Summer 1997

# Journal of Telecommunications in Higher Education

ACUTA

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Summer, 1997

# Journal

## of Telecommunications in Higher Education

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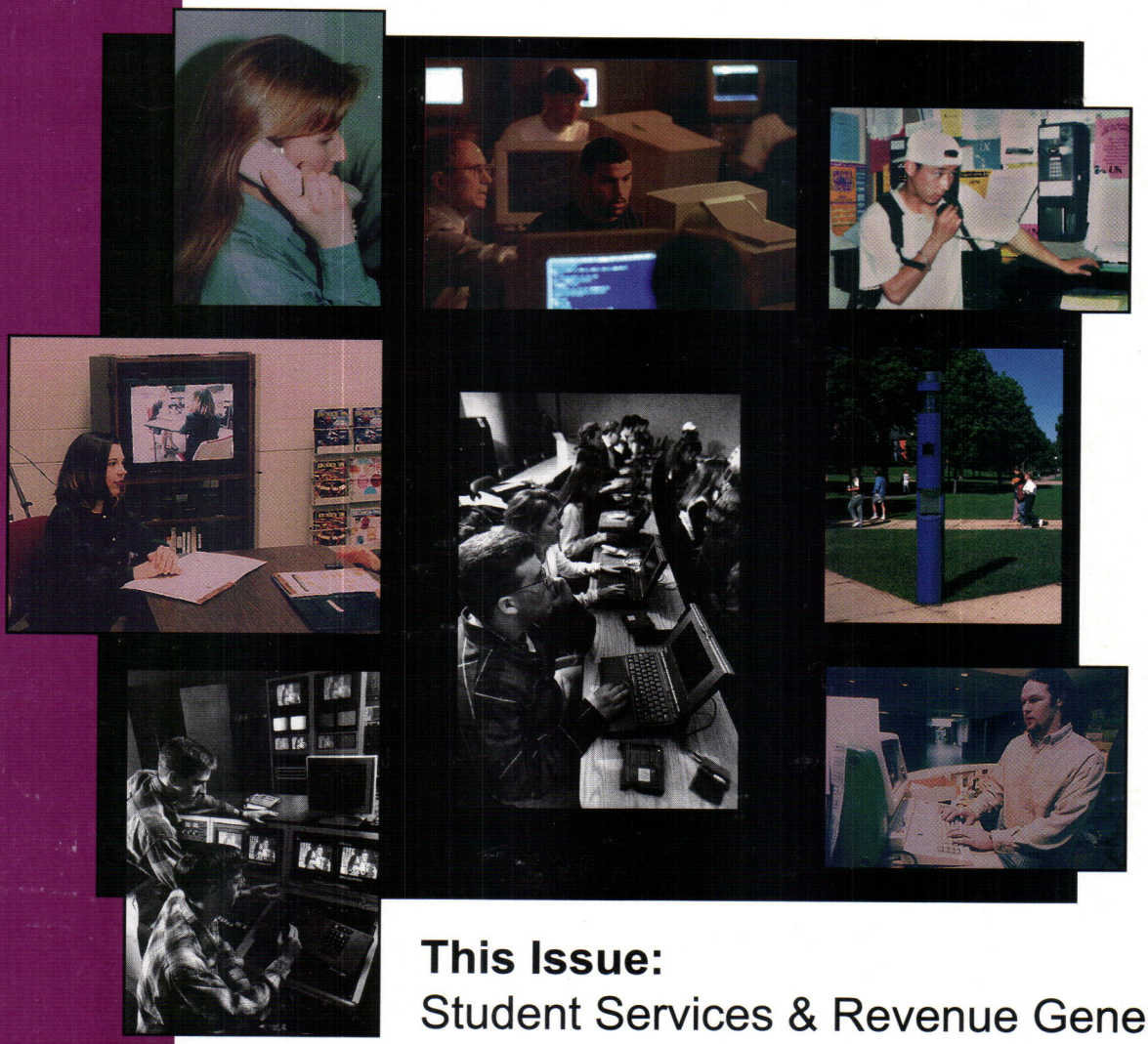

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## Student Services & Revenue Generation

- Student Services: Where Are We Going?
- UK Positions for the Future
- Prepaid Calling Cards: Big Deal on Campus
- Bringing Cable to Campus
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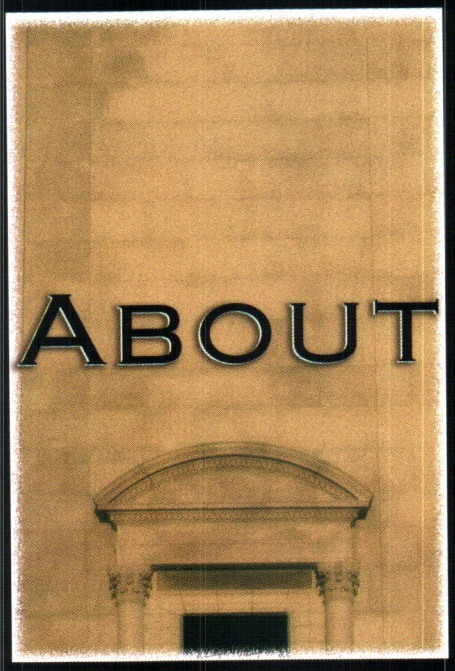

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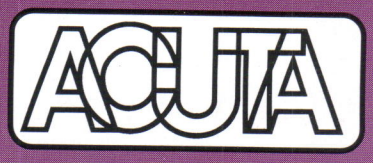

## MISSION STATEMENT

**ACUTA is dedicated to enabling college and university telecommunications professionals to contribute to the achievement of their institution's mission through: 1) the development of leadership, management, and technical capabilities; 2) peer networking; 3) the exploration of key issues; and 4) access to quality information.**

## ACUTA EVENTS CALENDAR

**26th Annual Conference**
July 13–17, 1997
Atlanta, Georgia
Marriott Marquis

**Fall Seminars**
October 19–22, 1997
Albuquerque, New Mexico
Hyatt Regency
Track One: Strategic Planning and Team Management
Track Two: Campus Card Issues and Applications

**Winter Seminars**
January 11–14, 1998
Tempe, Arizona
The Buttes
Track One: Enterprise Accounting & Integrated MIS Systems
Track Two: Legislative & Regulatory Issues

**Spring Seminars**
April 26–29, 1998
Cincinnati, Ohio
Westin Hotel
Track One: Technology Management Issues
Track Two: Disaster Preparedness & Facility Security

**27th Annual Conference**
July 12–16, 1998
San Diego, California
Marriott Hotel & Marina

Telecommunications has become a creative agent for making things happen on campuses. It has become an integral part of the landscape and sky, the cutting edge, the encompassing package, the fiber linking many diverse constituents, and the twine that binds together a global society....

—James A. Cross, Ph.D.
Michigan Technological University
ACUTA President 1996–97


# The ACUTA *Journal*

of Telecommunications in Higher Education

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The ACUTA *Journal*
of Telecommunications in Higher Education

Volume 1, Number 2
Summer, 1997

**FOCUS**

Student Services
&
Revenue Generation

## FEATURES



## CAMPUS PROFILE



## INTERVIEW



## COLUMNS



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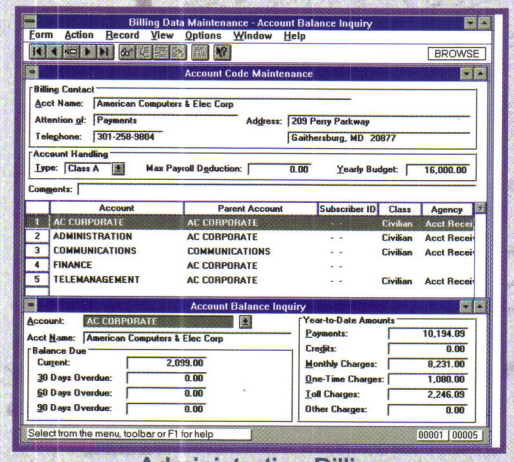
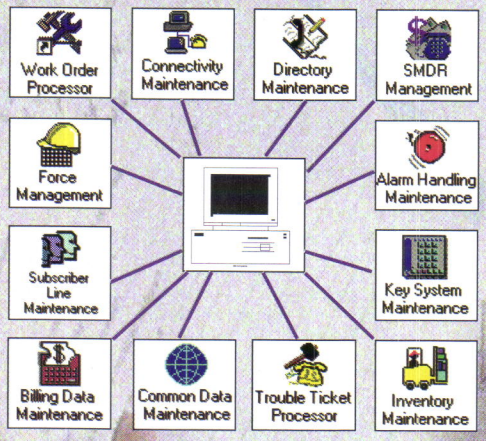


Administrative Billing

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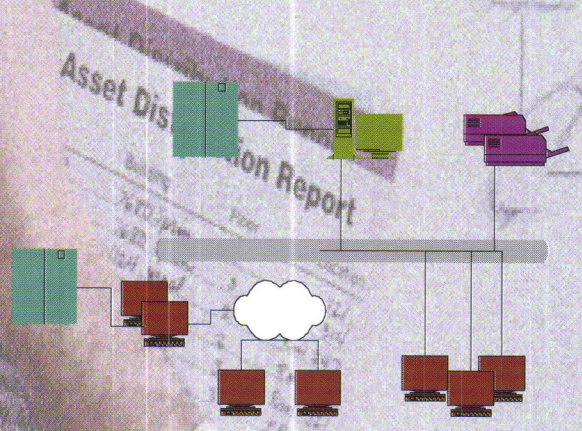

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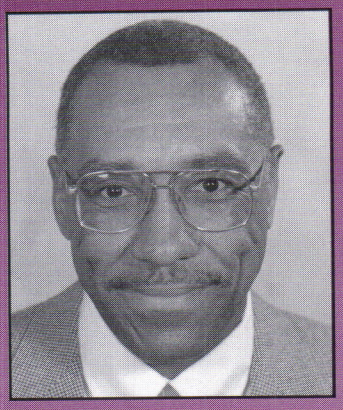
# President's Message



James S. Cross, Ph.D.

Michigan Technological University

ACUTA President, 1996–97

## ACUTA Launches Senior Leadership Forum

Successful leaders, managers, and administrators understand that learning is leverage, and to stay ahead in today's competitive world, they must stay abreast of the latest practices and concepts. As new technologies and business practices increasingly rely on telecommunications for access to and delivery of information, the demand for leadership in the telecommunications arena continues to accelerate.

The telecommunications landscape is changing dramatically as we move toward the 21st century. College and university administrators are demanding that telecommunications organizations deliver more value-added services and products that enhance the image, improve the bottom line, facilitate recruitment, improve retention, and support extended university programs. To be responsive to these demands, telecommunications management must develop an organizational, cultural, and leadership style that breeds positive attitudes, supports customer partnerships and strategic alliances, fosters teamwork, encourages initiative, drives open and active communications, and places a high value on innovation and the ability to effectively implement change strategies.

With traditional training programs for telecommunications professionals focused on harnessing technical skills, many directors and managers of telecommunications are not well grounded in the business principles and practices that leadership demands—vision, creativity, insight, business process, and strong interpersonal/intrapersonal skills. At the same time, many of those in senior leadership positions on our campuses are unfamiliar with the challenges, demands, and opportunities in managing and leveraging communications technologies.

The purpose of the Senior Leadership Forum, held in conjunction with the ACUTA Annual Conference in July, is to promote a better understanding of the technological possibilities and strategical significance of telecommunications and to help telecommunications management understand the essence of the "sense-and-respond management paradigm" and formulate strategies for success. The two-day forum brings together senior leaders and experts from higher education and industry in presentation, roundtable, and interactive discussion formats to explore and probe the strategic, managerial, and operational issues crucial to building and managing an effective telecommunications organization for today and tomorrow.

Our goal is to provide senior managers with the opportunity to enhance the business principles and practices that will be required of successful leaders on our campuses in the 21st century. Plan now to have your campus represented at this inaugural event.

Thanks to all who shared this vision and were willing to step outside of the box and make the Leadership Forum a reality. This will be an accomplishment of which we can all be proud.

# Student Services:

## Where Are We Going? Who Will Lead the Way?

by Mal Reader

What will technology do to our future? Canada 2005 attempts to answer that question in their bid to be the World's Fair site in eight years. Their proposal visualizes an exposition site with exhibits which include movies made directly in HDTV format to facilitate electronic editing, enabling directors to mix shots of actors and present-day locales with historical footage. Through such advanced technologies as 3D modeling at high resolution and artificial intelligence for speech recognition, visitors speak with Abraham Lincoln, Napolean, or even Bill Gates via videoconference. Large flat-panel active-matrix displays surround the riders on the action rides, providing a real-time virtual reality experience.

At Canada 2005 the Personal Digital Assistant is a commonplace portable collaborative terminal. Docking harbor sites, equipped with full videoconferencing, are located in most public places, including airports and bus/train terminals and campuses. With the potential to replace the telephone, intercom, terminal, credit card, and fax, the PDA makes global information resources easily accessible and communications instantaneous.

Remote pavilions, constructed in other regions of the world, link people who cannot travel to the exposition in Calgary using advanced communications capabilities. Visitors in Calgary "visit" such a remote pavilion by accessing multimedia terminals (voice/data/video) which give them the ability to experience in high definition and/or three dimensions, accompanied by superb sound, the displays, exhibits, and visitors located at the remote pavilion. "Virtual attendance" permits anyone with a personal computer and access to communications networks—such as the Internet—to attend or even create their own personalized tour.

Similarly, enhanced learning experiences will become an essential part of the college or university fabric in the next century. The fact that students are entering the higher education arena with increasingly sophisticated levels of exposure, expertise, and expectation in technology-related matters should warn us to keep abreast of the evolving needs. We must be visionary as we plan for our campuses in the years to come.

**How Has the Definition of Student Services Changed?**

"Student services" traditionally evokes thoughts of residence halls and phone lines. But in the sense that colleges and universities exist for students, what does student services *not* include? New technologies and innovative applications must constantly be sought to support academic and administrative missions on campus and off, across the quad and around the world.

What's driving the change?

Chief among the explanations for the redefining of student services is the rapid development of new technologies. Another factor is the demographics of the customer base: Increasing numbers of older workers returning to school; displaced workers in need of retraining; experienced professionals trying to keep up with changes; retired people seeking stimulation as lifelong learners.

Another factor is the aging of the PC generation. The first personal computers arrived in homes in the early 1980s. Many children 17 and under have never lived in a home without a personal computer. These "technobrats" are arriving on campuses not just computer

literate themselves, but with the expectation that everyone else is as well.

In addition, the past few years have seen an emphasis on technology in education supported at the highest levels in America and throughout much of the world.

### Mandated Goals

In 1994, Goals 2000: Educate America Act provided funds to state and local school districts to support "comprehensive, standards-based improvements in teaching and learning." Two years later, the Technology Initiative amended the Act with a Presidential mandate that every classroom and library in America be connected to the information superhighway by the year 2000, with computers, good software, and well-trained teachers.

In the 1995 Kickstart Initiative, the U.S. Advisory Council on the National Information Infrastructure identified the following among the benefits of educational technology:

- Brings the world to the classroom. No matter what their socioeconomic or ethnic background, and no matter where they live, the learning field for all students can be leveled. Students are introduced to people, places, and ideas they might otherwise not be exposed to.
- Enables students to learn by doing. Studies have confirmed what many instinctively knew—that students who are *actively* engaged in learning learn more.
- Supports networked projects, where students work with others and conduct their own research and analysis, transforming students into committed and exhilarated learners.
- Makes parents partners in their children's education by connecting the schools with homes, libraries, or other access ports.
- Makes it possible for educators to teach at more than one location simultaneously. Vastly expands opportunities for students in small, remote areas, linking them to students in more diversely populated urban and suburban areas.
- Enables educators to accommodate the varied learning styles and paces of learning within the classroom. This makes available individualized instruction techniques that are a proven factor in student achievement.
- Encourages students to become lifelong learners who can access, analyze, and synthesize information from a variety of sources.
- Makes students proficient in the basic technological skills needed to take their place in society.

