ACUTA Journal of Telecommunications in Higher Education

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Quotes of Note

Government regulation performs an important role in our lives as IT professionals. There have been new regulations to understand related to distance learning, copyright protection, privacy and data security to name a few. These affect all areas of IT.

Eric Breese
Director, User and Technical Services
Illinois Institute of Technology

We need state and federal regulations and legislation in higher education, but like concrete, without the right ingredients in precise proportions, the mix just doesn’t work. Technology will continue to play a key role in how education and government arrive at a formula to avoid gridlock.

Jeanne Janssenius
Director of Telecommunications and Technology Infrastructure Services
University of the South

The Year Ahead

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Core Purpose and Values

ACUTA's mission is to advance the capabilities of higher education communications and collaboration technology leaders.

ACUTA's core values are to:
- encourage and facilitate networking and sharing of resources
- exhibit respect for the expression of individual opinions and solutions
- fulfill a commitment to professional development and growth
- advocate the strategic value of communications and collaboration technologies in higher education
- encourage volunteerism and contributions by individual members
The process that communities will use to upgrade to next-generation connectivity looks very different from the process by which telecommunications and cable providers built out their networks. This new process is the rewriting of the social contract through which the public provides privately funded networks with certain benefits, like access to rights-of-way, in exchange for certain public obligations.

Blair Levin

The First Amendment to the U.S. Constitution guarantees freedom of speech and the press in any “public forum.” That term was clearly defined in 1776, but in today’s world, what constitutes a public forum? To date, no court has addressed whether a school establishes a “public forum” by creating or approving a Facebook page that allows the general public to post comments and opinions.

Paul Korzeniowski

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Anyway we look at it, the long-range radar of the legislative and regulatory arena can clear up our crystal ball and help us make more informed decisions for our campuses.

Don’t you wish you could see into the future? How about a crystal ball to see tomorrow’s headlines? Who will play in the World Series? Where will the next disaster strike? What about your career success?

Believe it or not, there are tools to help make these predictions, especially for our professional lives. For a short-range view, we can read publications such as our own ACUTA Journal to see what new technologies are promising. We can attend events such as ACUTA conferences or seminars to see how a new technology is playing out on other campuses. Or, we can watch research reports to see what innovations are being held as promising. There is even a longer range radar (or crystal ball) for the ICT Field—the legislative/regulatory environment. Which laws are currently under review? What new regulations are being brought up? Which policies are under fire by consumer or corporate groups? Let’s remember, the whole ICT field as we know it resulted from a legislative decision in the mid-1980s to break up AT&T.

Bottom line, there are lots of ways to make our crystal ball clearer and more accurate by listening, reading, and watching what is happening around us. In this edition of the Journal, we take a look at legislative and regulatory issues that are affecting the ICT field and even speculate on how they may affect us. This is long-range radar information, and these issues may not affect us right away. But it does guide us for those long-range decisions and decisions with lasting effect. Let me give you a few previews:

- In July 2013, the Education and the Workforce Committee held a hearing entitled “Keeping College within Reach: Improving Higher Education through Innovation.” This committee is reviewing the rise in tuition costs at traditional public universities in the last decade, the increased need to adapt to changing student demographics, and the use of technology in the system (MOOCs were mentioned specifically). There is broad consensus that there needs to be a focus on providing more affordable and better quality education to nontraditional students through the use of innovative technologies. The fact that this issue even arose and is being discussed can mean changes in funding models and support for the use of technology.

- The Congressional Research Service issued a report on rural broadband in June 2013. The report notes that Congress views broadband infrastructure deployment as a means to improve regional economic development and to create jobs. Large federal monies are behind this initiative with both RUS and USF programs. We hope that this report will continue the movement and allow colleges and universities in rural areas to piggyback with telecommunications providers to broaden their reach and infrastructure to poorly served areas. For affected universities and colleges, this can mean a continued influx of money and broader reach.

- Recently, some employers have asked employees to turn over their usernames or passwords for their personal social media accounts. The employers argue that access to personal accounts is needed to protect proprietary information or trade secrets, to comply with federal financial regulations, or to prevent the employer from being exposed to legal liabilities. But others consider requiring access to personal accounts an invasion of employee privacy. Many lawmakers have introduced legislation recently to stop this movement to get or keep a job. Some states have similar legislation to protect students in public colleges and universities from having to grant access to their social networking accounts. Either way, this could affect our approach to security university wide.

- The privacy/convenience debate started with websites and now has moved to mobile apps. Mobile apps provide us with convenience and access to information we want. But they also
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collect information on the user, which can invade our privacy. California now applies the 2003 Online Privacy Protection Act to mobile apps as well as websites and requires a published privacy policy on apps that Californians can use or access. How many of our colleges and universities are creating apps to aid the students? Are we compliant with California laws (which will probably come to our state soon)?

- Recently in Morocco, an international treaty for the visually impaired was signed and adopted by the World Intellectual Property Organization. The treaty deals with limitations and exceptions to copyright for blind and visually impaired persons, allowing them better cross-border access to books.

Not only can this move affect general IP action in each country (which affects our libraries, research, and other entities in our universities), but also the implications may carry over to our computer labs on campus (accessibility and software tools). Watch closely as this unfolds and is interpreted by the university community and the courts. This may affect your purchasing and support decisions in the future.

- Let’s not even talk about the cyber-security issues going on in the world right now. These are large and a real concern, and no doubt will effect how we do business in the educational environment. We may not be able to have any impact on these decisions (unless we have a lobbying arm), but certainly the decisions will affect us. Anyway we look at it, the long-range radar of the legislative and regulatory arena can clear up our crystal ball and help us make more informed decisions for our campuses.

We hope you enjoy this edition of the Journal and hope that your takeaway is a look into the future. I am always available at rkovac@bsu.edu.
The ACUTA mission is to advance the capabilities of higher-education communications and collaboration technology leaders. Three strategic plans and more than ten years ago, the governing body, determined that ACUTA would become the preeminent authority on telecom and IT in higher education, recognized the need to strengthen the ACUTA voice in Washington, D.C. One of the ways the organization is able to accomplish that lofty goal is through its Legislative and Regulatory Affairs Committee, which monitors and reports to the ACUTA board and membership on telecom and IT legislative and regulatory activities affecting higher education. Since this issue of the ACUTA Journal is devoted to legislative and regulatory topics, I thought I’d take the opportunity to take you behind the scenes to accomplish these eight objectives:

• Introduce you to the committee members, who spend a lot of their time watching large-scale federal issues so that you don’t have to
• Provide most honorable mention to the two legal firms that represent us in Washington, Dow Lohnes, LLC, and Thompson Coburn, LLP, and introduce you to the attorneys who research on our behalf, notify us of timely issues, and produce the monthly Legislative/Regulatory Newsletter and podcast discussions
• Introduce you to our EDUCAUSE associate, who keeps us aware of opportunities for alliance in legislative/regulatory higher-ed pursuits
• Remind you of the wealth of resources available on the ACUTA website (www.acuta.org), including the leg/reg issues matrix

• Let you know that we are a member of and active contributor to the Higher Education Compliance Alliance and its website (www.higheredcompliance.org)
• Indicate that we extend the reach of our legislative/regulatory umbrella by including on our website the listing for the CRTC (Canadian Radio-television and Telecommunications Commission), as our members are not ruled only by the FCC. ACUTA is not just telecom, nor do our members reside only in the United States anymore
• Reinforce the assistance the monthly ACUTA Legislative/Regulatory Newsletter and ACUTA eNews bring to your desktop
• Remind you to let us know if there may be a regulatory/legislative question that your school would like us to research.

Meet the ACUTA Legislative/Regulatory Committee

Eric Breese, chair, has a background of over 25 years handling telecommunications in a variety of industries and has recently accepted the position of director, user and technical services, at the Illinois Institute of Technology. He has been an active member of ACUTA for 13 years.

Randy Hayes, voice services manager for 16 years at the University of Northern Iowa in Cedar Falls, has been involved in communications technology for 32 years, been active in several statewide and national ICT organizations, and authored extensive legislative and regulatory reports. Randy has been a contributing member of ACUTA since 1989, during which time he has served as a director at large, board liaison to many committees, and chair of ACUTA’s Legislative and Regulatory Affairs Committee.

Andy Hulsey has spent more than 42 years in the radio and telephony industry, with an emphasis on engineering management, systems planning (strategic and tactical), and consulting services. This includes more than 21 years of experience in cable TV distribution and 20 years in LAN design of various technologies. He has provided electrical engineering services to REA electrical power companies, including high-voltage transmission and primary distribution and substation design and service-rate analysis. He provided consulting services to telephone companies in several states from 1972 through 1983. For the past 27 years as a telecommunications director, Andy has guided both the University of Florida and the University of Central Florida through FCC and state regulations and CLEC and ILEC tariffs. He holds an FCC radiotelephone and amateur radio license and is a registered professional engineer. He holds a B.S. in Electrical Engineering from the University of Arkansas in Fayetteville.

Holly King, network communications project manager, has worked for Northwestern University in Evanston, Illinois,
for 14 years. In addition to her 12 years of active service with ACUTA, she chaired the Insight 100 Operations and Implementation Forum in 2010.

**Dave Mongeluzzi** has been with the University of Pennsylvania in Philadelphia for 22 years and is a senior IT project leader responsible for vendor management and contract review and renewals. He is also CFO for MAGPI (an Internet2 connector operated by N&T staff at Penn) and serves as compliance officer as well as a member of the KINBER Business Committee, the group that won a federal stimulus grant to build out $100M of fiber around the state of Pennsylvania. Dave was appointed by Penn's president, Amy Gutmann, to serve on KINBER's board of directors in May 2013.

**Sharon Moore**, deputy CIO at Smith College, is an elected ACUTA director-at-large board member, serving as liaison between the board and the Legislative and Regulatory Affairs Committee. She had previously served two terms as the chair of the Corporate Liaison Committee. Prior to moving to Smith College in 2002, Sharon had been with AT&T for 14 years, working primarily in the higher-education market. Sharon has been an active participant with ACUTA for more than 20 years.

**Rodney Petersen** is senior government relations officer and managing director of the EDUCAUSE Washington office. He also directs the EDUCAUSE cybersecurity initiative and is the lead staff liaison for the Higher Education Information Security Council. He is the co-editor of a book in the EDUCAUSE Leadership Strategy Series entitled *Computer and Network Security in Higher Education*. He is also a founding member of the Association of College and University Policy Administrators and the author of “A Primer on Policy Development for Institutions of Higher Education” and “A Framework for IT Policy Development.” He received his law degree from Wake Forest University.

**Bill Phillips** is an associate director of customer solutions with the office of the CIO at The Ohio State University. He is responsible for relationship management in support of infrastructure services for the office of the CIO. His team provides IT consulting to the university colleges and departments. Bill has more than 30 years of experience in IT. He is in his eighth year with the university.

**Kevin Shaffer**, policy development and regulatory compliance, UCIT office of information security, University of Cincinnati, has been on the staff at the University of Cincinnati in the UCIT network and telecommunications services group for 23 years. Along with many other responsibilities at the university, he monitors legislative and regulatory developments for the department. Kevin holds a B.S. degree in paralegal studies. His telecommunications experience in a university setting and his legal experience make him a valuable member of the Legislative and Regulatory Affairs Committee.

**Greg Sparks** has served as the director for communication technologies at North Carolina State University for the past decade and has been in the IT field for over 20 years. His team is responsible for data, voice, and cable television services for the campus of 35,000 students. In addition to being involved in collaborative efforts within the Research Triangle area, which includes UNC-Chapel Hill and Duke University, Greg is routinely involved with the NC Research and Education Network, serving higher-ed institutions throughout North Carolina.

**Doris Stock** has advised other universities in the areas of operational procedures, rates, regulation, customer service and vendor relations, serving as the Vermont representative on many state and national organizations throughout her 30-year career at Virginia Tech in Blacksburg, Virginia. She is the university’s primary resource for interpreting FCC and SCC regulations and their impact on the campus environment. She has served as a strategic resource in the implementation of all aspects of the university’s converging ICT areas. Doris has been an active ACUTA member for over 25 years and has played a significant role in the Legislative and Regulatory Affairs Committee for almost as long.

**Ken Salomon** and **J. G. Harrington** are partners with two Washington, D.C., legal firms—Thompson Coburn, LLP, and Dow Lohnes, PLLC, respectively, specializing in telecommunications and broadband legal, regulatory, and congressional issues. Both have worked closely with ACUTA since 2008, advising on legislative and regulatory matters, highlighting important FCC rulemaking activities, congressional moves, and their potential impact on higher education. Their monthly newsletter is a must-read for all technology departments and governing legal councils, and whenever you have an opportunity to participate in an ACUTA-Dow Lohnes or Thompson Coburn webinar or face-to-face event, you won’t want to miss the opportunity for an up-to-the-minute, in-depth explanation of technology issues.

**Ron Kovac**, ex officio member, has been in information communications technology for 30 years and at Ball State University in Muncie, Indiana, for 18 years. He presently serves as the director of technical training and is a professor. He has been an active ACUTA member for 11 years, fulfilling the challenging and prestigious role of ACUTA president for 2013–2014.

