax money yet, but it's only going to take the inevitable downward turn in the economy to make this a lot hotter issue than it is right now.

For me, the questions are, What brick and mortar infrastructure are we trying to support with this tax? Are we supporting it at the seller's end or the buyer's end? What's the tax going to apply for? Is it the way we think of taxes and the government entities using tax dollars today, or is it going to be some new model that says we're going to take that tax and focus on something similar to what the Universal Service Fund is doing now in Washington? Those are the questions it raises for me.

Michalecki: Addressing the digital divide, one of the questions it raises for me is fairness—or lack of fairness—to local merchants who are selling the same product or a similar product and are required to put a tax on it, and then you can go to the Internet and buy it cheaper. What happens to that local merchant in the long run?

Cross: Well, that's why I think the model that's currently in place will evolve as it does with any industry. We've always subsidized new and evolving industries until they've matured to the point that they can sustain themselves. I think the Internet is going to get there, and goods and services sold on the Internet are going to be taxed just like when you go into a regular store. Virtual stores are going to be out there and we will be motivated

to figure out how to collect that tax dollar and not destroy funding our public service things that we want to make available. I think it's a good idea that we have held off taxing it until the industry matured, and we have developed the appropriate systems and vehicles to be able to manage it without it being disruptive. Ultimately it's going to evolve to where we will collect the tax.

Michalecki: Randy's got a good point asking where does the tax go then. Which end does this tip? And that again goes back to the local merchant because when you buy something here and you pay tax on it, you know that it stays right here.

Creativity, innovation, and visionary thinking, thinking beyond the obvious, have always been valued. There are people who are good implementors, but finding somebody who is a good thinker and can come up with that next bang product, that revolutionary success, it's like painting a masterpiece. You don't do that very easily.

—Jim Cross

Collett: That's the big thing, I think, everyone is struggling with. I pay a sales tax downtown, and I know that goes for my roads and streets and the community in which I live. If I'm paying sales tax to Amazon.com in New Jersey, where's my money going then?

Michalecki: That's a very good point.

Our next question is very provocative: "What does the Internet do? A lot of focus is put on the technology and the 'stock' of the Internet, but how is this changing the way people

behave and work? Has research been done on this, beyond salesman hype, and are these changes desirable?"

Gentry: Can you explain that question a little bit?

Cross: I took it to mean the entire arena of electronic services, not the term *Internet*. The whole concept of electronic service delivery is changing the way we look at the world, and what it's done is cause us to look at location and time barriers in a whole different light.

Gentry: There's a university in Georgia that just announced they're going to be offering an MBA program via the Internet. Of course, it's going to cost more than if you signed up and attended it on campus, but the fact that they're offering it just blew my mind.

Michalecki: We've been doing that for about two years.

Cross: Yes, and the significant thing here is that university is going to do high-quality, what I call truly video-game-type, materials. It should cost more. The generation now coming doesn't think learning is learning until it matches them sitting down to video-arcade-game-type learning materials.

Gentry: One of the things we talked about at ACUTA's spring seminar in Miami was the fact that the Internet and electronic services are changing and will continue to change the nature of our campuses. That may mean that we have more virtual campuses and more students getting their degrees online. We're able to reach older students. We can be more competitive, and it puts the whole world at your fingertips. We've just got to figure out how to take advantage of it.

Michalecki: I agree. I think Jim is right, it's got to be high quality. I was called to testify before the U.S. Senate at a hearing on the digital divide between urban and rural America. As a result of that Chairman Kennard and our senator from Nebraska held some

hearings in a little town in Nebraska a week ago and asked me to be present during that session. They had three people, one from our medical center in Omaha, from the University of Iowa's Medical Center, and one from North Carolina, who were all talking of the extreme value of delivering telemedicine and how they could reach so many more people if they could just get the bandwidth required to bring telemedicine services via the Internet to these locations.

Collett: In *Newsweek* (April 24) there's a whole section on college online, the frustration and concern about turning these things into paper mills. All the usual sociological arguments. I look at our last couple of questions together. I think a lot of this is geography related. I remember a column I wrote in the ACUTA newsletter about the conflict of people who need these virtual facilities. The people who need these services the worst are going to get them last just by virtue of market dynamics. Where high-bandwidth technology will be deployed first will be in our population centers, then continually edge out until we get to the folks who need service the most. But there's the conflict—those folks need it now. Small town America is slowly losing all their talent and expertise as qualified people go where the jobs are. Ultimately we might think that electronic service delivery may change that, but for right now, small town, rural America is hurting because all of their talent is leaving. They've got no way to attract or keep them because they don't have bandwidth there yet. So in my opinion there's a conflict that isn't going to be solved very quickly.

Michalecki: One of the panelists when I was in Washington, D.C., was from Wireless, and they're really starting to come up to bat on getting wireless to these small towns; but once again, it's a matter

of geography and cost. I know there are a lot of places in Nebraska where you'd be lucky to get a 56K frame relay connection.

We've come to our last question. "With the rapid advancements in technology, people are being forced to specialize in a certain technology area. The old days when a person was able to get a handle on the industry are long gone, yet there is still a need for some people to be able to look at the big picture. In a future world of specialists, where is the 'view from 30,000 feet' going to come from?"

I think Jim hit on the answer to that with our first question. We have to become more visionary.

Gentry: That's not just one person, it's the whole organization, at all levels.

Cross: We tend to lose sight of it. Creativity, innovation, and visionary thinking, thinking beyond the obvious, have always been valued. There are people who are good implementors, but finding somebody who is a good thinker and can come up with that next "bang" product, that revolutionary success, it's like painting a masterpiece. You don't do that very easily.

Collett: I struggle with having the time to do the kind of strategic thinking that you need to do. We get so busy putting out fires and addressing the most minute elements so that the man behind the curtain can do his thing that it's really hard to find time to do that.

Gentry: That's one of the specialists—you hire a visionary. All he or she does is sit and think.

Michalecki: How about me? I'd like a job like that!

Collett: If somebody comes up with one, you let me know!

Gentry: Well, that's why we have ACUTA, I guess, so we can take advantage of all of our visionaries. That's what we do in our individual

organizations. Everybody is a specialist but you have to bring them together to work as a team and provide service to your customer, your university, and you can't do it one piece at a time. You have to do it all together. That's one thing we have learned: As things have become more complex, we've learned that if we're not all working together, and we're not all headed in the same direction, it's not going to happen. It's not going to get anywhere.

Summary:

Everyone recognizes that the role of the telecommunications professional on campus is changing, even as the entire traditional process of higher education is undergoing a dramatic transformation. Most of the force behind that change comes from technology. While ACUTA members have a high level of comfort with new technologies, changes in the way our departments function can often be unsettling.

Among the challenges we face today are effective planning in the face of change; hiring, training, and retaining qualified personnel; anticipating and meeting increasingly sophisticated demands of students as well as faculty and staff; finding time to do the visionary thinking required to stay abreast of change; and learning to adapt to a converged workplace.

Delivering high-quality services to university customers in order to accomplish the mission of the institution will require, even more in the future than in the past, that we, as telecom professionals, stay abreast of technology and position ourselves to communicate our message to planners at the highest level on our campuses.

Reach the participants in this discussion at the following addresses:

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Convergence: A Framework for



Unprecedented change, extraordinary technological advances, and insatiable expectations and demands of faculty, staff, and students have combined to make this the most challenging period ever in the constantly evolving life of the campus IT/telecommunications professional.

In the area of technological advances, the evolution of switching in the LAN has taken us beyond the computer telephony interface (CTI) stage to a point where data networks, video networks, and telephone networks can be seamlessly integrated. Increasingly, this integration is expected to include wireless networks as well. This *convergence* of technologies, utilizing a consolidated transport infrastructure and with the proper interface standards in place, has the ability to offer sophisticated multimedia applications to the end user, thereby enhancing the entire desktop, lab bench, or student services experience.

Convergence is an undeniable agent of change, and the unprecedented amount and rate of change

by Mal Reader

results from a technological driving force that creates new expectations and fuels increases in demand of staggering proportion. The effects are exacerbated by the increasingly competitive nature of the world outside the campus walls and by the increasingly competitive nature of the business of higher education itself. Every constituent element of the higher education environment is affected in some way by the impact of technological advances on the higher education process. Three of the major trends that we witness today are characterized here:

Trend 1: Institutional Awakening

There exists a surging recognition that the convergence of computing and networking, together with the proliferation of the Internet, has fostered the need and provided the opportunities for profound change in teaching, research, and the provision of institutional services. An increased level of integration of computer-assisted learning, network-assisted research, distance learning, telecommuting, and remote

access is becoming evident. The process and the product are destined for continuous change, and hopefully continuous improvement, and the consumer will play a large part in dictating the direction and form that these changes will take.

All of this naturally places more stress on colleges and universities to stay in front of the pack, or at least to keep up with the pack, as technology budgets

strain against the exponential growth in user demands for ready access, increased bandwidth, and mobility. These "anytime, anywhere" expectations involve access to WANs and LANs from offices, homes, residence halls, classrooms, and labs, with the added expectation that a variety of platforms, such as Windows, Macintosh, and UNIX, will be supported. Multimedia application requirements add significantly to the continual challenge of reconciling expressed need with affordability, and Internet access requirements have grown beyond the basic to involve multi-megabit connections at considerable cost. Internet2

speed connections, of course, are already presenting an even greater investment and support challenge.

The institutional awakening involves recognizing that embracing technology is crucial to survival, and that the cost of the technology and supporting structures—not only the up-front costs for technology backbone and infrastructure, but also the cost of remaining current—can be as capital intensive as any new building program.

Rapid changes in technology, with new products and new versions of products being introduced continually, make it extremely difficult for institutions to remain current, and because the life expectancy of most technologies is decreasing dramatically, the realization that traditional funding and life-cycle models need to be rebuilt is inescapable.

Trend 2: Shift in Financial Strategies

With an ever-increasing investment in data networks, and a growing belief that one day these will carry the voice and video traffic, too, the cost of technology is becoming more capitalized on the one hand (reflecting a recognition that "we really have to budget for this; the numbers are simply too great to expect Telecom or anyone else to come up with the money through traditional revenues") and more operationalized on the other hand (reflecting a recognition that "we simply can't afford to give this away any longer; we have to charge for it").

One of the more predictable outcomes, therefore, is a recognition that the traditional funding models for technology-based services may no longer be appropriate. As user expectations escalate and competition continues to drive down market rates and lower the campus leadership's confidence level in traditional funding methodologies, the paradigm shift is simply too great to ignore. As a result, many institutions have either completed or are actively involved in completing a redesign of technology-funding models.

...the cost of the technology and supporting structures ... can be as capital intensive as any new building program. ... [T]raditional funding and life-cycle models need to be rebuilt.

...convergence of computing and networking, together with the proliferation of the Internet, has fostered the need and provided the opportunities for profound change.

Also, cost/rate analyses have become a major source of activity at many institutions in an effort to determine chargeback rates for individual services that reflect the true cost of service provision.

In many cases where these costs are shown to be noncompetitive, outsourcing alternatives are being considered. The motherhood practice of cross-subsidizing some lines of business by others is becoming increasingly unpopular, and this is particularly noticeable in the area of long-distance services, where artificially high rates have traditionally been used to support other, less profitable areas of business operations. Although this has, in most cases, been done in good conscience, the practice more than ever today is open to challenges from users, competitors, and regulators alike.