### The Networked Classroom

The result of this is intensified academic and student interest in exploring new, technology-facilitated learning styles and techniques, such as cooperative learning, collaborative learning,

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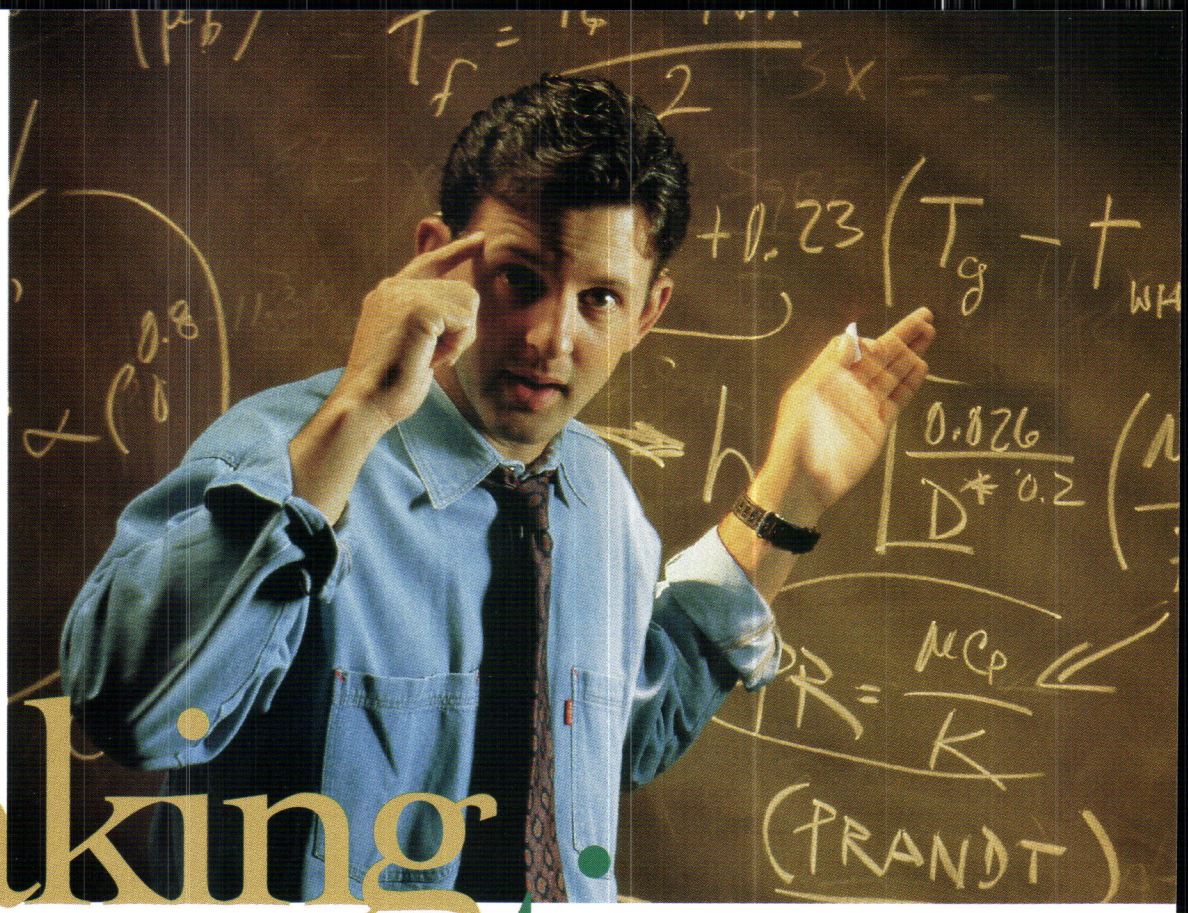


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problem-based learning, distance learning, etc., all of which involve computers, transmission facilities, and Internet access.

Radically different teaching and learning models are emerging within and beyond the traditional classroom environment. With the classroom networked and its boundaries extended, some obstacles to effective two-way communication in the teaching and learning processes are being quietly overcome. The use of e-mail, for instance, has proven to be remarkably effective in dealing with learning obstacles normally associated with cultural and personality differences among students.

Listserves are another example of student learning situations being extended far beyond the constraints of schoolhouse walls and hours of operation. Without the threat of grade assessment, writing becomes a liberating and fulfilling experience for many, and the exposure to diverse opinion that networking can provide adds meaning and attraction to the learning process itself.

In short, tools which have been around for a long time and are now being employed extensively throughout the educational system are being supplemented and replaced at an extraordinary rate by new tools made especially for technology-assisted teaching and learning. Students are becoming increasingly computer dependent and increasingly more comfortable with more self-directed learning techniques.

**What Does This Mean for Telecom?**

Providing services to students at colleges and universities today involves the provision of networking facilities that are essential to the student's "contract" with the institution. If they are deficient at one institution, the student will go to another—and so will the best academics, researchers, and administrators.

This fact is not news to most college and university telecommunications administrators, but it is a growing concern at institutions where funding has been under constant pressure for the last several years. The situation has to improve dramatically if colleges and universities are to prepare themselves for the outcomes of the mandated goals. The year 2000 is less than 1000 days away...

What will the outcomes be? Essentially they can be summarized as *student-directed learning requirements*. The facilities that institutions provide in support of the learning process, as well as the teaching and research processes, must recognize an escalating preference and demand for networked information services and user-friendly, technology-assisted tools.

Tomorrow's higher education customers will define what they need even more than today's, and if the product offered is unsatisfactory, if they feel disadvantaged in any way, they will simply shop elsewhere or opt for a different form of educational certification.

Close examination of the benefits typically identified as student services reveals that the common ground is telecommunications. Which of the following do not involve, at some level, the telecom department on any campus: individual telephone service; voice mail; e-mail; campus LAN access; Internet access; fax-on-demand; on-line registration; payphones; security/911 services; disaster planning; long-distance services; CATV; wireless/satellite transmission; interactive video...? Increasingly, these are perceived as basic services, not luxuries.

**The Opportunity...the Strategies**

Many diverse interests coexist on campus today. Academic departments drive applications. Other departments drive resources. In many cases, *no one* is driving transport. No one has stepped up to assume the role of coordinator, facilitator, or leader.

Careful strategizing will lead the person who wants to assume that leadership position to:

- Increase his/her visibility through limited self-promotion, more follow-up, and more time spent on campus and with the departments.
- Make customer service the primary concern.
- Join campus planning committees, especially faculty and academic committees.
- Take on a coordinating role, if only on a voluntary basis.
- Be seen as a problem solver, resource, and champion.
- Learn/cultivate emerging resource (power) centers.
- Get control of the infrastructure.

We must continue to redefine the institution's view of telecom from minus to plus, mundane necessity to strategic resource, maintainer to innovator, reactive follower to proactive leader, expense center to revenue source.

As former ACUTA President Coley Burton once said, "The telecommunications professional must be a major player in supporting an institution's primary missions; and...all areas of technology—voice, data, video, image, text, etc.—must cooperate and collaborate in order to realize the maximum potential of the technology."

No one doubts that the future promises the kind of technological razzle-dazzle described in Calgary's Canada 2005. Applying that visionary thinking as we anticipate and exceed the demands of student services will position telecommunications as a key player on the campus of the future.

*Mal Reader, Senior Consultant with Compass Consulting International, Inc., lives in Calgary, Alberta, Canada. He is a Past President and charter member of ACUTA. Mal and Compass Consulting have presented at many ACUTA events, including the recent seminar on student services in Las Vegas.*

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# UK Positions for the Future

by Bill Robinson


Research is an important work on many college and university campuses today, frequently resulting in tremendous benefits for society arising from an obscure corner of a laboratory. More and more, pursuit of far-reaching scientific breakthroughs demands a state-of-the-art information infrastructure. As contemporary research increasingly relies on high-speed computing and complex imaging to achieve its lofty objectives, enabling and supporting the work conducted in those obscure corners can lead to a technological "trickle down" that ultimately impacts the entire campus.

The University of Kentucky is keeping this in mind as it installs an ultra-high-speed asynchronous transfer mode communications backbone on its Lexington campus, according to Doyle Friskney, UK's Executive Director of Communications and Networking Systems.

The 622 Mbps ATM backbone will also provide remote access to the information resources of the mega-library that the Commonwealth of Kentucky is building at UK. The broad bandwidth and lightning speed of the network will allow computers to be linked, thus becoming one larger, *virtual* computer. It will provide enhanced connectivity to computing and information resources throughout North America and give researchers elsewhere better access to computing and information resources on the UK campus.

UK is already participating in one example of a truly wide-area network that is likely to be a prototype of cooperative computing in the future. Kentucky took the lead in applying for a grant to create a 45 Mbps ATM network linking six southeastern universities.* This WAN will allow researchers at any network member to link their on-campus super computer with the super-computer at another campus.

The decision to employ the emerging ATM technology for its campus backbone did not come quickly for UK, Friskney points out. The necessity for vast increases in speed, bandwidth, and interconnectivity was first driven home when the University set out to network the imaging resources of its medical college and teaching hospital. MRI, CAT, and PET scanners generate highly complex images that must be transmitted precisely and rapidly to facilitate prompt, lifesaving diagnosis and treatment. When converted to digital format, these complex images become enormous data files.

As the University studied the challenge of medical image networking, the prospect of using the campus's existing 100 Mbps, switched-FDDI backbone was clearly problematic. "Basically we had to choose between complimenting and expanding the FDDI network or beginning a new technology with ATM," says Friskney. Acting on the advice of its communications consultant, UK began looking at alternatives.

"After surveying trends in the communications industry as well as in higher education and medicine, we found that the demand for faster speeds, broader bandwidth, and interconnectivity of diverse technology seemed to be coming from all directions," explains Friskney. Asynchronous transfer mode technology, as the name implies, was created to bridge the gaps between differing types of electronic communications, he explains. "We saw that ATM appeared to be doing that successfully. And it seemed to be the option of choice for most leaders in the communications industry."

One theme stressed at a Gartner Group Symposium that Friskney attended stayed with the UK communications administrator: ATM-related applications will likely complement traditional PBX systems in the future.

UK then considered three alternatives for its communications backbone: ATM OC-3 with 155 Mbps capacity, ATM OC-12 at 622 Mbps, and gigabit ethernet. The cost of OC-3, with only 15 Mbps of capacity beyond the existing 100 Mbps FDDI network, could not be justified. Settled industry standards for gigabit ethernet, which "looked quite attractive," were not anticipated until about 1998. That left ATM OC-12, which could be in place as early as 1996, as the best option, Friskney points out.

With the needs of medical imaging transfer met, the next big item on the University of Kentucky's agenda was the multimillion dollar Commonwealth Library, scheduled to open at the beginning of the 1997-98 academic year. This facility, designed to meet the information needs of the state and its flagship university far into the next century, will do much more than house an expanded collection of printed materials.

Much information now being stored in libraries, and even more so in the future, will be in digital format. And this information, as was the case with the medical college, will often include large, complex images that must be transferred rapidly. Already, a major move is underway to convert existing text documents to digital format. The Library of Congress's Monticello project is one example that this trend is likely to continue.

What had originally been a solution to the medical college's networking needs became the model for UK's plan to enhance communications campus-wide. Extending backbone connectivity to workstations and imaging centers across campus evolved as the second phase of a comprehensive plan. The third phase will tie the network to the new library, and the fourth phase will make information and computing resources available to students in their dormitories.

Physically, the network consists of Light Stream 10/10s and CAT 5000s from Cisco Systems. "We chose to build on our previous infrastructure which used Cisco products," Friskney explains. "In this era of emerging technologies, we believe one of the ways to ensure success is to rely on a single vendor, at least for the core of your network." The backbone itself, the building verticals, and selected high-speed equipment will all get fiber media, while the building horizontals will get CAT 5 wire media.

The old FDDI network, which will remain in place for backup services, employed Cisco routers and switches. "We're upgrading the routers significantly and installing ATM switches," Friskney points out.



* The other five institutions are the Univ. of West Virginia, Univ. of South Carolina, Univ. of Alabama, Louisiana State Univ. and Mississippi State Univ.

"We will have ATM to all of the communications closets with switched ethernet to end users."

One UK researcher who is eagerly anticipating installation of the ATM backbone and accompanying high-speed research net is Dr. Susan Sinnott, Assistant Professor of Chemical and Materials Engineering, who previously worked at the Oak Ridge National Laboratory. Her research, which makes long-distance use of the Oak Ridge computing facilities, includes investigating the properties of materials at the nanometer level for computer chips as well as ceramics that are super light and super tough. Sinnott's clients include NASA and the U.S. military.

"Once my computer calculations are run at Oak Ridge, they must be downloaded at UK for analysis," she explains. "At present, I must wait as long as five minutes to execute some commands that would take only five seconds if I were on site at Oak Ridge." UK's ATM backbone will equal the speed of the Oak Ridge network and should eliminate the communications bottleneck. Sinnott's work reaches out as far as California, where she has remote access to the supercomputer at NASA's Ames Research Center.

Other UK research that will be enhanced by the high-speed backbone is more down-to-earth. Dr. James McDonough of UK's Department of Mechanical Engineering conducts research into spray paint application for Toyota Motor Manufacturing, whose plant in Georgetown, less than twenty miles from UK's campus, is one of the state's largest employers. By creating detailed, three-dimensional simulations of spray paint being applied to an automobile body, McDonough seeks to create a more efficient process. The ATM backbone will eliminate the present delays that result as these images are transferred from the engineering computer center to a visualization workstation.

In addition to the indirect benefit they will receive from the University's research efforts, students and faculty will be able to take advantage of such emerging, innovative applications as "streaming audio and video." When networks primarily handled data, delays in transfer may have been tolerable, Friskney points out. "The ear expects at least telephone-quality audio, and the eye expects at least television-quality video. When the entire network is complete, such services will be available to students and faculty from the new library while they remain in their dormitory rooms, classrooms, or offices."

"Our goal," Friskney explains, "is to enable students, faculty, and researchers to spend less time searching for and obtaining access to information so they can devote more time to assimilating and utilizing it."

Pointcast, another emerging application that requires high transmission speeds, "pushes" audio, video, and data to the end user who preselects it. "In the past, data networks enabled users to go and fetch a piece of digital information," says Friskney, who has been with the University of Kentucky for twelve years. "In the future, they can arrange for information to come to them in a timely fashion. And that information may take the form of high-quality audio and full-motion video."

Distance learning services, especially to the two-year community colleges which the University operates across the state, will also be given a boost by the ATM campus backbone. And UK should be well positioned to play a role in the "virtual university" of the future.

*Bill Robinson is a freelance writer living in Richmond, Kentucky. He attributes his interest in campus telecommunications to his tenure as Publications Editor for ACUTA from 1990–93.*

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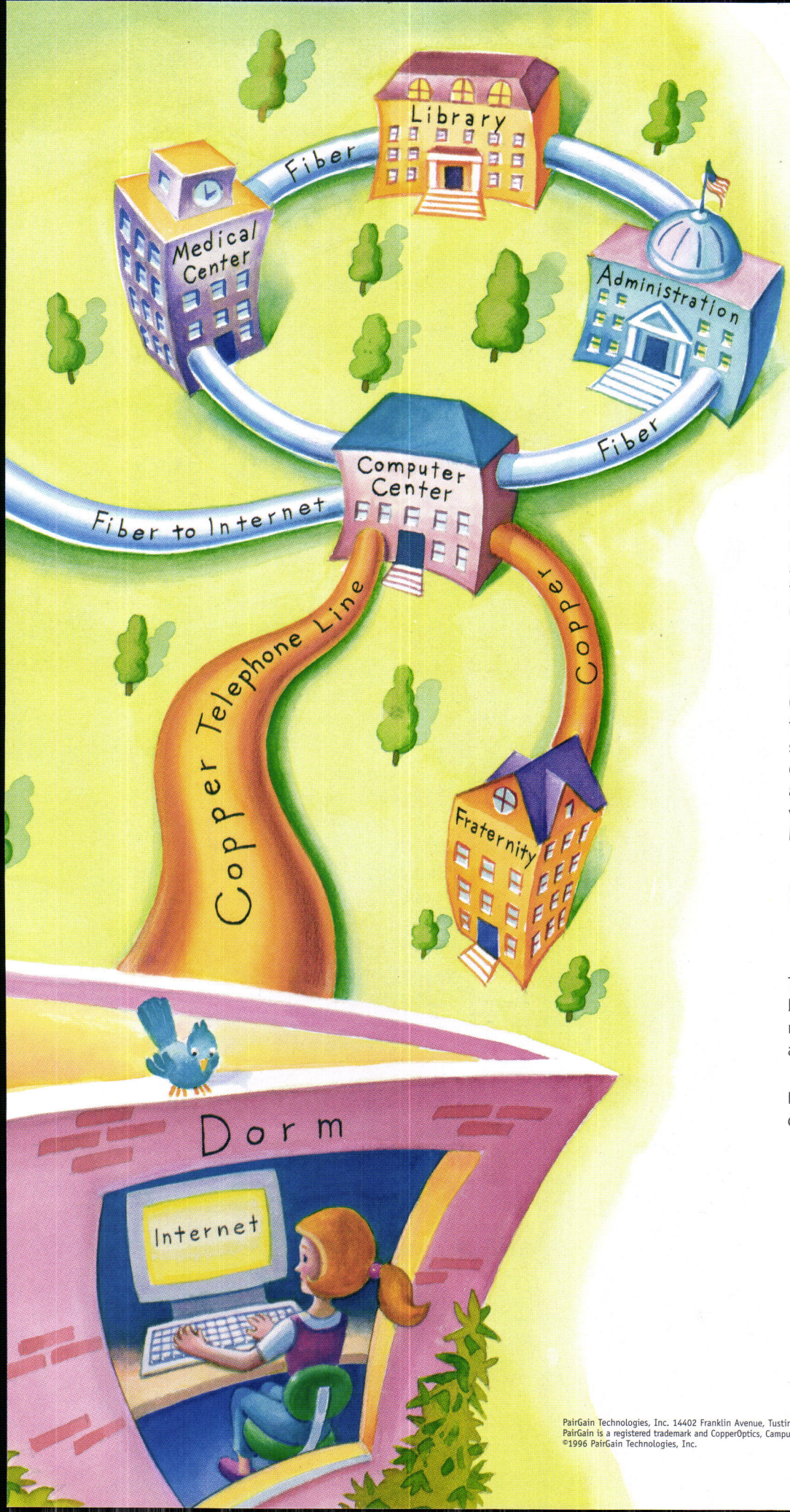


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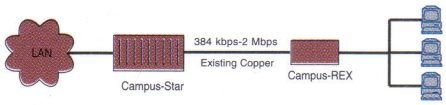


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# Prepaid Calling Cards: A "Big Deal" on Campus

By Curt Harler

Many colleges and universities are saying "Deal me in" to the flourishing game of prepaid calling cards. In addition to the excitement these cards are generating at schools across the country, there are practical considerations to be aware of when considering sitting down at the table to deal with service providers.