As for myself, as ACUTA CEO, I serve as staff liaison and ex officio member of the Legislative and Regulatory Affairs Committee. I retired in 2010 from Columbia University’s information technology department after 25 years and have been an active ACUTA member for more than 20 years, serving as president in 2008–2009.

**Working with the FCC**

Our work with the FCC in explaining the real-world experiences, literally from campus trenches, helped FCC members better understand the concerns we filed as reply comments to the commission's Rules to Improve Wireless Coverage through the Use of Signal Boosters, Notice of Proposed Rulemaking, 26 FCC Rcd 5490 (2011).

In February 2013, the FCC's booster order clarified many issues relating to signal boosters and established, for the
first time, that boosters are permitted. In addition, the major carriers and many small carriers have committed to granting blanket consent for any booster that meets the new technical standards adopted by the FCC.

The order also adopted several suggestions made by ACUTA, most notably by rejecting a proposal for special certification requirements for technicians installing large-scale boosters used in campus environments.

Check the ACUTA website (www.acuta.org) for late-breaking legislative/regulatory news, such as the following:
- House Education and the Workforce full committee hearing: "Keeping College within Reach: Improving Higher Education through Innovation"
- Spectrum Policy in the Age of Broadband: Issues for Congress
- USDA Seeks Applications to Finance Rural Broadband in Remote Areas

Found monthly in your inbox is the ACUTA Legislative/Regulatory Update, which highlights congressional and FCC notable actions that could impact your campus. You will want to include your general counsel team on the distribution list. Podcasts of the monthly discussions featuring our vigilant attorneys, J. G. Harrington and Ken Salomon, are embedded in the newsletter as well as archived on our website.

From the Committee to You
Also found monthly in each ACUTA eNews are the informative Info Links, posted by ACUTA's Legislative and Regulatory Affairs Committee member and past committee chair Randy Hayes. There is a wealth of information to be gleaned from Randy's compilation of websites from vendors, associations, governmental bodies, and other sources for white papers and additional documents.

Check the ACUTA website for the schedule for Legislative and Regulatory Affairs in-person presentations and webinars, which are frequently presented by J. G. Harrington and Ken Salomon on hot topics, such as Section 255 of the Communications Act, Universal Service, royalty payments, distributed antennae systems (DASs), and natural disasters such as Hurricane Sandy. Holly King also represents ACUTA and higher education by working with the PCIA/HetNet Forum, which has provided an excellent webinar series this year on DASs.

You can volunteer to serve on the Legislative and Regulatory Affairs Committee, which invites you to monitor and share important leg/reg trends in your area. The committee monitors and reviews FCC regulatory activity, ICT-related court decisions, and U.S. congressional legislative actions and provides information to the membership monthly through the Leg/Reg Update and eNews, as well as through e-mail broadcasts as necessary. To volunteer to help us or to share news, please contact Eric Breese (eric@breesestolt.org), chair, or Corinne Hoch (choch@acuta.org), staff liaison for the Legislative and Regulatory Affairs Committee.

As you'll see in Eric's article, which begins on page 10, Legislative and Regulatory Affairs Committee members recently discussed what we felt are the top five IT-related leg/reg issues that higher-education IT leaders face today: cybersecurity, 911, data security, intellectual property legislation, and USF reform.

Member institutions value the importance of ACUTA in meeting their strategic goals. Let us know how we can help you with your legislative/regulatory quests. Of particular note is our meeting during the 2012 ACUTA Annual Conference with Henning Schulzrinne, the FCC chief technology officer, who is also the Julian Clarence Levi Professor of Mathematical Methods and computer science professor of electrical engineering and chair of the computer science department at Columbia University in New York City. He recognizes the technical expertise in higher education, views us as early bellwethers, and encourages us to continue sharing with him. He is eager to learn from your technical notes or overviews of current implementation plans (anecdotes or numbers) as well as anything you think the FCC could do to help in the areas of IPv6, security, and VoIP/voice peering.

As higher education's advocate in the FCC, Henning sees campuses as having much technical expertise. I will gladly be your conduit; if you think your technical notes, white papers, Wiki implementation progress reports, etc., would be useful for the FCC to read, send them to me at choch@acuta.org. Together we will continue to make a difference.

Contact Corinne anytime at choch@acuta.org.
Leg/Reg Issues Facing Higher Education
Committee identifies top five issues you need to know about today

The Legislative and Regulatory Affairs Committee recently discussed what we felt are the top five IT-related leg/reg issues in higher education today. We settled on the following, in no particular order: (1) intellectual property legislation, (2) USF reform, (3) cybersecurity legislation, (4) 911 issues, and (5) data security legislation. Below are summaries for these issues.

Intellectual Property Legislation
The current issues around intellectual property primarily began with the 1998 Digital Millennium Copyright Act (DMCA). Title 2 of the DMCA creates a safe harbor for many universities that requires they remove the infringing content or block access to it. For many years, this worked well; however, the content industry, including the Motion Picture Association of America (MPAA) and the Recording Industry Association of America (RIAA), have continued to seek further protections. The first of these was a portion of the Higher Education Opportunity Act (HEOA) that requires universities to implement “a plan to effectively combat unauthorized distribution using technology-based deterrents.”

In October 2011, the Stop Online Piracy Act was introduced in the House of Representatives. The intent of the bill was to expand the ability of the federal government to enforce copyright infringement. The bill would have allowed law enforcement to block entire domains if the domain contained infringing content. Many websites opposed the legislation and coordinated a blackout of their sites in January 2012 in an effort to help raise awareness among the American population. This law would have had serious consequences on higher-education networks and DNS services in particular.

In October 2012, there was a case argued before the Supreme Court regarding the sale of copyrighted items. Currently, if you buy a book, record, CD, or other media, you—the buyer—can dispose of it any way you see fit. The case determined that first sale doctrine also applies to goods manufactured overseas (such as a textbook published in India). So it is legal to sell items you purchased overseas. Had the decision gone the other way, libraries would have been limited in their ability to lend materials and collections to students and others.

I expect the industry will continue to push for additional legislation that we will continue to monitor.

USF Reform
The Universal Service Fund (USF) was created in 1997 to help fund service to rural areas, schools, libraries, healthcare, and low-income consumers. These are broken down into several areas: the High-Cost Fund, which helps balance the cost difference between providing service in urban versus rural areas; Link-Up America and Lifeline, which assist low-income consumers; E-Rate, which provides subsidies for schools and libraries; and Telehealth/Telemedicine for rural healthcare.

Over the past 15 years, the FCC amended the program to enable other providers, particularly prepaid wireless carriers, to participate. This increased enrollment in the program, potentially expanding its benefits to previously unreached low-income Americans, but it also created new risks for fraud, waste, and abuse. The program grew from $800 million in 2009 to $2.2 billion in 2012. The FCC has begun to address these concerns by adopting new rules to reduce duplicate payments to carriers, ensure program eligibility standards are met, and reduce growth in the program. The Broadband Adoption Act was introduced in the House in April, designed to “bridge the digital divide” by authorizing expansion of the program to include broadband, giving consumers a choice of their Lifeline support, clarifying that families will qualify for only one service, and creating a national database to avoid duplication. Rural phone companies, however, are lobbying to prevent the fund from being changed from a telephone-centric to a broadband-centric support system.

The USF is generally a line item on your telephone bill that is currently calculated based on a percentage of your service fees. Due to the increasing usage of the fund and new VoIP services that may not be contributing, there has been a lot of discussion about contribution methods. One of the proposals that has the greatest risk to higher education is a numbers-based methodology. Under this proposal, the fee would be charged to every working telephone number. Because universities generally have many DID numbers, this method would exponentially increase...
an institution's monthly costs. Discussions are ongoing about different options at this point.

**Cybersecurity Legislation**

For the past several years, the federal government has been looking into cybersecurity with the goal of protecting the nation's power plants, water systems, and other forms of critical infrastructure from crippling cyberattacks. While higher education isn't the focus, there will be an effect, especially for research universities.

The current debates in Congress have been over how to provide incentives for businesses that adopt voluntary standards and liability protections for those sharing information. However, the two parties remain split over whether the federal government should set critical infrastructure cybersecurity standards.

In summer 2013, the Department of Homeland Security's Industrial Control Systems Cyber Emergency Response Team released a report that shows companies that operate critical infrastructure systems have seen a sharp rise in cybersecurity incidents. In 2011, 198 incidents were reported, up from 41 in 2010 and 9 in 2009.

With little action in Congress, the White House issued an executive order in February that relies on public-private collaboration to improve critical infrastructure cybersecurity and includes elements to enhance information sharing, develop a cybersecurity framework, and create a voluntary cybersecurity program. In addition, it requires the Department of Homeland Security to identify the "critical infrastructure where a cybersecurity incident could reasonably result in catastrophic regional or national effects on public health or safety, economic security, or national security."

In April, the House of Representatives passed the Cyber Intelligence Sharing and Protection Act. The act provides companies with immunity from lawsuits when they voluntarily share information (such as threats to computer networks and malicious source code) with each other and the federal government. The Department of Homeland Security was designated as the civilian agency to receive information from companies, with the Department of Justice tasked with serving as the collection point for information about cyber crimes. The House bill will probably have little chance of passing the Senate, which prefers fewer controls on what information is shared.

In May, the House Energy and Commerce Committee and its Subcommittee on Communications and Technology held hearings on cyber threats and security solutions. The focus was on federal government and private-sector actions to strengthen critical infrastructure and mitigate exposure to cyberattacks. It also looked at security solutions to better protect against cyber threats, including enhanced information sharing, public-private partnerships, and greater industry collaboration. The subcommittee examined how to secure the communications network supply chain, focusing on potential vulnerabilities and the wide-ranging impacts on national security and the economy.

**911 Issues**

There are several important issues that involve 911 service. Some apply only to campuses with their own public safety answering point (PSAP), and some apply to all universities.

The resiliency of the 911 network is a concern for campuses with their own PSAP. Due to the failure of 911 systems in at least six states during the summer 2012 "derecho" storm that swept from the Midwest to the East Coast, the FCC released a public notice asking for comment on 911 resiliency and reliability. This led to the FCC releasing a notice of proposed rulemaking to examine specific steps to improve the reliability of 911 service. The notice asks for comment on the appropriate steps to take to (1) ensure that there are periodic audits of 911 circuits for physical diversity; (2) ensure that adequate central-office backup power is maintained; and (3) maintain reliable and resilient network monitoring systems. The notice asks what mechanisms could be used to achieve these goals, including reporting, certification, specific reliability requirements, and inspections.

The other major 911 issue is known as next-generation 911 services. These next-generation services provide methods for both contacting 911 through alternative methods, such as text, and improving the location accuracy of the caller. One of the major challenges in this arena is determining the location of a mobile caller. For campuses that provide wireless VoIP services, this can be especially challenging.

**Data Security Legislation**

For years, Congress has been discussing data security—which is different from cybersecurity. The initial focus has been on notification of data breaches. Congress is trying to determine if federal legislation is needed to protect consumers. The only federal statute that covers data breaches is HIPAA. (Even FERPA doesn't address this topic.) Most data-breach notification laws have been left up to the states. Currently, 46 states have enacted their own notification requirements. Most states define a data breach as the unauthorized acquisition of personal information. They typically define personal information in terms of data that may lead to identifying a specific individual and data that may lead to financial harm. As Congress continues to address this issue, I expect higher education to be significantly affected due to the nature of the data we retain about a student.

The Leg/Reg Committee will stay on top of these and other issues. Watch for special alerts or emails when important information becomes available.

Eric Breese, chair of ACUTA's Legislative and Regulatory Affairs Committee, has been active in the committee since 2008. Contact him at eric@breesestolt.org.

**ACUTA Journal Fall 2013 11**
Future Proof? The Coming IP Transition
A variety of stops along the way could delay the transition to IP

In its 2010 National Broadband Plan, the Federal Communications Commission (FCC) announced that it intended to take steps to facilitate a transition to a telephone network based on Internet protocol (IP). Since that time, the FCC's efforts to advance that goal have multiplied, ranging from a recommendation that a "date certain" be set for the end of the public switched telephone network in June 2011, to a further notice of proposed rulemaking on IP-based interconnection later that year, to a series of requests for comment on IP interconnection in 2013.

Despite this activity, the FCC has made no decisions about how to make the transition happen, even as technology and network architecture move forward. This article reviews the key issues facing the FCC and some of the practical consequences that could result from potential FCC actions.

Today's Framework
Today, interconnection is subject to rules under Sections 251 and 252 of the federal Communications Act, which were added to that statute by the Telecommunications Act of 1996. Those rules, in general, create obligations for incumbent telephone companies, such as Verizon, AT&T, and CenturyLink, to offer interconnection and related services to other providers of voice service, including cable companies and wireless providers. These services typically have to be provided at relatively low, cost-based rates, and incumbents must provide interconnection at any technically feasible points within their networks. All telephone companies—including competitive carriers—also are required to provide number portability and have a general obligation to provide interconnection (although not on the same terms as interconnection provided by incumbents).

