# Real-World VOIP Migration

Lenny Liebmann

## Users are taking a variety of approaches to begin piggybacking voice on data networks.

Analysts may argue over the pace of market growth for voice over IP (VOIP) or the ultimate viability of convergence as a strategic architectural imperative, but some enterprise technology managers are moving ahead with real-world VOIP implementations. They're doing so for their own reasons, which often vary greatly.

Despite the differing drivers for early VOIP adopters, certain patterns can be discerned across their migration strategies. Some organizations are completely overhauling their voice infrastructure and implementing a full-scale VOIP transition—although they typically operate their legacy phone systems in parallel before flipping the switch over to VOIP. Others are taking a piecemeal approach, piloting VOIP at specific offices or departments and/or limiting deployment to installing an IP PBX rather than going "whole hog" with IP phones on the desktop as well. Still others are more cautious, leaving their entire voice and data infrastructures intact and simply installing VOIP gateways to route a very specific subset of their voice traffic over public or private data nets.

The following real-world examples of VOIP migrations point up these different migration approaches and should be quite instructive to those who dismiss VOIP out-of-hand, as well as to those who believe it is a market inevitability—but aren't sure exactly how we are gong to get from here to there.

### The Big Switch

Maurice Ficklin, technical services manager at the University of Arkansas at Pine Bluff, was in a particularly strong position to make a complete changeover of the campus voice architecture. For one thing, as part of a $100 million master plan, the university was making major renovations to its physical plant—including new buildings and new utility connections. That meant replacing the existing data network connections as well, since all the construction was likely to tear up existing cable. The decision was therefore made to put single- and multi-mode fiber into the ground at a depth of 12 feet, and to leverage that investment by using it for data, voice, security systems, video and any other communications needs the university might have.

While the master plan covered the cost of the optical fiber, Ficklin had to decide to devote a good percentage of his own equipment budget to a network upgrade—and figured this was the time to do it. "I really wanted to leverage the new network and move up to a fully switched Ethernet," said Ficklin. At the same time, Ficklin believed he could extend the one-network approach from the campus to the building level. "It just didn't make sense to have separate cabling plants for security, voice, data and any other services we might elect to install in the future."

Ficklin went lock, stock and barrel for Cisco gear, including Catalyst 6000 and 2900 switches. He also made sure that his entire cabling plant was Cat 5 or Cat 6 compliant.

In addition to having the advantage of an upgraded, consolidated network infrastructure, Ficklin also had particularly strong economic motivations for changing the university's voice architecture. Throughout the '90s, the university had Southwestern Bell Centrex service. While that might have seemed wise from a cost and operational perspective at the start of the decade, it was clearly no longer valid. Depending on the telco to execute moves, adds and changes added cost and time to the management of voice service. With 2,000 users in a very change-intensive environment, Centrex no longer made sense. The university also had key systems in place, adding another layer of management.

"We were spending $500,000 just for dial tone to all of our phones and faxes," Ficklin noted. "It seemed to me that we'd be better off investing that money in a technology with a future."

But perhaps the most important factor enabling Ficklin to move ahead with his VOIP overhaul was his full oversight of all technology on the campus. In August 1999, he was given full responsibility for data, voice and video services—which meant he didn't have to wrestle with someone else whose territory was threatened or whose vision differed from his.

These three factors—a fully upgraded IP network, an outdated voice environment and common organizational ownership of both data and voice infrastructure—combined to make UA Pine Bluff an excellent candidate for a full-scale VOIP transition. And that's just what Ficklin has done.

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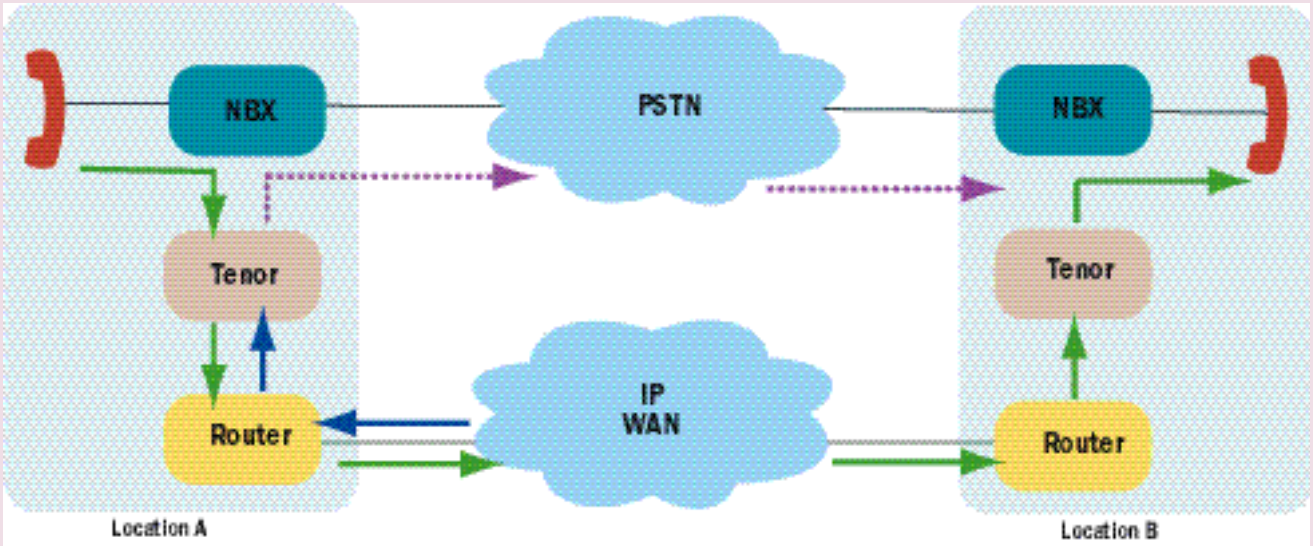
FIGURE 1 James Communications Implementation