Prepaid cards are not credit cards, but rather a form of debit card. The user pays for a predetermined amount of phone service up front and then, upon use, the amount spent is subtracted from the remaining balance. Cards can be customized for promotional purposes. Prepaid calling cards let students make calls without using cash, without added surcharges associated with telco credit calling cards, and without facing monthly bills. They are more secure for students since the loss on a stolen or misplaced card is limited to the remaining value of the card.

Photo courtesy of University of Nebraska at Lincoln. Tom Slocum, photographer.

To make a call with a prepaid card, the user dials an 800 number followed by the card's identification number—both numbers are shown on the back of the card. Most colleges deal with a phone company which provides the actual long-distance service. For telecom administrators, prepaid phone cards eliminate payment problems and disputes. At some schools, like Florida State University, the traditional student identification card has become a phone calling card as well.

Another powerful incentive for getting into the business is cash flow or "playing the float." Students buy and pay for their cards today, but the service is not delivered until some time in the future. If the card is lost or misplaced, the service may never have to be delivered.

Debit cards can turn into revenue generators in other ways, as well. Vanderbilt University in Nashville, Tennessee, and a lot of fans of NCAA women's basketball were big winners this past New Year as MCI PrePaid and MCI Telecommunications contributed $27,500 to Vandy's athletic department for the 1997–1998 season as a result of a prepaid card promotion.

**Multiple Uses at Florida State**

While prepaid phone calling cards are catching on at many campuses, their use is expanding to "smart cards" which allow a single piece of plastic to function as student ID, ATM card, food vending card, library card, and calling card. Florida State University's FSUCard, carried by 40,000 students, faculty, and staff, includes a digitized photo and two magnetic stripes.

The FSUCard lets students pay tuition electronically during phone registration for classes and have

tuition refunds deposited directly to their FSUCard accounts. The cards link with the FSU Connection Interactive Kiosk Network. Part of the campusMCI kiosk program, the kiosks let students use their cards to update local or permanent addresses, print transcripts and class schedules, and apply for graduation. Touch screens also have an interactive map with digital images of every building on campus, a tour and video history of FSU, and a welcome video from school president Talbot "Sandy" D'Alemberte.

The more applications that can be built into a card and the more uses there are, the more the whole community—students, town merchants, schools, and telcos—will adopt the cards. In Ohio, Xavier University and Ohio State University have proposed a project to get all Ohio schools to accept a single, standard card.

So successful was the FSUCard program that FSU opened a Card Application Technology Center. CATC was intended to provide research on campus card technology, training for administrators looking for ways to cut costs, and a showplace for sophisticated campus technology. The program took off beyond everyone's expectations, soon reaching the bounds of what FSU felt it could do without going public. As a result, this March CyberMark of Columbus, Ohio, took over operation of the commercial aspects of the program. CATC still exists at FSU to manage and operate the FSUCard program.

### A High-Stakes Game

There will be lots for researchers to do. According to Multimedia Publishing, the U.S. prepaid calling card business has increased each year since 1990, when only two U.S. companies offered prepaid phone cards. Today, there are more than 500 U.S. companies in the business and more than 100 million cards have been issued. Alumni can be lured into buying prepaid phone cards or which can also be used as promotional items and giveaways. Card users can call from any phone in the U.S.—public or private, touch-tone or rotary—to virtually anywhere in the world.

Full-featured prepaid cards offer international origination and termination, and rechargeability. Most big companies also include one-touch call re-origination, twenty-four-hour customer service, speed dialing, and support. Each time the card is used, the number of units remaining is announced before the call is connected.

Popular in Europe since the mid-1970s and in the Far East since the early '80s, prepaid calling cards entered the U.S. market in the early '90s. A $1 billion market in the U.S. in 1996, prepaid cards have grown in excess of 25 percent annually. Some industry analysts predict that the U.S. prepaid calling card market will reach $2.5 billion by the year 2000.

Analysts with the Yankee Group, Boston, Massachusetts, expect prepaid phone cards to represent a $2 billion market by 1998. While those numbers go beyond the campus, there still are a lot of market opportunities out there. The University of Nebraska at Lincoln got into prepaid cards as a result of the large number of people on campus for summer camps and courses. "Dial tone is turned on in the residence halls, but long-distance access is restricted," explains Ruth Michalecki, Director of Telecommunications at UN/L. While the school does bring in portable blocks of pay phones, the cards seemed a better solution. Michalecki says the sales to summer students and to those going away for spring break are the peak sales of the year. Nebraska prepaid cards are available at the bookstore, the student union, and the telecommunications office.

Arizona State University, Tempe, made a one-time order of 2,500 cards from LDDS to use as a promotion at the school bookstore. Two-thirds of them were ➤

## Card Collecting Is Latest Campus Craze

The collector's market for prepaid telephone cards was launched in 1976 when the first cards were issued in Italy, followed a year later by Belgium. The craze quickly spread throughout Europe and into Southeast Asia, Japan, Singapore, and Hong Kong.

There are cards available with photos of everything from centerfolds to Hulk Hogan (see text). The University of Nebraska printed a card with Coach Tom Osborne's photo and the National Champions designation for $20. Where but Arizona State are you going to get a $5 ASU card?

Already, calling cards have become *the* collectible of the '90s. There will be plenty of cards to choose from. By 1996, there were 159 telcos in 136 countries issuing phone cards of one sort or another.

They are valuable too. A 1994 phone card convention in Europe drew 66,000 people. It is rumored that one card sold for $2,000. Collectors look for the unique, of course, but even everyday cards have value. Unused cards—which have not had the silver covering the security number removed—are the most valuable.

distributed through the winter months, and the rest were kept for use later in the year. However, ASU does not market the cards on a for-profit basis.

Even nontraditional educational institutions, like the Smithsonian Institution, are involved. During the Institution's 150th anniversary, visitors to museum shops can buy prepaid calling cards featuring images of historic artifacts housed at the Smithsonian. A portion of all sales is donated to the Institution.

A benefit of prepaids to buyers is their ability to limit fraud, since the card's value is limited to the remainder of its face value. Michalecki says Nebraska promotes them as a take-along for spring break, and they advise students to beware of surcharges on other credit cards. "However, we have to be careful we don't undercut ourselves with our on-campus long-distance service," she notes.

AT&T provides cards denominated in 10, 15, 25, 50, and 100 units. Each unit is worth one minute of domestic calling. International calls are billed at three to five domestic units per minute. The AT&T prepaid cards cost the user an average of 45 cents per minute. For short calls, prepaids can't be beat. Contrast AT&T's per-minute charge with the typical 65 to 85-cent surcharge on top of the long-distance toll for making a typical telco credit card call.

The split of money between the long-distance provider and the college can be negotiated, just as with any other bulk resale of long-distance service. The retailer can sell the card at any rate. Prepaid cards can generate up to 45 percent profit to the vendor. Nebraska retains over one-third of the cost of a $5 card, its most popular seller, and has no investment in the cards. They also sell $10 and $20 cards.

In every case, there is a maximum chargeable tariff set by the Federal Communications Commission (FCC), which regulates all long-distance calls that cross state lines. Anyone selling cards for profit should sign a distributor agreement, saying they are acting as an agent for the telco. That puts the school under the telco's umbrella as far as conforming to FCC regulations.

The FCC has declared that telephone debit cards are regulated as a form of resale. According to Washington, D.C. telecommunications attorney Ellen G. Block, "Carriers providing debit card services must file tariffs with the FCC for interstate calling and must secure authorizations, file tariffs and otherwise comply with the rules of the regulatory commission of each state for interstate calling."

Most people would think of their local phone company or long-distance carrier when sending out bids for prepaid cards. However, there are some nontraditional firms involved in the business. Standard Register, Dayton, Ohio, is a good example. Better known for its business-document, electronic-form, and direct-mail services, Standard Register provides prepaid cards to such schools as the U.S. Naval Academy, the University of Kentucky, and the University of Wisconsin.

Colleges are not phone companies. However, it is the school's good name which goes in big letters on the front of the calling card. Any service, no matter how inexpensive, cannot be allowed to tarnish the school's reputation.

Calling cards shouldn't compete with the internal system, either. That's the reason, explains Ohio State University's Bob Carlson, there is no "Buckeye Card" available on campus. "We've been approached," he says, "but it would compete with our campus telephone service, so we don't do it."

**Custom Cards**

Promotional prepaids can be designed with any name, university building or logo, school colors, or other creative graphic devices on the card. MCI was the co-title sponsor of the MCI–First American Classic held December 28–29, 1996, in Nashville. Women's basketball teams from Seton Hall, Vanderbilt, Oklahoma State, and the University of Texas participated in the tournament. MCI distributed commemorative cards, hosted two halftime shootouts, and threw out promotional mini-basketballs.

Cards have been customized for vendors selling everything from food to World Championship Wrestling (WCW). One series features wrestlers Hulk Hogan, "Macho Man" Randy Savage, and String in the first three issues of cards for WCW. The card is being promoted as a collectible in addition to being a marketing tool and long-distance calling card.

"Our program platform marks an unprecedented combination of interactive technology and media, bringing telecards into the 21st century through aggressive direct-marketing and entertainment venues," says Pam Merolla, President of InterAction Solutions.

Even the U.S. Air Force got into the act, issuing a commemorative prepaid series honoring the 50th anniversary of the U.S. Air Force. Each card depicts an era of Air Force aviation history. The first was released in February, with the last one slated for release September 18, 1997—the official anniversary of the Air Force.

At Western Kentucky University, Bowling Green, it was cards like the Hulk Hogan that got them thinking

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# 10 Tips to Avoid a Scam

As the prepaid phone card industry continues to grow at a rapid pace, the market has become saturated with numerous providers, all vying for a piece of the prepaid calling card pie. As the number of providers increases, so does the risk of prepaid card scams. To combat the threat of illegitimate, fly-by-night companies and to protect consumers and business customers, MCI has identified ten tips for successful prepaid phone card operations.

## 1 Company Reputation

Look for a reputable, established, financially sound card provider with a name you recognize to avoid falling victim to the fly-by-night companies that may or may not be around to honor your pre-purchased calling time.

## 2 Customer Service

Make sure the card has a toll-free number on the back that you can call if you need assistance. If a customer-service number is not provided, there is a chance that if the card goes bad, the purchaser will be out of luck. The size and stature of the company issuing the card doesn't always directly correlate to the quality of customer service provided.

## 3 Brand Familiarity

If you are not familiar with the brand and if the vendor cannot provide answers to questions or give you materials that will answer your questions, do not buy the card. If you choose to purchase the cards, buy them in small denominations to get comfortable with the service and to make sure that it is a stable provider.

## 4 Reliability

Reliability and call completion are critical when using prepaid calling cards. Look for a card from a reputable company to guarantee quality customer service that is provided twenty-four hours a day, seven days a week. Other important features to look for are multilingual customer service and voice prompts in non-English.

## 5 Phone Card Industry Trade Association

If you are still concerned with validity of a service provider, call the International Telecard Association at 1-800-333-3513 to request an informational brochure provided jointly by the ITA and MCI.

## 6 Marketing Support

With prepaid cards fast becoming today's hottest retail item, it's imperative that the provider offer full-service marketing and merchandising support for the product, including retail packaging, servicing, point-of-sale support, advertising support, and inventory management.

## 7 Total Package Satisfaction

Look at the entire package; comparing penny to penny isn't always wise. Evaluate whether you will have to expend your own resources to market and merchandise the product.

## 8 Reputable Carrier/Provider

It is critical to look for reputable, established, financially sound card providers to ensure customers receive quality cards. Too many providers have gone bankrupt, leaving customers with cards that are invalid.

## 9 Distribution Channels

If you're a large retailer and have national distribution, it's critical you have a provider with the distribution and service capabilities to handle the huge demand.

## 10 Sophisticated Network

Look for a provider with a strong network platform, one that is able to customize features and ensure call completion.

about special cards for alumni reunions. Donald Smith, with the Alumni Affairs office, says they got started a couple of years ago with prepaids from MCI, which also provides their lon-distance service. They focus on the alumni. For the class of '71, for instance, they would print a card with the basketball team's picture on it.

Providers generally will sell a school as few as twenty-five cards at a time, replenishing supply monthly. The breakeven number for a customized look is about 1,000 cards.

While most cards intended for the retail market are sold at a discounted flat rate, promotional cards may be billed differently. Normally, 90 percent of the value of retail prepaid cards is used up. Since promotional and collector cards often are not used at all, request billing on a monthly usage basis if you issue a promotional card.

"The card is not the product," warns Craig Ryason, Director of Marketing for GTE Card Services, Irving, Texas. "Anyone can print a plastic card. The product is what is behind the card—promotion, reliability, marketing help, a twenty-four-hour help line for users."

GTE and Open Development Corporation, Westwood, Massachusetts, a software developer for telecom service providers, ran a nationwide football sweepstakes to promote NFL-GTE Prepaid Phone Cards. Cards featured officially licensed helmets and team logos from all 30 NFL franchises. They were sold in retail locations nationwide in $10 denominations.

Of course, promoting the cards as collectibles means the long-distance portion may not be used since hobby collectors push the idea of not removing the covers on the codes to keep the cards pristine. WCW's card benefits from promotional tie-ins with WCW major events on TV.

Some systems allow the college to record a brief message when the access code is dialed—it can include anything from a few bars of the college alma mater to a solicitation for the library fund drive. GTE offers prepaid cards in both English and Spanish.

The up-front cost of promotional cards is generally low. Although unused card minutes, known as "breakage," boost the telco's profits, users are becoming more aware of calling cards' value, and will be more likely to use them. A six- to twelve-month expiration date on promotional cards is normal.

**Doing It Yourself**

It is possible for a school to provide its own service. Until recently, the technology used to operate prepaid calling card systems—called enhanced services platforms (ESP)—was predominantly built around PC-based systems using proprietary hardware and software. These platforms have fallen short in keeping up with increased system demand, have failed to reliably process high-volume transactions, and do not offer the flexibility needed to build multiple, feature-rich applications.

Open Development Corporation brought out openMEDIA Prepaid, a prepaid calling card application that runs on its enhanced services platform. Engineered to be a network-based platform, it provides the software and hardware needed to build a reliable prepaid business.

"Using our system, service providers can deliver reliable, high-volume phone service twenty-four hours a day, seven days a week," says Jeff Laughlin, Vice President of Marketing. "Our system is designed for maximum performance and reliability. The use of industry-standard hardware and software guarantees system flexibility and scalability so our customers can quickly respond and adapt to new market demands now and into the future."

The Prepaid Communications Association, Princeton Junction, New Jersey (609/799-6253) is the best contact for schools thinking about getting into the prepaid calling card business. Its purpose is to educate organizations and consumers about prepaid telephone cards.

There is some question about whether or not to make a card rechargable. If the purpose is to draw the user back to campus or to a college bookstore, then shy away from rechargeable cards. However, to drain the full revenue potential and to allow the user to identify closely with both school and card, others, like Nebraska, do allow cards to recharge.

No matter when they are used, if sold well and used intelligently, prepaid calling cards can ring up a nice profit for student bookstores while delivering a compelling service to students, faculty, and staff.

*Curt Harler, formerly Editor-in-Chief of* Communications News, *is a freelance writer living in Strongsville, Ohio. He is a popular speaker and moderator for many telecommunications industry seminars and programs.*

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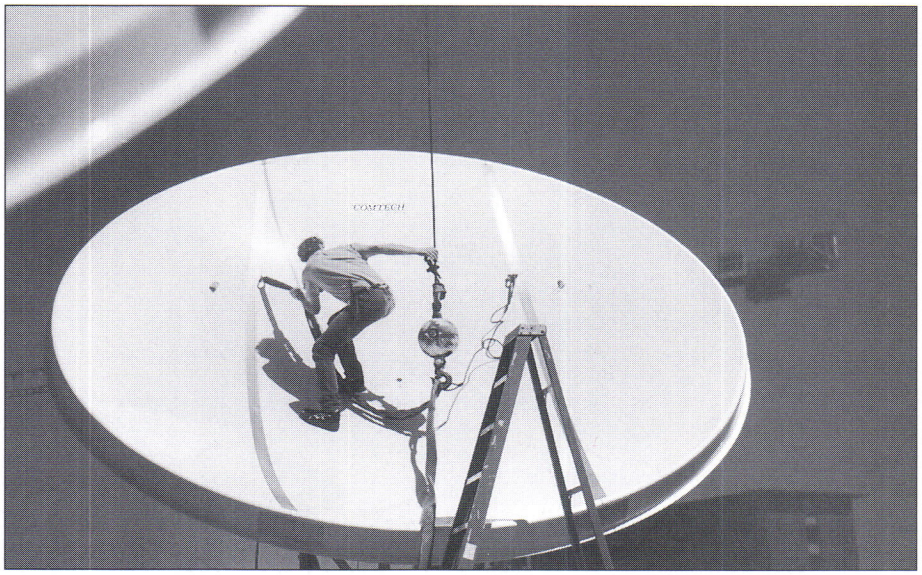
# Bringing Cable to Campus

## by Scott Bruckel

Over the past few years, the campus cable business has undergone a dramatic metamorphosis. In the late 1980s, campuses asked for MTV, CNN, and ESPN, and got the back of the hand from the local cable operator. Not only were they paying too much, but cable operators were typically reluctant to work with college campuses, which questioned whether local cable operators were meeting wiring and construction standards.