Many elements of the Telecommunications Act did not work as expected, but the interconnection rules generally have ensured that competitive phone companies and wireless providers can obtain interconnection on reasonable terms. This success comes, in part, because the Telecommunications Act also created a specific path to obtain interconnection with limited negotiation periods and arbitration rights, as well as the opportunity for competitive carriers to "opt in" to existing interconnection agreements. The FCC's interconnection rules, which were upheld by the Supreme Court after lengthy litigation, also simplified negotiation and arbitration by limiting the terms under which interconnection is provided. As a result, interconnection with the large incumbent carriers, and with many smaller carriers, largely has become routine.

Key IP Interconnection Issues for the FCC
While the current approach to interconnection generally operates smoothly, that does not mean that it will continue once carriers switch to all-IP networks.

Incumbent carriers, in particular, have been chafing under the rules because they would prefer the opportunity to negotiate more favorable terms. At the same time, non-traditional service providers like Vonage, which do not have interconnection rights today, would like to obtain those rights, which would give them much more control over their operations. In deciding how to adopt its current rules to an all-IP environment, the FCC has to consider both legal issues that could constrain what rules it could adopt and policy considerations, such as whether rules that are in place today reflect marketplace and technical realities.

The legal issues are important because they have an impact on what rules the FCC could adopt. Incumbent carriers argue, for instance, that the legal framework adopted in the Telecommunications Act does not apply and, further, that IP-based services may be outside the FCC's regulatory power entirely. These arguments are based primarily on the theory that voice over IP (VoIP) services are not "telecommunications services" under the Communications Act, but instead are "information services," which are not subject to Sections 251 and 252.

Many competitors take the opposite perspective, noting that the statute itself does not mention any particular technology or transmission protocol, and therefore, it is technology-neutral. They also dispute the claim that IP-based services are necessarily information services. At the same time, over-the-top VoIP providers, and many cable operators, suggest that the broad terms of the Communications Act give the FCC the discretion to...
apply the current regime, or something very much like it, to services that do not fall under Sections 251 and 252. These providers point to a series of cases involving regulation of VoIP services in which the FCC decided that it had authority, no matter what regulatory classification was applied to those services, and in which the courts agreed with the FCC's analysis.

The other key areas of dispute address the practical question of what the rules actually should be. Competitors support only modest changes to the current rules and generally are most supportive of changes that address technical differences between IP interconnection and today's standard interconnection. For instance, many competitors support consolidation of points of interconnection, so that it no longer would be necessary to interconnect with every other carrier in every location. In the view of the competitors, incumbents still retain their market power in interconnection, because the incumbents are the essential interconnectors and because the incumbents still have the majority of landline customers; therefore, the rules on pricing, negotiation, and arbitration should be retained.

Incumbent carriers have a much different point of view. In general, the largest incumbents argue that strict interconnection rules no longer are necessary because competition has burgeoned and they no longer are the dominant providers of retail voice services. As a result, the large incumbents say, the FCC's rules governing points of interconnection, pricing for interconnection, and other elements of the relationship between interconnecting carriers should be loosened or eliminated, and the terms and conditions of interconnection should be determined solely by negotiation.

In support of these principles, the large incumbents typically point to Internet peering, which they say demonstrates that market-based negotiations can and will be successful. Competitors respond by noting that Internet peering is built around a best-efforts model, which is inconsistent with the quality-of-service requirements typically applied to voice services, and that the number of disputes relating to Internet interconnection has been rising in recent years as larger providers seek to leverage their market power.

Smaller incumbents, meanwhile, often have different concerns from those of larger incumbents. They are concerned about being forced into an IP interconnection regime and into unplanned capital expenditures on a schedule that is faster than they prefer. They also are concerned that changes in interconnection rules may force them to interconnect at points that are distant from their operating territories. As a result, they are less supportive of the positions of the larger incumbents than might be expected.

There also are significant technical issues. These issues include the following:

- As noted above, the number and locations of points of interconnection
- Whether there should be redundant interconnection in an all-IP environment, so that traffic can be transmitted in the case of a local network failure or natural disaster
- How to handle call signaling in an all-IP environment, including how to transition from current signaling networks to the new regime

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Many of these considerations also tie into questions of the timing of the transition. The larger incumbents are more likely to prefer a date certain for the formal transition to IP-only interconnection, with all interconnection in IP-to-IP format after that date. Many competitors—particularly, smaller incumbents—prefer to leave the final transition open-ended so that they do not have to transmit traffic in IP format until they are ready to do so.

**Going Forward**

All of the issues described above have been raised at the FCC in various contexts, including the pending rulemaking and the petitions that the FCC received comments on early in 2013. The FCC also is considering IP interconnection trials that could address both the technical interconnection issues and some or all of the operational issues for the transition. While there is no specific timeline for FCC action, the pressure to begin to act is becoming greater and likely will increase after the new FCC chair is installed, possibly in the fall of 2013. The pressure also has been increased by recent actions of Verizon, which is asking for permission to discontinue copper-based services in areas affected by Hurricane Sandy and to replace those services with other services that Verizon asserts are not subject to the same regulatory obligations, including some IP-based services.

The most likely path for FCC action will start with the authorization of one or more trials of IP interconnection, which could take place in 2014. The terms of the trials could be an important indicator of how the FCC intends to move forward. Notably, if the trials adopt one of the regulatory models proposed by incumbents or competitors, this may provide some information about how the FCC sees its regulatory authority or the necessity for the current rules in an IP environment.

Regardless of what the FCC does next, any final transition to IP-based interconnection is probably years in the future. Moreover, whatever the FCC decides, it is likely that there will be appeals and further decisions implementing the new rules at both the federal and the state level. As a consequence, the transition to IP-based interconnection and to fully IP-based networks may be extended, perhaps for several additional years, while these processes continue.

During the transition, many carriers may begin the process of moving their customers to IP-based services to take advantage of the efficiencies of an all-IP network. These changes will have significant impacts on customers and how they connect with their carriers, particularly given that almost all telephone equipment is intended to interface with the current telephone network.

In addition, as demonstrated by the recent Verizon petitions to discontinue services, the transition to an all-IP network will have an effect on what functionalities are supported by the new network. Parties opposing the Verizon petitions have noted that the replacement services would not support connections to alarm companies or fax, and it is likely that other existing functionalities will be affected by new networks as well. Similarly, if "best efforts" interconnection replaces the current standard, it is possible that overall quality of service will decline over time for calls that go from one carrier to another.

Finally, the FCC's decisions also could have a meaningful impact on the nature of competition in voice services in the future. A regulatory regime that is more favorable to incumbent carriers may make it more difficult for competitors to survive, reducing the number of choices available to customers. By the same token, a regime that gives over-the-top providers additional interconnection rights may facilitate the development of services like Skype and Google Voice, making them more effective competitors to facilities-based providers and increasing the number of practical choices available to voice customers. As a result, the impacts of the FCC's actions could be as significant for customers as they are for carriers.

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We are entering a new era of economic opportunity driven by a change in how technology creates value. Where economies have historically been driven by the physical manipulation and then delivery of atoms, increasingly our goods and services are improved by the addition of information and are delivered over communications technologies—via bits and chips.

It's difficult to quantify the impact of the bandwidth-driven economy, but the former chief economist of BusinessWeek has estimated that the difficulty in measuring the "Data-driven Economy" leads to close to a 30 percent shortfall in our measurement of GDP growth. Around 40 percent of the U.S. GDP is produced by companies that didn't exist 30 years ago. As Marc Andreessen, founder of Netscape, noted recently in the Wall Street Journal, "Software is eating the world."

But changes in bandwidth have not kept up with growth in computing and storage—a roadblock to continued growth. Computing and storage continue to grow along the line of Moore's law, doubling every 18 months. But another law, Nielsen's, holds that home broadband connection speeds will increase at a rate that is 10 percent slower, and this has proven true in the United States. For most communities, the broadband access they'll have in five years will be the same as they have today.

In 2009, those of us working on the National Broadband Plan at the Federal Communications Commission looked at a study of wireline deployments and realized the market forces that had led to a series of wireline upgrades by cable and telecommunications providers from the mid-1990s to about 2007 had run their course. By 2009, neither telecommunications nor cable providers had a market-based incentive to increase the bandwidth in any geographic area to world-leading levels.

That analysis of market incentives has proven accurate. For the first time since cable decided to overbuild the telecommunications dial-up network almost two decades ago, no national carrier in the United States has plans to roll out a better network than the current best network.

So where do we look to make sure we take advantage of the economic opportunity that big bandwidth can provide?

University Communities as Big Bandwidth Test Beds
One place would be America's research university communities, which have spawned many of the innovations that shape our lives today—particularly network-based innovations. The best minds gather on these campuses and in these communities to ask important questions, experiment with new techniques, create new products, launch new businesses, and develop solutions to society's most pressing problems. University communities depend on high-speed networks to educate, collaborate, and share large amounts of information instantaneously. Research in real time has fueled the development of the global information economy, but today's market for bandwidth services does not fully satisfy the forward-looking needs of university communities.

This is the reason for Gig.U: The University Community Next Generation Innovation Project. This consortium of university communities has been working to create a favorable climate for investment in next-generation broadband networks. Although the goal includes faster speeds for increasingly hungry campuses, the project is focused on the communities that surround these institutions.

University communities have a unique combination of existing network infrastructure and other physical assets, concentrated populations, relatively high number of multiple-dwelling units, high demand for bandwidth for research and commercial purposes, tech-savvy residential and business consumers, and entrepreneurial startups. Linux, Mosaic, Netscape, Photoshop, and so many more critical pieces of computer technology have come from in and around universities; it is only reasonable to expect even more in the future.

These traits make university communities ideal areas in which to make investments in network and information technology infrastructure and services. Many of these community traits also attract other capital investment and businesses, which creates additional demand for bandwidth in these communities. This dynamic can create a virtuous

*Note: Current members include such institutions as Indiana University, the University of Arizona, Case Western Reserve University, Virginia Tech, and Duke. For the full list and more information, visit the website at www.gig-u.org.

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cycle—a complex chain of events that reinforces itself through a feedback loop. In this case, the availability of ultra-high-speed broadband will attract even more bandwidth-intensive users, who are likely to create the applications and awareness that will drive additional demand for bandwidth in these communities, and subsequently in the rest of the country.

The Strategy for Changing the Math

In the past several years, we have seen how cities—Seattle, Chicago, New York, Kansas City, Chattanooga, Gainesville, San Leandro, and a half dozen communities around the Research Triangle Park in North Carolina, and dozens of others—come to understand that market forces today are unlikely to produce the kind of broadband infrastructure they need in order to be all that they can be. Rather than simply accept a second-rate future, these communities have actively pursued next-generation networks by changing the math for an investment.

That math can be expressed in this formula: C + O > (1-r)R + SB + (–CL).

That is, no incumbent or new entrant is likely to upgrade or build a network because the new or incremental capital (C) and operation (O) Expenditures are greater than the risk-adjusted revenues ((1-r)R), the overall benefits generated by a broadband network (SB), and the threat of competitive losses (–CL).

To incent investment in faster broadband, the right side of the equation must be greater than left side. To do so, we must take steps that reduce the first three factors—CapEx, OpEx, and risk—and increase the next three factors—potential revenues, system benefits, and threat of competition. The details of how to make the formula work for any community or any provider will be different, but the formula is the same.

The three basic ways in which a community can affect those three factors are the following:

- Improve the use of key inputs to lower CapEx, OpEx, and risk
- Streamline their regulatory processes to lower CapEx, OpEx, and risk
- Help aggregate demand in ways that lower risk and raise potential revenue.

In addition, we have seen a number of ways that communities have, in their existing powers, the ability to do these things.

The Tactics for Changing the Math

Without additional expenditures or the provision of subsidies by the community, communities can revise existing policies and procedures to more effectively use existing assets to lower costs and increase potential revenues. This includes the involvement of community anchor institutions as well—particularly universities that already have extensive network assets but that also control other potential assets.

Communities can focus on factors affecting the costs of deployment, including the following:

- Rights of way (ROWs), easements, and physical assets: Municipalities own the ROWs either in fee or as easements that are dedicated to the general public and managed by local authorities. In addition, many municipalities—or their anchor institutions—have access to physical assets, such as dark fiber, racks, and other spaces where communications providers can collocate equipment. These assets can be used to lower the costs of deploying or upgrading a network.
- Information and administration: Network upgrade and build-out costs include physical assets and construction costs, as well as transaction costs such as the time and effort put into gathering information and working through local regulatory processes. By sharing existing data, adjusting policies related to broadband network deployment, and contributing staff and other administrative assets, communities can reduce the costs associated with a network build-out.
- Funding: Municipalities have multiple financial levers to push to reduce the cost of upgrading and deploying a network, including federal or state funding, tax incentives, bonds, or public-private partnerships. Innovative funding and financing mechanisms may serve as incentives to build out or upgrade networks by reducing associated costs and risk.

- Construction: A wide variety of local government regulations affect construction methods, like trenching, as well as policies governing permits for that construction. These regulations and policies can be updated to allow for a broader range of construction techniques, potentially driving down construction costs.