Quintum's Tenor gateway "senses" conditions on James Communications' IP network. If conditions allow, office-to-office calls pass over the company's WAN (→). If the gateway detects any conditions that might jeopardize call quality (←), the call is re-directed over the PSTN (→)

By pooling the $500,000 that would otherwise have been budgeted for Centrex, together with his combined capital equipment budgets for voice and data, along with other operational funds, Ficklin has put together a $4 million converged infrastructure that includes Cisco's CallManager and IP phones on the desktop.

According to Ficklin, a $425 IP phone can offer far more functionality than the $600 Meridian phones he previously used. "I have an LDAP-compliant phonebook right on my phone that I can search and scroll through," he noted. "I can see who has called and who I've called. I can also create text messages and broadcast them."

Of course, from an administrative point-of-view, Ficklin's big gain is simplified moves, adds and changes. When users change locations, they simply take their phones with them. The MAC address of the phone allows Cisco's Call Manager system to identify it and transfer all of the user's account attributes to the new location automatically.

It's interesting to note that, according to Ficklin, the technical advance that allowed him to seriously consider VOIP was the ability of IP phones to get their power from the network cable, rather than through a separate power "brick." From a facilities management perspective, he also likes being able to run both the PC and the phone from a single jack.

But the bottom line is that the university is now paying $6,000/month for dial tone over eight PRIs—with virtually no additional cost for moves, adds and changes—rather than $30,000 or more.

It should be noted that, as part of his migration strategy, Ficklin is not commingling voice and data at the demarc. The university's voice trunks are entirely separate from its Internet and WAN lines.

Ficklin also ran into some trouble when the Cisco equipment was first installed, because the young SBC engineer who laid out the initial switching configuration made some basic mistakes that sent traffic through too many switches—undermining the quality of calls made over the local net. Those mistakes were immediately corrected, and the service is now working properly.

It's important to note that, as radical as Ficklin's deployment may appear, it's still just a first step towards a longer-term vision for the university. That vision includes unified messaging, distance learning using IP video, and a variety of other potential revenue-generating communications services that the university could provide to students, faculty and even—by allying itself with a local cable TV franchise—to the off-campus community as well.

### Playing It Safe

Bloomfield, MI-based cable operator James Communications provides a more mainstream example of VOIP cost-justification and migration. The company grew through acquisition, so it soon found itself with a variety of incompatible PBX platforms—including Lucent (now Avaya), Nortel and Toshiba—in each of its seven main offices, which are located in seven different states and are connected by a VPN over WorldCom's (UUNet's) backbone. The company was also spending about $4,000 per month for inter-office calls. In addition, because service calls from customers in every state are directed to the headquarters

Centralized authority and responsibility helps make VOIP happen

location, the company was spending about $8,000 per month for its toll-free support line.

Those factors—combined with the fact that the company was moving towards a more aggressive marketing strategy that would require even greater use of the offices' multiple phone systems—made the staged replacement of his PBXs with IP PBXs a compelling choice for Charles Mann, James' director of data services. "It was really a no-brainer," he claimed. "We priced the 3Com system out at $11,000 per site and that was that."

In addition to the cost savings, Mann felt that the 3Com NBX system would give his company a better handle on group and individual performance across multiple locations. "We're getting the reporting functions we need at a very reasonable price," he said. "Plus, we get the ability to route traffic anywhere between our locations for virtually no cost—which means we can use our human resources more efficiently regardless of location." Mann also finds the NBX's Web-based management interface much more convenient to use than conventional PBX tools.

One problem that Mann encountered was the requirement for an H.323 server at each location to handle the NBX-to-NBX calls across the company's WAN. "H.323 tasks are extremely processor-intensive," Mann noted. "So we would have bought and managed a pretty expensive box at each site." In addition, 3Com would have charged an additional fee for an H.323 server license. "They're supposed to build it into the server in the next version," noted Mann. "But I can't wait for that to happen."

So, rather than buy and babysit an expensive—and perhaps unreliable—H.323 PC-based server, Mann opted to purchase Tenor VOIP gateways from Quintum Technologies. The Tenor gateways provided an easy-to-manage system for routing calls to IP destinations. "It's deceptively simple," said Mann. "You just put the box between the NBX and the data network [Figure 1, p. 45], and tell it which numbers you want to get to by VOIP. Because the Tenors talk to each other over the network, they know where to send any call to those numbers when they occur."