At that time, service primarily meant providing coaxial cable TV systems supplying entertainment services to the residence halls as an alternative to the local cable provider. Today, picking up MTV, CNN, and ESPN is a commodity, and you can buy it in many ways. The local cable operators are much more aggressive and competitive than in the past, and a smart manager learns to be a good negotiator as well.



Rooftop antennas and dishes are both practical and effective.

**Satellite Services**

The world has changed in other ways. More than 700 different services are now available via satellite. Most campuses want to provide more than basic cable TV entertainment: not just MTV, but MTV Latino; not CNN, but CNN International or CNN Financial; Bloomburg Information Television; or MSNBC. A dozen or more business- and news-oriented services transmit via satellite now: International Channel, SCOLA, and specialties such as Morelos' live feeds from South America for campuses that might be assigning a Spanish soap opera as part of the curriculum.

With hundreds of services available via satellite, the first question facing most campuses should be "What type of services do we need to provide on campus?" If entertainment services will meet the primary needs of the campus community, the answer may come from talking to

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the local cable operator, finding an MDS operator, finding a DBS (Digital Broadcast Satellite) provider, or putting in your own C-band/DBS dish.

Some campuses choose to install a C/Ku band satellite-receive dish, allowing the campus to buy wholesale off the satellite, rather than retail through a local distributor. More importantly, this allows the college to pick and choose services from a menu of entertainment, educational and international programming, distance learning, and teleconferencing.

Colleges may customize their programming lineups, from five to fifty services at a time. Programming sources are received at the earth station and transmitted to the headend for processing and forwarding for campuswide distribution. With the appropriate electronics, the signal may then be reversed from a classroom or office back to the headend for campuswide distribution. Whether it be satellite-originated, off-air, or locally originated, programming can be originated from the academic facilities, sent back to the headend to be processed, and then fed over the entire network back to the academic and residential outlets. If a professor wanted to deliver a live tutorial from the classroom to the residence halls, reverse connectivity would be implemented.

A number of satellite configurations are available. The largest and most costly is a Simulsat dish, capable of looking at every satellite in the domestic orbit simultaneously. This option suits a campus interested in significant distance learning, teleconferencing, and international programming, because the dish does not have to be steered or alligned to the desired satellite. The Simulsat is able to receive any satellite at any given time.

Most campuses are not eager to make that large an investment. A step down from the Simulsat is a simple C-band dish that looks at the primary entertainment satellites. One single 5-meter dish can look at up to four major entertainment satellites at a time. This provides a good mix of up to 120 channels from which to choose. A 3.8-meter steerable dish looks at every satellite in the domestic orbit, one at a time.

For DBS systems, a 1.2-meter DBS dish is necessary for delivering the digital signal to multiple-dwelling units like a college campus. Each channel to be received and distributed campuswide requires a separate receiver and modulator. Unlike the home environment, with delivery to one TV requiring only one receiver and modulator, on campus a thousand students may want to watch forty different channels simultaneously. With DBS, programming is limited to entertainment and is still offered only in packages, not a la carte. Sources say this will be changing in the near future, providing much more flexibility in program selection.

**Earthstation**

Earthstation capacity (number and size of dishes) is another important issue in determining what to offer on campus. The location for the satellite antenna must be clear of any microwave interference as well as terrestrial interference sources such as local telephone company type transmission paths. Use of fiber is reducing this type of interference. Clear southeast or southwest line-of-site is needed, depending on the location. Generally, a space at least 50 feet by 50 feet is necessary for the dish farm, within 400 feet of the headend. Roof mounts may require structural support. Location should provide enough space to add antennas in the future. Loca-

tion, whether rooftop or ground mount behind the football field, should be considered a long-term decision.

Ten years ago, when Campus TeleVideo was a young company in a new industry, new satellite dishes went front and center. Campuses were boasting "high tech and proud of it. Let's show everybody our dish." Today, dishes are located out by the football field, far from the campus population. (We try not to take offense at that; we think some of these dishes are pretty good-looking.) Of course, the point is, the dish can be located anywhere.

Off-air antennas should be positioned closest to the highest location on campus: on the roof of a high-rise or on a radio antenna, within 400 feet of the headend. Many campuses have very specific off-air requirements. Penn State, for example, attracts many students from the Philadelphia and Pittsburgh areas. They wanted to bring in local Philadelphia and Pittsburgh broadcast TV channels to Penn State's campus. With local independent affiliates microwaved in from both communities, students now watch the Phillies and Pirates play on a customized off-air facility.

The headend is a signal-gathering facility. Different types of signals that can be received include satellite C/Ku bands, off-air, FM/AM radio, local origination, character-generated, text-based services, video retrieval, teleconferencing, and distance learning. In the headend, the signals are processed and converted from lightwave/digital to analog, so the end user's television set can translate the video signal.

The location of the earthstation and headend does not necessarily become the central hub of the system. You may choose to hard-cable from the headend to the central point on campus you designate. That central location, or hub, may be the AV facility, residence life center, or computer center, depending on the voice/video/data applications of your system.

**Wiring Infrastructure**

Back in the '80s, residence life and housing officers were driving a lot of the telecommunications directions, wanting to bring cable TV to the residence halls. Many campuses ended up with a short-sighted design wired just to the residence halls without consideration for the rest of the campus. Meanwhile, the office of telecommunications was pulling multimode fiber to another part of the campus.

Network design strategy should include integration of voice, video, and data. A committee representing all areas of the campus should evaluate what currently exists (multimode, singlemode fiber), consider the direction most appropriate to meet the needs of the future, and determine how to expand from the existing infrastructure.

If residence life and telecommunications departments have unique requirements for video or data distribution, the two departments should meet and structure a one-time installation plan to include the entire campus infrastructure (residence halls, academic facilities, and administrative buildings). Ideally, the infrastructure will be designed to provide the flexibility to grow as requirements change.

How do you plan for technological growth? In broad terms, coaxial cable or singlemode fiber is the distribution medium of choice for broadband video. A 750 MHz, 120-channel-capable system will ➤

be sufficient for some time. You'll probably be pulling multimode fiber along with it for future voice and datacom activity. Anticipate all voice, video, and data applications, because the economies of pulling for all three simultaneously are pretty dramatic.

The most commonly asked questions relate to fiber versus coax. It makes economic sense to work with as much of the existing infrastructure as possible. Emory University had a nine-year-old coax LAN system in place. Campus TeleVideo designed their video system off of that, using coaxial cable to remain uniform. Both coax and fiber can support a 700-channel digitized universe. They both can provide crystal clear reception, better than any feed from the local cable operator. With a dish on site, the campus is more than three or four amplifiers in cascade out to the classroom or dorm room. A local cable operator might have his dish located five miles away, with the campus at the end of a cascade.

For the campus with coax and multimode fiber, there is no disadvantage to upgrading the coax-based system. If you are planning a multimode fiber pull, make sure you pull singlemode along with it. Coaxial cable is, by definition, capable of supporting two-way connectivity. A sub-split system has four channels in the reverse direction, from a classroom to the headend. A mid-split system allows 16 reverse channels. Since fiber is uni-directional, a separate fiber strand is needed for both forward and reverse paths.

The cable operator or phone company is often willing to build the infrastructure at no cost to the college. Although this is a compelling offer, the college must retain control. Without ownership, the college has no flexibility and becomes stuck with "vendor number one."

Many campuses wish they owned the outside infrastructure, giving the college the ability to provide the video retrieval system, high-speed data via coax modem, pay-per-view, or high-speed ethernet. Allowing a vendor to own the wiring infrastructure on campus enables that vendor to act as the gatekeeper on your campus.

Many campuses wish they owned the outside infrastructure.... If you allow a vendor to own the wiring infrastructure on campus, you will be allowing that vendor to act as the gatekeeper on your campus.

Most major vendors can provide financing on a no-money-down basis. At the end of the lease period, you own and control your own infrastructure. In most cases, that infrastructure touches only the tip of the iceberg right now. Maybe it facilitates e-mail, Internet access, and campus cable television; but the world of interactive, transactional telecommunications is changing dramatically. It has both educational and financial opportunities: books, videos, and lectures on demand, to name a few, in addition to the basic long distance service and reselling of cable television.

**Programming**

Eager to get onto your campus, many new programming services are willing to pay a premium for shelf space. For instance, Rupert Murdoch is coming out with yet another news service, and is willing to pay up to $10 per outlet to bring his news service to your students. With your own satellite capability, you decide if you want to offer Murdoch's news service or not, and the college keeps the $10-per-outlet incentive, often using this money to pay for the electronics at the headend. More and more services are coming up with incentives and lucrative deals each year.

With a downlink direct to campus, the school also controls the advertising avails. Programmers like ESPN, CNN, and MTV all provide a minute or two of local advertising per half hour. It's still experimental in most cases, but national advertisers are now coming to the University Programming Cooperative wanting on the campus networks. With your own system, you decide who's on and who's not.

Not only is your own system a revenue-generating opportunity, it's a great way to get information out to the student population. E-mail and local-originated or character-generated information could be passed along to the students instead of preparing, printing, and distributing thousands of flyers. A 30-second spot advertising a college event aired during an ESPN football game reaches a lot of students.

On a character-generated channel, information is sometimes scrolled across the screen while the campus radio station plays in the background. Frankly, this is rather boring to watch, and not many students would be expected to tune in. Some campuses have

inserted the Campus Movie Service on this channel, playing up-to-date films found months later on HBO and Showtime, originated from a bank of VCRs at the headend. Students viewing *Braveheart* on a Sunday night would definitely be tuning in before and after the movie, which is a perfect time to get information across.

When public rights-of-way become an issue for off-campus locations with video, other distribution options are available. Road-crossing permits are usually easy to obtain when running a hard cable to the remote location. A microwave system may be implemented to reach more distant locations. For voice, video, and data, there are uplink possibilities. Cable modems, about 100 times faster than ISDN, are being perfected. Avoiding any expensive hardware in the student rooms, whether it's a converter box or a $300 cable modem, is usually advisable. Interdiction systems are best located off premise in a utility closet, away from student hands.

Summarizing briefly, we recommend that you plan your telecommunications strategy to integrate voice, video, and data requirements, not just for the present, but also for the future. Don't get caught a few years down the road with an inadequate infrastructure. Make sure you own the infrastructure and as much of the system as possible. Find a company that can provide you turnkey service, including design, installation, maintenance, and financing, so that the school and vendor can work together as a single entity in order to accomplish the goal—school ownership and operation of a system that supports participation in present and future technologies.

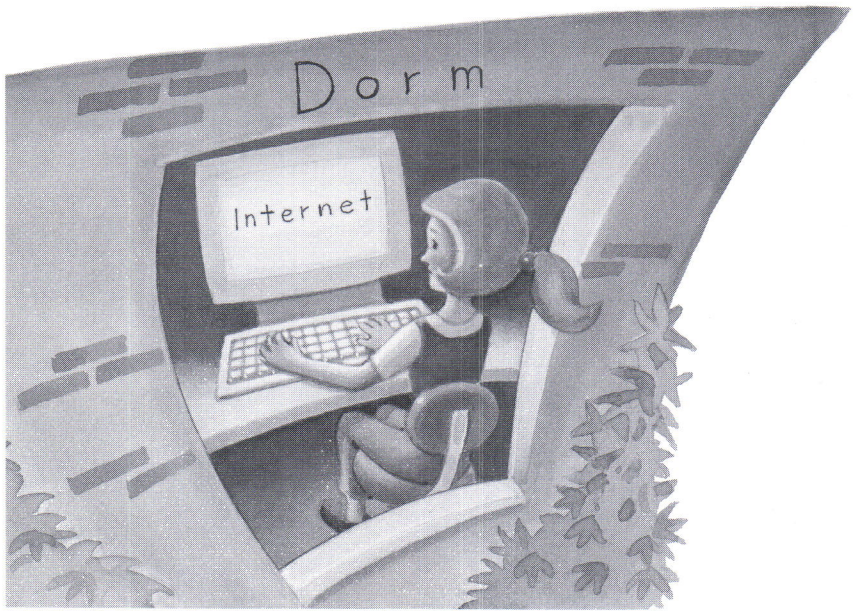
*Scott Bruckel is Director of Marketing at Campus TeleVideo (CTV). This article is based on a presentation given by Edward M. Lamont, President of Lamont Television Systems, Inc., and Pete Daly, CTV Vice President of Engineering. Campus TeleVideo provides satellite and telecommunications services to colleges and universities, including engineering, construction, financing, and programming. A wholly owned subsidiary of Lamont Television Systems, Inc., CTV is headquartered in Greenwich, Connecticut, and maintains engineering offices in Delaware, Indiana, Ohio, and California.*

# Using xDSL to Link Off-Site Faculty and Students to Campus LANs

by Perry Lindberg

The same technologies that have changed working habits in the corporate world have also affected campus life and expectations. Within private campus networks, bandwidth-hungry applications contribute to an increased usage of high-speed data connections. It is commonplace for students to establish e-mail accounts on campus and surf the Internet at breakneck speeds. Transmission of large files using FTP (file transfer protocol), and the arrival of teleconferencing and videoconferencing applications, as well as whiteboard and application-sharing technologies, will continue to fill these high-speed pipelines to their capacity.

At the end of the day, though, when faculty and students return to their homes, dormitories, apartments, or fraternity and sorority houses, high-speed connectivity may not be available. More faculty members are telecommuting, distance learning is becoming more popular, and many students require graphics-intensive programs for school projects. Today, homework occasionally involves stuffing piles of paper into a backpack, but is more likely to mean logging onto a computer, returning e-mail, transferring several large files, accessing the Internet, or tapping into a shared, collaborative project late at night.




**What are the options?**

Several options exist for university administrators faced with this new level of bandwidth demand. One of the most promising options to surface in recent years is high-speed Digital Subscriber Line (xDSL) technology. xDSL is used to provide T1 data transmission speeds over copper wire for on-campus LAN connectivity. Typically for remote-access needs, off-campus *power users* are left to rely on other methods, including analog modem connectivity via POTS (Plain Old Telephone Service), ISDN (Integrated Services Digital

Network), and WAN (Wide Area Network) extensions. While these appear to be feasible options, growing demand for high-speed services may outstrip their capabilities.

- POTS

Currently, the simplest and most widely used method for remote access is the regular dial-up modem, providing end users with data speeds of 28.8 Kbps (kilobits per second). The service is generally reliable and inexpensive, but most users agree that the speeds are inadequate for many of the advanced multimedia and interactive applications that are quickly rising in popularity.

Winton Woods, a law professor with University of Arizona, recently became a telecommuter due to a shortage of office space on campus. He now interacts with students from home via e-mail and regularly transmits documents over the Internet, but bemoans the lack of bandwidth. "Communication lacks effectiveness when you don't have the eye contact and body language. I can hardly wait for videoconferencing," said Woods, who plans to use conferencing applications along with electronic whiteboards and application sharing. "It would be great to be able to go through a PowerPoint presentation with my law students in real-time," said Woods. "It is so difficult to convey certain meanings without the ability to gesture and make your point visibly, as well as verbally."

Even with increased modem speeds of 56 Kbps around the corner, data transfer speeds are not likely to increase much, according to James Feld, a Network Administrator with California Polytechnic University in San Luis Obispo. "The issue here is not the speed of the modems, but the transmission technology used," said Feld. "The infrastructure is not capable of dealing with that kind of speed over analog connections. Going digital is the only solution."

- ISDN

ISDN is a digital, circuit-switched system that enables point-to-point connections over the existing copper wires. It offers speeds of up to 128 Kbps, which is sufficient for high-speed Internet access, and basic LAN connectivity. The phone companies have been touting ISDN as a high-speed digital solution for several years, but the technology has yet to penetrate more than five percent of the online population. Support generally offered for ISDN installations is not at the level that most administrators would prefer. In addition, ISDN is difficult to order, deploy, and maintain. Establishing an ISDN connection is difficult for many users, who are responsible for configuring a variety of setup parameters.

In the campus environment, expense is one of the biggest obstacles to common acceptance of ISDN. Often the service is made available only with a measured access rate rather than a flat rate, which most users prefer.