Communities can also focus on factors affecting potential revenues for investors, including the following:

- Demand profile and identifying demand: Consumer demand for and uptake of next-generation networks and services drive revenues for the investors, owners, and operators of the network. Municipalities and their partners can use information on community characteristics to plan potential projects, determine effective strategies for community engagement, and work with potential partners to assess demand for next-generation networks and services. Precommitted demand for service can reduce capital costs for new network deployments or upgrades.
- Potential Partnerships: Next-generation network upgrades make sense as part of a regional or local long-run economic development strategy. These projects can and should enjoy the full support of the broad-based community leadership—from elected officials to private and nonprofit organizations focused on upgrading broadband. This support is necessary for any project, but can also be useful to secure the assets or changes reviewed above.

Changing the Math in Practice

While every community should chart its own path for an upgrade, a number of experiments in the recent past offer examples that provide useful lessons to all.

First, there are a number of relatively low-risk actions a community can take...
to become fiber ready. These activities range from local and county ordinances or resolutions that are supportive of next-generation network projects to instituting conduit- and fiber-leasing policies, or “dig once” policies, like those listed above. For example, the city of Seattle has been working to expand broadband access for several years, first offering excess capacity in city-owned conduit and more recently offering access to excess capacity in city-owned fiber. The Gigabit Seattle project takes advantage of both of these policies.

Moving a step farther, cities can release a request for information (RFI) that begins a discussion with current and potential service providers for how to address particular needs that the city wishes to address. For example, in their RFI, the city of Chicago asked for information to address three needs: gigabit zones, public Wi-Fi areas, and underserved areas. In October, the University of Chicago, in partnership with the state of Illinois and the city, announced Gigabit Chicago, a project to bring gigabit-speed fiber to the Chicago’s mid-southside neighborhoods. Such an RFI can be released with a minimum of work and risk.

Some cities then move to a request for proposals (RFP) that invites a negotiation with current and potential service providers for the specifics of what the parties are willing to do to address those needs. Champaign-Urbana and six North Carolina cities are among those that have issued an RFP. The RFP takes more time and resources to prepare, as the odds of success improve if the key institutions are willing to make concrete commitments (such as access to dark fiber and commitments by multiple-dwelling unit owners to purchase the service) to improve the competitive climate for potential bidders.

Once the city or community has evaluated the potential options—or occasionally gets a windfall, as in Austin, Texas, and Provo, Utah—it enters into an agreement with the service provider to nail down the details of the deployment and service offerings. The most extensive example of such an agreement is the agreement between Kansas City and Google, though the initial agreements between Gigabit Squared and Seattle and Chicago provide other examples of how to proceed.

In addition to an agreement with a service provider, the city can also take separate actions to expand and improve broadband connectivity. For example, the city of New York recently announced a suite of new initiatives, including a competition to build out fiber wiring for commercial and industrial buildings, a grading program for connectivity in New York City buildings, a crowd-sourced digital map highlighting wired buildings citywide, a streamlined process for broadband-related permitting and exploring the streamlining of regulatory issues, and a competition to develop mobile applications to help residents access critical services provided by the city and community-based organizations.

Looking Ahead

The process that communities will use to upgrade to next-generation connectivity looks very different from the process by which telecommunications and cable providers built out their networks. This new process is the rewriting of the social contract through which the public provides privately funded networks with certain benefits, like access to rights-of-way, in exchange for certain public obligations. The details are different, but what is happening in Kansas City, Seattle, Chicago, and other places proves that collaboration really moves the needle. To make it work, communities are not mere recipients of faster networks; rather the combined efforts of the local government, educational institutions, healthcare facilities, business and real estate interests, and local community groups, working in harmony, make the upgrade economically viable.

Blair Levin is executive director, Gig.U. Ellen Satterwhite is program director at Gig.U. Learn more when you visit their website at www.gig-u.org.
Air U: Transforming TV White Spaces into Internet Connectivity

WVU is partnering to bring high-speed Internet to underserved communities

When it comes to high-speed Internet access, West Virginia is underserved. In too many rural areas of the state, the information superhighway lacks an on-ramp for people who are looking for educational and professional advancement but who are frustrated by a situation that puts rural residents at a disadvantage.

West Virginia University (WVU) is working to change that by bringing much-needed connectivity to its campus and the surrounding area.

As U.S. Secretary of Agriculture Tom Vilsack has said: “Broadband service expands educational, medical, and health services for rural residents. Expanded broadband service also is important because it supports employment opportunities and makes income growth possible in rural areas.”

WVU has partnered with AIR.U, the Advanced Internet Regions consortium, to transform TV “white spaces” into Internet connectivity. WVU is the first university in the United States to use vacant broadcast TV channels to provide the campus and nearby areas with wireless broadband Internet services. In 2010, the FCC began allowing devices to operate in the unused portions of the TV broadcast bands, known as white spaces or Super Wi-Fi frequencies. These frequencies, left empty when television stations moved to digital broadcasting, are particularly abundant in rural areas. This is important because these are the areas where traditional telecom infrastructure faces its biggest challenge in delivering broadband services.

According to Bob Nichols, AIR.U co-founder and CEO of Declaration Networks Group, “Super Wi-Fi presents a lower-cost, scalable approach to deliver high-capacity wireless networks, and DNG is leading the way for a new broadband alternative to provide sustainable models that can be replicated and extended to towns and cities nationwide.”

Who Will Benefit?
The initial phase of the white space network will provide free public Wi-Fi access for students and faculty at WVU’s Personal Rapid Transit (PRT) system platforms. Through the PRT system, more than 15,000 riders travel the WVU campus each day in 73 computer-guided, electric-powered vehicles.

Students and faculty will also be able to access the Internet in the PRT vehicles themselves. In the future, this connectivity will help the university develop applications to communicate with PRT riders through on-board video screens and other technology.

The PRT system is a useful target environment for testing an effective way to design, deploy, and operate a Super Wi-Fi network. Later phases of the project will extend coverage to more of the campus and areas outside Morgantown.

“Not only does the AIR.U deployment improve wireless connectivity for the PRT System, it also demonstrates the real potential of innovative new technologies to deliver broadband coverage and capacity to rural areas and small towns, to drive economic development and quality of
life, and to compete with the rest of the world in the knowledge economy," said WVU CIO John Campbell.

WVU is a land-grant university, and improving the lives of state citizens is at the heart of its mission. In time, Super Wi-Fi may offer a solution for the many West Virginia communities that still lack broadband access—and the economic development and quality of life benefits that broadband provides.

**Public Wi-Fi Access**

The Demonstration Network will provide Wi-Fi access to the Internet for students and faculty from five PRT stations that have installed Remote White Space CPE as they wait for the arrival of the PRT cars. Areas immediately surrounding the platforms could also share that connectivity, so the initial demonstration site may ideally be a platform in an area where students congregate for other purposes in addition to the PRT.

The WVU community will also have access via Wi-Fi to the Internet while riding PRT cars that have installed Remote White Space CPE. Individual cars with Wi-Fi capability can provide students and faculty with Internet access on their commute through campus, as well as support future vertical applications for the PRT system and monitoring functions, such as alerts, video monitoring, public announcements, on-board video screens, and more.

**System Design**

The system design (Figure 1) includes end-to-end system components for the initial application demonstration network. The actual radio coverage takes advantage of the rooftop of the Engineering Building (Figure 2), which is a high point on the WVU campus. With two base stations with directional antennas pointing to different PRT platforms, the PRT tracks can be covered from the rooftop, as shown in Figure 2.

**Behind the Scenes**

The network deployment is managed by AIR.U co-founder, Declaration Networks Group LLC, and represents a collaboration between AIR.U and the WVU Board of Governors; the West Virginia Network for Telecomputing, which provides the fiber-optic Internet backhaul for the network; and Adaptrum Inc., a California startup providing white-space equipment designed to operate on vacant TV channels. AIR.U is affiliated with the Open Technology Institute at the New America Foundation, a nonpartisan think tank based in Washington, D.C. Microsoft and Google both provided early support for AIR.U’s overall effort to spur innovation to upgrade the broadband available to underserved campuses and their surrounding communities.

The AIR.U consortium comprises organizations that represent over 500 colleges and universities nationwide, including the United Negro College Fund, the New England Board of Higher Education, the Corporation for Education Network Initiatives in California, the National Institute for Technology in Liberal Education, and Gig.U, a consortium of 37 major universities. “We are delighted that AIR.U was born out of the Gig.U effort,” said Blair Levin, executive director of Gig.U and former executive director of the National Broadband Plan. “The communities that are home to our research universities and colleges across the country need next-generation speeds to compete in the global economy, and we firmly believe this effort can be a model for other communities.” Founding partners of AIR.U include Microsoft, Google, the Open Technology Institute at the New America Foundation, the Appalachian Regional Commission, and Declaration Networks Group, LLC (a new firm established to plan, deploy, and operate Super Wi-Fi networks).

**Conclusion**

"Innovative deployment of TV white spaces presents an exciting opportunity for underserved rural and low-income urban communities across the country," says FCC acting chair Mignon Clyburn. “I commend AIR.U and West Virginia University on launching a unique pilot program that provides campuswide Wi-Fi services using TV white space devices. This pilot will not only demonstrate how TV white-space technologies can help bridge the digital divide, but also could offer valuable insights into how best to structure future deployments.”

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Taming the Social Media Beast

As they increase their social media presence, universities need to protect themselves and their students from inflammatory exchanges

Student usage of social networking sites like Facebook and Twitter is one reason the founders of those entities are now worth billions of dollars. Perhaps more than any other demographic, adolescents love social media and spend much of their day interacting and sharing information, often including personal data. The sites have been wildly popular: Facebook has more than 1 billion users, and Twitter is nearing the 800 million mark.

With so many individuals using these sites, many universities have used this opportunity to dabble in using this communication channel for marketing purposes. Universities' Facebook pages and Twitter accounts can serve a variety of purposes: extending themselves to potential students, publicizing extracurricular programs, outlining various internal operations, and raising awareness about various events.

But such interactions differ from traditional communications, where the conversation was one way and tightly controlled. With social media, communication is a decidedly two-way give-and-take. The participants have much more control than the school, and the tone can quickly change and degenerate. This new dynamic places universities in a precarious position, one potentially leading to lawsuits and liability.

As they extend themselves into this new communication medium, schools need to protect themselves from potential problems. For example, universities do not control social media conversations, and in many cases, individuals are willing and able to engage in inflammatory exchanges that sometimes lead to bullying and harassment. As a result, creating a Facebook page where this can happen opens a college to a raft of potential legal liabilities.

Ignore at Your Own Peril

Ignoring that possibility is unwise. In many cases, students rely on university computing resources and networks to spew their venom. At the very least, schools appear to be willing conduits in unhealthy exchanges. If problems arise, third parties may say academic institutions must try to stop any bullying.

Currently, although clear laws lag well behind the technology and uncertainty reigns, cases are weaving their way through the courts and ideally will deliver more clarity in the near term. As this area evolves, schools want to err on the side of caution and at least attempt to quash any hurtful speech that arises from social channels.

But this process is complex and requires a number of steps. First, the university telecommunications department needs to get approval from the highest level to monitor these interactions. "In an academic environment, there is often a perception that schools should not be monitoring any online conversations because it may inhibit free speech," stated Jason Thatcher, associate professor, faculty lead, Social Media Listening Center at Clemson University.

With proper authority, IT needs to put monitoring tools in place. However, one immediate challenge is simply dealing with the volume of information generated. The Nielsen Company reports that more than one million tweets are sent out every hour. That's a lot of data. Universities do not want—and cannot afford—to hire small armies to monitor the ever-growing array of social-media sites. In response, approximately 100 different social-media management solutions have emerged. These products monitor social media updates, forum posts, and blogs and then pinpoint conversations related to specific schools, teachers, or staff. The solutions, with pricing ranging from free to hundreds of thousands of dollars, offer a wide range of functionality.

Where to Begin?

As a starting point, universities can monitor a few basic elements: the use of their name, any mentions of their services, and any conversation about their faculty and staff. At the low end of the market, the management solutions, which often are free, use keyword searches to collect this information and then present it to the college for evaluation and possible follow-up.

Most universities want to do more than simply aggregate the information, because social media conversations often include a lot of inane chatter, such as "I'm going to meet Bill from the University of North Carolina." Universities need to separate the idle chitchat from the more
actionable blurbs, such as, "Every student at the University of North Carolina hates Professor Jones."

The next type of social monitoring management tool deletes the idle chatter and presents only the important conversations. These systems rely on sophisticated data analytics to make distinctions among the various interactions. Once the school has a good idea about who said what, it can determine how to respond.

In some cases, monitoring these conversations proves to be beneficial. At Clemson University, the Social Media Listening Center has a number of social media monitoring projects underway. One involves tracking Twitter conversations. "We have been able to find a lot of useful information about what prospective students are thinking during the selection process and been able to engage with them and answer their questions," said Clemson's Thatcher.

**Say It to My Face, Not My Facebook**

Other conversations are not so nice. Individuals will often say things in cyberspace that they would not say face-to-face. Here is where a school's legal liability becomes murky.

The First Amendment to the U.S. Constitution guarantees freedom of speech and the press in any "public forum." That term was clearly defined in 1776, but in today's world, what constitutes a public forum? To date, no court has addressed whether a school establishes a "public forum" by creating or approving a Facebook page that allows the general public to post comments and opinions, according to law firm Dinsmore & Shohl LLP.