There is no blanket solution to the issue of when to charge and what to charge. In order to be acceptable and successful, chargeback methodology must fit with an institution's culture, have a positive influence on the customers' use of services, and promote rather than impede the adoption of technologies. Rates must be defensible, and this requires a clear understanding of where funding comes from

(e.g., allocated charges, direct charges, subvention, grants, etc.) as well as the ability to influence budget processes armed with factual information.

It is also necessary to realize that different funding and rate-setting strategies can induce changes not only in business process but in human behavior, too. Sometimes the consequences of charging for a service that has always been provided

at no cost, or even repricing a low-cost service at realistic rates, can be enlightening.

Trend 3: Reorganization

Many institutions have already undergone considerable organizational change as a result of the convergence phenomenon, and newly shaped organizational models are being continually reshaped as institutions struggle with the most logical and

appropriate service organization "fits." The consolidation of authority under a CIO is perhaps the most prominent organizational trend, but it is also noticeable that different people are now actively involved in the planning and funding processes:

CIOs, controllers, business affairs officers, provosts, and so on. One of the most gratifying outcomes of reorganization is a widespread recognition that voice technology is more complicated than at first thought!

Staffing has become a major issue at many institutions, as colleges and universities continue to have problems recruiting, training, and retraining staff, as well as problems holding on to really good technical staff. On the faculty side, there is a recognized shortage of IT faculty and program-support staff, as well as a general shortage of faculty who grew up with technology and are comfortable integrating technology into the curriculum. On the support staff side, the staffing issue is being addressed most commonly by merging some of the service operations.

Close examination of the dozens of lines of business that different service-providing departments engage in on college and university campuses consistently shows some form of duplication, and with convergence, this has become especially pronounced. One example would be a typical PBX/WAN customer service operation, whose activities might include handling calls to the MAC or trouble call desk; logging service requests in the online tracking system; providing instruction and assistance on software and hardware changes; dispatching in-house or outside vendor technicians; following up to make sure that the required work was performed; updating records; closing the online record when the request is completed; and making follow-up calls to ensure client satisfaction. These same activities take place in the LAN customer service area and even in the video services or instructional delivery technical service areas, and it therefore seems perfectly logical

...different people are now actively involved in the planning and funding processes: CIOs, controllers, business affairs officers, provosts, and so on.

...chargeback methodology must fit with an institution's culture, have a positive influence on the customers' use of services, and promote rather than impede the adoption of technologies.



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to consider integrating the various customer services operations for technology-based services.

Similar issues arise with technical support, help desk, directory, training, and billing operations for such areas as WAN services, PBX services, library services, one-card system services, administrative computing services, academic computing services, video services, and so on. There may be economies and other benefits to be gained by integrating many service functions, but there are pitfalls, too. The issue of security (and perceived security) comes to mind, along with all the complexities of managing multicultural, cross-functional resources (particularly human resources) in what essentially becomes a multivendor environment.

The Roots of Change

These three trends lend credence to the old adage, "Change is inevitable: Success is up to you," making this thought as relevant today as it was back in the mid-1980s, when it was the theme of an ACUTA annual conference. The only things really different are the actual *rate* and *magnitude* of the change to which ACUTA members are subjected today. Over the last five years alone, so much has happened to change the way that telecommunications is perceived, valued,

utilized, and managed on campus.

The trends clearly indicate that today's convergence of traditionally separate voice, data, video, and imaging technologies is having a profound effect on the organizational processes of planning, budgets, operations, and facilities. Coupled with the impact of increased competition in the outside world following the 1996 Telecommuni-

cations Act, the impact on the providers of technology service on campus is at the highest level since the advent of "interconnect" in the early 1980s. At that time, moving from an era of cost control and maxi-

mizing the resources of the telephone company to an era of "we ARE the telephone company" presented new challenges and opportunities, but for the most part this still left voice and data in separate camps.

Even later, when data communications went beyond the low-speed dial-up stage on campus, it remained clear that integration at any level other than the transport level would be difficult. Different cultures, customer needs, tolerance levels, and so on, supported the belief that you cannot integrate operations that do not want to be integrated.

As time passed, these perceived obstacles to integration became less daunting, and many successful operational mergers have since taken place. Collaborative planning and the sharing of special skill sets and processes essential to the success of the overall enterprise have been the positive outcomes in many cases. Whatever the actual degree of success, these experiences served to familiarize ACUTA members with the process of change and the challenges it presents.

Leading the Way to Success

Perhaps the most important challenge so far lies ahead: how to remain vital in an evolving environment where voice, data, and video are perceived as indistinguishable; where the "ownership" of voice services no longer comes with a clear-cut mandate; where ultra high speed campus backbone networks feed into lower speed local networks, and the demand for that "lower speed" to increase is continual; where demands for more bandwidth at the desktop to accommodate multimedia applications is accompanied by demands for more mobility and flexibility through the seamless integration of wired and wireless media.

...it will be essential to ensure that the many individual lines of business for which telecom is responsible receive proper recognition and evaluation, and this can best be achieved by telecome specialists playing leadership roles in the process.

Perhaps the most important challenge so far lies ahead: how to remain vital in an evolving environment where voice, data, and video are perceived as indistinguishable, ... and demands for more bandwidth at the desktop to accommodate multimedia applications is accompanied by demands for more mobility and flexibility.

Remaining vital will undoubtedly involve ongoing organizational reviews, continual re-assessments of the business itself, as well as the human and cultural aspects of attracting, hiring, training, and compensating the right staff. Each time the subject is revisited, it will be essential to ensure that the many individual lines of business for which telecom is responsible receive proper recognition and evaluation, and this can best be achieved by telecom specialists playing leadership roles in the process. This is the only way to ensure that both the department's and the institution's interests are best served. That level of leadership includes the following:

- Knowing how to build alliances to achieve your objectives
- Being involved in decisions that determine how technology is deployed, utilized, and protected through collaborative contingency-planning initiatives
- Recognizing and promoting the "usefulness" or potential benefits of planned change and communicating effectively in all directions

Since it is a natural human instinct to fear change, leadership also means handling and managing the all-important human aspects involved.

Much has been written and said about leadership recently, including an emphasis placed on leadership issues by the ACUTA board of directors. In the *ACUTA News*, President Tony Mordosky has devoted his column this year to the development of leadership skills. If you have missed these columns, you may be missing an opportunity to grow professionally.

Among the characteristics of good leaders Mordosky describes in his December 1999 column are vision, charisma, character, responsibility, planning, social skills, stability, decisiveness, and a positive outlook. The telecommunications professional who recognizes the need to embrace change will also see the wisdom of learning more about becoming an effective leader.

Conclusion

From the merging of voice and data departments to the implementation of VoIP, ACUTA members are destined to face many challenges. The enhancement of leadership skills, communication skills, customer service skills, and strategic planning skills are key to survival. Accepting that continuous change is both

inevitable and necessary and being suitably equipped, prepared, and willing to deal with its effects are essential. Playing a leadership role in the change process itself is just good sense.

Success is sometimes defined as "becoming yourself at your very best." Faced with the ubiquitous challenge of convergence, success dictates that the best is yet to come.

A former ACUTA president, Mal Reader now works as a consultant with Western Telecommunication Consulting, Inc., Los Angeles, California. Reach Mal at m-reader@ix.netcom.com.



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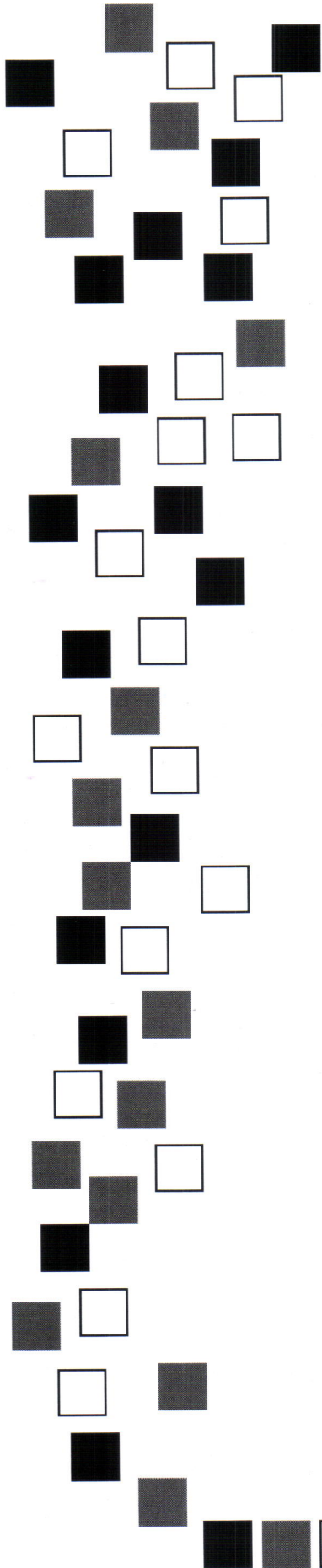
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Planning for Competition and Convergence

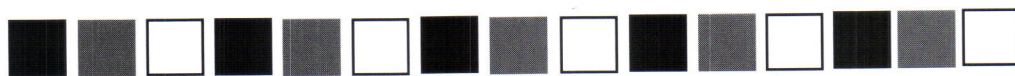
by Tad Deriso

In February, 1996, the FCC (www.fcc.gov) began implementation of the Telecommunications Act of 1996. This act has fundamentally changed the telecommunications industry from a regulated structure to a market-based structure. This change, coupled with an explosion of technological advancements, has resulted in products and services that are electrifying the industry.

Also in 1996, the reality of voice, video, and data convergence was in its infancy. At that time, many campuses were beginning to migrate their networks from shared to switched technologies, and gigabit networking requirements on the campus were far from deployment. Technology for wireless

networking was continuing to evolve on the LAN/WAN, and most users did not have integrated requirements for voice, video, and data.

Today, telecommunications competition and network convergence on the college campus are becoming a reality. Decline in traditional revenue sources as well as increases in costs for maintaining and upgrading network systems exacerbate the problem of operating campus telecommunications departments. The following information will help campus administrators position their telecommunications operations to exploit opportunities presented by telecommunications competition and network convergence.



Drivers of the Paradigm Shift

Three key drivers have shaped the telecommunications industry as the paradigm has shifted from monopoly to competitive: market pull, technology push, and regulatory enabling.

1. Market pull

The most significant force affecting the industry is market demand. Users on campus have demonstrated an insatiable appetite for enhanced voice services, data connectivity, and *infotainment* that extends well beyond *plain old telephone service*. Networking requirements for academic, research, and administrative functions have exploded as users demand faster network connections and enhanced communications services.

2. Technology push

The push of new technology has affected campus networks in several ways. Microprocessors have enabled increased computing power for switching and other functions; fiber optics/digital networking has enabled increased capacity and management of transport signals; and complex administrative and academic computing systems now require powerful networks to operate. In addition, the probability of converging voice, video, and data on a single campus network will provide opportunities to leverage campus network investments.

3. Regulatory enabling

Regulatory changes have enabled the telecommunications industry to shift gradually from a monopoly structure to a market-based structure. These changes include items such as the deregulation of customer premise equipment in the 1960s, the restructur-

ing of AT&T that resulted in competition of long-distance services in 1984; the granting of spectrum to cellular operators in the early 1980s; the passage of the Telecommunications Act in 1996, which effectively removed barriers and franchise boundaries for local telephone and cable TV service; and the auctioning of licenses for PCS and other wireless services.

The trends for market, technology, and regulatory forces continue to evolve. Market demand forces will continue to increase, technology forces will continue to expand, and regulatory forces will continue to decline.

