THINGS YOU SHOULD KNOW ABOUT...
VoIP

Scenario

After several years of rising enrollments—and growing numbers of faculty and staff—State University had to decide what to do with an aging PBX system that had become costly to maintain and would be expensive to expand to accommodate the number of extensions the campus needed. Senior IT staff, with the support of institutional leadership, decided to replace the PBX with a campus-wide VoIP system. The new system provided sufficient capacity to put a phone in every dorm room, office, and classroom on campus; previously, very few classrooms had phones. The IT staff also implemented several features that PBX couldn't provide, including a tie-in to the campus e-mail system.

Some members of the campus community, upon learning that the entire phone system would be replaced, expressed concern. They worried that changing something as familiar and fundamental as the telephone would be needlessly disruptive to everyday activities. The IT staff undertook an awareness and training program to explain the benefits of the new system and help users take full advantage of the available features. As users learned how the new phones made some tasks easier while also providing new functions, they began to spread the word about the new system and its benefits, building support for the new system virally.

Because VoIP used the university's data network, the additional infrastructure costs to implement and maintain the VoIP system were minor. The VoIP system provided many features at no extra cost that had previously been billed separately, including caller ID and call waiting. Even long-distance calls were largely covered. As a result, the costs to operate the VoIP system were considerably less than for the PBX. The administration decided that for three years, the departments and units on campus—which were billed for phone service—would pay the same rates as for PBX, and the surplus funds would cover the implementation costs. After that, the savings would be split between the departments and the IT group.

1 What is it?

Traditional phone service operates over dedicated transmission lines that also provide the electricity that powers the phones. Because most phone carriers operate backup generators, traditional phone service is not often affected by disruptions at local power companies. By contrast, Voice over Internet Protocol (VoIP) converts voice calls to packets that travel over data networks. In this way, a single, robust network can carry all of an organization's data and voice traffic in a converged system. As with the data network, the electricity for VoIP comes from the local power grid. Unless institutions make accommodations for backup power, VoIP is more susceptible to outages than traditional phones. VoIP involves tradeoffs surrounding factors such as cost, flexibility, reliability, and user expectations, but evidence continues to mount that improvements in technology are tilting such evaluations in favor of VoIP.

2 How does it work?

VoIP converts voice calls to data packets that travel over networks using the same Internet Protocol that facilitates the exchange of data. Although this can be accomplished using a standard telephone with an adaptor, most VoIP calls are made using either IP phones (dedicated VoIP handsets that connect to IP networks) or softphones, software that uses either a headset or the computer's microphone and speakers to make calls. With VoIP, a user with a softphone on a laptop, for instance, can connect to the phone system via the Internet, whether from home, an office, a hotel, or anywhere else, and the phone functions the same in any location. One consequence of this, however, is that VoIP callers—because they can plug phones into the Internet wherever they like—are more difficult to locate when they call 911 in an emergency.

Some VoIP calls can be made entirely over IP networks; in other cases, VoIP must route calls over traditional phone networks to reach certain destination phones. Because there are no additional charges to access Internet resources regardless of where they are located, VoIP calls that circumvent phone networks incur no long-distance charges. Similarly, whereas conference calls on traditional phone lines require bridging services, VoIP systems frequently include conference call support at no additional cost.

Because VoIP uses the same network and protocol as other Internet services, integrating phone service with, for example, e-mail becomes far simpler. At some institutions, VoIP is a central component of emergency notification systems. Campus officials can quickly send emergency information and instructions to VoIP phones around campus. A message might automatically play over an IP phone's speaker, and the text of the message might then show on the phone's screen. These systems can be integrated with text messaging and other notification avenues to provide reliable,

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consistent coverage. Institutions are integrating VoIP systems with wireless networks, providing more flexibility in how VoIP phones are deployed and how users access the system.