"That single issue is what makes or breaks anything around here," said James Feld. "If it's a measured rate, no one's going to buy it. As a state university, Cal Poly doesn't foot the bill for these services, which means the cost has to come out of the user's pocket. Right now ISDN is just too expensive, and not just because of monthly service costs. Additional installation and maintenance costs, along with the many headaches involved with ISDN, make it difficult to justify."

- WANs

A third remote-access option is extending WANs using frame relay and router technologies. Cal Poly also uses this method, and has extended its network more than thirty miles to remote sites. "But the end user is still calling a local service provider for access to the network, using a 28.8 Kbps modem," said Feld.

Because maintaining the WAN can also be time consuming and costly, it is not viewed as a solution for mass deployment. "We've got a lot of concerns," said Feld. "We're always looking for a better technology to deliver greater bandwidth."

- xDSL

One solution that offers some answers for Feld's and many other network administrators' concerns is xDSL. A variety of xDSL technologies have emerged, including the original HDSL, ADSL (Asymmetric Digital Subscriber Line); RADSL (Rate Adaptive Digital Subscriber Line); S-HDSL (Single-pair High-bit-rate Digital Subscriber Line); and others.

HDSL (High-bit-rate Digital Subscriber Line) was developed in the late 1980s to enable high-speed transmissions of multiple megabits per second using existing copper wire. Originally HDSL was viewed as an intermediate solution that would provide connectivity only until the telephone companies replaced the current copper infrastructure with fiber optic cables, or until the cable companies developed bidirectional coaxial capabilities.

It may be many years, or even decades, before the cable or phone

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companies are ready to implement a wholesale upgrade to fiber optic connectivity. The telcos are faced with the task of replacing hundreds of thousands of miles of copper with fiber optic cable, which will take an enormous amount of time and manpower. In addition, the expense is difficult to justify in areas without a high-density of potential subscribers.

So far, the cable companies have upgraded less than ten percent of their coaxial cable networks, which is a requirement to handle bidirectional data transfers. In addition, cable networks were installed with a serial-connected architecture, so that when a failure occurs, it affects every user beyond the point of that failure. To overcome this problem, cable companies are scrambling to re-route their networks in a star-network architecture, with point-to-point connections.

This leaves xDSL as the technology of choice to handle both on-campus LAN and off-campus remote-access requirements. Not only does it leverage the existing 600 million embedded copper lines, it also offers bidirectional high-speed capabilities, is easily scalable, and does not require any outside modifications.

xDSL relies on simple yet sophisticated electronic equipment attached to both ends of a twisted-pair or single-pair copper wire. Digital Signal Processing (DSP) technology is used to transmit electronic signals down the wire. The result is fiber optic quality at transmission rates of up to 1 Mbps, providing thirty times more bandwidth than dial-up modems, and more than twelve times the bandwidth of ISDN, with even higher speed xDSL solutions on the way.



- WAN/xDSL Hybrid

WAN products are being developed which integrate xDSL subscriber interfaces into routers. These products will provide additional bandwidth efficiency by routing network traffic instead of bridging it. This gained efficiency will likely be substantially more expensive in equipment costs than standard bridged xDSL connections.

### Current Uses in the Campus Environment

Because HDSL was very expensive when it was first developed, it was used by phone companies and private networks only when the routes of copper wire were too complex for repeatered T1 service. But prices have dropped in recent years, and currently more than 60% of the T1 services provided by phone companies use HDSL technology. It has become the fastest and most competitive technology for establishing T1 links on copper wire for public and campus networks, and so far more than 300,000 lines have been installed and are being used in this capacity.

In addition to adding bandwidth within a campus LAN, HDSL can be used to overcome distance limitations, extend campus LANs, add phone lines in areas of limited capacity, and provide high speed remote connections.

HDSL was deployed recently at Southwest Texas State University after a road crew, installing traffic lights near campus, accidentally cut into a 60-foot section of fiber optic cable. The cable was the main link to the campus and could not be spliced together, so the phone company tried to restore service to the University using the existing copper cable, which had been replaced by the fiber and was not

damaged. In just three hours, the phone company installed HDSL equipment, assigned the cable pairs, turned the system on, and restored full service to the campus.

**Extending xDSL Off Campus**

The most likely xDSL technologies to come into play for remote access are HDSL, S-HDSL, and ADSL. HDSL technology has been tried and proven over the past several years. Offering bidirectional data connection at speeds up to 2 Mbps over two pairs of copper telephone wires, HDSL is ideal for application sharing, videoconferencing, and interactive educational programs. It provides fiber optic quality data transmission over distances of up to five miles, and can also provide transparent LAN access over the *last mile* or local loop, using the high performance systems already in place at many private campus networks, such as frame relay or ATM.

S-HDSL (Single-pair HDSL) also offers speeds of up to 1 Mbps, but is able to transmit over a single copper telephone line. This is the ideal solution for off-campus subscribers with a limited number of phone lines at their residence. Even if the user has access to only one phone line, S-HDSL is in a unique position to offer a solution due to the availability of some new products that provide simultaneous data and lifeline POTS voice connections over the same wire.

Even more important, S-HDSL is still capable of providing the off-campus power user with the same high-speed bidirectional capabilities as HDSL. Tapping into the campus LAN requires a lot of bandwidth and a clear, uninterrupted connection. S-HDSL is a tried-and-proven technology, giving off-campus users the reliability they need.

ADSL (Asymmetric DSL) is a variation of xDSL offering potential transfer rates of up to 6 Mbps. ADSL's exceptional speeds are accomplished by using nearly all of a copper wire's capacity to deliver data downstream, from the provider to the user. This leaves very little space for the user to return information upstream. ADSL products available today deliver 1.5 Mbps downstream and 64 Kbps upstream, and systems due later in 1997 and 1998 are expected to deliver up to 6 Mbps downstream and 640 Kbps upstream. Thus, ADSL will be popular for one-way streaming applications such as Internet browsing and research, video on demand, and fast downloads of large files.

> Not only does [xDSL technology] leverage the existing 600 million embedded copper lines, it also offers bidirectional high-speed capabilities, is easily scalable, and does not require any outside modifications.

**Installation**

Beyond their private network boundaries, the university is somewhat at the mercy of what the local telephone company can offer in terms of technology for remote access subscribers. This is an issue that campus administrators will have to deal with immediately when implementing remote access LAN links.

xDSL services are difficult to deploy unless there is a solid relationship between the phone company and the university. Most universities want to be on the leading edge of technology, and will get involved in providing these solutions early. Sometimes they can use their clout as a large customer to encourage the phone company to deliver the service, before the telcos are willing to provide them as standard services to everyone else.

However, not all universities enjoy this type of relationship. James Feld with Cal Poly finds that working with the local phone company can be a challenge. "It's so difficult when it involves convincing them to deliver a new technology. Most of the time the phone or cable companies won't consider it unless you can provide them with a guaranteed number of subscribers, and we aren't able to do that."

However, even this obstacle is likely to dissipate as the demand continues to grow for videoconferencing, electronic whiteboard applications, collaborative computing, and application sharing. For instance, new versions of Microsoft's Internet Explorer and Netscape's Navigator Web browsers contain built-in conferencing applications, providing an instant potential subscriber base of millions.

Once an agreement is established to deploy xDSL, implementation is usually easy. The nice thing about xDSL is that it is a plug-n-play technology that works with the existing private network infrastructures. It's as easy as plugging an Ethernet 10Base-T connection into a hub.

At the central office on campus, remote access is enabled by plugging a modem with a built-in

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10Base-T port to the campus network. At the subscriber site, an xDSL remote unit is installed on the other end of the copper wire. The telco then connects from one modem through the telephone network to the other modem, and remote access is established. Even for the subscriber, plugging in the xDSL modem to an Ethernet port is a simple process. Unlike ISDN, no configurations are needed, and all the user has to do is switch the unit on.

**Maintenance**

Once the installation is complete, maintenance requirements for xDSL campus network products are minimal. Some vendors offer sophisticated management capabilities based on SNMP (Simple Network Management Protocol). In addition, products are available that support maintenance protocols across many platforms, including Unix, PC-based management stations and dumb terminals.

**Summary**

Some day, fiber optic cable will likely provide most of the world's high speed connections. In the meantime, xDSL leverages the existing 600 million pairs of copper wire that have been embedded worldwide at a steady rate for the past hundred years, and offers the most promising solution for providing remote access to campus networks.

xDSL is compatible with ATM, frame relay, T1 connections, ISDN, and LAN extensions to a fiber backbone. xDSL is simple for both the subscriber and service provider to maintain, as no end user configurations are needed. At the hub, Ethernet ports are easier to maintain than the traditional, labor-intensive WANs.

University administrators may want to begin talking with their local phone companies about the availability of xDSL. Currently, xDSL systems are being used for commercial and residential telecommuting and remote LAN access applications. Companies such as !NTERPRISE, the data networking arm of US WEST Communications; HarvardNet, an Internet Service Provider in Boston, Massachusetts; and ATU Telecommunications, the local exchange carrier for Anchorage, Alaska, are setting examples of how xDSL can be deployed throughout a community.

With the initial success of these deployments, xDSL should soon be widely available. It may be the best solution for off-campus "power users," including students requiring high-bandwidth applications, and faculty tapping regularly into the campus LAN for telecommuting or distance learning purposes.

As university and campus administrators look for cost-effective ways to provide high-speed remote access for faculty and students, xDSL is poised to provide them with a viable solution for years to come.

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# Setting the Course for 1997 and Beyond

by James S. Cross, Ph.D.

Waypoints are places in time and life where options become apparent and decisions are made. Not long ago, the waypoint that preoccupied America was how the country would prosper in an era of global competition against a relentless Japan, a reunified Germany, a uniting Europe, the low-wage economies of the Pacific Rim, and protectionist governments with state-dominated economies. After almost 20 years of restructuring to produce lower labor cost than our competition, the nation that fired the most hired the most.

The U.S. has emerged as a nation at yet another waypoint: (1) enjoying an export boom where 1996 exports total $607 billion, nearly twelve percent of GDP, up from seven percent a decade ago; and (2) being the dominant world supplier of Information Age brain power, muscle, and advanced technology goods and services.

Today, more than ever before, knowledge and information have become the valued commodity in business and in our personal lives. The manner in which we acquire, process, disseminate, and use information continues to change dramatically. In the past, information was primarily manually packaged, printed, and distributed. Today, it is distributed electronically in multimedia form, providing the recipient the options of printing or not printing, archiving or passing along, or synthesizing and re-engineering. Timeliness and ease of use are critical to the electronic distribution process of the brain-powered businesses of the Information Age. They are founded on the need and ability to move, at will, capital and expertise back and forth across borders in search of maximum return.

**Hot Technologies**

Thirty years ago there were no personal computers, laptops, Web browsers, Internet, or ISP providers. Over the past three decades, high-powered PCs with Web browsers and Internet access have become commonplace in the office and home. Throughout 1997, business and consumer Internet users will see continued emphasis on defining technologies that make a difference, enhancing customer services, generating new revenues, increasing productivity, and putting an organization in sync with its workforce, customers, and suppliers.

So what's hot for 1997? Plug and play, multimedia, data mining, RSVP, DHCP, universal messaging, IP multicasting, thin clients, Java, 64-bit servers, ADSL, robust browsers, data warehouses, data marts, and everything that has to do with the Internet and Web-based applications. As both business and consumer Internet access continue to grow at a phenomenal rate, so will the service portfolio and global coverage of ISP providers as they expand worldwide. The portfolio of services available through the Internet may very well be limited only by time and the imagination of creative and innovative professionals.

Interestingly, the hot technologies that will make the most difference in 1997 will not necessarily be the ones that garner the most media attention. Instead, they will be the ones that are user-friendly, integrate well with existing technologies, collectively support and enable users, and pave the way for the proliferation of exciting new network applications. The hottest technologies in 1997 that may very well

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have the most impact are those involving plug and play, high-speed access, and internetworking.

■ Plug and Play

In the plug-and-play arena, the universal serial bus (USB) appears to be the hot topic. USB is a new PC peripheral bus standard that promises to make plug and play a hardware and software reality. The standard is supported by more than 300 suppliers of computers, peripheral device manufacturers, software houses, hardware vendors, and resellers. USB is more than new technology. It means good-bye to the tangle of wires, the round keyboard port, the stubby mouse port, the monitor port, dip switches, DMA addresses, IQR setting, a multitude of software drivers, and the snarled power cords in the back of many PCs. It means that adding new peripherals to PCs need no longer be a test of skill and endurance—a frightening experience for the home and office user. It also means faster development time for vendors in meeting the needs of a rapidly changing customer base and marketplace.

In a nutshell, the USB standard means one size fits all, from monitors to keyboards to printers to modems, and paves the way for the proliferation of exciting new network applications, products, services, and revenue growth. A survey of available literature revealed the following key attributes of the USB technology:

- 12 Mbps bandwidth to handle a wide array of peripherals and telephony devices
- Ability to handle 127 devices from a single connector
- Enables device moves, adds, and changes without reconfiguring or powering down the system
- Built-in power distribution for devices off the USB signal line
- Complementary technology that does not compete with the high-speed peripheral connectors — FireWire or P1394
- Elimination of the need for complex arrays of add-in cards and software drivers
- Reduction of time for product design and test cycle
- Strong backing by powerful industry vendors such as IBM, Intel, Microsoft, Compaq, DEC, and NEC.

USB provides the opportunity for the development of new methods of marketing by eliminating the compatibility barrier of cost-effective bundling of PC hardware, software, and peripheral products. Packaged PC systems of hardware, software, and peripherals will become easier to bundle to meet the needs of niche segments and users. The inherent compatibility of USB will make it attractive for resellers to offer packaging that adds value, or to offer customers build-your-own incentive promotions based on market demand and perceptions.

For a technology that is relatively unknown to the average consumer and business user, USB offers both promise and potential for some exciting new applications in the home and office PC market in 1997 and beyond. By making peripherals easier to install and at the same time more reliable, USB opens the door to widespread buyer acceptance of a whole array of new products. (At Comdex this spring, a host of vendors announced products that support USB-enabled devices.)

■ High-Speed Access

In the high-speed marketplace, service provider success will increasingly be determined by the ability to provide affordable high-speed access for the growing number of dial-up PC users. The challenge is to provide high-speed access designed for the masses which connects PCs to private and public networks on demand. Developments to date have focused on ISDN, cable modems, and asymmetric digital subscriber line (ADSL). ADSL may well be the most promising of the group by providing sufficient bandwidth, solving the numerous problems created by the longer-than-average hold time for data users, and providing a migration path to the new network infrastructures, including ATM.

Just what is ADSL? How does it differ from ISDN? How does it work? What applications are well suited for the service? What equipment is required? Should ADSL be used in place of ISDN or in conjunction with ISDN? What products and services are currently available? These are some of the many questions being asked about ADSL, a transmission technology that provides reliable transport of data, video, voice, and POTS signaling over a single copper facility.