The Campus Telecommunications Environment

The higher education marketplace is experiencing some of the

It seemed to Karen
that instead of helping
her do her job, the
phone system her
predecessor purchased
was in reality a
478 pound gorilla
sitting on her forehead.



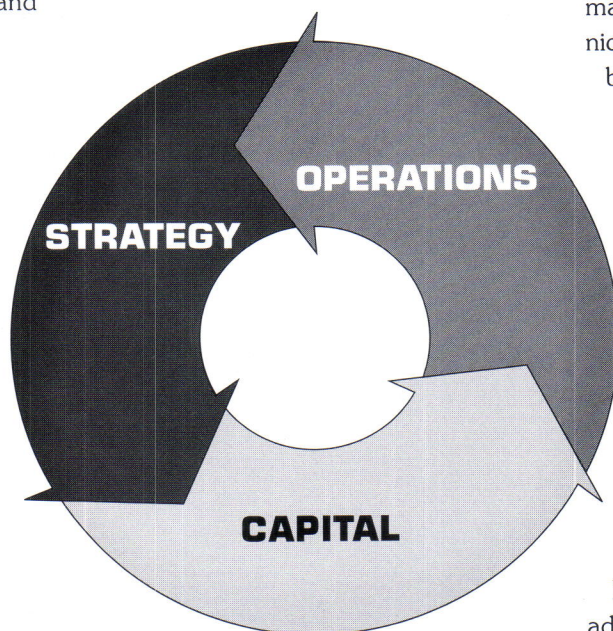
Your phone system should be your friend.

forces inherent in a new technological age. External pressures for attracting and retaining students, faculty, and staff will always be an issue for campus administrators. In the January/February 2000 issue of *EduCom Review*, author Barry Munitz offers a compelling argument for competition and the changing landscape of campus operations: "The successful educational institution will use the new technologies to integrate the worlds of education, work, and leisure. As a result, the expectation for a unique, scheduled, and separate educational activity will dissolve into the idea of something that is delivered and acquired in an anytime, anyplace, on-demand fashion."

Campus departments are under continuous pressure to establish innovative methods of delivering their services while reducing operational costs. Campus facilities operations, bookstores, and other auxiliary services must find more efficient and cost-effective ways to operate. The advent of e-commerce companies such as textbook retailers is contributing to reductions in campus revenues. Similar revenue strains are happening in the telecommunications department. The traditional sources of telecommunications cost-recovery efforts that fund network maintenance and upgrades are continuing to decline. Competition and convergence are the new environmental factors that all campus telecommunications administrators must address.

- Competition

The Telecom Act of 1996 has been the driving force in telecommunications competition. The FCC has released a report titled "Telecommunications @ the Millennium—The Telecom Act Turns Four." The law firm of Kraskin, Lesse & Cosson, LLP, provided a summary of this report. According to its findings, over the past four years, long-distance prices have



fallen by 34 percent and wireless phone prices have fallen by 35 percent. The report also concludes that telecommunications companies have invested more than \$25 billion in their networks, and there is more overall competition in the telecommunications marketplace. The industry has created nearly 170,000 new jobs and generated \$57 billion more in revenue. In fact, the FCC estimates that by 2006 half of the American private workforce will be employed in industries linked to information technologies. As the report sug-

gests, barriers to entry for telecommunications providers are becoming virtually nonexistent.

The advent of alternative forms of competition in the marketplace has also affected traditional campus telecommunications revenue. Cell phones, e-mail, calling cards, prepaid long-distance and wireless cards, Internet telephony, and others have contributed to a decline in traditional revenues. As competition intensifies in the marketplace, campus telecommunications revenue will continue to be a target for outside service providers.

- Network convergence

Convergence has been hotly debated in recent years, and several ACUTA conferences have addressed network convergence from a technology and management perspective. A recent seminar hosted by *Network World* titled "State of the LAN: Creating a Master Plan for Your Next-Generation Network" addressed convergence from a campus perspective. Most of the major vendors in this arena (3com, Alcatel, Extreme, Foundry, Lucent, Nortel) gave their insight into network convergence and how their product lines combined voice, video, and data services. However, none of the vendors were able to answer a simple question: What is the key business driver for implementing a converged network for my campus? Although the carriers have realized the strategic benefits of converged networks, full implementation and ready acceptance of convergence in a campus environment are still under debate.

While the benefits of full convergence are being debated, some campuses have implemented various forms of network convergence. Denison University (www.denison.edu), a private liberal arts university in Granville, Ohio, has implemented a unique method of combining video programming on the campus data network. By using Cisco's IP/TV product, they are able to stream video programming to academic classrooms and offices using IP multicasting on the existing switched Ethernet data network. The video stream requires 1.5 Mbps of bandwidth, and allows faculty members to have real-time access to video programming from the classroom or office. Denison can also utilize this technology to pull foreign language broadcasts (TV5, Deutchavella, Univision) off a satellite and feed the program directly to a computer. The modern language faculty members can then take excerpts of the broadcast and show them in class, utilizing the data network. This innovative use of video distribution via the data network eliminates the need for a separate coaxial-based video network in the academic and administrative buildings and enhances the learning environment for the students.

What Does This Mean for Your Campus?

What does all this competition and convergence mean for your campus telecommunications operations? The major consideration is that there is an elevated risk in decision making. Additionally, revenue streams will be affected by competition in the marketplace. Competition and convergence have also allowed technological and market changes to occur much faster today. The potential impact of

these changes may require institutions to analyze all aspects of each decision. For example, strategic decisions to upgrade the campus PBX can require technical, regulatory, financial, and marketing analyses. The same can be said for decisions regarding major outside plant investments, implementing CATV or wireless networks on campus, becoming a CLEC, implementing DSL or LMDS services, or investing in voice over IP.

To manage campus network operations effectively, institutions must be able to analyze and forecast industry and technology trends within the context of potential impacts on the financial, settlements, network evolution, regulatory, personnel, and marketing aspects of campus telecommunications operations.

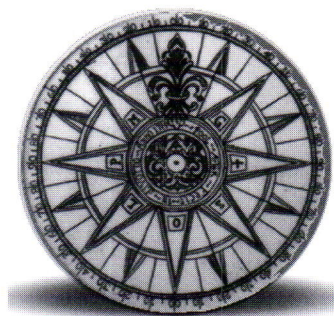
What Can You Do about Competition and Convergence?

Institutions can prepare for competition and convergence and reduce the risk of decision making by using business-planning principles as a management tool.

To effectively communicate the funding needs of telecommunications operations, more emphasis must be placed on the planning process. Just as any successful business venture has a business plan, so too must campus telecommunications departments in the new competitive environment. Competition will force new and innovative methods for generating revenue and reducing costs. Convergence will require a strategic assessment of the institution's technology direction and how that direction fits into the existing network resources on campus. ▶

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As traditional telecommunications revenue streams on campus continue to decline, and costs for maintaining systems and supporting users continue to increase, campus telecommunications business operations will require a drastic change. New telecommunications revenue streams from innovative marketing efforts, creative partnerships with nontraditional sources, alliances with service providers, and aggressive strategies to evaluate feasibility of operating as a CLEC will be required.

According to a survey by the Strategic Leadership Forum (<http://www.slf.org>), there are more than 30 complex planning models that address business and strategic planning. These models cover every facet of the planning process and range from Porter's Four Forces model to Myer's Structural Cybernetics Theory. Planning for telecommunications competition and convergence on the campus involves beginning with a simple planning model and building from there. Sophistication can be built into the planning model as needed. Scenario planning is one such addition to the basic model and can be used to forecast what-if possibilities. These possibilities could include disaster recovery, elimination of regulatory barriers, substantial increases or decreases in capital, and more.

While every campus environment is distinct, basic business-planning concepts can be a tremendous tool to assess current operations and develop strategies for competition and convergence. The three main processes for successful business planning are as follows:

1. Strategic

The strategic process must address four critical factors. First, the mission and objectives of the department that relate to the overall mission and objectives of the institution must be defined. Second, the market demand (students, faculty, staff, community) for voice, video, and data services must be identified. Third, the resources (human, financial, and physical) currently employed to meet user requirements must be evaluated. Last, credibility and consensus among department staff and key stakeholders must be built and maintained.

2. Operations

One of the critical factors in planning for competition and convergence on campus is how the telecommunications business will operate. Operations plans can help crystalize the strategies for the overall management structure and service delivery methods. There are many factors included in the development of operations plans. They include but are not limited to the following:

- Organization/management
- Facilities

- Operating departments
- Marketing/sales/service
- Support functions
- Information systems

Critical to the operations-planning process is the development of performance assessments. These assessments should include economic valuations and key ratios with benchmarks. Analysis of previous financial reports can yield information on areas such as revenue per access line, which is one of the key indicators of successful operations.

3. Capital

The capital plan is the most critical aspect of business planning. This plan identifies capital and recurring funding resources and explains how those resources will be used. Competition and convergence will require senior management to have a deeper understanding of capital versus cost-recovery funding requirements. For future network upgrades and expansions, capital funding must be clearly indicated, and both short- and long-term projections of network-funding requirements must be developed. The plan should include one-time and recurring costs as well as identify tangible benefits from increased funding. A well-developed capital plan will also provide the necessary support for increased capital funding versus cost-recovery funding.

New ways to fund network expansions, infrastructure upgrades, and recurring costs must be established. In January of this year, Bowdoin College (<http://www.bowdoin.edu>), a private higher education institution in Brunswick, Maine, received a \$21 million dollar technology endowment to pay for the recurring costs of

computer and network upgrades and investments in new technology. The anticipated annual earnings from the endowment will provide an additional \$1 million per year for network operations at the 1,500-student institution. This type of innovative funding will be critical in addressing recurring costs of maintaining high-performance campus networks. A detailed capital plan would help development officials and other members of the campus community to realize telecommunications-funding needs and provide support for those needs.

Industry Observations

As traditional telecommunications revenue streams on campus continue to decline and costs for maintaining systems and supporting users continue to increase,

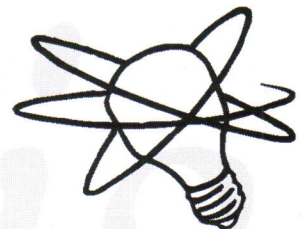
campus telecommunications business operations will require a drastic change. New telecommunications revenue streams from innovative marketing efforts, creative partnerships with nontraditional sources, alliances with service providers, and aggressive strategies to evaluate feasibility of operating as a CLEC will be required. Identifying strategic outsourcing opportunities for various tasks within the campus telecommunications organization will allow administrators to reduce recurring operational costs. Capital funding for upgrading voice, video, and data networks will be a critical factor for high-performance network connectivity on campus. Continued cost-recovery funding for network upgrades will not provide the level of support required for a robust network.

Planning for competition and convergence on the college campus is no easy task. External and internal environmental factors present unique challenges to the planning process. However, through focused leadership and utilization of the business-planning process, telecommunications administrators can effectively communicate their funding requirements to senior management and position the telecommunications department to meet the challenges of a demanding market, changing technology, and enabling regulatory drivers in the future.

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Axis

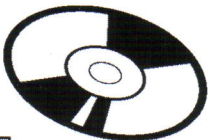
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Voice and Telephony over IP: Risk Dimensions and Solutions

From Circuit to IP—
To Packetize or Not to Packetize

by Bruce Grant
and Nader Nanjiani

The drive toward convergence is in high gear across the nation. Discussions about delivering voice over Internet protocol (VoIP) are ringing through the corridors in all business settings as well as on college and university campuses. Telecommunications managers and directors are responding to a commitment from technology planners to create a converged voice, video, and data network over IP. The promise of a converged IP network has become a technological reality.