A school's need to protect personal information raises other legal issues. The Family Educational Rights and Privacy Act (FERPA) mandates that schools must have a student's consent prior to the disclosure of information about his or her education records. Likewise, the Health Insurance Portability and Accountability Act (HIPAA) of 1996 prohibits the disclosure of health information about students, faculty, and employees. Once schools open new forums, individuals may post such information online. These people may not be aware of the laws or may simply choose to ignore them.

In addition, individuals could (and often do) post content that is controversial, harassing, disrespectful, and not tolerated in a physical school setting. Does the college have a legal responsibility to remove confidential student or protected health information posted on its Facebook page? It would seem so.

**Monitoring 24 / 7**

The immediacy of social media creates additional challenges. Postings on Facebook and other sites occur in real time, but it does not seem reasonable to have employees monitoring such interactions continuously. Even with the various monitoring tools, there will be a lag between when the data are posted and when the school takes it down. Would they be liable during that lag?

What can schools do after they take down offensive materials? Can an academic institution discipline a student whose Facebook post arguably violates the board's student code of conduct, or is this speech protected by the First Amendment? Ideally, the school would outline its policies and potential discipline in its student handbook. However, because this area is new, some schools have not yet developed policies.

Another issue is where the student logged in from. If the pupil accessed the
network from the library or his dorm, then the university would seem to have standing, since the student is relying on school resources. However, what if the student logged in from a local Wi-Fi hot spot? If the student lived off campus, that may create additional nuances. Are off-campus activities still under the purview of the school?

**What's in the Marketplace?**

As individuals voice their opinions on social media sites, universities have begun searching for tools to monitor those interactions. Currently, they find a range of capabilities coming from a mishmash of vendors, ranging from industry leaders to startups.

Some schools want simple tools that provide a quick snapshot about who is using their name, mentioning their services, or talking about their staff. Such solutions, which are often free, rely on keyword searches to collect and list that information. For instance, Addictomatic.com functions like a news feed: It searches websites for the latest news, blog posts, videos, or images centered on a company and presents that information.

**Twazzup** is a real-time news platform that filters out relevant news from Twitter exchanges. The system outlines how many mentions a college receives compared to its competitors.

**Social Mention** is a social media search-and-analysis platform that tracks and measures what people say about a college, its faculty, and its employees. The solution monitors more than 100 social media sites, including Twitter, Facebook, FriendFeed, YouTube, Digg, and Google+.

More sophisticated systems do more than simply aggregate the online chatter. "During football season, the number of mentions about the school increases dramatically," noted Jason Thatcher at Clemson, which relies on Salesforce.com's Radian6 to filter its social media traffic. The sophisticated solutions use various algorithms and analytic functions to separate chitchat from more important blurbs, such as student rant.

**Dow Jones Insight** collects print, online, and even video conversations; synthesizes the information; and presents reports that outline how a school is being portrayed online.

**Spredfast**, which costs from $1,000 to $2,500 per month, is a social media management system that works with Twitter, Facebook, Google+, LinkedIn, Pinterest, YouTube, blogs, SlideShare, and Flickr.

**Sysomos** developed two social media monitoring tools. MAP is a data analytics solution designed to help schools understand what is being said about them on social media. Heatbeat is a real-time monitoring solution that enables schools to respond quickly to social media firestorms.

**Sprout Social** manages up to 10 school profiles. Its "Web alerts" feature monitors school mentions from social media as well as others sources, such as blogs and online news sites.

**Trackur** scans web pages, including news, blogs, video, images, and forums; tags social media content as positive, neutral, or negative; and presents executives with various reports.

**uberVU** delivers monitoring, engagement, collaboration, and reporting functions in a single dashboard. The product illustrates insights, detects influencer mentions, outlines trending stories, and suggests engaging content to post.

**The Viralheat** platform compares search profiles or relevant terms across the Web and social media so schools can track their own social buzz (positive and negative comments) and compare it to their competitors. For as little as $50 per month, schools can monitor interactions on a couple of social media sites.

A growing number of schools are putting new processes in place that outline how they will interact with social media content. Increasingly, such exchanges are being routed to contact centers.

One product that offers such functionality is Cisco Systems Inc.'s SocialMiner. This collaborative tool enables schools to see what adolescents are saying on such sites as Facebook and Twitter, as well as blogs and other online networking environments. The college then determines how to respond to those comments.

In March 2011, Salesforce.com bought Radian6 for $326 million. Since the company was founded in 2006, its products have been used by more than half of the Fortune 100, including Dell Inc., General Electric Co., and United Parcel Service of America Inc. The Radian6 solution is being integrated into Salesforce.com's CRM line.

Following suit, competitor Oracle Corp. purchased Collective Intellect in June 2012. Collective Intellect offers web-based, automated, real-time text mining and analytics software, so companies can identify emerging consumer thoughts about their brands. That product is being incorporated into Oracle's contact center solutions.

Schools need tools to monitor social networking conservations. Not only are such solutions emerging: they are also becoming more sophisticated, enabling colleges to monitor and respond to such comments appropriately.

**Conclusion**

The social media craze has created new opportunities for universities. Along with those possibilities have come new challenges. At the moment, ambiguity reigns in terms of their legal liability. But to protect themselves against possible lawsuits, schools need to take a proactive stand in monitoring social media.

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Technology to Comply with Clery Act
UNH alert system pings everyone within a geo-fence

Everyone likes something extra. The University of New Hampshire has a notification system that not only complies with Clery Act requirements, but also gives them an opportunity to generate revenue for the school.

Best of all, says Bruce Hasford, associate director of enterprise computing at the University of New Hampshire, Durham, “We don’t have to maintain anything with it.” The vendor does all hardware updates and software patches.

UNH uses a system called Ping4 alerts. Ping4 will wake up a smartphone and send photos or videos to alert users of incidents or of other events happening on campus, according to Michael Welts, senior vice president at the company. Patent-pending technology draws a geo-fence around any size area and alerts anyone with the app downloaded. The app—which is free to users—pays for itself by licensing and revenue sharing with the user. It was launched in New Hampshire in March 2012 with the Manchester police department.

Today, the school has access to a secure portal that allows security or IT to draw geo-fences—known colloquially as sandboxes—around areas of the campus. “You can paint a square around the state, the city of Durham, the entire university, or even a building within our campus,” Hasford says.

UNH, like many other colleges, has several locations: the main Durham site, a satellite in Manchester, Great Bay, and a human resources office in Lee. “You don’t want to draw a big square around all of the areas,” Hasford says. That would cause many people to get irrelevant alerts.

On the other hand, if campus security needs to send an alert to multiple sites, dispatchers cannot waste time scrolling across maps, drawing boxes, and trying to ensure that they have included all the points that require notification. The system soon will have a drop-down menu that will allow dispatch to click on predetermined geo-fence areas and include them in an alert or notification.

The typical college might have local sandboxes that include Old Main, the bookstore area, and South campus, sometimes an emergency warning covers multiple areas that were not preprogrammed. In this case, a new geo-fence must be defined on the fly. A Google Maps–style interface allows an approved user to use a mouse or a light pencil to define a new area.

The UNH public-safety notification system delivers expected security features, but it goes beyond public safety. Not all alerts are emergencies. The school leverages its security investment for everyday uses—such as sales promotions at the campus bookstore or updates on concert ticket sales. But emergency compliance is the bedrock requirement.

Comply with the Clery Act
Like other colleges, UNH has several emergency platforms in place that protect students and faculty. The rub is how to reach visitors—alumni, sports teams—who are not in the campus database.

The Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (20 USC § 1092(f)) is the landmark federal law, originally known as the Campus Security Act, that requires colleges and universities to disclose information about crime on and around their campuses. Tied to an institution’s participation in federal student aid programs, the law applies to most higher ed institutions, both public and private.

The law was amended in 1992 to require that schools afford the victims of campus sexual assault certain basic rights and was amended again in 1998 to expand reporting requirements. The 1998 amendments also formally named the law in memory of Jeanne Clery. Subsequent amendments in 2000 and 2008 added provisions dealing with registered sex offender notification and campus emergency response. The 2008 amendments also added a provision to protect crime victims, “whistleblowers,” and others from retaliation.

The Clery Act requires colleges and universities to:
1. Publish an ASR by October 1, documenting three calendar years of select campus crime statistics, including security policies and procedures and information on the basic rights guaranteed victims of sexual assault. The law requires that schools make the report available to all current students and employees, and prospective students and employees must be notified of its existence and given a copy upon request. Schools may comply with this requirement via the Internet if required recipients are notified and provided with exact information regarding the online location of the report. Paper copies of the ASR should be available upon request. All crime statistics must be provided to the U.S. Department of Education.
2. Have a public crime log. Institutions with a police or security department are required to maintain a public crime log documenting the “nature, date, time, and general location of each crime” and its disposition, if known. Incidents must be entered into the log within two business days. The log should be accessible to the public during normal business hours.
remain open for 60 days and, subsequently, be made available within two business days upon request.

3. Disclose crime statistics for incidents that occur on campus, in unobstructed public areas immediately adjacent to or running through the campus, and at certain noncampus facilities, including Greek housing and remote classrooms. The statistics must be gathered from campus police or security, local law enforcement, and other school officials who have "significant responsibility for student and campus activities."

4. Issue timely warnings about Clery Act crimes that pose a serious or ongoing threat to students and employees. Institutions must provide timely warnings in a manner likely to reach all members of the campus community. There are differences between a timely warning and an emergency notification; however, both systems are in place to safeguard students and campus employees.

5. Devise an emergency response, notification, and testing policy. Institutions are required to inform the campus community about a "significant emergency or dangerous situation involving an immediate threat to the health or safety of students or employees occurring on the campus." An emergency response expands the definition of timely warning as it includes both Clery Act crimes and other types of emergencies (i.e., a fire or infectious disease outbreak). Colleges and universities with and without on-campus residential facilities must have emergency response and evacuation procedures in place. Institutions are mandated to disclose a summary of these procedures in their ASR. Additionally, compliance requires one test of the emergency response procedures annually and policies for publicizing those procedures in conjunction with the annual test.

6. Compile and report fire data to the federal government and publish an annual fire-safety report. Similar to the ASR and the current crime log, institutions with on-campus housing must report fires that occur in on-campus housing and must generate an annual fire report and maintain a fire log that is accessible to the public.

7. Enact policies and procedures to handle reports of missing students. This requirement is intended to minimize delays and confusion during the initial stages of a missing-student investigation. Institutions must designate one or more positions or organizations to which reports of a student living in on-campus housing can be filed if it's believed that student has been missing for 24 hours.

The challenge for campus security and IT is how to reach members of the university community who are on campus on a regular basis as well as outsiders. How does one reach someone who may be on campus for only eight or 24 hours?

Anyone with the app on his or her phone who is within a defined area will be notified via an attention-getting audio alert. Jamie Heitmiller, Ping4 director of sales for education, says the system can warn of dangerous storms or other natural disasters, provide emergency communications, help locate missing persons, and more.

Noncriminal Alerts

Most emergencies do not involve criminal activity. Many times a school needs to broadcast non-life-threatening safety alerts. "Cancellation of classes, road closures, power outages, and other important messages, such as parking availability during high-profile events, can easily be handled through the same notification system," security consultant Nick Halias points out.

A system like Ping4 is not a cure-all. Chief Dean merged it with his existing RSS feed, which underscores that the new technology will not displace other technology on campus. In fact, given today's smartphone penetration statistics, it cannot ensure complete Clery Act compliance. Chief Dean says UNH cannot rely 100 percent on Ping4, since only 58 percent of the campus population have smartphones. "To comply with the Clery Act, I need to reach 100 percent of the people," Chief Dean says. "One system is not a catch-all. I believe in redundancy. I want our public to have several options."

The alert can be campuswide or localized to a single dorm. Since it offers full rich media, a photo, drawing, or video of a suspect can be attached to the alert. Or a student can send a photo back to police—say of a bike thief or a license plate on a fleeing car.

Users signed up in one community will automatically get emergency notifications when they move inside another geo-fence. Getting the outsiders involved is key. At UNH athletic events, visitors can win T-shirts for signing up. UNH housing makes e-mail blasts with the information in it. Chief Dean used the example of a UMass student who comes to UNH for a hockey game. Inside UNH's catchment, the student gets UNH alerts. Outside the UNH geo-fence, he is not bothered. Back home at the UMass campus, the student again would get UMass alerts. Once you put up a geo-fence, you can get an alert to everyone inside the fence.

Both Chief Dean and Hasfjord emphasize the privacy aspect of the system. Chief Dean says he likes the fact that the app lives in the background and does not require people to give out their cell phone number or e-mail address.

Students and staff self-select to receive different kinds of alerts. For example, a sports-phobic person might not choose alerts about game ticket availability. But almost everyone might avail themselves of announcements about parking lot crowding, free pizza, or criminal activity. However, if a user signs up for a business deal, public safety automatically is added.

UNH uses the app to send out promotions or alerts for the computer store, housing—even the current menu specials in the dining halls. "I get NOAA [weather] notices. I get merchant messages and restaurant specials. It knows where I am," Hasfjord says. "And you can turn it off if you don't want alerts." The community information may be what keeps the app on the students' smartphones, but for UNH, it is the public-safety benefits.
including Clery compliance, that are invaluable.