ADSL is a modem technology that converts a single POTS twisted-pair telephone line into three transmission channels: (1) a high-speed channel with data transfer rates from 1.5 to 9 Mbps downstream to the subscriber; (2) a medium speed channel with a data transfer rate from 16 to 640 Kbps upstream from the subscriber; and (3) a standard telephone channel for voice. ADSL enables interactive, multimedia, high-speed applications to be accessed by

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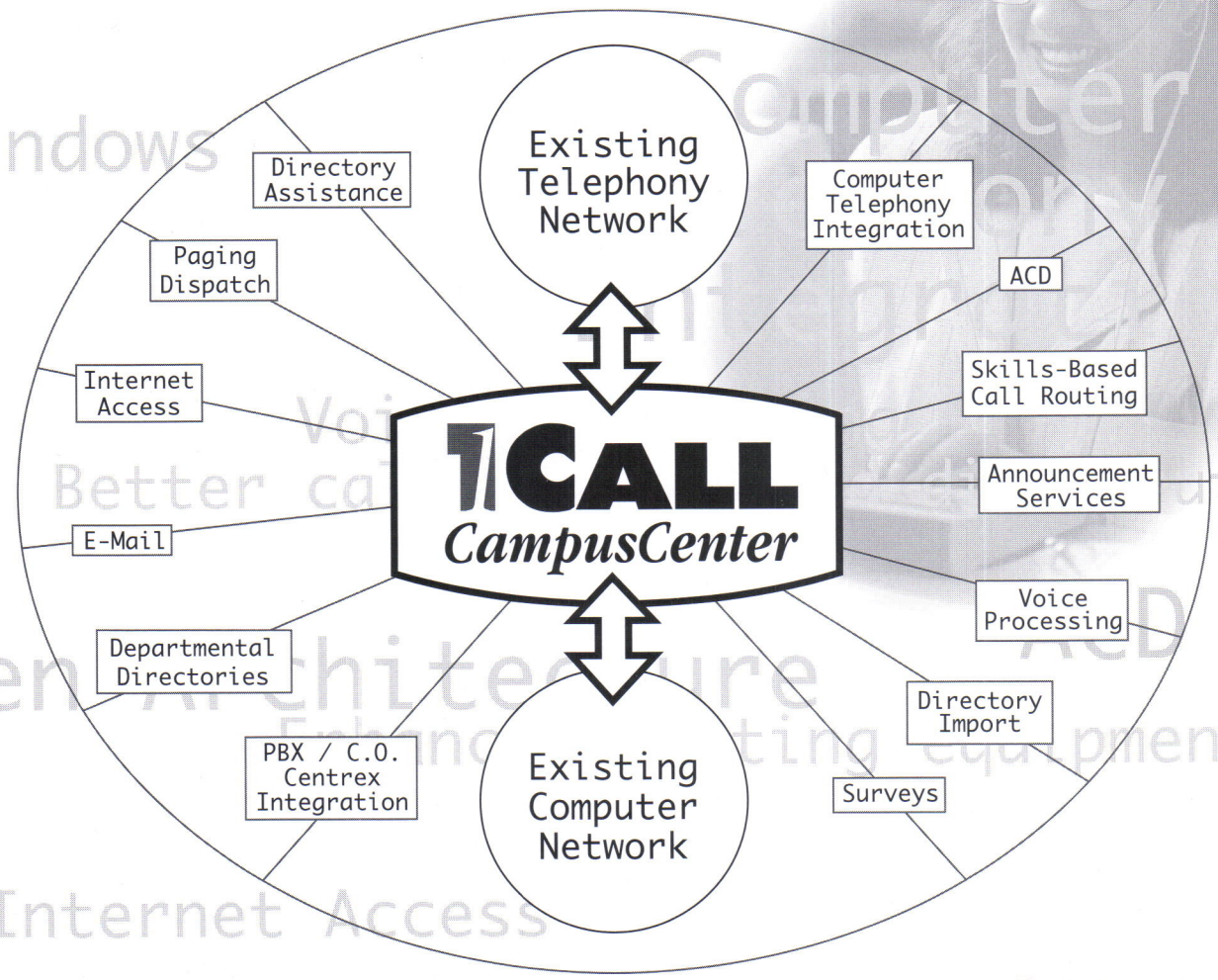


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anyone with a telephone in their home or business. From a subscriber's perspective, ADSL provides a completely transparent modem-like digital transmission service that operates very much like a typical analog modem. The primary difference is ADSL transmits data asymmetrically at high speed to match the asymmetric nature of interactive multimedia applications. ADSL technologies can provide wideband and variable bandwidth connectivity over existing copper lines for a nearly ubiquitous offering of high-speed access.

With ADSL, local exchange carriers and alternative LECs can now provide access to high-speed interactive services such as movies-on-demand, home shopping, home banking, and Internet service over the same copper twisted pair that supports conventional telephone service. The technology will enable telcos to maximize their existing copper network investments by offering a variety of new services without installing fiber. ADSL may very well become the transport technology of choice in areas that are not heavily populated, as fiber is only cost-effective when there are large numbers of customers in close proximity. ADSL is economical in that it provides both a high-speed data link and regular telephone service.

The ADSL technology is being deployed by a number of the RBOCs because costs and time to deploy fiber have exceeded the estimates of even the most optimistic and aggressive local exchange carriers. Other than a 10 Base T ethernet card for each workstation, there are no special hardware or software requirements needed to use ADSL service. ADSL may well be a technology that truly brings the information superhighway to the masses. In addressing the emerging high-speed access market, the primary advantages of ADSL technology appears to be threefold: its deployment cost is lower; it does not rely on the presence of voice-switching networks; and it can be connected directly to internetworking equipment such as routers, bridges, and high-speed ethernet, frame, and cell switches. While traditional dial-up modems will continue to be the largest ISP access link for the next decade, ADSL will put a major damper on the growth of ISDN and cable modem services. ADSL is forecast to grow to more than eight million connections in the next ten years, edging out the cable modem as the second most popular Internet access option. ISDN is forecast to be a distant fourth behind cable modems.

## ■ Internetworking

Managing a successful multiplatform network with thousands of desktops and servers is no easy task. However, new switched-based internetworking technologies have evolved that promise to make the job more manageable by providing the scalable performance, flexibility, and reliability to deliver bandwidth on demand, support multimedia traffic, and simplify network administration—all this, even though today's network applications and desktop computers are orders of magnitude more powerful than just a few years ago.

Some of the technologies are simply enhanced versions of existing products, but four—frame, cell, frame-cell, and VLAN switching—provide a broad portfolio of new capabilities for the campus telecommunication professional. These technologies provide enormous potential and capabilities to enhance network administration, configuration management, security, quality of service, and performance management.

*Frame switching* provides an attractive price-performance alternative for relieving network congestion on 100 Mbps or less LANs, while protecting user investments in station software, network interface cards, and building wiring, and while ensuring that existing applications and networking operating systems run unchanged. Overall throughput of payloads is increased by attaching the various segments on a shared-media hub to a separate port on the switch, which provides full LAN bandwidth. Frame switching also provides a cost-effective alternative to leased-line networks by supporting a high-performance, bandwidth-flexible, and multiprotocol WAN fabric that can integrate SNA, serial, and LAN applications. Thanks improved price performance and coexistence with ATM, ADSL, and ISDN, there is increasing demand for frame switching.

*Cell switching* is required for links over 100 Mbps and multimedia applications. Cell switching's big-pipe scalability and its dexterity at handling a mixed bag of applications and bit streams make it the infrastructure of choice. It scales to gigabit speeds, carries all traffic forms, and guarantees quality of service.

Cell switching differs from frame switching in two major ways. First, internetwork cell traffic travels over a virtual circuit to ensure quality of services, while frame traffic of frame switching is connectionless. Second, cell switches move cell payloads of 48 bytes, and each session is like a telephone call. Cells do not flow until an end-to-end path has been established and resources reserved. Frame switches move ethernet frame payloads that can vary from 45 to 1500 bytes. Each frame payload is a separate packet that is forwarded like the

U.S. mail from point to point without a preordained path or guaranteed resources. The short cell length, virtual circuits, and predictability of cell switching give ATM capabilities that cannot be achieved with the current capabilities of frame switching.

*Frame-cell switching* has evolved as a hybrid because of the need to use both frame and cell switching technologies in a single network. Like a frame switch, it interfaces directly with ethernet shared-media hubs and is transparent to applications, NICs, and the network operating system. Like a cell switch, it sends traffic across the backbone as cells, keeping latency to a minimum in meeting stringent quality-of-control requirements of voice and multimedia applications.

*VLAN technology* provides an attractive list of value-added capabilities that complement frame and cell switching. It allows a more efficient alignment of traffic flow across the network by separating addressing from the physical network architecture and topology. VLAN seeks to maximize the performance benefits of device portability and segmentation while minimizing the number of subnets by assigning subnet addresses to a VLAN segment rather than to the physical LAN segment. Fewer subnets means fewer network address reconfigurations as a result of moves, adds, and changes.

These four technologies (frame, cell, frame-cell, VLAN) provide enormous potential for telecommunications professionals who are faced with the challenge of re-engineering 100 Mbps ethernet and token ring FDDI campus backbones to meet the needs of big-pipe, bandwidth-hungry multimedia and virtual reality applications of the 21st century. A survey of the literature suggests we will hear more about four major internetworking architectures evolving to replace the FDDI backbone: cell-based distributive backbone, frame-based virtual collapsed backbone, cell-based collapsed backbone, and integrated routing-switching backbone.

**Telecommunications Organization**

Creative leadership means seeing the opportunities, promise, and potential in the technologies. The telecommunication organization must be in the business of advancing waypoints of the university, faculty, staff, and students. To that end, the goal is to empower constituents to use information in the most advantageous ways possible to be proactive players in achieving waypoints and creating the future.

The goal is to empower constituents to use information in the most advantageous ways possible to be proactive players in achieving waypoints and creating the future.

Telecommunications professionals must be visionary as service providers, innovators, arbiters, connectors, translators, and bridges to the future, where PCs and networks will be ultrapersonal. According to the Battelle Memorial Institute, networks and PCs of the future will recognize your voice, follow voice commands, control appliances in your home, brief you on your favorite subject, keep travelers from getting lost, and reduce the jingle in pockets as credit-card-sized smart cards replace cash and keys.

While in transition to the Knowledge Age University of the 21st century, it is difficult for many to comprehend a future they have not experienced and an array of technologies they do not understand. The campus telecommunications professional must provide leadership in the articulation of future visions and perspectives, their impacts and risks, and the opportunities they make possible.

Telecommunications has become a creative agent for making things happen on campuses. It has become an integral part of the landscape and sky, the cutting edge, the encompassing package, the fiber linking many diverse constituents, and the twine that binds together a global society. Little happens on a campus that does not involve the use of the technology—from the simplest phone call to mobile computing to biotech research to electronic commerce to the most complicated of digital operations.

The telecommunications organization must continuously be the champion and catalyst for the delivery of value-added services in a more global-oriented university and society. As we look to 1997 and beyond and as technology continues to be the driving force for economic, social, and cultural change in our society, the telecommunications organization must continually gather information on the needs and expectations of constituents as well as the promise and potential of the emerging technologies.

*Jim Cross is Vice Provost of Information Technology at Michigan Technological University. He has also served as ACUTA's president for 1996–97.*

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**Campus Profile**

Photo courtesy of Univ. of Colorado at Boulder. Ken Abbott, photographer.

# University of Colorado Assures Users a Quality-Based Technology Future

*by Dennis Maloney*

At the University of Colorado at Boulder, we believe that the deployment of feature-rich and reliable information technology resources is essential to the institution's mission of providing instruction, research, and public outreach. The Department of Telecommunication Services is one of the primary suppliers of information technology services. We provide voice communication services, support data communication services, and provide the campus fiber and cable infrastructures.

In this role as a primary supplier, Telecommunication Services decided to implement a quality-based program to ensure that campus customers receive excellent customer services.

**Background**

The University of Colorado at Boulder has a total student enrollment of 24,500. The campus covers 850 acres, 150 of which are a dedicated research park. Telecommunication Services provides service to over 200 buildings and 22,000 jack locations. Currently, we serve 13,000 voice extensions and 6,500 voice mail subscribers. We provide low-speed data service to 1,200 customers and connectivity to over 7,000 ethernet customers. We provide service to 30 campus call centers which integrate a mixture of ACD, automated attendant, and integrated voice response technology.

**Implementation of Quality Program**

Six years ago, Telecommunication Services began a journey toward implementing a quality program. Our initial efforts were driven by opportunity, but more recent efforts have been driven by internal desire, motivation, and an operational mandate for change.

Our endeavor is not one project, but rather an ongoing journey toward continuous improvement. Our journey is guided by four principles:

- To allow our customers to lead the development of our processes.
- To make decisions by data whenever possible.
- To involve everyone in making changes who would be affected by those changes.
- To think long-term and act short-term.

**Planning, Leadership, Management Support**

The structure of our effort began with a clear understanding of our institution's mission, which is to provide instruction, to support research, and to offer service to the public. Telecommunication Service's mission is to support the institution's mission by providing enhanced voice services and data communications connectivity which meet or exceed our customers' expectations. Our vision is to provide that service in such a way that our customers could literally not afford to turn to the competition. In each of these statements, our direct customers are defined as students who live on campus, plus faculty and staff, but we fully understand that our ultimate customers are the entire student population of the University, and our shareholders are the taxpayers of Colorado.

To accomplish this mission we've identified five critical processes on which we believe our success will hinge:

- Work-order processing: customer requests for moves, adds, and changes
- Trouble management: customer requests for repair
- Long distance services: 1+ services for our customers
- Plant construction: expansion of fiber and cable infrastructures
- Plant engineering: planning for the expansion of fiber and cable infrastructures

There are many other processes that are important to our mission, such as budgeting, financial management, traffic management, and operator services. In the final analysis, however, these procedures simply support the five critical processes.

Around each of the five critical processes we have formed cross-functional teams. Each team is responsible for managing the process, and each member of the team is described as a stakeholder. As stakeholders, their success is measured in light of the process as a whole. Each team is supported by three types of data: management data, quality data, and efficiency data.

The key to the compilation and delivery of this data is our management system. Our management system was developed on our campus as a part of the original switch installation project in 1986 and has been evolving ever since. The management system integrates our cable records, equipment records, work-order process, trouble-management process, scheduling, long-distance call pricing, directory assistance/operator assistance/customer service tools, and financial reporting functions.

Three types of reports are compiled and distributed automatically via our campus network through e-mail. Examples from the trouble-reporting process are provided to describe each of these types of reports.

### Process Management Data

Process management data is distributed daily and is designed to provide all stakeholders with the information necessary to confirm the health of the process and/or set their priorities for assuring the health of the process. (See example 1 below.)

**Example 1: Trouble-Reporting Open Ticket Report**

Extensions with Open Trouble Tickets

| EXT | TICKET | SEV | COMMIT DATE | COMMIT TIME | REVISED COMMIT DATE | REVISED COMMIT TIME | STAT | LAST REFER |
|---|---|---|---|---|---|---|---|---|
| TSF | 26480 | 3 | 03-11-97 | 03:11PM | | | Referred | RUSW |
| 21150 | 26484 | 3 | 03-13-97 | 01:39PM | | | Open | ROUT |
| 25970 | 26485 | 3 | 03-13-97 | 02:23PM | | | Open | |

3 records listed

**Example 2: Trouble Tickets by Opening/Closing Codes**

**Trouble Tickets by Opening Code**

| Opening code | Last 7 days | Last 30 days | Last 365 Days |
|---|---|---|---|
| BELL DOESN'T RING | 1 ( 3%) | 1 ( 1%) | 1 ( 0%) |
| Can't call number | 3 ( 8%) | 5 ( 3%) | 28 ( 1%) |
| CUTS IN AND OUT | 1 ( 3%) | 1 ( 1%) | 1 ( 0%) |
| Data | 2 ( 5%) | 8 ( 5%) | 127 ( 6%) |
| EQUIPMENT PROBLEM | 2 ( 5%) | 2 ( 1%) | 2 ( 0%) |
| Feature | 1 ( 3%) | 4 ( 3%) | 131 ( 6%) |
| HEARING PROBLEMS | 1 ( 3%) | 2 ( 1%) | 2 ( 0%) |
| JACK | ( 0%) | 1 ( 1%) | 1 ( 0%) |
| Message waiting lamp | 2 ( 5%) | 12 ( 8%) | 81 ( 4%) |
| NO DIAL TONE | 8 ( 21%) | 30 ( 20%) | 374 ( 17%) |
| Service interruption | 10 ( 26%) | 59 ( 40%) | 1098 ( 50%) |
| Stolen or vandalized | 1 ( 3%) | 2 ( 1%) | 11 ( 1%) |
| STATIC | 1 ( 3%) | 2 ( 1%) | 2 ( 0%) |
| System | 2 ( 5%) | 6 ( 4%) | 114 ( 5%) |
| ACD TRAFFIC PROBLEMS | ( 0%) | 4 ( 3%) | 4 ( 0%) |
| Voice mail | 3 ( 8%) | 8 ( 5%) | 205 ( 9%) |
| | 38 (100%) | 147 (100%) | 2182 (100%) |

**Trouble Tickets by Closing Code**

| Closing code | Last 7 days | Last 30 days | Last 365 Days |
|---|---|---|---|
| CANCEL TICKET | 3 ( 8%) | 9 ( 6%) | 82 ( 4%) |
| MDF to switch | 1 ( 3%) | 9 ( 6%) | 248 ( 11%) |
| CUSTOMER OWNED EQUIP | ( 0%) | 2 ( 1%) | 58 ( 3%) |
| Clear when tested | 7 ( 18%) | 30 ( 20%) | 337 ( 15%) |
| Equipment | 2 ( 5%) | 21 ( 14%) | 307 ( 14%) |
| Inside wire | 2 ( 5%) | 16 ( 11%) | 216 ( 10%) |
| Outside wire | ( 0%) | 1 ( 1%) | 131 ( 6%) |
| Outside vendor | 3 ( 8%) | 3 ( 2%) | 45 ( 2%) |
| SERVICE | 3 ( 8%) | 13 ( 9%) | 195 ( 9%) |
| Terminal set | 17 ( 45%) | 43 ( 29%) | 561 ( 26%) |
| | 38 (100%) | 147 (100%) | 2182 (100%) |

### Quality Management Data

Quality management data is most often reported weekly or in conjunction with the end of a process cycle. These reports provide data on predetermined quality indicators, which can be used to plot run/control charts to determine the capability and the consistency of the process. Example 2 above shows Peg counts and and Example 3 (on page 36) shows service interval reports.

### Process Efficiency/Productivity Reports

These reports are fed workload data by the information system, but exist in the form of spreadsheets on our file server. The reports generated by this data are called "major volume indi-

➤

**Example 3: Average Service Intervals**

| SEVERITY | LAST 7 DAYS | LAST 30 DAYS | LAST 365 DAYS |
|---|---|---|---|
| 1 | 0.00 | 0.00 | 1.80 |
| 2 | 0.25 | 1.39 | 1.37 |
| 3 | 1.97 | 2.15 | 2.85 |
| | 1.88 | 2.12 | 2.78 |

cator reports." In short, for each process one workload indicator is identified as that which best describes workload fluctuation over time.