Convergence over IP is expected to create a single, economical, and pervasive solution for

meeting the information and communication needs of a higher education campus. Implementation of IP for voice, video, and data promises increased efficiency and effectiveness over traditional communications systems.

The challenge for IT professionals is to determine whether the benefits of an IP conversion offset potential trade-offs in the cost to upgrade or in the quality of service (QoS). In a campus setting, this is particularly true. The mission on campuses is to manage the delivery of voice applications as a robust, dependable, and revenue-driven service.

Compared to instructional video or Internet access, the tolerance for diminished quality is far lower in telephony. The following guidelines should help identify and minimize the risks associated with deployment of voice and telephony over IP solutions in a campus environment.

Risk Dimensions of Voice or Telephony over IP

These guidelines will help the telecommunications professional present certain criteria and proposed solutions for chief financial officers, chief information officers, and campus analysts to consider in making a decision concerning conversion to IP technology. Instead of debating the mechanics of an IP deployment, such administrators need to be aware of QoS considerations, deployment considerations, investment protection, and business risk issues.

- QoS considerations

The demands of creating an efficient, converged, single network have to be balanced against the expectations of quality from end users. Different users have different needs. A 40-second downtime at an emergency care university hospital could risk lives. For campuses, E911 applications underscore the role of telephony as an essential service with legal liabilities as well as social and moral responsibilities. Higher education users are more likely to tolerate data network downtime than telephone outages. A student on the go may willingly trade quality for mobility in her cellular phone, or a frugal student might settle for Internet phones to call home. However, most campus users will have a higher level of expectation for feature sets and benefits they have come to expect from a college or university phone system.

Expecting users to pay a premium for mediocre telephone service would be like replacing exotic cuisine with fast food. Unlike

voice, the quality expectations of users from video and data delivered over IP have evolved with technology. When adding value to voice applications, telecommunications managers have to assume a strategy of continual improvement instead of selected trade-off. Although the promise of IP telephony is tantalizing, user benefits have to be delivered over and above, not at the expense of, existing benefits.

- Deployment considerations

When deploying an IP solution for voice, campus administrators need to recognize and assess risks associated with implementation. To maintain user expectations of quality and sound reliability, administrators should assess three key factors before relying on IP for voice applications on campus.

- (1) *Costs associated with upgrade of existing campus network*

A voice solution deployed over an IP network may require an upgrade of the existing data network to ensure that the LAN/WAN environment is ready to respond to the demands that voice signals place on it. The cost of upgrading the network could offset any proposed savings expected to accrue from voice deployment. A thorough assessment of hidden costs associated with network upgrades should be a fundamental part of any analysis conducted for VoIP deployment.

- (2) *Interoperability of the products used for deployment*

At the network level, the idiosyncrasies of a campus VoIP network should be transparent across other IP networks, existing telephone networks, and the public switched telephone network. Technology providers will need to offer products that are interoperable with other IP networks and still comply with varying standards implemented by other vendors. The level of maturity in the product and its ability to

interface with varied networks should be demonstrated through real life tests prior to deployment.

- (3) *Expertise of the provider offering the IP solution for voice*

An enhanced component of a product mix goes beyond the core product. Support mechanisms and application-friendly architecture are essential for a successful deployment of voice solutions. An understanding of circuit switching is critical for translating the benefits to an IP switched environment. A provider with experience in offering near total reliability over a circuit-switched PBX is more likely to require and maintain that integrity in an IP environment as well. An assessment of a provider's current and future line of products and core business would demonstrate an understanding of expertise in voice solutions.

- Investment protection

An infrastructure investment in a voice solution generally has a life cycle of 7 to 10 years. With nascent technologies, the risk of obsolescence is significantly higher. To minimize risk and demonstrate investment protection, a well thought out migration strategy should be devised to ensure that emerging features are incorporated into the infrastructure over the years in a cost-efficient manner.

- Business risks

Telecommunications in higher education has to be managed as a business with revenue objectives and administrative processes to serve customers. The cash flow generated by the telecommunications business often drives innovation and investment on campuses. Telecommunications managers conduct adds, moves, and changes of existing student customers; track billing and prepaid phone services; conduct bill reconciliation; assign chargebacks; manage customer receipts; follow up on delinquencies; and maintain customer call

records as part of the administrative process. The business risks involved in managing the telecommunications network on campus leave little room for experimentation, and much less for error.

Anything less than a tried-and-tested voice solution that is interoperable with existing administrative applications would introduce a significant risk for the institution. Therefore, institutions will need to ensure that the back-end operations associated with running a successful telecommunications business on campus will not be hampered by an IP switch deployment due to a dearth of corresponding applications.

Should our dependence on existing telephony discourage us from taking advantage of the latest innovations? Not at all. The robust reliability that we currently expect from our phone systems should carry over into innovative applications coming down the pike such as smart phones, soft phones, and IP-based wireless phones. Beyond convergence, IP deployment promises innovative voice applications. Being able to deliver those solutions without affecting the user's expectation of robust reliability and feature sets presents the true challenge for technology providers.

Solutions and Strategies for Deployment

Faced with the proposition of convergence and the benefits of IP, IT managers need a prudent, yet innovative, path to deployment. The range of options available for voice or telephony over IP include the following:

1. A VoIP solution in a circuit-switched environment

In today's environment, IP-enabling an existing or circuit-switched PBX system can provide a cost-effective implementation of VoIP. To enable an existing PBX system, two methods can be used.

One is to deploy existing proprietary instruments over IP, where the major cost savings would be in placing both voice and data over the same cable, reducing the cabling cost associated with those instruments.

Beyond convergence, IP deployment promises innovative voice applications. Being able to deliver those solutions without affecting the user's expectation of robust reliability and feature sets presents the true challenge for technology providers.

Another method would be to network systems via IP trunk facilities. The benefit of this method is a reduction of the cost of the voice network resulting from utilization of the existing WAN/MAN bandwidth. The advantage of a VoIP solution is that it allows flexibility in the level of desired deployment.

2. A telephony over IP (ToIP) solution with a TDM hub

This solution should be thought of as a migration strategy. It allows for the existing circuit-switched or time division multiplex (TDM) based system and all of its investment to be utilized, while providing new ToIP solutions to be implemented on an as-needed basis.

What this means is that pure IP switching may be utilized for IP smart phones, soft phones, and wireless phones when they are connected in a pure IP environment. Calls made to and from the existing TDM-based system would utilize the existing TDM switching system. The benefit of this method is that it allows the flexibility to deploy critical station users via traditional TDM, while noncritical station users may be deployed in a pure IP environment. Additionally, this method provides for easy migration to a ToIP solution and all the benefits this emerging deployment method offers.

3. A ToIP solution with robust technologies

This solution allows for a full deployment of telephony services based upon a pure IP environment. What this can mean is that all components of the system are based on industry standards for existing on an IP network. All of these components must operate as "good neighbors." This means they must not interfere with the existing network, cause undue delays, or bog the network down.

The return on investment from a ToIP network is questionable. A phone system must be able to support a seamless QoS network. The network should also comply with emerging voice standards for items like voice-enabled policy servers and directory servers. Basically, the network needs to provide everything necessary to prioritize the voice traffic and its associated processing in a real-time environment. The compelling advantage of this solution is still unclear.

A ToIP solution is currently in an early adopter stage, which means that the pricing is not mature enough yet to determine if there is a cost benefit when compared to the standard circuit-switched systems. Standards for the network to deploy this technology

are still emerging and are in constant flux. Networks may have to be upgraded or replaced to provide the required capabilities. It is apparent that this emerging method of deployment will provide new and exciting capabilities, but overcoming the hurdles to provide the reliability and feature set demanded by the customer will be the key factor that could limit widespread deployment of ToIP solutions.

Conclusion

Like any exciting new technology, the lure of migration toward

VoIP or ToIP is powerful. How one should arrive there, however, is debatable. With existing risks of deployment and potential strategies, CIOs, CFOs, and telecommunications directors in colleges and universities will need to assess alternatives and advantages unique to their campuses prior to making any commitments to voice or telephony over IP. Like all other technology decisions, the timeline and the extent of IP deployment for voice applications on a campus should be a business decision. With business objectives at the fulcrum, the decision will determine the

balance between service, innovation, and customer satisfaction for voice services on campuses.

Nader Nanjani is product marketing manager for the education market at NEC America's Corporate Networks Group. Bruce Grant is manager, product management for NEC's IP migration strategy.

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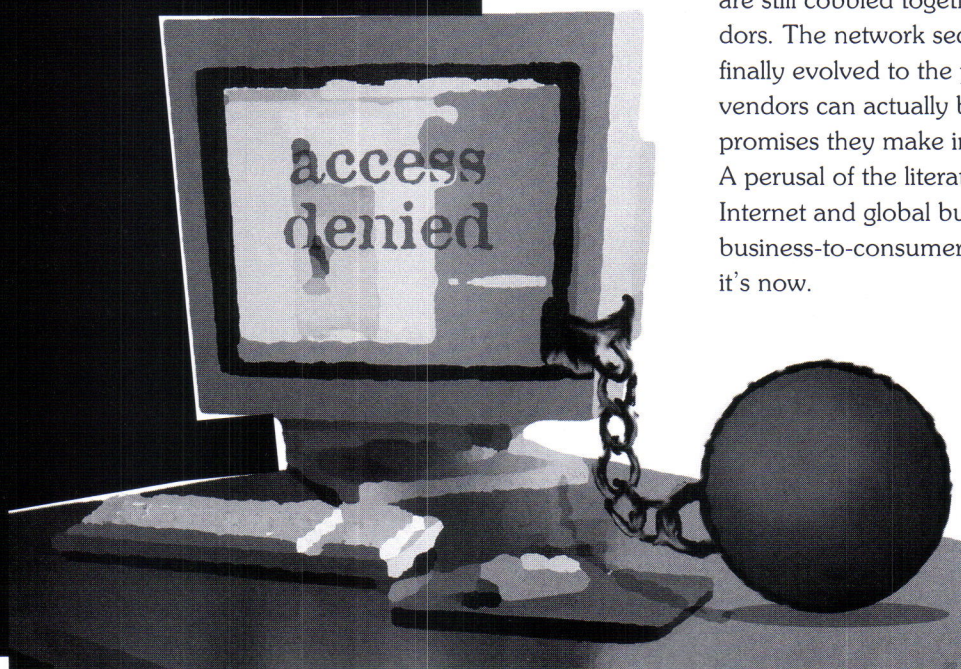
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Cybervandals: Fending Off Attacks

by James S. Cross, PhD

Electronic commerce, a mobile workforce, and the collaboration requirements inherent in supply chain management are driving a new era in secure connectivity. As organizations continue to build their intranets and extranets for collaboration and information exchange with suppliers, partners, dealers, distributors, customers, and internal constituents, solutions are needed that facilitate the secure and timely exchange of mission-critical information. Today, as organizations demand the tools and technologies to gain a competitive advantage, the need to develop the right security strategy is more crucial than ever.

One of the most daunting aspects of managing a campus network is consistency in performance and quality of service in intrusion detection and security. The promises of vendors are edging closer to reality, but the best options are still cobbled together from different vendors. The network security marketplace has finally evolved to the point where security vendors can actually back up some of the promises they make in their sales pitches. A perusal of the literature indicates that the Internet and global business-to-business and business-to-consumer commerce isn't future, it's now.