Given that cell phones are ubiquitous and smartphones so popular, the system makes sense. Heitmiller says that 52 percent of the university population currently carries a smartphone. By 2016, that figure is projected to climb to 90 percent.

**Simple Technology**

The IT department at a college does not have to do much to get the system up and running. “Everything is hosted at a data center,” says Ernie Makris, director of software engineering for the firm. “There is nothing for the campus to run locally.”

Minimal setup is required—mainly defining those geo-fenced areas and promoting the system to the campus community. As part of the initial setup, specific sounds or Web pages can be used to personalize the college’s system. All of the off-site servers are redundant and fault tolerant.

Chief Dean adds that he is impressed with the vendor service. “It is very refreshing in today’s business world to find a company that has a home-town feel,” he says. “They are always asking how they can make the system better and are quick to respond to questions.”

Hasfjord says there were some growing pains as the college and the vendor got the system off the ground. UNH worked with the company as a startup, so some things required adjustment or modification. However, Hasfjord emphasizes that the company was eager to improve and responsive to requests.

**Community Involvement**

Of course, getting the current campus population involved was a vital part of the strategy. In addition to stickers and signs scattered around campus, in-com students get pinged by housing and admissions by email to alert them to get the free app and download it.

Ping4 is a software as a service offering, not a platform. It is supported by a combination of revenue sharing from the merchants who might buy space to offer two-for-one pizzas and the college. With the SaaS comes a full marketing program that the college can roll out as it sees fit.

“Campus law enforcement/security and the office of the dean of students will typically be responsible for the gathering of statistics,” Halias says. But in order for an institution to successfully comply with the mandates of the Clery Act, it must develop a coordinated effort from key stakeholders. Those other divisions should include residential life, judicial affairs, athletics, admissions, and human resources.

Halias says that many colleges and universities are now convening “Clery Act Compliance Oversight Committees” that meet on a regular basis to ensure compliance throughout the calendar year.

**What Else Is Out there?**

At least two other similar systems are available. One, from W.A.R.N. of Gallatin, Tennessee (http://warnalling.com/), was first deployed at the University of California-Davis and, more recently, at four other UC campuses. UC-Davis started looking for a small-volume, limited-device program but ramped up to an extremely high-volume and numerous-device project. The college wanted a fully off-site, hosted, redundant, and highly flexible emergency notification system, capable of contacting the entire campus community within minutes via multiple devices.

Not long after W.A.R.N. was implemented, the emergency management group was able to instantly react when a student was found with unknown and suspicious chemicals in his dorm room. Four hundred students were immediately evacuated, and the local bomb squad (as well as state and federal agencies) responded. Fifty-three thousand messages were launched and received in less than nine minutes.

A second system, from Cooper Industries, is called the Roam Secure Alert Network. It allows security to send alerts and instructions to unlimited communication devices simultaneously and from a single Web page. It automates alerts from third party information sources such as the CDC, National Weather Service, Department of Homeland Security, breaking news stations, and monitoring services.

When the stakes are high, having a reliable way to alert everyone who might be affected is absolutely critical. If it is easy to configure and maintain and generates revenue, in addition to providing security, that makes it even more appealing.

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Emerging Technology Trends on Campus

How does the campus network need to grow in order to meet unprecedented demand?

One of the most pressing issues institutions of higher learning face is not what's going on inside the classroom or even the overall decline in federal and private funding. A critical issue is how colleges and universities are prepared to manage the ever-increasing demands on their communications technology infrastructure. Is the campus not only equipped for today, but also prepared to handle anything that might come tomorrow—from move-in day, to the interactive lecture, to game day, to total campus shutdown in the event of a crisis?

Communications environments are pushed to their limits in higher education. Students, who tend to be on the bleeding edge of technology, carry a full arsenal of wireless devices and use increasing amounts of bandwidth. Teachers leverage communications technology within the classroom as they embrace new technology-based methods. University and academic requirements call for increased use of cloud-based networks for storage and parallel processing applications. Ensuring public safety and the ability to communicate effectively with university personnel, students, visitors, and public safety officials in the case of an emergency has never been more challenging.

The net effect is that the wired and wireless networks that facilitate all of these services and applications are reaching—and exceeding—capacity.

Demand Is Up, Funding Is Down
The challenges schools face today are not

To address these challenges, colleges and universities must install multipurpose networks that are easy to deploy and manage. These multipurpose networks must be flexible and scalable to accommodate growth and change. And, they must lower costs, through CAPEX or OPEX efficiencies, or through the creation of new revenue stream opportunities.

One way to solve cellular communications problems has been to employ a “spray and pray” approach—put up an antenna at the highest point, and hope for the best. However, today customers upload more content than they download, and the bulk of cellular traffic occurs indoors, so macro networks cannot efficiently serve users in high-density areas. Given the tremendous increase in usage, it is necessary to build networks from the “inside-out” to complement the macro network approach of “outside-in.”

One Solution: DAS
Distributed antenna system (DAS) networks offer one solution for overburdened cellular networks. DASs address two critical issues: DAS brings coverage indoors where the outdoor macro, traditional cell sites, cannot reach or penetrate. More importantly, DAS addresses capacity. It brings capacity relief to the macro network to allow more users in the macro environment to enjoy all the social networking, video streaming, and access to cloud-based storage that anyone could want. Indoor users benefit from having dedicated capacity and quality service enabling both public safety and cellular services with the same infrastructure.

Funding DAS implementations, often multi-million dollar projects, is a key challenge for colleges and universities. Campus IT departments hope to be able to shift the burden of cost to wireless operators, which allows them to fund other critical improvements to infrastructure. Operators tend to be more focused on servicing the high-traffic places on campus where capacity is a problem, such as stadiums and arenas, rather than on dorm or library access. Additionally, hospitals are more likely to receive funding for DAS deployments—either through the carriers or university—as physicians and clinicians now rely on smartphones and tablets to deliver patient care, in addition to pagers and security and ground staff communications via private 2-way radios. Finding funding for dorms, classrooms, and offices remains problematic.

DAS Alone May Not Be Sufficient
The DAS may not be enough to satisfy the capacity requirements. For example, on game day, the University of Tennessee attracts more than 100,000 fans to Neyland Stadium. Demand for capacity for that number of people can strain carriers’ radio access network, which manifests itself on the user’s handset as showing full-bar signal strength but being unable to upload a photo to, say, Facebook.

That’s when carriers seek to leverage an important campus asset: unlicensed spectrum on the university’s Wi-Fi network. Like DAS, Wi-Fi helps augment...
Like DAS, Wi-Fi technology is not new. But unlike DAS, Wi-Fi uses unlicensed spectrum. Recent protocols enable wireless data networks to be more robust. Still, Wi-Fi does not possess the bandwidth and throughput of wired networks. Campus IT departments must move access point (AP) locations or add additional APs to deliver services as capacity requirements continually change and increase. Physically shifting infrastructure adds to costs.

Realistically, there are no silver-bullet solutions to wireless communications challenges. Today’s “toolkit” offers DAS and Wi-Fi and will soon include small-cell technology. Small cells, akin to Wi-Fi APs, are a local base station but differ by using cellular standards. User requirements, vis-a-vis capacity throughput, are driving changes that will occur to technology infrastructure, and this will have a profound impact on funding, tracking, and monetizing such investments.

**Emerging Trends: Convergence and Fiber Networks**

Networks are evolving to handle more data faster and more perfectly. They will continue to change rapidly—demand on the infrastructure depends on it. Two key trends in campus technology include convergence and fiber networks.

Increasingly DAS networks will be called upon to support both cellular and public-safety services. The fledgling in-building public-safety market of today is similar to the early days of neutral-host cellular DAS, when building owners insisted on a single platform, as opposed to having three systems installed by three different shareholders.

Similarly, offloading traffic to Wi-Fi networks will resemble the neutral-host DAS model whereby multiple wireless carriers can share the costs of participation in a carrier-grade network able to deliver a consistent user experience for their customers. This technology, ideally suited for large stadium deployments that face a capacity crunch on game day, diverts data traffic to the Wi-Fi network.

Using a security gateway, traffic for each carrier is authenticated and routed to the carriers’ own backhaul pipe. Quality of experience for the user is ensured because the network is no longer constrained by the ISP’s bandwidth, which is sufficient for everyday use but not for the volume of game day. The system tracks and charges each carrier for only the amount of traffic that accessed the public network.

**Solutions for Fiber Exhaustion**

Gigabit Ethernet fiber multiplexing solutions will increasingly be deployed to solve fiber exhaustion. Demand for throughput is being driven by the explosion in Wi-Fi-enabled mobile devices and the emergence of bandwidth-intensive cloud-based services, social networking, advanced collaboration, and medical applications. Data throughput and speed are typically constrained by the point-to-point fiber-optic links that connect campus buildings. Fiber multiplexing solutions use wavelength divisional technologies to channelize fiber strands, increasing the capacity of existing fiber deployments without the need to install or lease costly new fiber strands. As an example, a single strand of fiber can deliver multiple wavelength channels, each running symmetrically at 1Gbps up and down stream. This represents significant CAPEX and OPEX savings.

Although copper cabling (CAT 5 and 6) has long been the standard, over time, the industry will shift to a fiber infrastructure to meet throughput requirements. Put simply, today’s copper may not be high enough quality to support 1GE speeds. Further, the physical medium of copper is unable to support higher data rates of 10 GE. Fiber infrastructure is physically smaller and lighter than copper, and is easily installed by technicians. Most importantly, fiber delivers almost unlimited room for future bandwidth expansion.

Lastly, DAS will go digital. Following the trends of convergence of services and the continued emergence of fiber, radio frequency (RF) and Internet protocol (IP) will converge onto a single, digital architecture. The platform will enable plug-in and support for cellular and public-safety communications, Wi-Fi services, and other applications such as RFID, building automation, security, and more. We predict this infrastructure to similarly enable fiber-to-the-desktop.

Ultimately, these next-generation networks will be smarter and more flexible. They’ll handle increased data, enable better use of network resources, and scale capacity—up or down based on use and need during peak and off-peak times.

At the core will be intelligent backhaul to centralize network management and lower operational expenditures. This will be essential for higher ed campuses.

**How Long Will This Take?**

Some of these trends may reach fruition by year’s end; others, currently under development, are several years away. No one really knows what a good, balanced network looks like. We expect to see new technology trends develop at a rate of at least one new trend every two years, as demand—and solutions to meet demand—continue to evolve.

The problems facing higher ed will only grow as they continue to struggle with disparate networks they don’t control and unlicensed frequencies they cannot maximize or that do not have a clear ROI. The urgent need to provide clear communication for public safety and the exponential growth of the demand for capacity means that technology solutions will need to be consolidated offerings bringing multiple networks together. They can be monetized and must provide unfettered access for students, employees, safety personnel, and the general public. To be sure, the years ahead are certainly going to be interesting.

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OARnet and Ohio’s 100 Gbps Broadband Pipeline

Innovative technology increases the speed of the state’s research and education network from 10 to 100 Gbps

The University of Cincinnati and Proctor & Gamble Company were among the several universities and businesses invited by Ohio Governor John Kasich and former Ohio Board of Regents Chancellor Jim Petro to participate in a statewide unveiling of OARnet’s ultra-high-speed fiber-optic network backbone upgrades in December 2012.

Ohio invested approximately $13 million to harness innovative technology that “opens the faucet” of Ohio’s current 1,850 miles of broadband fiber, increasing the speed of the state’s research and education network from 10 to 100 Gigabits per second (Gbps). The tenfold upgrade in data transmission for the network system, operated by the Ohio Academic Resources Network (OARnet), will promote research and job growth across Ohio’s medical research, higher education, manufacturing, engineering, and technology networking corridors.

“The increased bandwidth offered by the 100 Gig capability will allow universities like UC, with large academic medical centers, to transfer large amounts of data—medical imaging for example—much more quickly,” said Nelson Vincent, vice president for information technology and CIO at the University of Cincinnati.

The 100 Gig network connects Ohio’s major metropolitan areas to northern and southern connection points of Internet2, a nationwide advanced networking consortium led by the research and education community.

“Ohio has long been a leader in its broadband fiber network and speeds,” said Pankaj Shah, executive director of the Ohio Supercomputer Center and OARnet. “While a few states have limited deployment of 100 Gbps, no other state has as far reaching a network at these speeds, benefiting as many sectors. The 100 Gbps network is already making Ohio even more attractive to medical research, manufacturing, engineering, and other technology sectors.”

The Evolution of OARnet

As a division of the Ohio Board of Regents Ohio Technology Consortium, OARnet serves Ohio’s education, health care, public broadcasting, and government communities. OARnet delivers technology-based solutions that reduce costs, increase productivity and improve customer service—and has done so for more than 25 years.

The Ohio Board of Regents created OARnet in 1987 through legislation by the Ohio General Assembly (O.R.C., section §3333.04(V)). Originally, OARnet was founded to provide Ohio researchers and academics online access to the computing resources of the Ohio Supercomputer Center, established in Columbus the same year. The initial connection ran between Case Western Reserve University and John Carroll University. Pre-Internet connectivity to the NSFnet was completed in 1988, with a reinforcement of the initial installation. At that time, TCP-IP format became the dominant protocol.