By analyzing each position's activities, the frequency of these activities, the unit of measure for each activity, and the time required to perform one unit of the activity, we can use the major volume indicator for each position to (1) predict staffing requirements, (2) evaluate actual-staffing-to-actual-workload ratios, and (3) measure the impact of any changes/improvements to our critical processes.

Example 4 shows a workload evaluation report for our customer service team.

Our approach to management is best described as an ongoing, continuous-improvement approach. Operating under the strategic direction of the institution's executive cabinet, we are fully supported by the managers and the Business Services quality steering team. Managing the processes allows us to utilize data to determine changes, capture new ideas for improvement, and commission teams to implement the ideas. The commissioning body for each team writes a formal commissioning statement which outlines their objectives, their span of control, and the expected results.

### Promotion of Technology

Although there are other technology centers on campus, such as the Media Center and Computing and Network Services, Telecommunication Services has carved a niche for itself by focusing on helping our customers use the existing technology to serve their customers. In many cases, this means partnering with the other technology centers to meet the customers' needs. Our quality program has been instrumental in bringing together the processes of our partners to meet the needs of our customers.

New technologies and services are introduced in a similar fashion. The customers' needs must be identified, and our partners' concerns must be addressed. One example of such a project was the integration of a new ACD traffic package. Our customers needed

**Example 4: Workload Evaluation Report**

MVI: Total Queued Switchboard Calls 2945
MVI: Student Auth. Codes Activated 147
MVI: Trouble Tickets Created 83

| Saturday Week Ending Date | Staff Hours | | | Reductions | | | | Avail. MVI Hrs. Explain | Equiv. Staff (h/40+) | MVI Qty. | Reqd. Staff Table | Eff. (k/ix100) | Staff Var. (i-k) | Staff Var. 4-wk roll avg. (4L/4wk) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Reg. | O.T. Explain | Tot. | Vac. | Sick | EDP | Other | | | | | | | |
| | a | b | c | d | e | f | g | h | i | j | k | l | m | n |
| 11/25/96 | 202.75 | 0.00 | 202.75 | 7.00 | | 15.25 | 22.25 | 158.25 | 6.59 | Table | 4.06 | 62% | 2.53 | 2.55 |
| 12/2/96 | 290.00 | 1.00 | 291.00 | | 8.75 | 17.25 | 7.25 | 257.75 | 6.44 | Table | 5.02 | 78% | 1.42 | 2.22 |
| 12/9/96 | 299.75 | 0.75 | 300.50 | | | 8.00 | 33.50 | 259.00 | 6.48 | Table | 5.11 | 79% | 1.37 | 1.96 |
| 12/16/96 | 290.25 | 1.75 | 292.00 | | 1.75 | 15.75 | 12.50 | 262.00 | 6.55 | Table | 4.95 | 75% | 1.60 | 1.73 |
| 12/23/96 | 291.50 | 5.50 | 297.00 | 31.00 | | 12.00 | 8.00 | 246.00 | 6.15 | Table | 4.65 | 76% | 1.50 | 1.47 |
| 12/30/96 | 150.00 | 4.50 | 154.50 | 22.00 | | 3.75 | 4.00 | 124.75 | 5.20 | Table | 1.76 | 34% | 3.43 | 1.98 |
| 1/6/97 | 197.00 | 0.00 | 197.00 | 7.75 | 0.25 | 17.75 | 11.50 | 159.75 | 3.99 | Table | 3.09 | 77% | 0.91 | 1.86 |
| 1/13/97 | 283.75 | 11.50 | 295.25 | | | 17.50 | 12.25 | 265.50 | 6.64 | Table | 5.25 | 79% | 1.38 | 1.81 |
| 1/20/97 | 239.00 | 0.00 | 239.00 | 1.50 | 9.25 | | 4.25 | 224.00 | 5.60 | Table | 6.02 | 107% | -0.42 | 1.33 |
| 1/27/97 | 266.00 | 0.50 | 266.50 | | | | 11.25 | 255.25 | 6.38 | Table | 6.00 | 94% | 0.38 | 0.56 |
| | | | | | | | | | | | | | | |

timely access to raw data and analyzed information. Our Computing and Network Services partners needed to be involved because they would be supporting the e-mail through which the reports are delivered.

By creating the team to include customers and Computing and Network Services representatives, all concerns could be built into the product/process at the beginning.

**Quality, Performance, Productivity**

In the initial quality project on each of the five critical processes, we identify four measurable internal quality indicators and help customer focus groups to identify the top five customer expectations of the process. The five customer expectations are structured into a telephone survey which is sent to randomly selected customers each week.

Together, the four internal indicators and the average of the responses to the customer survey questions become the five key quality indicators for each process. These indicators are reviewed every week by all process stakeholders and plotted on run/control charts.

In addition to identifying and fixing obvious problems, determining and improving the capability and the consistency of the process are important goals. "Capability" refers to the level of service that the current process can be expected to produce on a regular basis. "Consistency" refers to how the process indicators vary over time. For example, the four quality indicators for the trouble-management process are:

1) Percentage of missed commitments
2) Average service interval
3) Percentage of trouble tickets written within 30 days of a previous ticket
4) Percentage of trouble tickets written within 30 days of a completed work order

The customer survey for the trouble process consists of five statements to which the customer responds on a scale of 5–1 where 5 equals "strongly agree" and 1 equals "strongly disagree." These statements are:

1) The trouble agent was accessible and answered my call in a timely manner.
2) The trouble agent was skillful at gaining a clear understanding of my problem.
3) The problem I reported was fixed.

4) The timeliness with which my problem was fixed met my expectations.

5) I was treated with courtesy by all those involved in fixing my problem.

One important lesson we have learned is that process problems are not usually the fault of the people who manage the process, but rather are a result of the design of the process. This becomes obvious to the team members when we evaluate the data metrics, as discussed in previous paragraphs. Because the team members approach the data from a collaborative problem-solving standpoint, rather than trying to find someone to blame for problems, they become free to ask tough questions and truly improve the pro-

**Example 5: Project Description and Results**

| Project | Description | Results |
|---|---|---|
| Customer Service | To combine the staff members from three different functional units into one self-directed team. | • Personnel expenses in '96 are $150,000 less than in '91.<br>• Reduced repetitive-motion injury claims to $0 in the last three years.<br>• Increased responsiveness to user support calls.<br>• Positioned team to impact future improvement projects. |
| Trouble Management Generation I | To review our trouble-management process, identify improvement opportunities, and organize a series of projects to address each opportunity. | • Decreased trouble tickets by 13%.<br>• Established key quality indicators, including customers satisfaction scores which are currently rating the service at 4.9 on a 5-point scale.<br>• Decreased the process's staffing requirement by over 300 hours annually.<br>• Established commitment times that are set automatically by the system and communicated to all involved. |
| Authorization Code Management Generation I | To review our long-distance authorization-code management process, identify improvement opportunities, and organize a series of projects to address each opportunity. | • Established an on-line assignment process.<br>• Established on-line editing functions to ensure consistent database entries.<br>• Improved authorization code security.<br>• Reduced staffing requirement by 510 hours annually. |
| Authorization Code Management Generation II | To improve the processes connection with the Bursar's (Student Billing) Office. | • Reduced the authorization code and informational sheet into one laser-printed sheet.<br>• Electronically connected the Telecommunication Services and Bursar's management systems.<br>• Created charge/payment tool to ensure that communication between two departments is right the first time.<br>• Automated the delinquency management process.<br>• Reduced process staffing requirements by 159 hours annually. |
| Traffic Management | To fine-tune and implement an ACD/ trunking/call coverage traffic-reporting tool. | • Automated a very manual process.<br>• Increased traffic-reporting interval from monthly to daily.<br>• Provided cross-functional support from the Computing Services organization for downloading data to spreadsheet format.<br>• Reduced staffing requirement by 286 hours annually. |

cess, rather than spending their time defending their role within the process. This enables the team to improve the process further and strengthens trust within the team.

**Cost/Benefit Analysis**

In Telecommunication Services, we invest in the staff by providing quality and customer-service training, supporting the investment of time and resources into each project, and sharing the control over the evolution of the services we provide. To this point in our history with this process, the return on our investments has been incredible.

For example, we invested approximately 410 staff hours in the Trouble Management - Generation I project. As indicated, we recovered over 300 hours of that investment in the first year in processing staffing requirement reductions alone. The indirect benefits of customer delight are somewhat harder to quantify, but no less real. Having administrators, faculty, staff, and students all describing the wonderful service that is provided not only is gratifying to our staff, but also solidifies our position in the future of technology growth on campus.

**Results to Date**

To date, fourteen teams have been commissioned, while nine others have been identified and are simply waiting for the time resources to become available. Some of the teams have been commissioned to improve existing processes, and some have been commissioned to implement new services and technology. Example 5 is a synopsis of some of those teams which have completed their missions.

We feel these results are impressive. More importantly, our administration, our customers, and our peers think they are impressive. Our administration understands the benefits of quality and doing it right the first time, particularly with regard to technology, which can be of great benefit when implemented properly and great detriment when not. Our customer satisfaction scores are averaging 4.8–4.9 on a five-point scale, and they let us know that our customers appreciate the staff's extra effort.

In addition to the honorable mention we won in ACUTA's Institutional Excellence Award competition, our peers in the International Definity Users Group selected us as the first winners of their Excellence Award in 1994. The crystal globe on the marble stand that decorates our conference room is a symbol to our teams that they are doing world-class work.

It is a goal of the Department of Telecommunication Services to be a primary supplier of campus information technology resources by being the very best supplier to meet campus customers' needs and requirements.

We began a journey toward implementing a quality program that values continuous improvement, and there is no foreseeable end. Our customers' needs and requirements for information technology resources continue to evolve, changing in step with the exploding information technology industry. Our journey is far from complete.

*Dennis Maloney is Director of Telecommunications at the University of Colorado at Boulder. UC Boulder was recognized at the 1996 ACUTA Conference as an honorable mention in the Institutional Excellence in Telecommunications Award competition for the efforts described here.*

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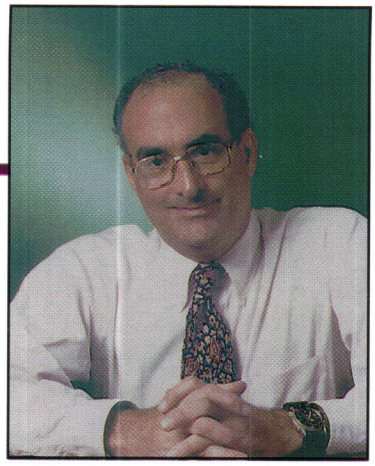
# *Interview:*

# The Yankee Group on ELECs, CLECs, and the Future of Telecom



**Howard Anderson**
Managing Director
The Yankee Group

## *by Terry Robb*

*Our thanks to Howard Anderson and Bryan VanDussen for taking time to address some questions raised by the ACUTA Publications Committee. The following is a transcript of their recent conversation with committee member Terry Robb.*

**Robb:** The way universities are set up today, we're not only corporate telecommunications managers, we're also marketing managers to our student population. Essentially, we run phone companies, and we're trying to sort out what the future holds for us. Telecom departments are wealth producers for their colleges and universities; we want to maintain that and be ready for the future.

**VanDussen:** I've worked with twenty or thirty different universities over the course of seven or eight years. The whole concept of an ELEC is something that you guys more or less developed and institutionalized ahead of the commercial environment. Now, you've broadened your purview to include not just voice and PBXs, but anything to do with campus communications.

**Robb:** More or less. The second area that most of us got involved with is video. And now with the advent of ATM, we're being drawn into the data world.

**VanDussen:** Back in the heyday of integrated voice/data solutions on campus, about the extent to which university telecom departments ever got involved was making sure all the cable pairs were in the walls, deciding whether they had the right kind of outside plant, and so on. Maybe some installed integrated voice/data PBX. But for a feasibility study, I'd walk around and meet with various department heads and computer labs, speaking to people about IP and the Internet and this wonderful thing called CerfNet. About the extent to which the telecom managers got involved was the ordering of private lines. But the telecom manager was always involved with delivering solutions to the students and administrators and the faculty—both on and off campus. So I suspect, too, that when you say "data," you're talking about delivering Internet services to those constituencies.

**Robb:** Absolutely.

**VanDussen:** Well, the ELEC concept takes it a little bit further. It suggests that at a gross, almost unglamorous level, as a strong community participant, your ability to buy volume is something that you can turn to the benefit of your internal constituencies as well as the constituencies outside of your institution—maybe those people who come to work for you on a daily basis.

Or maybe those partners with whom you have research-joint ventures, or maybe you're putting seed money into small businesses around the community. Any number of permutations can fall off of this whereby you can take your long-entrenched, deeply developed ability to provide services to those different constituencies and parlay those over to other organizations outside the university.

**Robb:** So your concept of ELEC is more than just serving faculty, staff, and students who leave campus at the end of a workday, but maybe extending that concept to private business or corporations who may enter into a research agreement with us or something similar.

**VanDussen:** Yes. Think of the various different relationships universities tend to have, and different economic groups with whom you have financial relationships—alumni, local schools, health- care institutions, research institutions, and partnerships with small businesses in the area. What I'm suggesting is a laboratory of telecommunications expertise. I can recall there were many different groups within the university that were at the leading edge of many things that ultimately became commercial. The Internet is just about the most perfect example. People within the universities were way ahead of the commercial environment. And so imagine your ability to take that expertise—those organizational skills in particular, things like customer service and billing and support, maintenance, management, and volume discounts—and parlaying those on to these other constituencies.

Particularly at public institutions funded with public money, there has always been a concern as to whether there was a profit motive involved or whether commercial issues or business issues involved might take away your tax-exempt status. How do you provide services to students without giving the appearance of taking money from their pocket when they're already paying you dearly for books and courses and such?

We have to balance, I think, some of the things that we're talking about here with reality—that you're really not in the business of being in business. You're really looking to extend the services and build those relationships with existing constituents, but also, again, keeping an eye on some of the new constituencies that might take advantage of some of the things that you know and are capable of doing.

**Robb:** Right. Some of our members may still be wading through the 1996 Telecommunications Act. Could you explain the major differences between a CLEC and an ELEC?

**VanDussen:** There really is no functional difference. A CLEC is primarily an organization that's been built around the idea of delivering commercial telecommunication services. They were born out of what we used to call the CAP market. These companies like MSS, TCG, and you may have heard of McCloud out in your area—Missouri. They made a business out of providing high-bandwidth lines to large corporate customers, pretty much within urban corps to long-distance carriers. There were a few other esoteric things they offered, but that was the principle part of their business.

Then the Telecom Act comes along, and a couple of the states advanced the Telecom Act and said, "Well, we've still got this thing called a monopoly in the local market. There is nobody else that can provide local dial tone or other services in the local market. It's time to break that monopoly open."

And so these CAPs, by virtue of installing a switch, can now offer services outside of their internal needs. The CLECs installed these switches and began to offer some of the services that, to date, have only been offered by monopoly providers. Now, to do that, all they have to do is go to a state public utility commission, file an application, pay a modest fee, and say "I'd like to be authorized to provide local services in your territory." By and large this is a rubber-stamp process. As long as they have capital, a decent management team, and some track record, they'll get approved.

An ELEC really is just a twist on that concept. It is functionally a company, an organization, or a group of interested parties, maybe even third parties on ➤

behalf of a university or a utility, that installs a network—maybe a switch, maybe something more—a lot of fiber, a lot of lines. But they install a switch and begin to offer services in the local market, maybe also long-distance services, and increasingly, a whole grab bag: Internet access and hosting is the big hot button. Also value-added network services like data communications facilities, X.25, ATM, or frame relay.

A fully integrated CLEC/ELEC has a great portfolio, a broad array of services that they can begin to plug and play for particular groups and particular demand. So really all we're talking about is a shift away from the long-distance world vs. the local world, to one where all the barriers are essentially removed. Anybody can get into anybody's business, and private institutions such as universities and utilities and maybe a few commercial companies can take advantage of that.

**Anderson:** Let me just point out that an ELEC is a subset of CLECs. We had Dick Wiley at our conference who is the ex-FCC Commissioner. He says, "This is just the sort of innovation that the FCC was looking for. Just because I am an enterprise local exchange carrier, I don't have to go market to the whole world. I can market internally—have a customer base of one, if you would, and that's okay. I'm going to be allowed to do that. It's going to be innovative, but I can do it."

Our view was that for a place like a university—which has already done great wiring and has switches—to be regarded by the long-distance companies as a carrier as opposed to a customer is in their best interest. If I'm MCI and you've cut a deal with me, I'm just as happy to pay you one or two cents a minute as I am to pay Southwestern Bell. So the barriers to entry are essentially very, very modest. The cost to file is probably $10,000 per state.

From the university perspective, you handle incoming calls because you're doing some level of switching, but you get no revenue from them. Suppose there were revenue when parents called their kids at college. Would that help offset, at least from the university's perspective, a capital cost they're going to have to put in anyway? Yeah, that didn't hurt very much at all!

**Robb:** Right! And as a matter of fact, many schools, including mine, do have arrangements set up now that bring in substantial revenues by bypassing the local exchange carrier and terminating calls directly.