Because so many businesses and organizations depend on the Web for electronic commerce, there is no shortage of funds being spent on security and data integrity. According to International Data, Inc., corporate America spent more than \$4.4 billion in 1999 on Internet security software solutions and products. We are in an era when wired businesses are subject to 24/7 demand for constant information and instant electronic transactions in a secure environment. An unexpected outage, even for a few minutes, can be catastrophic, cost millions, and scare away customers. From e-commerce sites to field offices, to home office intranet applications, it is imperative to authenticate, screen, audit, and validate requests before permitting access to mission-critical and strategic assets.

On February 7, 2000, Yahoo, one of the most popular and reliable Internet sites, made front-page headlines across the country when an unknown group of cybervandals purposely directed too much traffic to the site, causing it to buckle under the pressure and triggering a major outage for more than three hours. In a *USA Today* article, Jeff Mallet, president of Yahoo states, "Yahoo can usually handle unanticipated demand, but this happened so quickly and was so widespread that it crashed the network" (Solomon, 2000). What happened to Yahoo, e-Bay, E*Trade, ZDNet, Amazon, CNN, and Buy.com can happen to any of our campus mission-critical systems. Mitch Hill, chief financial officer for Buy.com, told the Associated Press, "the attacks that flooded Buy.com with an unprecedented amount of junk data were traced to powerful computers in

Boston, New York, and Chicago." (Solomon, 9 Feb 2000) To crash the site, cybervandals instructed hundreds of powerful computers to flood the site with an enormous amount of mock traffic and fake requests that, again, overloaded the network.

Any site can fall victim to an assault whereby hundreds of powerful machines flood the site with bogus requests, mock data, or unwanted materials. For example, on November 6, 1999, here at Michigan Tech, an e-mail system attack was fended off that involved over 422,000 attempts to deliver illicit mail. The attacker was sending messages at a rate of more than 15 per second. The attack did not disrupt campus service, but it did cause our log file to potentially overrun allocated space for logging. The campus e-mail system has evolved from a convenient service to an essential application requiring 24/7 support in a secure environment. A survey of Michigan Tech's e-mail server security system statistics for FY1998-99 indicates more than 7,000 different hacker incidents were logged.

Fending Off Attacks

Providing a sense of security and protection of assets involves integrating multiple strategies and defensive solutions: (1) timely incident identification and reporting, (2) event forensic analysis, (3) firewalls, (4) authentication and digital certificates to restrict access, (5) digital signature, (6) encryption algorithms to scramble data, (7) hostile active code, (8) currency in software releases and patches, and (9) scam security. For most organizations, a combination of these strategies will cover a fairly comprehensive set of vulnerabilities.

- Timely incident identification and reporting

The objective is to have a comprehensive set of tools that will enable system anomalies to be quickly identified and reported. It sounds simple, but the challenges are enormous in a complex network environment. This is where intrusion detection systems prove their worth by real-time detecting, identifying, and alerting network personnel to active attacks. Intrusion detection systems in the marketplace are generally grouped into two broad categories: host-based and network-based systems. Some of the vendors offering intrusion detection products are Cisco Systems, Axents Technologies, CyberSafe, Internet Security Systems, Network Flight Recorder, Network Ice, and Network Security Wizards.

- Event forensic analysis

Once an event is detected, the objective of the intrusion detection system is to blueprint type, severity, impact, and options to minimize impact.

- Firewalls

Traditionally, firewalls can be segmented into three broad categories:

- (1) Packet filters that accept or reject traffic based on such criteria as source and destination IP address and destination TCP/UDP port numbers
- (2) Packet inspectors that accept or reject traffic based on packet header and data content
- (3) Proxy gateways that act as a user's entrance from an unsecured client to protected services or data located on a secured host

According to Forrester Research, firewall technologies have traditionally consumed the bulk of security dollars. With the growth of the Internet and e-commerce, the predominant focus on firewalls is expected to change in the future, with significant emphasis to be focused on encryption and digital certificates (Forrester, 1998). Some of the major vendors offering firewall products are: Borderware, Check Point, Cisco, IBM, Compaq, Cyber Guard, Actane, and Ascend.

- Authentication and Digital Certificates

Authentication is the process of validating and certifying the identity of a requester trying to gain access to a service or resource electronically, by using an IP address, passwords, user names, biometric data, and digital certificates. Digital certificates are digital files that certify the identity of an individual or organization based on the content prescribed by the X.509 standard of the International Standards Organization (ISO). The key elements of a digital certificate are: version number, serial number, signature algorithm identifier, certificate issuer, validity period, unique identifier of holder, and public key information. Some of the major certificate authority vendors in the marketplace are: Baltimore Technologies, Entrust, Verisign, CREN, and Xcert International.

- Digital Signature

Digital signature refers to the use of a digital code that is attached to an electronically transmitted message or document to uniquely identify and certify its authenticity by the sender. The recipient uses the digital signature to verify who

sent the data and that the data has not been altered after being signed.

- Encryption algorithms to scramble data

Encryption is the process of coding and scrambling data to prevent unauthorized access in electronic transmission and storage. The data are grouped into blocks before being scrambled into a secure code using a special conversion key and algorithm. When the message or file reaches the recipient, a matching key and algorithm

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7. Hostile active code
8. Currency in software releases and patches
9. Scam security

are used to reconvert the data or message. Although a number of different alternatives are available for encryption, the most popular are the data encryption standard (DES) used by the U.S. government, RSA Data Security, secure socket layer, and secure hypertext transport protocol. Currently, the U.S. government prohibits the use of any encryption keys larger than 56 bits for communications

between the U.S. and foreign countries. Because supercomputers can crack codes in seconds, many security experts and network administrators are frustrated because they cannot use encryption keys larger than 56 bits in communicating with international trading partners, customers, and employees.

- Hostile active code

Hostile active code security breaches may be grouped into three broad categories: data theft, viruses, and denial of service. Data theft involves cybervandals breaking into a network site and stealing proprietary, valuable, and sensitive information. For example, a cybervandal broke into the online database of Internet music store CD Universe and stole thousands of credit card numbers that were posted to the Internet when extortion demands were not met.

Virus attacks involve infiltrating a computer system with hostile code that disables, corrupts, compromises, and alters the content of data and files located on the system. For example, the Melissa virus that paralyzed e-mail systems in spring 1999 caused an estimated \$80 million in damages. In an *Infoworld* advertisement, Network Associates indicated there are over 55,000 known deadly viruses and worms such as Melissa, Chernobyl, and Backdoor-G (Network Associates, 2000).

Denial-of-service attacks involve the attacker breaking into a large number of unsecured systems and installing hostile code that can be activated to send massive amounts of bogus data to a targeted site. For example, the Yahoo attack involved one gigabit of incoming data per second that deluged and crippled the site. The frightening

thing about denial-of-service attacks is that conventional security measures like firewalls, authentication, and intrusion detection systems are powerless to halt the paralyzing flow of bogus data. Although there is no easy and fast way to distinguish bogus traffic from real requests, Tivoli Systems, Computer Associates, BMC Software, and other network management vendors are planning updates to their products to address denial-of-service vulnerabilities.

- Currency scans of software releases and patches

Currency scans by cybervandals involve widespread probes of Internet sites to determine the type of computers installed at a site, number of connections, services available, software release installed, and security defense measures used. The objective is to identify vulnerabilities to spoofing, trojan horses, sniffing, malicious applets, logic bombs, denial-of-service launches, and war dialing.

- Scam Security

Scam security breaches occur when cybervandals gain access to network sites and systems by (1) sifting through trash and physical garbage to find sensitive information to help break into the site and/or (2) talking unsuspecting employees and customers out of valuable information, such as passwords, on the pretense of testing the systems or performing maintenance functions.

Prevention First

The element of unauthorized access has always existed, but the rate of incidents has skyrocketed with the growth of the Internet and electronic business-to-business and business-to-consumer commerce.

One vendor in a *Network World* advertisement states, "On the Internet, as in nature, you need a lot more than just good defense to survive. You need a fully integrated security system—one that protects you from the predators while you win the war of evolution" (NetScreen 2000).

The series of hacking and network security incidents perpetuated during the last several months have caused many of my colleagues to wonder, If Yahoo, eBay, CNN, the CIA, the Justice Department, and the military can't keep their sites secure, what are other organizations going to do? Because the threat is real, strategically implemented security measures are not a wasted effort. Even minor defensive moves can make cybervandals think twice if there are hurdles to jump that disrupt their efforts. Our law enforcement professionals constantly warn us to take basic actions to protect our lives and property. These same principles apply to protecting the systems and Web sites that are strategic assets and critical to the mission of our organizations. It's far easier to prevent a problem than to fix it. The recent release of Internet Protocol Security (IPSec), together with improved hardware, software, and employee education, can help to prevent unauthorized access.

According to Oppenheimer, Wagner, and Crabb (1997), a determined adversary with unlimited resources will always be able to defeat your security measures. Although we have to be very careful in terms of how we monitor people and their activities, the trick is to make it too costly and too much trouble for the typical would-be hacker to compromise our

systems without requiring that our organization spend a fortune and inconvenience and frustrate our customers. Well-documented policies and procedures are imperative if a security program is to be successful and meet both business goals and legal requirements. Good business practices and tight controls can help avert embarrassment, public criticism, and complaints, while saving time in the investigative process.

A former ACUTA president, James S. Cross, PhD, is vice provost of information technology at Michigan Technological University. He also serves as chair of ACUTA's publications committee. Reach Jim at jcross@mtu.edu.

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Why Vendors See Colleges as a Key Market Segment

Sales teams believe schools have money, demand hot services, welcome side programs

The poet Robert Burns wished that someone would give us the gift of seeing ourselves as others see us. Wouldn't it be great to climb into a vendor's shoes and take a look at the college and university market for telecommunications and networking products?

Almost every vendor who has segmented marketing agrees that there are two vertical markets in the telecommunications area that are different animals: education and government. While there are a host of other vertical areas recognized by industry—retail, transportation, hospitality, medical, financial—higher education is one market segment that gets special attention anywhere one goes.

"We definitely see a difference between education and other markets," says Teresa Kniskern, education industry marketing manager for Nortel, Santa Clara, California. Nortel just completed a

carefully assessed process of reorganizing its sales force into 12 separate segments to address vertical markets.

"Show Me the Money"

The reason so many vendors have special divisions focused on higher education is precisely the same reason Willie Sutton used to rob banks—that's where the money is. Many vendors see colleges as institutions with huge budgets and unlimited sources of funding. Before you start to laugh, look around at your colleagues.

The build-out of many university networks is subsidized, either by the government or by businesses. Researchers at colleges demand high-bandwidth backbones, and that requires all of the associated boxes that hang off the network. Students want Internet connectivity to every room. Many schools, and not just engineering-

by Curt Harler
Contributing Editor

oriented schools like Emory University in Atlanta, have data ports located in every dorm room, every faculty office, the library, and the student union. Thanks to a major grant from Roberto C. Goizueta, late chairman of Coca-Cola, Emory's new state-of-the-art business school has an asynchronous transfer mode (ATM) network that enables videoconferencing and distance-learning applications. These allow students to access lectures at other universities and participate in classes while off campus. With this network upgrade, Emory University and the Goizueta Business School are helping students and teachers use

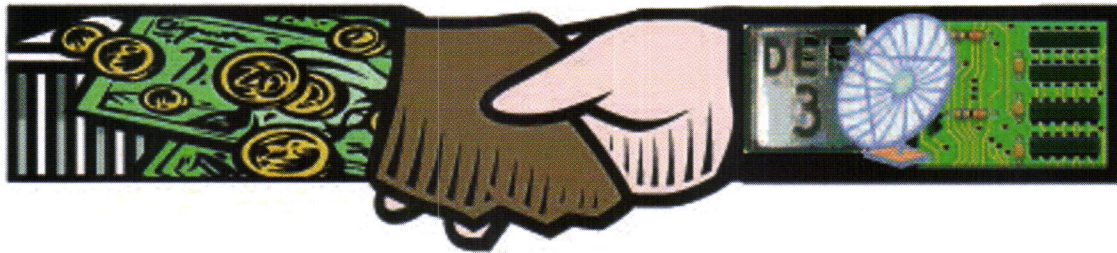
"Higher education is a key area and very much different than the others," Lasater says. The vertical markets are supported by a national accounts team that applies technical and operational support to complex installations. He maintains that while the idea of vertical markets is an old one, in recent years it has been forgotten by many service providers.