The first business use of the backbone occurred in 1991, as OARNet provided early Internet service before it became a commercial product. Exponentially increasing demand from college and university researchers for statewide connectivity and increased bandwidth led to the lease of dark fiber to create a highly scalable, fiber-optic infrastructure, launched in November 2004. The new network was referred to as the Third Frontier Network and, later, OSCnet, both for a period when OARnet operated as the networking division of the Ohio Supercomputer Center. This forward-thinking investment in dark fiber laid the architectural framework for the 100 Gbps upgrade eight years later.

In 2011, OARnet’s operating structure changed with Chancellor Petro’s creation of the Ohio Technology Consortium. The five-member consortium, called OH-TECH, includes the Ohio Supercomputer Center, eStudent Services, OhioLINK, OARnet, and the still-in-development Research & Innovation Center.

“[OH-TECH enables] those organizations to concentrate on their core mission and to save state resources through shared services, infrastructure, and consolidated operations and command,” according to the Addendum to Directive 2011-023.

Ultimately, the consortium leverages the existing strengths of each organization to deliver next-generation technologies and world-class expertise, thereby providing Ohioans with a strong foundation for education, innovation, and discovery.

“Today OARnet is recognized as the United States’ most advanced nationwide research and education network. Its driving principles are to increase access to affordable broadband service, reduce
the cost of technology through aggregate purchasing on behalf of its members and clients, and maximize shared-services opportunities.

**A Backbone for the State**

The network continues to be OARnet’s flagship service. Ohio, to date, has more fiber optic broadband installed per capita than any other state in the nation. Because it offers more than 1,850 miles of fiber-optic backbone, the costs for last-mile access are lower.

The backbone design features a series of six network rings, which ensure redundancy. (See Figures 1 and 2.) A majority of the network also includes 100 Gbps capacity; the OARNet 100 Gbps network backbone connects Columbus, Cleveland, Akron, Youngstown, Dayton, Cincinnati, Wooster, Portsmouth and Athens to Internet2’s international 100 Gbps network backbone at data hubs in Cleveland and Cincinnati.

Through the Ohio Middle Mile Consortium partners Com Net, Inc., Horizon Telcom, OneCommunity and OARNet formed a public-private partnership to create a comprehensive statewide plan to expand broadband infrastructure to the underserved and unserved areas of the state. This plan focuses on community anchor institutions such as schools, hospitals, public safety and local governments to ensure the development of an affordable and sustainable broadband program. Together, this consortium adds 3,634 miles of broadband services to rural and underserved communities throughout the state.

OARnet’s in-state reach is augmented by partnerships with other Regional Optical Networks. Michigan’s Merit research and education network, the Pittsburgh Supercomputing Center and Chicago’s research collaboration network OmniPoP are also in the loop.

OARNet’s backbone utilizes 31 Points of Presence and 16 Regen sites for further network interconnectivity and optimum long-distance transmission. Support capability provides for 40 independent networks on separate lambdas to transport up to 100-gigabit Ethernet speeds. The transport technology Dense Wavelength Division Multiplexing (DWDM) with ITU Grid frequencies, as well as ITU G.709 transport protocol specification, serves as the core technology for the network.

At the transport layer, the network is based on the Cisco ONS 15454 MSTP multiservice transport platforms. With the 40-SMR2-C card, the network provides multi-degree switching capabilities at the individual wavelength level. Mesh and multi-ring network topologies can now be deployed using the complete flexibility of service routing at all nodes in the network. At the network layer, OARNet employs Juniper M and MX series backbone routers.

Although “IP everywhere” is the expectation for networks, the OARNet network can transport alternate network protocols, such as SANS and native HDTV.

The network uses MPLS to allow a level of granularity in routing that was previously unavailable. By using MPLS in the core, packets are routed to their correct destinations.

Bandwidth and utilization statistics are available online to all academic and government members.

**Benefits of 100 Gig**

At 100 Gbps, Ohio’s statewide broadband speeds far exceed the rest of the nation. How fast is 100 Gbps? Consider the following:

- It allows a data equivalent of 80 million file cabinets filled with text to be transferred daily;
- Every one of Ohio’s 1.8 million enrolled K-12 students could download an eBook simultaneously in just over two minutes;
- 300,000 X-rays could be transmitted in one minute; and
- 8.5 million electronic medical records could be transmitted in a minute.
Governor Kasich’s announcement in the 2012 State of the State address outlined his intentions for a dramatic increase in Internet speeds for Ohio’s universities and hospitals. Ohio’s economic future is dependent on the creation of high-tech environments supporting next-generation business applications.

“[100 Gigahits per second] is the real thing, where we can send amazing amounts of data, videos, file transfers—the kinds of things that can be used at great distances to communicate back and forth with people who are engaged in anything from the development of businesses to the practice of medicine,” Kasich said in his address. “It is unlimited potential for the State of Ohio.”

Commitment to Growth

Attracting new employers with access to the research network, including 90 four-year and two-year colleges and universities, highlights Ohio’s commitment to growth.

The research and economic interests of Ohio and the drive to entice and retain businesses are enhanced by offering the private sector—with clear research needs—access to the 100 Gbps network. Universities and government agencies working in conjunction with private sector interests can affect the local community and region by providing valuable resources and information spurring and supporting economic development. The University of Cincinnati Research Institute melds university expertise with industry partners effectively facilitating commercialization of cutting-edge research.

“The University of Cincinnati has a number of key partners locally and across the state,” said William Ball, vice president for research at the University of Cincinnati. “We’ve recently launched the University of Cincinnati Research Institute (UCRI) to better connect our experts to industry partners such as P&G. The power of the enhanced network will surely expand the impact and success of UCRI’s efforts to facilitate commercialization and enhance experiential learning opportunities for our students.”

Advanced manufacturing, engineering, and medical concerns combine UCRI’s relevant research with entrepreneurial opportunities in a framework that is positioned to take full advantage of the recent 100 Gbps upgrade.

“This technological advancement has the potential to spark economic and research activity and will make UC a critical partner in Ohio’s role as a leader in innovation and development,” said UC’s Vincent, who also serves as a member Ohio Board of Regents CIO Advisory Board. “This is a tremendous opportunity for UC and for our partners in the Greater Cincinnati area. We’re grateful to be a part of it.”

Supporting the Future of Research at UC

UC, a premier research university, will establish a Science DMZ by leveraging its existing wide area network metropolitan optical ring and re-architecting the campus network. This will enable the university’s network infrastructure to support research activities involving large science data flows. The plan includes an upgrade to the campus connection into Ohio’s new 100 Gbps statewide backbone and the connection to Internet2’s nationwide 100 Gbps backbone.

Improving the campus network infrastructure will enable the university to formulate new approaches to research and education. The effort will also provide an integrated framework for people, instruments, and tools to address complex problems and conduct multidisciplinary research that requires the sharing and transfer of large data sets. The plan creates opportunities for widespread use of a comprehensive cyber-infrastructure framework that has the potential to revolutionize every science and engineering discipline, as well as education.

“Computing power, data volumes, software, and network capabilities are all on exponential growth paths. Establishing an advanced computer networking architecture will enable highly diverse, multidisciplinary collaborations and partnerships to grow dramatically, greatly enabled by new and emerging technologies to address complex, grand challenge problems,” said Mark Faulkner, senior associate vice president University of Cincinnati Information Technologies and Ohio Board of Regents CIO Advisory Board member.

Kevin W. Shaffer is documentation specialist in infrastructure management for UCIT Network and Telecommunications Services at the University of Cincinnati. He can be reached at shaffekn@umail.uc.edu.

Susan Mantey is communications manager at the Ohio Technology Consortium. Additional information regarding OARnet, the 100 Gbps upgrade and other related information can be accessed at www.oar.net. Additional information on the University of Cincinnati can be found at www.uc.edu.

Figure 2.
Iowa State Moves Voice Communications to the Cloud

10,000 lines in 10 weeks? We Did It.

Beginning in May 2013, Iowa State University migrated 10,000 lines in just 10 weeks from a premise-based PBX to a cloud communications service. Along the way, we learned the value of collaborative teamwork, constant internal and external communication, and sheer determination. Here is our story along with some best practices developed along the way.

Challenges

Any higher education practitioner is familiar with the need for changes in the way our institutions operate to adjust to the changes of our constituents, technology platforms, pedagogy, globalization, and funding models. The way educational and research missions were supported in the past may not work in the future. Today, opportunities exist to share demand and operations of solutions that scale—not just institutionally, but nationally and globally—solutions that are tailored to meet the unique needs of all research and education institutions. One technology service our team at Iowa State University (ISU) chose to transition was phone service, deciding to replace the outdated phone system on campus with a new cloud-based solution.

The legacy phone system had been in place since 2003, and the contract was set to expire June 30, 2013. The system was premise-based, meaning it was on campus, and we were responsible for the maintenance, the trunking to the PSTN (public switched telephone network), telephone and routing administration, and software upgrades. We have more than 15,000 telephone numbers plus hundreds of “soft” lines that handle the overflow calls to automated answering services and call centers, making operations, support, and maintenance very time-consuming for campus IT staff and very expensive for vendor support.

We’ve been working for several years to find the best option to replace this system, and cloud-based communications are a cost-effective alternative to traditional voice phone systems. We decided to look at cloud-based solutions to minimize capital investments in hardware that quickly becomes obsolete, to increase system reliability through geographic redundancy, to provide more flexible service levels, and also to decrease our level of involvement in maintenance and administration.

Solution

Our team went through a rigorous RFP selection process to evaluate more than a dozen solutions, and we ultimately chose the Internet2 NET+ SIP Program with services provided by Aastra (hosted PBX solution) and Level 3 Communications (SIP trunking services). The new cloud-based system met the primary organizational goals of allowing the university to upgrade its technology and meet diverse user requirements, while at the same time minimizing overall expenses. In addition, this service leveraged our existing connection to the advanced Internet2 network.

Evaluation and Benefits

The reasons behind the selection of the new cloud-based system were twofold: The Internet2 platform ranked highly in the technical evaluation process and the overall cost was low when compared to other compliant bidders. The reduction in system maintenance costs, lower price for telephones, and decrease in trunking expenses, combined with the solution features and reduced support requirements, are creating an estimated $600,000 savings annually for the university.

Some new features that users are looking forward to include the following:

- mobility integration whereby users can make and receive calls from one number on any device;
- integration with existing campus applications as a result of standards-based technology;
- new user-controlled features and online training;
- additional audio and video conferencing features;
- integration with OCS/Lync and analog as needed.

Additionally, our team at Iowa State is an early adopter of the Internet2 program, joining Tulane and others. We are the first educational institution, however, to completely convert to the program over the Internet2 Network. Being an early adopter with full commitment gives ISU leverage in helping to establish national communications practices for the Internet2 offering, and ISU officials are involved in setting up telephony standards for higher education nationwide.

ISU Phone System Diagram

The on-campus installation required to support the Internet2 SIP service consists of two clusters of session border control-
lers with local trunks for survivability, multiple connections to the Internet2 network, and a commodity Internet connection used as a backup. Analog gateways are installed in centralized node rooms to support campus applications that require analog service such as alarms, faxes, elevator phones, and emergency phones. SIP phones are served by Gigabit Ethernet and all wiring closets are equipped with a UPS. (See Figure 1.)

**Implementation**

Implementation of the new system took place in groups of approximately 1,000 lines per week, beginning May 20, 2013, and concluding with a total of 10,000 campus phones transitioned by mid-July, including users in over 175 campus buildings, an active Research Park complex, federal buildings, and residence hall lobbies and dens. A transition of this magnitude required a detailed, well-executed plan. We worked closely with our service provider partners to clearly identify roles and responsibilities for each party. We leveraged team members' strengths and assigned a leader to each aspect of the transition. To keep the implementation on track with its tight timetable, we instituted daily checkpoint meetings. These meetings allowed any issues to be raised and addressed quickly, while keeping everyone informed of progress.

The “telecom coordinators,” people identified in each department to act as our main points of contact, were responsible for communicating within their groups regarding implementation and training. Training could be done on an individual basis online, and we offered in-person training initially with an Aastra trainer, and eventually using internal personnel. Our team used the OpEasy® Suite from Aastra to facilitate mass provisioning. Administrators were able to define user profiles based on roles within the organization (e.g., knowledge worker, administrative assistant, executive) with a limited selection of set types. Individual users were assigned to a profile, and their phones were automatically provisioned with a pre-defined set of features for their role. When connected to the network, the phones automatically downloaded the correct configuration and were ready to be used. The telephone sets were placed well in advance of the actual user cutover, with both phones functional for outgoing calls. Once the system cutover was completed, the old sets were removed.

To simplify the routing, Level 3 Communications ported 17,000 phone numbers over two separate nights early in the implementation process. (Iowa State University has an entire NPA-NXX range and half of another NPA-NXX. This allows us to differentiate between customer bases and retain spares/overflow numbers as needed.) The Aastra system then acted as a tandem to route calls to the existing PBX as needed throughout the transition period. The migration from the legacy PBX system to Internet2's NET+ SIP Program was completed in a total of ten weeks. Aastra, Level 3, and Internet2 all partnered with us closely to meet this very demanding time frame.