**Anderson:** This is exactly what we mean. It was never called an ELEC at the time, but you are essentially a co-carrier.

**Robb:** I think our challenge, though, is what do we do about all the students living off-campus? We have only so much campus housing. We act as essentially a LEC there because we're in the local, long-distance, and Internet- access business. We're confronted with, in the case of Mizzou, 5,000 students on campus, and approximately 17,000-18,000 off-campus. We also have our faculty and staff off-campus. We would like to look at offering them services, but what holds us back from saying, "Okay, we're going to become an ELEC" is that we may be perceived by the phone company as a competitor.

That's one point, and then the other point, especially with state-funded schools, is unwanted customers. Joe's Tire and Fix-it Shop looks at our rates and says, "Hey, they've got some pretty attractive rates. I'm gonna go get my business from them because they're a LEC!" Do we have to serve them? How do we avoid being in true competition with the local phone company instead of just serving our interests?

**Anderson:** There are two answers to that one. The first issue may set up a for-profit subsidiary, even within a nonprofit. Hospitals do this all the time, for example. The second is your existing local exchange carrier may actually *want* some level of local competition to be able to say "Look, we've got local competition; now let us into the long-distance business."

**VanDussen:** It's possible the incumbent local telephone company won't perceive you as an enemy. In fact, they may even be a decent partner in helping you to facilitate some of the services and the delivery of those services or maybe even help you with the infrastructure side of things. We have talked with a number of long-distance carriers, who have explored partnerships of a similar level, where they come to a particular customer and they have a few ideas. They've got some solutions they'd like to try out with that customer, and they work hand-in-hand with them—either as a third party or as a hand-to-hand partner in delivering the services and helping them develop the infrastructure for those services.

**Anderson:** The tire and repair shop is a tricky one. If you are a carrier, do you have to accept customers? You don't have to market to customers, but you do have to accept them. If the university were my only customer, my billing would be kind of simple. If I have to put in some sophisticated billing systems, and now have to worry about bad debt and credit checks, the $25 a month that I might be getting may cost me $27 to administer.

So you may want to do it with your pricing or you may want to do it with some affinity-group pricing, which is: "It's $200 a month if you are not part of the official campus family." Maybe you don't offer all services to people. Off campus you might say, "We have a remote access service so that you could get into the data solution and we could put in some Ascend gear or whatever. We could put some cable modem in your house if you're coming in that way. We don't necessarily have to offer every service remotely as we do here, but it's a business decision.

**Robb:** But if you're a certificated carrier in your state, can you discriminate using pricing?

**VanDussen:** No. You can't be capricious, you can't be arbitrary, and you can't be discriminatory. Here's the issue: If you file for certificate status, that basically means you've got to file a tariff. That doesn't prohibit you from developing promotional campaigns or filing a tariff that is based on an affinity-group concept. Let's not shy away from the issues. There are administrative issues, organizational and potentially financial issues that would have to be dealt with. But if you look at it as an extension of what you have done for so many years, I'd think the rational position would be that you aren't going to be in a position to be everybody's local telephone company. Your interest is in serving specific constituencies within your local community or those groups that already have economic or research relationships with you or the seed idea for local businesses. You don't have to go and promote the idea and let the world know that you're now providing local telephone services to the local tire and fix-it shop.

**Anderson:** If you look at Friends and Family as an example of a cute kind of bundling, you might say, "We've got our own Friends and Family program here. If you're part of the Friends and Family group (i.e., your family is the university community), we can offer discounts when you call the university community." Those make it relatively attractive and when you call the university computer, that's part of the university family.

**Robb:** Postalized rates are a big deal right now. In fact we're bidding out long distance as I speak, and we're requiring them this time around. Where do you see postalized rates going?

**VanDussen:** Will we see further reductions in long-distance? It borders on getting esoteric, but you're familiar with the whole access-charge issue—access reform? Other than on-to-on calls, you will probably see a precipitous drop in pricing in the next three to five years. As access charges are pulled out of the long-distance carriers' costs, everybody from ➤

Howard and me at home to your university and commercial customers will see on-to-off or off-to-off calls reduced substantially. I think you'll find they'll all be priced at postalized structures.

There are technology and competitive issues that will potentially bring those charges down, maybe another penny. We've even argued that in fully bundled solutions, for example, a long-distance provider offering a bundled package to a high-value residential customer may very well position long distance as a loss-leader, or at least at cost. So there is pricing pressure on that on-to-on price from a competitive standpoint and from a bundling standpoint.

Technologically speaking, there's also some pressure coming from the Internet—voice over the Internet, or a real basic one is the fact that bandwidth is increasingly less expensive. There's a lot of fiber, and there are new companies that are entering the market to provide to the AT&Ts of the world low-cost bandwidth from one side of the country to the next. It doesn't cost a lot of money anymore to put another minute of voice on those networks. Marginal costs are very, very low.

**Robb:** I heard it compared to an airline seat. Once the plane takes off, if a seat isn't full...

**VanDussen:** That's a perfect analogy!

**Robb:** Another issue that's really hot is the claim that all this Internet traffic on the local network is kludging up the switches, and maybe the rates ought to change to reflect the overuse.

**VanDussen**: The local telephone market, because it's a monopoly and because we wanted to make sure that Grandma and Grandpa get phone service at low cost, has been subsidized for many years. It's not economically efficient. It's not based on cost. If I pick up my phone and make a phone call, I'm using resources in the local network. We are the only country in the world that still offers flat-rate local calling. Ameritech has increasingly begun to move away from flat-rate local calling. Many of the local telephone companies for many years have tried to get away from flat-rate local calling by being able to offer measured services either to businesses or high-volume local customers.

The whole access charge reform and universal service reform plays into this. The bottom line is there's an increasing amount of pressure to move away from straight flat-rate pricing and to do two things: (1) start charging users for the cost of using the network, and (2) start charging Internet service providers (ISPs) for the use of the network. That's a real political issue. We're not going to see an answer to that question for four or five months, when the FCC makes a couple of rulings.

**Anderson:** In normal situations, this was a political, not an economic issue. The politicians didn't want to face the issue of going to local measured service. Local unmeasured service has become the rule, and we were essentially doing a form of social engineering. When you look at Lifeline costs—that was social engineering. With the advent of ISPs that require an awful lot of resources, we are now favoring a technologically elite at the cost of voters and consumers. I don't think we're going to move away from the politically correct solution of local unmeasured service, but we may see some limit on it. That would solve part of this problem, but that may be a difficult thing to sell politically.

**Robb:** Right. I've read about the phone companies complaining that we have flat-rate service, and folks using their lines to connect for hours at a time to the Internet really kludge up the switches. But the phone companies haven't hesitated to sell second and third lines.

**Anderson:** They used to not want to do that because the average phone was used 20 minutes a day in the American household, and not used 1,420 minutes a day. They built their whole engineering on that. When you put in, for example, a Lifeline telephone, and you say to your kids, "Don't you dare call out on this thing; just let all our incoming calls come in," what you were getting for $4.75 a month was network access almost for free. There is no means test on Lifeline service. I did exactly what I said to you, and I used the other phone for my wide area local unmeasured service. This was social engineering. Now what we're talking about is that second and third phone line. Sixteen percent of U. S. households now have a second phone line—up from twelve percent last year. It may go to twenty percent by next year. That's an enormous increase in second lines.

**Robb:** One of the challenges facing telecom people in universities is the flattening of long-distance usage—primarily due to increasing use of e-mail. Parents now have e-mail, so they exchange e-mail instead of calling. Depending on the access- charge reform, those of us terminating long-distance calls directly may see our commissions go away. We're all really faced with the need to look at new "markets" within our organizations. Do you have a feel for what we all should be thinking about in order to keep our revenue stream going so we can do things like ➤

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rewiring campus and so on—any technologies out there that we could benefit from and not rely solely on long-distance?

**VanDussen:** We were talking earlier about how the ACUTA membership has, for many years, been trying to get into the data side of the business, and delivering value-added high-speed data connectivity to faculty, administrators, and students. Everybody is frustrated when they have to use a 9.6 modem or a 14.4 modem to get hold of the Internet or log on or send e-mail. The fastest growing segment of the industry is the data networking side of the business. If you think you've got flattening revenues on long-distance, you should see what AT&T is facing! You think you are going to have problems with lower access charges and lower pricing on long-distance. So, too, is every reseller, long-distance, and local company out there. They're all taking a grab at the low-hanging fruit in providing data communications services.

Most of your membership probably wired their campuses seven to ten years ago. There's a lot of dark fiber out there. You've probably got all the twisted pair that you need in the walls. You've probably got the right jacks. Some of you even require that your students walk through the door with a computer under their arm. The trick to the business is to provide those students with the ability to take advantage of the information revolution. So, the challenge to the telecom administrator in ACUTA is the same as the telecom manager in the commercial world. As organizational experts, as technology experts, as the people who understand what it takes to negotiate with these large organizations that provide services, you are in a position to bring data communications platforms and Internet access to your student body in particular and to constituents outside the campus.

**Anderson:** What you may be doing is saying, "There is a base level that you get for coming on campus, but for an extra $15 a month, I can give you high speed. Is it a service you may choose to buy?" The second revolution that's coming is going to be when the computers that people will buy will not only be Internet ready, but they will have voice technology over the Internet. You're going to have the wires there anyway. Students have all the time in the world and all the computing power in the world. "Why not start to do my voice over the Internet? It's not terrific, but if I'm going to be on the phone with my girlfriend in Germany for 45 or 50 minutes, using the Internet sounds like a pretty good idea!" So you're going to see the volume continue to increase and the technology drive the costs down at the same time. You're not going to make a ton of money off of the ELEC concept, but if you do it right, it can self-fund or liquify some of the enhancements they're going to have to put in just to be competitive for college students.

**Robb:** Exactly. That's the big issue. When you're shopping around, the price of tuition is important, but what do you have in the way of infrastructure for my education? More and more students are looking at that now.

**Anderson:** You'll see whole dorms or houses filled with computer science majors where 56 kilobits isn't going to be good enough. They want T-1 access all the time. And they're not just going to be sending e-mail. They're going to be sending video. I think we're going to see a video service available at universities over the next five years. It may be 15 or 20 bucks more a month, and you'll have a special phone—maybe a screen phone that will let you do video at the same time. If I can do video, that means I'm going to have access to files, so it's an ongoing requirement that you want to have high-speed access. High speed today is a privilege, not a right. Within five years it's going to be a right and a demand. As my kid gets ready for college, he's going to say, "Can I have access to a video library on-line?" So, it becomes a recruiting mechanism, and your faculty wants all those same rates too.

**Robb:** Well, I'm ready to recruit your kid because we're going to have ethernet in all the residence halls in a few years, so he's welcome at Mizzou!

*As Managing Director of the Yankee Group, which he founded in 1971, Howard Anderson oversees planning services and consulting in client/server computing, consumer communications, data communications, interactive commerce, telecommunications, and other areas. He speaks frequently at conferences and trade shows and is widely quoted in a broad range of business and industry publications.*

*Bryan Van Dussen became Director of the Yankee Group's Telecommunications Research Practice in 1996 after spending three years working in the Yankee Group's London office. An expert on the local telephone, long- distance, and resale markets, he regularly consults to the leading long-distance, CLEC, and local telephone companies, and is widely quoted on regulatory and industry matters.*

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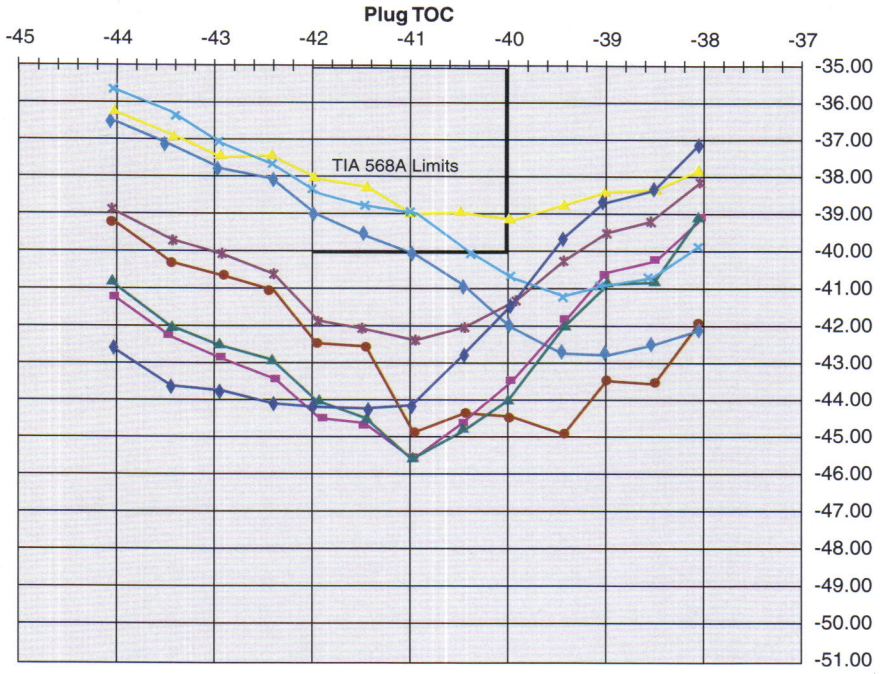


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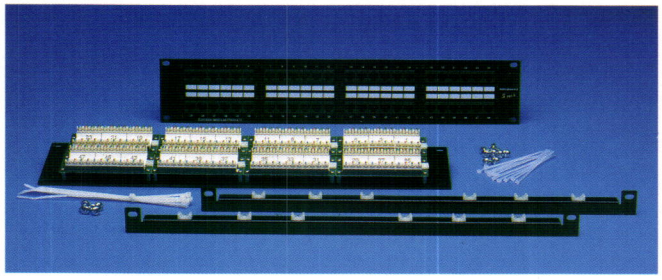

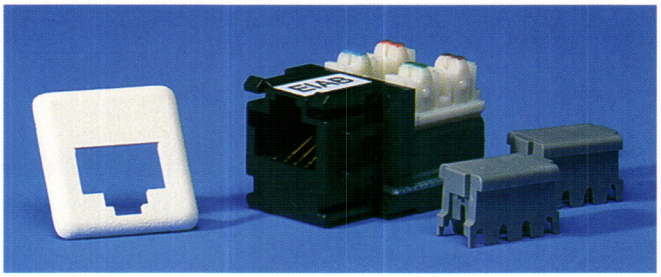

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# From the Executive Director

**Jeri A. Semer, CAE**

**ACUTA Executive Director**

Student Services and Revenue Generation is the theme of this second issue of the ACUTA Journal. These issues are central to the strategic thinking of any telecommunications manager in higher education today:

- How will telecommunications support the academic mission of the university?
- What services will we provide and to whom?
- What choices should we make from the broad array of available and emerging technologies?
- How will we finance the ever-increasing technology needs of a networked university?

Participants at ACUTA's Spring Seminar on "Student Services and Revenue Generation" explored the changing definitions of student services. We considered how societal and economic pressures on educational institutions and their graduates are fostering a change in the college and university "product"—learning—and how it is delivered to a changing student population. We also looked at the concept of "life-long learning" as dictated by the need for working adults to ride the crest of the digital revolution and survive in a rapidly changing work environment.

We also examined likely changes in revenue and costs resulting from increased competition, the changing marketplace caused by legislation and regulations, and the increasingly well-informed "customer" base. We explored ways in which universities can adapt to change and develop new revenue sources. The seminar departed from the usual student services fare, but presented issues that we all need to be aware of in helping to guide our institutions in the right technological directions.

It is clear from this discussion that technology-based student services will be at the heart of the university of the future. ACUTA members are realizing that they can and should play an active role in shaping the technical direction their institutions will take, and that they have valuable expertise to help the institution avoid costly mistakes. Much of the discussion at the Spring Seminar, on the ACUTA Listserve, and at the upcoming Annual Conference is focusing on telecom as a strategic asset of the university.

In this issue, we continue this discussion, examining the issues from the perspective of authors from the consultant community and our own respected peers. We also look at the changing regulatory environment resulting from the Telecommunications Act of 1996. We hope you will find it stimulating and useful.

Just as universities are re-examining their strategic direction, associations must continually strive to remain relevant to their memberships. ACUTA embarked upon a strategic planning process this winter, which will result in proposed goals and objectives to be presented and discussed at the Annual Conference. We are in the process of examining ACUTA's niche in the higher education and telecommunications market, likely scenarios for change in these environments, and how ACUTA can best help members thrive in a changing world. The Strategic Planning Team's work in progress will be available to the membership via the ACUTA Web site in May and June for comment and suggestions. I hope that you will take a few minutes to look at the special Strategic Planning section of the Web site, and give us your thoughts. Watch your e-mail or fax machine for instructions on how to access this information.

We have been gratified by the positive reaction to the first issue of the *Journal of Telecommunications in Higher Education*. Our team has endeavored to create a practical and useful publication that enhances the image of telecommunications in higher education. We hope that you will share the Journal with colleagues, administrators, and appropriate faculty at your institution.

Have a great summer, and we look forward to seeing you in Atlanta!

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# *Welcome to the second issue of the ACUTA Journal of Telecommunications in Higher Education*

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