When Adelphia took part in a focus group with members of ACUTA, they got high marks because they actually asked questions about what colleges need. Participating also gave them a chance to tell colleges about their single-pipe offering of local, long-

partner for Internet2 and has pledged to donate \$1 million of hardware to the group.

Since Alcatel's North American group recently merged Xylan, Packet Engines, and other divisions, they are trying to pick the best of each acquisition's marketing ideas. Stearns's group drives the market analysis, produces collateral sales material, and sets up programs for higher education. There is a separate group with responsibility for the K-12 market, although they do share strategies.

"We try to address solutions geared to education rather than just throw out products," Kniskern says. Rather than take a piecemeal



technology to enhance decision making and gain competitive advantages.

Needs-Based Relationship

"Our job is to discover and meet needs," says John Lasater, vice president of national accounts at Adelphia Business Solutions, Pittsburgh, Pennsylvania. He says that his CLEC actually started with three key vertical areas: higher education, government, and medical.

distance, Internet, and data connectivity to the student. Single-statement billing is on the way, giving the school something unique to offer students.

Kim Stearns, associate director of higher education with Alcatel, Spokane, Washington, says their focus is to build "collaborative relationships at a higher level than simply vendor-client." One way they do that is by getting involved in college-focused projects like Internet2. Alcatel is a corporate

approach, vendors see the advantage—both in terms of service and sales—of presenting a suite of products. For instance, if a school inquires about Internet access, a company knows it will also need an addressing solution, more bandwidth, and so forth. Kniskern calls it the "domino effect," and she is training staff to meet those particular needs.

According to Jerry Smith, group manager of education markets at Sprint, "At Sprint we have identi-

fied several key technology and educational trends that we believe will drive relationships between service providers, universities, and students." These trends include the following:

- Rapid growth in distributed learning, both for adult learners and as an alternative delivery model for traditional college students on and off campus.
- A growing desire on the part of universities to establish a lifelong relationship with students. This includes establishing a relationship while a prospective student is in high school and continuing throughout the undergraduate, graduate, career, and retirement phases in life. One example of this model is the establishment of a university domain e-mail address that remains active throughout the student's lifetime.
- A desire to provide student technology services to all the university community (on- and off-campus students, active students, alumni, faculty, and staff) with the university coordinating—but not necessarily providing—these services and with sharing in the revenue stream provided by these services as one of the goals of the university. These services are likely to be presented in packages or bundles that include a wide range of options.
- Rapid deployment of a single, integrated voice, data, and video network that extends throughout the university community of learning.
- Rapid growth in wireless services that support *anytime-anyplace* access to university resources.

Smith continues, "Sprint believes that these trends will drive

service providers and universities to different models of doing business than in the past. For example, the wholesale/retail model that was widely utilized by universities to provide on-campus long-distance services in the 1980s and 1990s has evolved to a much tighter partnership between the university and the provider. Many of these programs currently look more like an *affinity partnership* than the old wholesale/retail model.

The reason so many vendors have special divisions focused on higher education is precisely the same reason Willie Sutton used to rob banks—that's where the money is. Many vendors see colleges as institutions with huge budgets and unlimited sources of funding.

"Thus, Sprint expects that business partnerships will become the dominant model for the provision of technology services. This will consist of the service provider working with the university to provision a full package of student services including voice, Internet access, cable TV, video services, wireless services, paging, and other specialty services. It is

also expected that the business partnership would include joint marketing activities and sharing of capital expenses and revenues."

The University as a Customer

While there may be some overlap in solutions across industries, universities tend to be at the upper end of bandwidth demands. They also tend to require a shockingly wide and diverse range of technology, from voicemail and pay phones to Internet2 connectivity and satellite-based distance learning.

MIT has its own OC-12 on its Cambridge, Massachusetts, campus. And that is not unique in the university world. The vendors made a respectable amount of money on those deals.

However, finding a college campus does not guarantee a sale. It seems the market is split into the "haves" and the "have-nots" when it comes to funding. Even if a vendor finds a school with the desire and the capital to invest, making the sale is not a slam-dunk proposition.

Most companies with a focus on the higher education market work through distribution channels. Those distributors often become systems integrators. Typically, schools have very thin IS/IT staffs. They outsource much of their business to their carriers. When they write up an RFP (request for proposal) they send it off to a limited number of vendors. Their local telco is usually the first stop for any long-haul or wide area networking project. That gives the carrier the first shot at a lucrative client.

Speaking for Sprint, Smith comments, "It is also expected that the university/technology provider

partnership will extend beyond student services to the general provision of the university's technology infrastructure. These partnerships are predicted to be much deeper than those in the past, which have been dominated by a *research sponsorship* model. With the university's technology becoming crucial to attracting top students and faculty, the infrastructure is now a key strategic element of university planning. It is more and more likely that universities will be expecting their technology providers to be strategic partners in this process. These activities will range from the simple sharing of network and product plans, to full outsourcing of technology services and all levels in between."

Side Programs

Vendors have a variety of ways of getting close to the school's IS/IT staff. It would not be wise to see these side programs as techniques that are predatory or duplicitous. Such arrangements should benefit both sides. One example of a win-win-win is a company-sponsored internship program at a school. The student gets money and experience, the school has the services of a \$40-per-hour technician but probably pays only \$10, and the company not only gets intelligent feedback on its equipment but also builds a relationship with the student. Down the road, the company hopes, the student will get a job and feel most comfortable with the equipment he became familiar with at college.

Programs like Nortel's NetKnowledge—a curriculum for introductory college classes in computer science or engineering—present the basics and make it easy

to set up a 101-level course. The Canada-based company also is liberal with scholarship money. It contributed Cdn \$20 million to six Ontario universities and two Ontario colleges to create approximately 7,000 scholarships over 10 years for undergraduate and graduate students enrolled in advanced-technology programs. The scholarships range in value from \$500 to \$5,000.

"We are helping our universities compete, and we are investing in the intellectual capital of students who will fuel the continued dynamic growth of Canada's high-tech industry," says John Roth, the company's president and chief executive officer. Nortel Networks will contribute funds to Carleton University, University of Ottawa, McMaster University, University of Waterloo, University of Western Ontario, Queen's University, Sir Sandford Fleming, and Humber College.

"With the launch in 1997-98 of Canada's first software engineering program, a key element of our new School of Information Technology and Engineering, the University of Ottawa has become a leading center for research and education in the field of information technology," explained Dr. Marcel Hamelin, rector of the University of Ottawa. "This initiative is a further demonstration of their commitment to ensuring that, regardless of economic circumstances, the best and brightest students have the opportunity to train for careers in high technology." Nortel employs 2,000 cooperative education students annually in Canada and hired 1,800 graduates from Canadian universities over the last two years.

The payoff can be big in the broader community, too. Drew University put in a Bay Networks ATM network to deliver remote eye care to the underserved urban community of South Central Los Angeles. The university is now expanding beyond teleophthalmology to include other telemedicine applications, such as telepsychiatry. These programs also serve as teaching programs for caregivers in remote clinics throughout the community who now consult regularly over the network with specialists on the Drew University campus.

Alcatel, too, is working on what it calls the Alcatel Academy, a vendor-neutral program to teach students about technology like IP and QoS (quality of service) without linking it to specific product lines. "We want to develop skill sets," Stearns says. It will be available in the fourth quarter of this year.

Marion Connolly, director of business operations and industry marketing for Adelphia, says vendors realize colleges have to do more with less staffing and fewer dollars. Today, she finds, it is often the student driving the demand for technology. "You have a situation with students being ahead of the faculty in their requests," she says. "That means we have to know the client intimately."

Simply knowing how to talk to colleges makes a difference. Kniskern points out that terms like "ports per pillow," while common on campus, are unheard of in other industries.

Niche within a Niche

Some vendors have their own niche-within-a-niche market like



colleges. Walter Groteke, executive vice president of NetWolves, Melville, New York, says that his product is suited for smaller colleges but not large universities. They make the FoxBox, an ISP (IP Security Architecture for Ipv4)-based virtual private networking (VPN) tool that provides Internet access and allows secure data transmission between network points.

A school like the University of Washington at Tacoma, with fewer than 1,000 students, was ideal for the setup.

"It is simple to set up and does everything with one administrative interface," Groteke explains. "More than targeting a specific vertical market, we look for an organization which needs secure Internet access but has a limited number of users."

Although there is a lot of money available at top-tier colleges, at the tier-3 school, which does not benefit from NSF funding, things tend to be tighter. Starting late in 2000, Alcatel will offer money to help train students. The program will be administered by Alan Amrod, executive director of vertical markets (alan.amrod@ind.alcatel.com).

There are other ways to take advantage of the vendor-client relationship. Lasater would like to see schools bring together people from many disciplines when submitting RFPs. "It shouldn't be just residence life and telecommunications. Involve performing arts, athletics, medical," he says. "Bring everyone to the table and that will enhance your ability to see what special services we can deliver to all of the community," he says.

Stearns says colleges should be asking their vendors a lot more questions about security. "It's a reality that a lot of the hacker community comes from the university market," she notes. "Colleges want to provide a safe haven for their networks. They need ways to authenticate users and meet security issues that are unique to this market."

She says she expects to see the lines blur between higher education, K-12, government, and libraries as new projects involving those groups, forced by the real-world realities of providing economical service, come online. "We're seeing this happen as more MANs [metropolitan area networks] come into being," Stearns says.

The Partnership View

"The bottom line," says Smith, "is that universities will view selecting a technology partner less in the light of specific products and services and more in terms of resources and capabilities. Just as this new partnership model will require a higher level of commitment on the part of the university, it will also require a much higher level of resource allocation on the part of the technology service provider. Since the past model was one of simply selling and installing services, providers were glad to seek and provide any and all customers with their products and services. But, since such partnerships today require a considerable investment of both human and financial resources, the technology provider must build a *business case* for each potential university partnership. In other words, in the past, the provision of products and services was like a casual date

between the provider and the university. The partnerships of the future will be more like marriage.

"Thus, while Sprint will continue to develop a wide range of integrated voice, data, and video products for a wide variety of university needs, an increasing proportion of our resources is expected to be invested in developing and supporting partnerships with our key university customers. This trend was recently illustrated at the ACUTA spring seminar in Miami. The discussions regarding VoIP products and services focused as significantly on the stability and commitment of the companies providing the products as it did on the product features. There was a major concern that in a rapidly developing field such as VoIP, the university must have a technology provider that is in the market for the long run, and has the capabilities to support deployment of emerging technologies."

