

Diffusion of IP Telephony in Undergraduate Private Colleges

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ABSTRACT

Over the summer of 2000 Menlo College implemented enterprise wide Internet Protocol (IP) Telephony (Voice over Internet Protocol [VoIP]). More than five years have passed, and analysts are predicting that in the near future the only available Private Branch Exchange (PBX) solutions will be VoIP [4]. In view of this market trend, the diffusion of this technology in these institutions seems slow. The Menlo College implementation is very successful, but has the concept diffused to other institutions? What factors influence the diffusion of this technology to other institutions? This paper examines the status of VoIP at these institutions.

Keywords: IP Telephony, VoIP, Higher Education, Diffusion of technology, PBX, Menlo College

1. THE ISSUE

The implementation of VoIP at Menlo College is considered an unqualified success. In fact, many trade journals [3, 5, 7, 8, 11, 12] (including the Chronicle of Higher Education [9]) covered this project over the first two years following the implementation. In view of the benefits of this technology to an organization, two questions follow. First, has the technology diffused to other organizations? Second, what factors have effected

this diffusion?

2. A SHORT EXAMINATION OF THE HISTORY AND CURRENT STATUS OF VoIP AT MENLO COLLEGE

The story of IP Telephony/VoIP at Menlo College begins with problems related to the Enterprise Resource Planning system (ERP). Prior to the fall of 1998 the leadership of the college selected a product that used a centralized database system and "fat clients" on the end user's desktops. Such a system would require access from several building across the campus. Some of these buildings were linked via optical fiber. The performance of this system was a problem. In February of 1999, the acting Director of Information Technology (IT), a consultant, and a member of the IT staff noted that the problem seemed to be linked to network performance. Upon closer examination it was discovered that the fiber network was running 10 mg Ethernet (at half duplex). The problem was solved by implementing two Gigabit Ethernet links. The performance with the ERP became reliable. This is critical to the story because the vendor community - upon discovering this background with Gigabit Ethernet - were eager to work with the staff at Menlo College. In effect, without this background Menlo College would not have been a candidate for IP Telephony/VoIP.

The next critical event in the Menlo College story is the year 2000 problem (Y2K). Technology related to Y2K has very little to do with IP Telephony/VoIP. Y2K is related because the IT department was very successful in keeping Y2K from becoming a problem. As a result of this success, telephony was assigned to IT. If this had not happened, IT could not have proposed a telephony project. Telephony was assigned to IT in January of 2000.

By April 2000 a collection of vendors (particularly Jim Barron from VoicePRO, and Robert Tocci from AMS.NET) and the IT department developed a proposal for the IP Telephony/VoIP project. The IT department elected to have the vendors present the proposal to the President and Vice-President of Finance. Over the following week the Vice-President of Finance asked some questions about Return on Investment (ROI) and presented the proposal to the Board. The Board said approving the project was a "no brainer" and contracts were signed in May 2000.

The project was physically completed in August 2000. It is important to note the fact that IP Telephony/VoIP requires prerequisite technologies. This includes at least an appropriate wire/cable infrastructure, appropriate facilities for "edge" and "intermediate" hardware in each building, network switches, and a network operations center. These prerequisites are the same as those required for the proper distribution of the Internet and support of campus wireless projects, and future technologies and applications such as those related to on demand interactive video. This was not in place at Menlo College - as with most colleges and universities - and had to be established during the summer of 2000.

At the completion of this project many benefits accrued to Menlo College. It now has a network architecture that is ready for future applications; they operate one instead of two networks; adds, moves, and changes for telephony cost nothing; no staff were added as a result of the project; and there are more benefits. In fact, the financial benefit as represented in the total annual cost of telephony to the institution (see graph following) is ample reason for any institution to follow Menlo College's example. [Note: the cost does not decline in 2000 - 2001 as a result of having to make a settlement with the regional telephone company to terminate lines.]