**Best Practices**

- **Communication.** Our team knew immediately a proactive approach to communicating the changes to the campus phone system was of great importance. We employed multiple channels to "get the message out," including early presentations to deans, directors, and department chairs, meetings with campus IT professionals, and continued interaction with our telecom coordinators. We posted a news article on the ISU campus IT website announcing the telephone service upgrade, expected benefits, and impact on the user community. A series of stories about the system was published in the campus faculty and staff weekly news to provide an overview of the entire process, expected benefits, and detailed descriptions of new features and the web portal interface. Further, we created a customized website portal to serve as a one-stop information resource for campus users, including links to tailored "how-to" guides and turnkey on-demand video training provided by Aastra. We published numerous articles in a campus IT newsletter (IT News) to prepare users for changes, promote new features.
Internet2 was created by and for the research and education (R&E) community to provide advanced technologies that move us forward. With a growing portfolio of dynamic, tailored and federated cloud services, the Internet2 NET+ initiative is a key tool for research and education to enable the future, again.

Scan the QR code to learn more about the NET+ SIP Program


The Internet2 SIP Program provides hosted voice services yielding exponential value for the R&E community. Learn how the services were rated as lowest TCO, and how Iowa State University has migrated 10,000 campus phones to the cloud at an estimated cost savings of $600,000 per year.

Visit us in Booths #1001 (Aastra) and #371 (Level 3) at EDUCAUSE 2013

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http://bit.ly/1aZah7G

www.internet2.edu/sip
and provide resources. We continue to utilize IT News to publicize a new idea or feature about the telephone system each week including “tips and tricks” and “how-to’s”. We found the communication with constituents throughout the design and deployment process increased user acceptance.

- Training. Early training for the system administrators, support staff and department contacts is highly recommended. As the system is rolled-out, the technicians’ knowledge-level is also very important. They are often our most visible public relations staff. In our experience, the online training is good for the casual user, but advanced users have required hands-on practice.

- Staffing. We contracted with Aastra to install and test the 8,000 IP phones deployed in this process. (Approximately 2,000 phones/lines remained analog.) However, we completed all of the administrative, network, communication, and user support tasks using our existing staff. All Netcom employees were focused on this project, and we assigned very clear responsibilities to each person. The teamwork and mutual support required for a successful implementation caused our voice and data teams to become one, a much more effective and collaborative work group.

Results and Reactions
Although we have faced our share of challenges in implementation, the new system has already proven to provide increased business continuity through multiple interfaces to the Internet2 Network, and the new phones and handsets are not as expensive as the old ones. Feedback from campus users about the system has been good overall, with most users experiencing a trouble-free transition. Analog services and call-center operations have taken extra support and attention.

Users are looking forward to new communications options provided by the broad integration and mobility features. Several professors have expressed excitement that they can now program the system so calls can ring into their desk phone and their cell phone at the same time and are already looking forward to new features that will be rolled out in the fall.

Our team at ISU is participating in a steering committee devoted to the Internet2 NET+ SIP Program. Since we are members of Internet2, and an early adopter of the services, we are happy that we can act as a conduit to optimizing the services, analyzing future needs and providing advice on the technology road map.

Angela Bradley is director of Systems, Operations, Networks, and Communications in the Information Technology Services department at Iowa State University. Contact her at bradley@iastate.edu.

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The Washington University in St. Louis (WUSTL) Emergency Mass Communications Dashboard project is an innovative mass communication plan designed to reach every member of the university community through a single, comprehensive, Web-accessible interface. It gives us a cadre of tools to communicate through multiple venues, such as e-mail, text message, cable TV over-ride, computer screen pop-ups, wall-mounted alert beacons, outdoor sirens, audio-enabled fire-alarm systems, internal public-address systems over-ride, and RSS-fed Web page updates—all with a few clicks of the mouse in under a minute. The dashboard helps us achieve our goal of issuing emergency warnings and notifications in the least amount of time possible. Prior to this project there was not a centralized system in place to address emergency communications. Multiple, disparate systems could have taken 15 to 30 minutes or more to notify the campus community.

With no products available off the shelf, this project allowed us to work with our vendor partners to utilize technologies such as application programming interface and common-alerting protocol to integrate with our existing delivery infrastructures. This includes NOAA weather alerts to engage our system during a tornado warning and automatically notify our constituents with a pre-approved alert.

The Alertus interface allowed us to alert the campus at which an incident is taking place while informing the others. In an emergency on the Danforth Campus, all modes of communication would be used there, while other campuses would receive only text, e-mail, and desktop pop-ups. This level of integration with multiple vendor products, simplicity of access to deliver timely alerts, economical initial and on-going costs, and collaboration with our primary vendor puts WUSTL at the leading edge for emergency communications in higher ed.

When we started this project (fall 2010), there were growing regulatory and legislative requirements to communicate effectively with the entire campus once a significant emergency involving an “immediate threat to the health or safety of students and staff” is confirmed, but there were no turn-key, centralized-activation portals on the market. Our work with ACUTA corporate partner, Alertus, has led to at least one product that can now serve as that emergency mass communications dashboard.

Our dashboard has continued to be effective, efficient, and economical as it relies on the strengths of our internal network. Students, staff, faculty, and visitors on campus now have up to 10 modes of communications to effectively alert them about an emergency/incident at WUSTL. The police dispatchers can quickly (in less than 60 seconds) issue an alert, with authorization from their supervisor, without interfering with their responsibilities to the first responders.

Planning, Leadership, and Management Support

WUSTL started planning and implementing emergency communications probably about the same time as most other colleges and universities—right after the tragedy at Virginia Tech in April 2007. We have invested in a variety of different communications systems to meet different requirements. We had already signed up with Cleartxt, an event-notification system that was opt-in and originally designed to use text, e-mail and voice communications to let those who signed up know of a change in the football game start time or maybe even that the sidewalks were icy and slick.

In 2008, after the tragedy at Northern Illinois University, we did an RFP for a notification system that was focused on emergency notification only (e-mail/text message/voice) and chose Everbridge.

In 2009 we worked with St. Louis County to put three Whelen outdoor sirens on our campus that we would control but that the county would add to their weather alert system and be

Matt Arthur (second from left) received the Institutional Excellence Award for the Emergency Mass Communications Dashboard project at Washington University in St. Louis. Presenters included Joe Harrington, Awards Committee chair; Chuck Flaherty, Pinnacle (sponsor); and Jennifer Van Horn, ACUTA president.
able to activate in the event of a weather emergency. There was hope that the siren system software (Centralert) would enable us to integrate this system with some of our other communications modes. After a year of unsuccessful attempts, we began to look for a product or service that would bring together not only the modes of communication specific to emergency notification, but also those that were primarily for other purposes (CATV, digital signage, public address systems, etc.) so they could also be used in an emergency.

At WUSTL, all operational authority and control of campus emergencies/incidents have been given to the Crisis Management Team (CMT) from the University Executive Leadership Team. In summer 2010, at the request of the CMT, the director of incident communications wrote a vision paper discussing our goal of being able to issue emergency warnings and notifications in the least amount of time possible using multiple modes of communication that would reach students, staff, faculty, and guests at all six of our campuses. The paper reviewed all current and available modes of communications. This lead to authorization for an RFP that summer. Funding for this project came in a special request to the Executive Leadership Team for a $200,000 “account” to be used for purchase, testing, and implementation. The total amount actually used for the project was than half of the available funds.

The RFP made clear that our purpose was to find a solution that would integrate all current modes of communications and easily add future communications technologies. The chosen product should not replace or supplant any existing infrastructure and should allow for continued independent activation of each available mode of communication.

Promotion of Technology and Maturity of Effort
Like a lot of higher ed institutions, WUSTL can be considered federalized or “silo-ed” in many respects. Each school has its own IT group and even the central fiscal unit (CFU) is supported by a different group within central IT (IS&T). Getting the Alertus beacons and desktop pop-ups pushed out to the schools and departments required a bit of coordination to assure all those groups that the technology would not be disruptive or require too much attention on their part.

We did testing with all seven schools and the CFU. Early on we had an idea of where to place each beacon (largest gathering spaces and classrooms on campus) and met with representatives from each of those areas to demonstrate how the beacons and desktop pop-ups worked. In addition, we collaborated with the facilities department extensively on placement of the outdoor sirens—to include what color (gray) they would be painted.

All beacons were installed by IS&T after coordination with approving department representatives. This coordination took place after the overall plan was approved and funded, but before final installation took place in the fall of 2011. The system was up and running in time for testing in spring 2012. Since the original project completion, we have added a number of new beacons across all campuses with more being requisitioned each semester.

This project started with the vision paper in late summer 2010, and the RFP was published in late fall 2010, before funding was approved. At that time there were no off-the-shelf, turn-key products available to integrate all of our emergency communications. Alertus was chosen only after coming to campus in spring 2011 to prove they could access both the Whelen sirens and our emergency notification system.

Accessing just the sirens required coordination among Whelen, Alertus, Centralert, St. Louis County; and WUSTL over a two-month period. We even had to have an official memorandum of understanding between St. Louis County and WUSTL before they would agree to include our sirens in their county inventory and let us have control of our sirens as well. This was the first time the county had allowed active sirens to be dual-controlled. During this same time frame we started a grass-roots effort called Where To Go to assure we got the word out around campus so that all concerned knew what they should do and where to go in the event of various emergencies. We work closely with all orientation programs to provide new faculty, staff, and students adequate information about emergency communications in a timely manner once they arrive on campus. This is also an on-going project that includes IS&T/incident communications, public
affairs, and university operations/emergency management.

Quality, Performance, and Productivity Measurements

There are three access levels in the dashboard system: preset, user, and admin. All approved personnel have to complete initial and on-going (semi-annual) training to retain access. Approval must come from a director or higher, and each must also be approved by both the director of emergency management and the vice chancellor for university operations. Records are retained for historical and audit purposes.

Preset accounts have access to a limited dropdown menu and are primarily used by the police and protective services dispatchers. User accounts have access to custom templates that allow editing for more specific messages and delivery methods. Admin accounts are restricted to a small number of administrators who have full access to the system.

The entire system is tested each semester. Information about each test goes out via the student newspaper, campus newsletter, e-mails, digital signage, and the university website. During the actual system test, each text message, e-mail, beacon, and desktop pop-up allows for an acknowledgment to be made by the recipient. Thus, we are able to document how many people acknowledged a particular mode of communication versus how many messages were sent via that mode.

In addition, the Everbridge system tells us how many of each type of message were sent within 15 and 30 minutes. For that same test, 51 percent of our population acknowledged either a text message or e-mail—an all-time high. We also have staff stationed outside to listen for the Whelen sirens and in each building with an activated public address system to be sure they go off and the message is intelligible. All of this is reported to the Crisis Management Team for review. The report includes comparisons to historical data to assure a consistency of effort and response.

Cost, Benefit, and Risk Analysis

This system allows us to incorporate a variety of previously installed communications systems whose normal function lies outside of emergencies. From indoor public address systems to cable television (CATV) to digital signage—all can be leveraged in emergencies via our normal alerting process. This will reap additional rewards if/when it is decided to add social media to the mix or other

Figure 1. The system worked in a real situation

During the test, we were able to leverage multiple communications technologies into our dashboard if we choose. The emergency-specific systems such as the outdoor sirens and the emergency notification system were already in place and required very little additional investment to incorporate into the Alertus dashboard. Thus the dollars spent on the Alertus systems, both initially and on-going were a small percentage of the overall dollars spent on communications systems across campus.

Access to the Alertus server (set up on a virtual server—another cost savings), is restricted to WUSTL ip-space and uses WUSSTL IDM login/authentication. Access from outside of WUSTL ip-space would require a virtual private network or similar security. Initial access during an emergency would most likely come from either the Washington University Police Department or from the Medical School Protective Services group.

Violence on Campus alerts are divided among our campuses. The alert would use all technologies available on that campus and only use e-mail/text message/desktop pop-ups for the others. Tornado warnings for St. Louis (STL) County are automatically triggered by the National Weather Service to set off all of WUSTL’s emergency technology alerts except the outdoor sirens. Since they are tied into the county system, the county sets off our sirens along with others.

Customer Satisfaction/Results to Date

Each semester we test the system on all campuses and report the results to the Crisis Management Team. We follow up with any questions or concerns. The dashboard and all its components have been received well at WUSTL.

The only time the system has been used in an emergency was at 7:02 p.m., Saturday, April 28, 2012, when the National Weather Service issued a NOAA tornado warning for St. Louis County. I was in Indianapolis for the ACUTA Annual Conference. Once our Alertus server received the CAP alert from NOAA, it executed a custom-event trigger which set off all campus beacons, desktop pop-ups, CATV/public-address system overrides; sent an RSS feed to the emergency website; and set off an Everbridge script to e-mail/text a message to the entire campus community. The county set off the outside sirens. I received the alert on my phone via text message and e-mail. I quickly got to my laptop to verify (from my hotel room) that the system had worked exactly as it was supposed to. Within minutes, public affairs staff who monitor social media sent me a tweet from one of our engineering students (Figure 1).

One picture was worth a thousand words. Matt Arthur is director, incident communications, at Washington University in St. Louis. Reach Matt at arthur@wustl.edu.

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