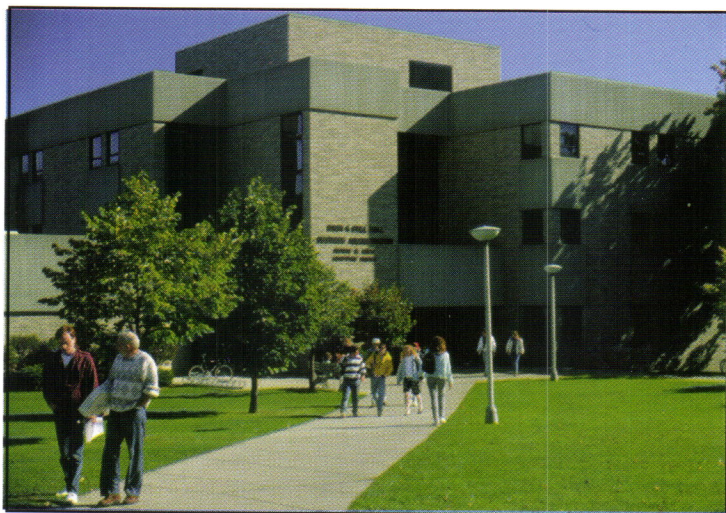
Eventually, the bottom line is to have the telecom director request and get good service from the vendor. "If we can help the university meet the needs of both the on-campus and off-campus population, then we are doing our job," Lasater concludes.

Curt Harler is a freelance writer and contributing editor to the ACUTA Journal. He is also respected as a speaker on issues of importance to telecommunications professionals. Reach Curt at curt@curtharler.com.



Campus Profile

Clarion University of Pennsylvania



by Karen DeMauro

Situated just off Interstate 80 near the Allegheny National Forest in rural western Pennsylvania, Clarion University is a school whose roots date to the 19th century. But today Clarion is congratulating itself for some 21st-century ingenuity. Creative thinking has enabled the university to rise to a technological and financial challenge and bring affordable Internet access not just to the campus but to its extended community as well.

The Challenge

Recognizing that the university would have to make some changes in order to remain technologically competitive, President Diane Reinhard mandated in 1998 that Internet access be available to its seven residence halls by the fall of 1999. However, neither the estimated \$2 million in costs nor the personnel to support new student network connections were available.



The Solution

Our solution was to combine all telecommunications services for the university and the on-campus students into one package and to develop an alliance with a consortium of telecommunications vendors to install and manage those services. Now, a consortium headed by ALLTEL Communications, Inc., supplies the services listed below to students, the university, faculty, staff, and affinity groups such as alumni, donors, and parents at special "Clarion" rates. Annual royalties from these services are used to reimburse the consortium the \$1.5 million it paid to wire the residence halls. Some services (indicated by an asterisk) were not even available previously:

- Residence hall and university long-distance service
- Internet access to the residence hall rooms*
- ISP service for off-campus students, faculty, staff, and affinity groups*
- On-campus computer sales and repairs for students, faculty, staff, and affinity groups*
- Student help desk*
- Cable television for residence halls
- Cellular services (telephone and paging) for students, faculty, staff, affinity groups, and the university*
- Ten years of management of residence hall data network*
- Ten years of management of cable TV service*
- All billing
- All marketing
- New university PBX*
- Ten years of management of PBX*
- Residence hall voicemail and caller ID*
- One residence hall telephone outlet per student rather than per room*
- Residence hall and university local exchange service (as a new CLEC)

A Unique Project

There are four unique aspects to this project:

1. The procurement process Because of the accelerated schedule, Clarion became the first entity to complete the new request for qualified contractor (RFQC) process recently developed by the Commonwealth of Pennsylvania. While this earned us some recognition, it meant there was no precedent to follow and necessitated a close working relationship with legal counsel and the chancellor's office as the

project facilitated changes in the traditional State System of Higher Education procurement rules.

2. Consortium Due to the broad scope of services included in the project, we recognized that no single vendor could adequately supply all we required. Therefore, we requested that consortia, not individual vendors, respond to the RFQC. However, each consortium had to be headed by a prime vendor who was legally responsible for all services. The university has entered into only one contract, with the prime. Any contractual arrangements between the prime and other consortia members are the responsibility of the prime.

3. Accelerated schedule The new RFQC process is extremely labor intensive with multiple document releases and submittal reviews and an extensive amount of negotiating or fine-tuning with each consortium. Even so, the initial RFQC was released in November 1998 and the consortium was chosen in April, only five months later. Even more impressive is that construction began in mid-May, and three months later, all seven residence halls were completely wired and the data network installed. In fact, the first 11 items listed above were operational by the fall 1999 semester, and the balance of the items (PBX related) were operational for the spring 2000 semester. Between May 1999 and January 2000 we completely overhauled the telecommunications services for the university.

4. The business case ALLTEL communications will recoup its \$1.5 million over the next 10 years through an estimated \$200,000 in annual royalties on the telecommunications services it sells to our on- and off-campus students, faculty, employees, and affinity groups such as parents, alumni, and donors. Typical lease or loan arrangements to pay for the network were unacceptable, and the university refused to guarantee a minimum annual payment. The consortium and the university will share any annual royalties over and above \$200,000. Additionally, the university owns all equipment and wiring installed as part of the project.

Significant Benefits

Without the alliance, a \$144 student housing fee would have had to be imposed just to cover the \$2 million cost for Internet access. With the alliance, the students receive Internet access as well as many additional services for a single increase of \$48 plus service charges.

Residence hall students are not the only beneficiaries of the project. All services, with the exception of cable TV and CLEC services, are offered at special rates to off-campus students, faculty, staff, retirees, parents, donors, and alumni. By design, it is to the benefit of both the university and the consortium to expand the customer base as much as possible to increase the royalties.

The university itself has benefited as well. For approximately \$10,000 in additional telecommunications costs annually, it has positioned itself to take advantage of new technologies, such as voice over IP, by replacing its Centrex service with a PBX that also offers new services to the university community such as voicemail and caller ID.

Finally, all these services have been put in place without additional support staff. Two full-time and two part-time on-campus consortium employees manage the services, and that support is supplemented with around-the-clock remote management and telephone support.

Looking Back

This project originated as an outgrowth of our CNet campuswide network installation after Computing Services inherited the responsibility of university telecommunications two years ago. At first, the concept was difficult to sell to the university community. A public/private partnership such as this had never been formed before, and this one was extremely complex. However, President Reinhard was supportive of the effort and was instrumental in convincing doubtful administrators and the chancellor's office that it was worth attempting.

Three cross-divisional teams have managed the three aspects of the project: procurement, installation, and long-term management. Due to this experience, a much stronger working relationship has developed among all the departments involved, which include Computing Services, Student Life, Facilities Management, Purchasing, Finance, University Relations, and Alumni Services. Each department made a significant contribution in time and effort, and all share in the success.

Looking Ahead

The procurement and implementation phases have been completed. Now we face the long-term management of this complex arrangement. Since, again, there is no precedent for the management of this type of partnership, the best way to do it will

evolve over time. The university has created a cross-divisional Alliance Coordinating Council to work with the ALLTEL team. In addition, the technical counterparts meet on a regular basis to ensure the smooth integration of like services. For example, the two help desk staffs meet to improve student services, and the two network managers meet with the ISP to ensure a smooth integration of the two networks and improve Internet service to the students.

The project has already effected a permanent change by completely overhauling the university's telecommunications services and letting us take a giant leap forward in student technology. The university would not have had the resources to implement all these services for many years to come had the traditional purchase/install or construction procurement procedures been used.

Karen DeMauro is assistant vice president for computing services at Clarion University. She can be reached at kdemauro@clarion.edu.



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Called to Serve: The Conscripted Consultant

Do you find yourself busier than ever and yet getting less accomplished? Maybe you've been conscripted!

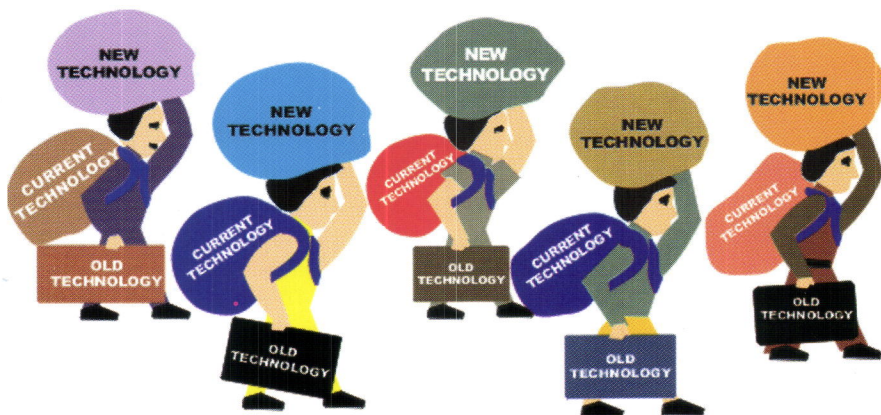
by Mick McKellar

Convergence is the buzzword that generally refers to the confluence of voice, video, and data to the desktop. Some days, however, it also describes the meeting of paths at the desk of someone willing to answer questions about the tools and the protocols, the software and the hardware, the methods (and the occasional madness!) with which we attempt to meet customer needs and expectations.

What is a "conscripted consultant"? How and why does conscription happen? What impact does it have on IT professionals? And what can be done to make the best of this complicated—yet golden—opportunity?

Conscripted!

The IT professional's job includes a variety of responsibilities and requires a diverse set of skills and knowledge that uniquely qualify him or her for a consultant-type position to people within and outside the department. Colleagues, coworkers, and customers each seek advice and assistance so that from time to time we may be inclined to describe our job as "a series of interruptions interrupted by a series of interruptions."



How did we get to this point? As new tools become available and new capabilities appear for delivery of multimedia integrated with course management software, demand for these tools increases dramatically (also increasing the load on the campus network). Although new technologies appear on the scene almost daily, most faculty and staff members prefer to remain pioneers on the trailing edge of technology. (In this, fortune favors us, or we would be inundated with customer demands, for both assistance and bandwidth, immediately.)

The early adopters of these dynamic new technologies tend to be few in number and above average in technical knowledge and system savvy. They need some assistance to get started but learn quickly and are committed to learning the technologies. However, the early adopters also promote the advantages of the technologies to colleagues and generate interest from new users—faculty and staff members who have less technical expertise but a similar desire to benefit from the technologies.

These new users become “conscriptors,” needing more attention over a longer period of time and in more detail than many early adopters. Faculty members tend to be extremely busy, discipline-focused people who have little time to learn new technologies and who, in many cases, don’t really want to learn enough about the technologies to support themselves. They want dependable, simple tools that always work the same way every time. To desire this is understandable; to expect it may be unrealistic.

However, those who would conscript us have those expectations. They come to visit or call us, as IT professionals, when software or hardware fails to perform as they think it should—whether or not we can do anything to fix the problem. This may happen because they heard about the technology from us, either verbally or in written form, or through conversations with colleagues, articles in campus newspapers/newsletters, or e-mail messages. As frequent campus champions for new and innovative technologies, we must expect that others will assume we are willing to help them learn how to put these tools to use. We’ve been conscripted.

The Conscription Process Is Gradual

Requests for assistance develop into consultancies not overnight but over time. (I still get questions about programs I haven’t used or supported for years.) If we attempt to extricate ourselves

from the consultancy, we sacrifice certain intangible benefits such as goodwill, perceived helpfulness and service orientation, accessibility, and opportunity for personal growth. It becomes necessary to strike and maintain a balance between being accommodating (which others may assume is an unwritten part of our job description) and making progress on meaningful projects of our own.