Institutional Telephony - Annual Net Cost

Year	Net Cost
1996 - 1997	~\$140,000
1997 - 1998	~\$180,000
1998 - 1999	~\$200,000
1999 - 2000	~\$180,000
2000 - 2001	~\$190,000
2001 - 2002	~\$140,000

2002 - 2003	~\$120,000
2003 - 2004	~\$90,000
2004 - 2005	~\$60,000
2005 - 2006	~\$40,000

Three broad categories influenced the IP Telephony/VoIP project at Menlo College. These are technology issues, organizational issues, and economic issues. The last two areas are in effect managerial issues. Thus, examination of the influences on the diffusion of IP Telephony/VoIP at similar institutions in Higher Education should begin with technology and management.

3. IDENTIFICATION OF INSTITUTIONS SIMILAR TO MENLO COLLEGE

When marketing organizations in major corporations focus their efforts, they lump government and education together. The Department of Treasury (United States), Franchise Tax Board (State of California), UC Berkeley (Research University), San Francisco State University (Masters Degree granting institution), Menlo College (Undergraduate [four year] College), College of San Mateo (two year College), and Hillsdale High School are all in the same category. This provides a useful division of labor for these organizations, but it unsatisfactory for the inquiry this paper pursues.

It is easy to understand that those involved with Menlo College would not identify with any of the other institutions listed above. In fact, scholars that conduct research on Higher Education would not categorize Menlo College with any of the institutions listed above. These scholars use a classification systems that is maintained by the Carnegie Foundation, and Menlo College would likely be listed as a Bachelors II [2]. This is a better system, but not entirely sufficient for this inquiry. The Carnegie Classification system provides a beginning, and could be enhanced by adding those attributes that Menlo College uses in describing itself, particularly those that would influence decisions made at the institution.

The attributes of similar institutions must include similar degrees granted. Menlo College is an undergraduate college that awards Bachelor degrees. It offers no graduate degrees, and no longer offers Associates degrees. It is a private institution, which means it is not connected with the government of the State of California. Menlo College has less than 1000 students. This is important to this type of institution because its income is generated by tuition, and the size of the institution has an important relationship to the financial capability of the institution. Students generally live on campus. This is important because the institution is providing services to the students beyond teaching and learning, which puts a greater financial burden on the student and their family. These four attributes (Undergraduate degrees, private

institution, less than 1000 students, residential) are used to make a list of similar institutions.

This process began by using a college guide to identify private Undergraduate institutions with less than 1000 students. Barron's Profiles of American Colleges [1] was used for this effort. This resulted in a list of 80 institutions. The next step was examination of their Web sites, which resulted in elimination of 28 institutions. Fifteen institutions were eliminated because they had established graduate programs. Five institutions were eliminated because they had more than 1000 students or were acquired by another institution with more than 1000 students. Five institutions were eliminated because they have no dorms. Three institutions were eliminated because they had no available Web site. The result is a list of 52 institutions. However, six of these institutions have no identifiable technology leader.

4. AN EXAMINATION OF THE STATE OF TELEPHONY AND NETWORKING AT THOSE INSTITUTIONS

One fact listed above may come as a shock to those that have not had the opportunity to work with institutions similar to Menlo College. That fact is that three institutions of 80 had no available Web site. It is true that these institutions need the Web as much as any other institution. However, it is also true that size can work against this type of organization. For example, these institutions are small enough that a person holding a belief that the Web is not important (however wrong that belief might be) can also hold enough importance to keep the Web site undeveloped.

In light of this, three important aspects about these institutions should be kept in mind. First, they are not inherently poor quality institutions. In fact, one of the institutions is the alma mater of a recent popular President of the United States (Ronald Regan graduated from Eureka College). Another institution was the site where Winston Churchill introduced the world to the term "Iron Curtain" (Webster College). Secondly, the belief that these are "small" institutions affects their outlook. This was noted above, and it is a problem. However, it is also true that small size worked in Menlo College's favor. Just as a management scholar might point out, size allowed Menlo to move where a larger institution would be slowed by the scope of the project. Third, in Higher Education innovation seems to move from the "top" down. This is really due to the way PhDs are produced and distributed, but it can also be viewed as a sort of imitation of institutions like Stanford, and Michigan. One would not expect a Research University to imitate Menlo College, however, the IP Telephony/VoIP project was successful and well publicized so similar institutions should be inclined to adopt the technology.