3 Who's doing it?

The PBX (Private Branch Exchange) technology that underlies traditional phone systems at many campuses has reached its end-of-life stage, and higher education has begun to embrace VoIP as a way to leverage IP technology for lower infrastructure costs, improved network efficiency, converged communications, and improved end-user features. In an ACUTA survey from 2007, 43% of responding institutions had begun to implement VoIP, with their VoIP networks extending over less than 25% of their campuses. A newer survey by ACUTA found that about 25% of responding colleges and universities had completed a campus-wide VoIP installation, while another 49% were planning a VoIP deployment within the next year.

4 Why is it significant?

VoIP is an increasingly viable alternative to traditional phone service. In many cases, institutions save considerable costs on long distance and other features that cost extra from traditional phone service providers. VoIP systems integrate with services such as e-mail and online directories, and VoIP calls can handle video and data as well as voice. Institutions that implement VoIP can deploy converged networks that combine voice, data, emergency notification, and other systems, streamlining maintenance and reducing operational costs. By migrating phone service to the data networks that colleges and universities maintain anyway, institutions can take fuller advantage of that infrastructure while providing another imperative to ensure the reliability of those networks, which benefits all of the IP services. Upgrading a VoIP system is typically far less complex and less costly than extending a PBX system. Although traditional phone networks provide a level of reliability that IP networks have been hard-pressed to equal, the rich feature sets, along with its relative affordability, present an ever-more compelling argument for VoIP.

5 What are the downsides?

Perhaps the biggest drawback of VoIP is that it is subject to the same limitations as other online activity—the network can be slow or overloaded, and this can degrade the quality of VoIP calls. When the quality and reliability of a phone call are vital, traditional phone service might be a better option. In addition, regular upgrades and network maintenance will likely result in some amount of downtime for VoIP systems, and this can be a sticking point for consumers accustomed to virtually uninterrupted phone service. Setting and managing expectations is an important part of a successful VoIP deployment. Any institution considering migrating to VoIP must carefully evaluate the many options to determine the point at which the benefits of VoIP outweigh the limitations for a particular campus. Moreover, a highly decentralized IT environment would pose another layer of complexity for a VoIP implementation.

Although solutions are emerging that address the difficulty in physically locating a VoIP caller during an emergency, concern over this limitation will preclude its being a viable option for instances when 911 service is required. Because VoIP relies on electric power separate from the phone service, power outages can be problematic. Any VoIP implementation requires a robust network infrastructure—an institution that does not have sufficient network capacity or lacks data network wiring where VoIP phones are desired would need to upgrade its network as part of a VoIP deployment.

6 Where is it going?

As data networks become increasingly reliable and high-speed networks approach ubiquity, the move toward VoIP will continue, with more and more institutions finding that the switch makes sense, economically and technologically. VoIP will likely see greater integration with online services, perhaps including academic tools such as learning management systems. VoIP is part of a larger trend toward converged communications, which promises expanded feature sets and increased reliability and effectiveness of enterprise communications. Phones will incorporate presence data, allowing for highly relevant and targeted communications.

7 What are the implications for higher education?

Virtually all campuses have implemented robust networks that host a growing number of institutional services, and the need to continually maintain and upgrade this infrastructure is well understood. At the same time, many campus phone systems are old and costly to maintain. VoIP provides an opportunity for many colleges and universities to eliminate PBX systems, in part or altogether, and operate fully featured phone service on existing network infrastructure. Along with cost savings, campuses can benefit from additional features and integrated systems.

As nearly every student shows up on campus today with a cell phone, VoIP might offer an inexpensive way to make phones available, either in every dorm room or on every floor. VoIP also allows an institution to integrate phone service into its emergency notification plan, along with other network resources such as e-mail, text messaging, networked signs, and alarms. In addition, cell networks are often overloaded in emergency situations, and a VoIP phone system provides an institution with additional capacity to make and receive calls even if cell service is disrupted. In these ways, VoIP reassures students and parents that the institution can effectively communicate with constituents in the event of an emergency.

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