We are not alone. Others become consultants, and sometimes we ourselves are the conscriptors! Most of our colleagues have their own consultancies, and sometimes we are their customers. Often, we have to resist strongly the urge to skip researching a solution and just ask a knowledgeable colleague—instead of saving the pester factor for those times we really need help. The urge to create our own private support cadre is both strong and seductive, and the urge grows stronger as each new technology or upgrade comes along.

If IT professionals are not immune to conscripting colleagues as consultants, why should we expect colleagues, coworkers, and customers to behave any differently? Often, they have greater need for



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assistance and less reason to resist the urge to conscript. Panic by colleagues when confronted with esoteric support questions also offers new and challenging opportunities to be conscripted.

What Do We Do about It? Duck?

First, the bad news: It's too late to duck! Technology has opened Pandora's box, and there is no closing the lid. Like it or not, we are accessible and vulnerable to conscription. We can neither research software without learning how to use it nor write about something we don't understand (at least not effectively). Also, we cannot champion something and not expect a question or two about how it operates. It's part of the package.

Now, the good news: No one has to carry this burden alone. Fill Pandora's box with potting soil, add the seeds of experience, and watch what grows. Here are my recommendations for effective ways to deal with consultancy conscription:

1. *Learn to use the tool.* If you plan to champion a new technology, learn about it before you open your mouth or put virtual pen to virtual paper. It's much easier to help if you really know the product.
2. *Start building a network.* Turn the tables on your conscriptors. As they learn (you'll know because the questions get harder to answer), you can refer new, potential conscriptors to your existing cadre of conscriptors. The resulting network may eventually become self-sustaining, and you will find yourself asking questions.
3. *Receive, review, and reroute.* If the project promises to generate a lot of support questions, build your own team of specialists who can field difficult questions and to whom you can actually delegate the task. Establish clearly your level of expertise and find out who knows more than you. Transfer, delegate, send new conscriptors with questions you cannot answer to new gurus. The new guru may not like it much, but your customers will thank you.
4. *E-mail them.* If you can manage the time, don't respond by phone; send e-mail. E-mail can be archived and offers source material for your FAQs. The extra time spent in writing your responses forces you to be careful about what you say (it's in writing for posterity to judge) and offers you the raw material from which to construct documentation.
5. *Publish, don't perish.* Write down your responses to information requests and build a Frequently Asked Questions (FAQ) list. Put it on a Web site or attach it to e-mail requests. Don't just respond, re-purpose

responses. Put technology to work for you. Establish an online user group—a listserv and/or a chat room—and let users ask questions of each other directly. Post a list of knowledgeable sources for referral. If you send conscriptors to an incorrect resource, they'll be back, but in a really bad mood.

6. *Tell them once.* If you've already written an answer to a conscriptor and posted the information to your FAQ, don't write—refer. They will eventually get the message and look it up first.

An Upside to Conscription?

Being drafted into the role of consultant for our office or our campus may not be all bad. If we step back and look at the big picture, we can see not merely an aggravation but an opportunity. As we learn new technologies and explain them to others, we enhance our technical as well as our communications skills, increase our value to our institution, and improve our visibility among our colleagues—if we are successful at this new role.

It is becoming increasingly important for telecommunications professionals to participate in strategic planning on campuses. The very survival of our departments may be at stake in some cases. If we allow conscription to work for us, we may be positioning ourselves for new opportunities for leadership. Earning a reputation as the resident expert in this or that technology may open some important doors. Striking a balance between doing our job and doing what others perceive to be our job may from time to time be a difficult task, but the long-term rewards could be great indeed.

Taking the Long View

Convergence is a good thing. Multimedia is a fantastic resource. New and unique tools offer spice in a virtually vanilla environment. Be aware, however, that new and wonderful technologies have hidden costs beyond the hardware, media, software, installation, bandwidth, and maintenance. They tax our time and tie us to our customers as consultant and guru. A truly successful solution incorporates this cost and seeks to find and exploit the opportunities inherent in these new relationships.

Don't dodge the draft—embrace it!

Mick McKellar is editor/analyst for Distributed Computing Services, a division of Information Technology at Michigan Technological University (<http://www.it.mtu.edu/dcs>). Reach Mick at mckellar@mtu.edu.

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Continued from page 48

responding to our 1998 Member Needs Assessment already had data and video management responsibilities in addition to voice. I am certain that percentage has increased in the intervening two years. However, ACUTA recognized this trend and began planning to expand and alter the direction of our publications and educational programming to become a recognized high-quality source of information and knowledge in these areas.

It has been a long time since ACUTA members have seen a seminar track, journal, or newsletter devoted strictly to voice issues. Here are just a few examples of our plans for the next year that will help you gain essential knowledge as a telecom professional:

■ **2001 Editorial Calendar for the *Journal of Telecommunications in Higher Education*:**

- Spring: Security in Cyberspace
- Summer: Business-to-Business Applications in Higher Education
- Fall: Planning for New Technologies and Alternative Revenue Sources
- Winter: Impact of the Web on the Classroom, Faculty, and Instructional Delivery

■ **2001 Seminar Programs:**

Unlike huge megameetings that attempt to meet a variety of needs with a broad brush or commercially sponsored trade shows, many members tell us that ACUTA meetings are just the right settings for learning and exchanging ideas. We will continue to offer enjoyable and educational learning opportunities, and we will be adding more distance-learning options.

While these programs are still subject to change based on changing member needs and technologies, the 2001 seminar program is planned to include intensive programs on such topics as the following:

- Planning for New Technologies: The Future Compatible Campus
- E-Education: Challenges and Opportunities
- Cybersecurity
- Management of Data Networks
- Maintaining or Improving the Bottom Line
- Telecom Auditing Secrets

■ **ACUTA Strategic Plan**

The ACUTA Strategic Plan states ACUTA's long-term commitment in no uncertain terms to be an indispensable partner to ACUTA institutional members and corporate affiliates as they prepare for the future of higher education. Through educational programs incorporating both technical and leadership/management skills, proactive involvement and alliances throughout higher education, mentoring programs, publications, and ongoing vendor partnerships, our aim is to help our member professionals to be leaders in the development and implementation of telecommunications technology in support of higher education.

■ **ACUTA as Advocate and Source of Regulatory Information**

Despite talk of deregulation and allowing market forces to replace rules, the U.S. federal government is becoming *more* involved in telecom regulation, not less. No other organization provides information and advocacy focused specifically on the needs of higher education telecom users in the United States. The FCC is making

decisions that will have a major impact on your bottom line, and information from ACUTA can help you plan budgets and operations to meet these new regulatory requirements. Beginning this year, we have increased our financial and operational commitments to place more emphasis on this critical area, and we will continue to do so in the future.

■ **ACUTA as a Knowledge Network**

Information is plentiful, but ACUTA provides the vital role of interpreting that information and placing it in a context that is relevant and timely for higher education telecom professionals. Through the accumulated wisdom and experience of more than 2,000 ACUTA members, accessible to you via electronic or in-person means, information overload is transformed into knowledge that you can use to immediately benefit your institution. Only ACUTA is targeted specifically to higher education telecommunications professionals.

As you can see by this overview of our current and future plans, ACUTA is steadfast in its commitment to becoming your indispensable partner in success in the higher education technology environment. Through the participation and support of every member of ACUTA, we will achieve these goals and more, and I welcome your comments and suggestions for how we can become even more useful to you in your professional life. Please contact me at jsemer@acuta.org or 859/278-3338, ext. 25.



Introduce Your Colleagues to ACUTA—The Network Just Keeps Growing Stronger!

Advertiser Index

By advertising in the *ACUTA Journal*, these companies are not only promoting products and services relevant to telecommunications 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.

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Jeri A. Semer, CAE

From the Executive Director

ACUTA Prepares for Convergence: Helping Members Stride Successfully into the Future

There is no question that voice, data, and video networks are moving toward convergence, as the technology for IP telephony and voice over the LAN continues to evolve. While the quality and scale of VoIP applications are not sufficient to meet the needs of a college or university campus or even a large department at this time, telecom pundits seem to agree universally that the transformation will take place. It is a given that most voice-only networks are on the way to becoming obsolete. The experts differ only in their predictions of how long it will take to reach that point (10 years, 5 years, or less). Certainly educational institutions will not be able financially to abandon their legacy networks, PBXs, and voice telephony hardware overnight, but the campus network of 10 years from now will be a very different "place."

I recently read an interview with Rachelle B. Chong, former FCC commissioner, who put it very well when asked about IP telephony. She said in *Telecommunications Reports* (May 1, 2000), "It is the future. The legacy telephone networks are quickly going to become outdated in the next five years. I say that with absolute confidence because every next-generation provider I see going into business is not doing traditional telephony. They're all putting in Internet telephony equipment. Bundled products are the wave of the future, and it sits very nicely with that strategy."

Some might ask themselves whether, given the evolution of convergence, there will still be a need for telecommunications professionals, the traditional membership base of ACUTA. After giving a great deal of thought to this question, ACUTA's leadership answers with an enthusiastic and confident "YES!" At the same time, ACUTA's leaders recognize that the successful telecom professional of the future will need to have a new and different set of skills to supplement his or her basic telecommunications and management knowledge.

Many of these new skills will build upon the solid base of customer service orientation and expertise, financial and business acumen, planning and project management, human resource management, and communication skills that are the current attributes of a higher education telecom professional. These are important and essential skills that must not be discounted. As technology becomes more complex and pervasive in campus life, the ability to manage a financially viable operation, complete complex projects within budget and time parameters, and relate successfully to nontechnical professionals will be prized qualities.

At the same time, ACUTA members are recognizing the need to expand their knowledge base to include data and video networks and applications. Actually, more than half of ACUTA members

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Please take a moment to look up the ads, choose two in which you have some interest, and complete and mail the cards below. Even if you send the cards anonymously, they will know their ad has been seen! We just need to let our advertisers know that we value their support. ***They want to hear from YOU!***

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Why should *your* company advertise in the *ACUTA Journal*?



The *ACUTA Journal* has proven itself as an important vehicle for the dissemination of information to telecommunications professionals. Because its unique, targeted audience consists largely of decision-makers on campus, the *Journal* represents an excellent opportunity for providers of telecom services and equipment to reach their specific market.

—James S. Cross, PhD
Michigan Technological University



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"This was my first ACUTA conference and I enjoyed it very much. Was made to feel very welcome, met a lot of nice people, gained valuable information that I could take back and share with coworkers. Am looking forward to future conferences."

"Guest speaker was excellent, very motivating. Good networking. Thank you for your warm welcome."

"This was my first time at ACUTA. I have attended other conferences, seminars and trade shows and feel that this was the best organized and most informative."

"Being a first-timer and not knowing what to expect I'd have to say I'm impressed. I'm new to the world of communication and this helped a lot. All the members made me feel welcome and really know how to have fun. I really appreciate the time and effort ACUTA put into the conference."

"This conference is one of the best values of any I attend."

"Great conference. Good to be with ACUTA family/friends again."

"I learned a great deal. ...I felt that many of the seminars opened my mind to new ideas and will help me by enabling me to make better decisions when I return to my job."

Conference Registration Form

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- Cancellations received July 15—28, 2000: Registration fee must be paid. Credit memo will be issued (less \$25 administration fee) for any cancellation received July 15—28. Credit must be applied to registration for another ACUTA event within one year of issue.
- Cancellations received after July 28, 2000 are not eligible for refund or credit.
- Cancellations may be mailed, faxed, or e-mailed to Kellie Bowman 152 W. Zandale Dr., Ste. 200, Lexington, KY 40503; fax 859/278-3268; or e-mail kbowman@acuta.org

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