Sadly, preliminary indications are that IP Telephony/VoIP has not been adopted by similar institutions. The authors are conducting further investigations on these institutions, however, their Web sites are quite revealing. On these Web sites telephony is rarely discussed, students are told to bring their own telephones, there are multiple prefixes and the directories contain a range of numbers that are not in a sequence, the way IT departments describe themselves (i.e. helpdesk and computer labs), and the fact that several Web sites make no mention of IT are important indicators. However, the fact that IP Telephony/VoIP is not mentioned on any of these sites is in itself a strong indicator that there has been no diffusion to these institutions. At Menlo College it is mentioned on the Web site, and is one of the important attractive features for the dorms. The benefits to the students from this system are so important that they would be discussed in recruiting literature for campus housing (dorms) if this was implemented at any of these institutions.

5. AN EXAMINATION OF THE INSTITUTIONAL, TECHNOLOGICAL, AND FINANCIAL INFLUENCES

From the Menlo College example we know that technology and management both affect the ability of an institution to undertake and successfully complete an IP Telephony/VoIP project. The technology is a system, and that system requires prerequisite systems. On the management side there needs to be an IT department and they need to have responsibility for telephony, or the project won't happen.

All aspects of management are important to a project like IP Telephony/VoIP. This includes staffing and leadership. For example a college President has made the following observation:

"It's just downright scary to think about how little the average college president knows about information technology. The highly combustible blend of high influence and low knowledge can blow up even the most sound IT decisions." [10]

In effect, there must be an IT unit, and they must provide leadership on technology to the organization.

The technology side of the IP Telephony/VoIP project is also important. This does not seem to be diffusing among organizations in a fashion that is analogous to prior technologies. While some might note that this is related to the continuing campaign of fear, uncertainty and doubt (FUD) provided in many trade periodicals [6], we know from the Menlo College example that this is unfounded. The technology works and is within the grasp of this kind of institution. So while FUD is focused on technology it is only likely to be effective because of staffing problem.

The real technology issue is if an IP Telephony/VoIP project is really analogous to prior IT projects. There is a suggestion that it is not analogous to other technology projects in both the Menlo College example, and the examination of similar institutions.

6. CONCLUSION

The effort represented in this paper is to document the diffusion of a technology. One might expect the diffusion of VOIP among organizations to be similar to other technologies, for example personal computers. If this is the case then IP Telephony will fit with the generally understood patterns for technology. Since this is not the case, more investigation will be undertaken to discern the nature of the difference, particularly the technology and management effects on this diffusion.

7. REFERENCES

[1] Barron's Profiles of American Colleges 2005, 26th Edition, Compiled and Edited by the College Division of Barron's Educational Series.

[2] "Carnegie Foundation's Classification of 3,600 Institutions of Higher Education." Chronicle of Higher Education. April 6, 1994. pp. A18 - A25.

[3] "Colleges Experiment with IP Telephony", (techwatch section), EducauseREVIEW, Jan/Feb 2002, p.2.

[4] Cougias, Dorian J., CEO, Network Frontiers. Keynote Speaker, Liebert Business Continuity Series 2005, San Francisco, CA, August 17, 2005.

[5] Drucker, David. "Branches Get Connected", InternetWeek, May 7, 2001.

[6] Hoover, J. Nicholas. "VoIP Gotchas." InformationWeek, November 14, 2005.

[7] Lee, Stephen. "Voice over IP gets wake-up call", InfoWorld, May 7, 2001.

[8] Michael, Bill. "One-Wire Wonders At Work", Computer Telephony, March 2001.

[9] Olsen, Florence. "Colleges Experiment with Routing Phone Calls Over the Internet", The Chronicle of Higher Education, 11/16/2001. p. A38.

[10] Robinson, William P. "Leading the Leaders." Keynote presentation at the Western Regional Educause Conference, April 24, 2006.

[11] Wildee, Candee. "Menlo College: Starting at Ground Zero", in Informationweek.Com [http://www.informationweek.com/837/ippbx4_side.htm], May 14, 2001.

[12] Wortman, Victor. "The Real World of Integrated Networks", Business Communications Review, April 2001. p. 72-76.