Perhaps more important, the Tenor also provides built-in failover capability. The device continually tracks conditions on the IP network. If congestion, latency or an outage threatens the quality of voice transmissions over the data network, the Tenor automatically re-routes the call over the PSTN. This is done so quickly that it can switch active calls from the IP network to the data network while they're in progress without call participants even noticing that anything has happened.

"That's a very powerful capability when you're talking about a customer service application," said Mann. "It's also a great way to overcome any objections someone may have about VOIP because they're unsure about voice quality or the reliability of the data network."

Mann also has Packeteer packet-shaping devices in place to serve the needs of his Internet users. Those boxes can therefore be used to ensure the prioritization of voice calls over the company's VPN-style WAN.

Ultimately, Mann's goal is to be able to "virtually centralize" any and all data and voice services in whatever location is most appropriate. That is, a billing service might be provided by an ASP connected to the company via a VPN, while a technical support service is handled in-house. But, either way, calls and data can be transparently routed to any of these consolidated resources.

It's worthwhile noting, too, that—as with the UA-Pine Bluff's Ficklin—Mann has sole technical responsibility for both data and telephony at James Communications. Before implementation of VOIP began there, PBX and voice decisions were made by controllers and the contractors/consultants they hired. Mann has therefore been able to take authority over all aspects of the company's VOIP migration without displacing existing internal telecom staff.

### The Gateway Option

Suraj Tschand, president of Aberdeen, NJ-based Parwan Electronics, which makes voice processing solutions, is using the Tenor gateways to perform a very different type of VOIP migration. For one thing, he is not changing his in-house PBX or phone equipment. Instead, he is simply inserting the Tenor between his PBX and his Internet router.

More surprisingly, his purpose in doing so is to enable VOIP calls over the public Internet. That means he has to install another Tenor device on his customers' premises. But, according to Tschand, the scaled-down version of the Tenor that he buys for this purpose is well worth the investment. "You can run up several thousand dollars in phone bills with your biggest customers fairly quickly," he pointed out. "So giving them a gateway can pay for itself fairly quickly."

Tschand and some of his customers in other countries also use their gateways to bypass international long distance and to call other locations in those countries. So, for example, if he puts a Tenor box at one customer's site in Germany, then wants to call another customer in the same country who doesn't have the Tenor box, he might place the call via the first customer's Tenor gateway, from which it goes onto the local PSTN to reach the final destination. This call gets billed to Tschand's customer as a local or in-region call rather than to Tschand as an international call, so the arrangement relies on no one abusing the system.

Like Mann at James Communication, Tschand sees the gateway approach as much less expensive and more practical that the use of PC servers with H.323 cards installed. And, because of its failover feature, he feels confident about installing the Tenor at his customers' premises. He claimed that because of his proximity to a Tier 1 provider's

backbone, call quality hasn't been much of a problem, even if the customer site isn't close to a major backbone. Finally, he said, setting up free voice links promotes strong customer bonding.

Tschand believes that this kind of "voice VPN" is the shape of things to come. "VOIP is a tool to extend your customer reach," he declared. "And it's better than an 800 number, because you can talk as much as you want."

Robert Altinger, director of IT operations at Seattle-based Avanade, is taking another approach to VOIPfailover. When his company formed as a partnership between Andersen Consulting and Microsoft in April 2000, his CEO rejected VOIP because of the risk of data network problems affecting critical voice communications. So the company went with a Lucent PBX architecture that had been used at Andersen.

This year, Altinger discovered Shoreline Communications' solution, which connects to both the local Ethernet LAN and the PSTN. If LAN or WAN connections fail, users can still get dial tone from the PSTN. The only difference is that, for on-net calls, they have to dial the full number and area code when using the PSTN, rather than the five digits they use when the network is up. And, unlike the Tenor box, Shoreline's hardware doesn't automatically switch calls that are already in progress.

Interestingly, Avanade actually had to switch to analog handsets to support the Shoreline system, which meant dumping their digital Lucent units. Call features are driven by Windows 2000 client software on user PCs. This facilitates integration with applications such as Exchange and Outlook—obviously an important consideration for an organization that's selling Microsoft technologies.

## Conclusion

The examples of UA-Pine Bluff, James Communications, Parwan and Avanade demonstrate how varied the VOIP landscape is today. Companies are dealing with different objectives, different existing equipment, different budgets and even different cultures. Any market analysis that attempts to paint VOIP with too broad a brush will miss these important niche differentiators. Such oversight will result in bad advice for buyers who occupy those various niches and for vendors seeking to meet their divergent needs□

**Companies Mentioned In This Article**

3Com (www.3com.com)
Avanade (www.avenade.com)
Cisco Systems
(www.cisco.com)line.com)
James Communications
Packeteer (www.packeteer.com)
Parwan Electronics (www.parwan.com)
Quintum Technologies (www.quintum.com)
Shoreline Communications (www.goshore