

VoIP MANAGEMENT GUIDE

Lessons From the Front Lines

The right deployment strategy can dispel lingering fears about voice and data convergence

WILL 2006 BE THE YEAR THAT VOICE AND data convergence really takes off? Looking back, VoIP was one of the hottest and most hyped technologies of 2005.

Yet despite all the attention, only about a third of IT departments have rolled out full-fledged deployments, according to a recent survey by Forrester Research.

Much of the reluctance can be attributed to the burden that VoIP can place on even the most efficient networks, in addition to concerns about voice quality, scalability, and QoS. Still, many experts say present-day technologies have smoothed over most of the potholes. Nonetheless, there is extensive provisioning

BY JOHN S. WEBSTER | ILLUSTRATION BY RYAN ETTER

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— William Stofega, IDC

involved in implementing and maintaining a VoIP system. Fortunately, the right deployment strategy can dispel any apprehension.

“People were told that VoIP is going to be the greatest thing,” says William Stofega, VoIP research director at IDC. “But in some cases, people didn’t do the necessary network planning. Ninety-nine percent of all VoIP network implementations that fail do so because IT departments didn’t do their homework.”

So, what do you need to make it work? How will you manage it? And how much will it cost? The answers vary and depend on numerous factors. Practically no one is ripping and replacing but rather installing hybrids that put VoIP where it yields the greatest benefit while leaving legacy systems in place elsewhere. Regardless of the scenario, early adopters are providing clear answers.

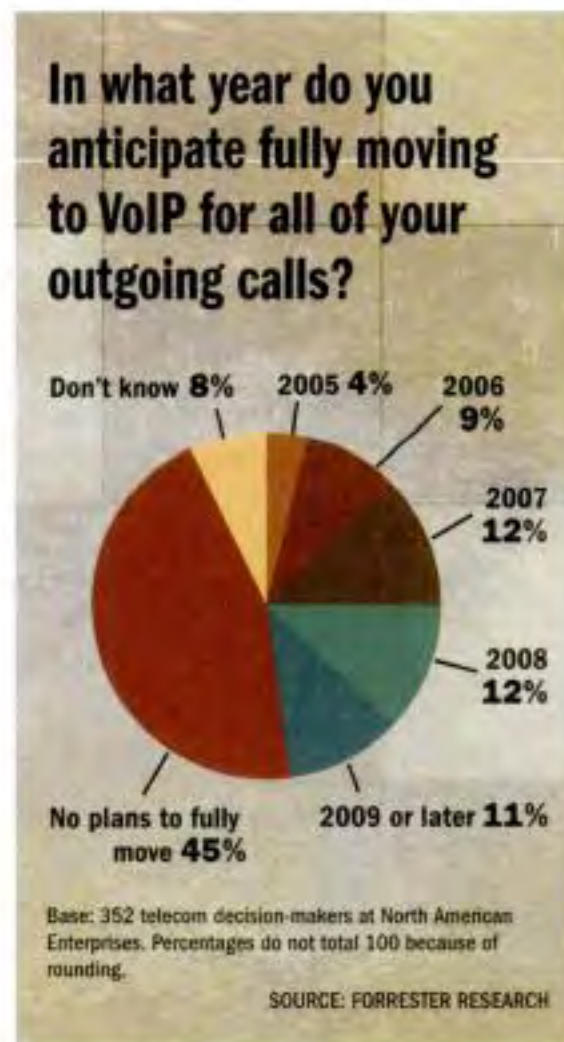
Proceed With Caution

Good planning begins with a comprehensive review of your existing infrastructure. For fees starting around \$5,000, telecom equipment vendors will help you decide which systems can take on voice traffic and perform adequately, and which ones need to be replaced. A rigorous pre-assessment also aids in identifying potential network bottlenecks.

When Erlanger Health System chose Nortel Networks to provide its IP telephony hardware and software, Nortel’s first performed a full network audit. The inspection revealed how little the IT staff understood about impending network requirements, says John Haltom, network director at Erlanger.

The audit “was shocking proof of how much we needed to get a better understanding of our network prior to

going large-scale with VoIP,” Haltom says. For example, networking gear that could handle data traffic with only minor delays would not be capable of handling the stress of voice data, he adds. “We had duplex mismatches, NIC cards chattering in several locations — all of which have some minor effects on data-based traffic,” but with voice they would be a menace.



Of course, audits are a prelude for vendors to sell products, and they “aren’t always looking out for your best interest,” cautions IDC’s Stofega. With that in mind, internal expertise, in addition to conferring with consultants and outside colleagues, become invaluable.

Ensuring that users get the voice services they need also hinges on cabling,

according to Joanne Korsuth, CIO at Olin College of Engineering. Cabling will determine the viability of future services. With an eye toward expansion, you’ll want to consider stackable switches with 24 or 48 ports each.

Power is also a consideration, Korsuth says, “so we have UPSes [uninterruptible power supplies]. That seems like common sense, but with VoIP, wireless, and power over Ethernet, it’s as important a consideration as cooling in closets.”

Martin County, Florida, chose to deploy VoIP at sites that already had fiber optic cable in place, says Kevin Kryzda, the county’s CIO. “We had to consider the network connection and bandwidth. We chose sites for VoIP that have fiber-optic cable broadband connection with a limited number of data network connections, thus considerable available bandwidth,” he says. The network equipment changes began in 2001, when legacy voice services were either replaced or left as separate Bell-South circuits such as fax lines. Voice session quality was the yardstick; so far so good, he says.

Knowing your phone users’ calling habits plays a key role in assuring clear, uninterrupted conversations over IP. “How long are people on the phone? How much voice mail do they want?” Korsuth asks. “Because voice is another IP packet, if students flood the network with MP3s or peer-to-peer connections, you have to rate-limit traffic.”

Analysts estimate that for typical VoIP rollouts, it’s safe to assume that users are on the phone about 20 percent of the time. That percentage rises dramatically, however, at large call centers where employees may be on the phone as much as 85 percent of the time. Those environments typically demand extensive upgrades.

How will your company monitor and manage the VoIP systems and services it acquires?



Base: 352 telecom decision-makers at North American Enterprises. Multiple responses accepted.

SOURCE: FORRESTER RESEARCH

Manage With Care

Upgrading the network was essential when the Arizona Cardinals NFL football organization deployed its VoIP system. The Cardinals' IT staff planned a new training facility and headquarters with VoIP in mind from the start. This ensured that its IP network would be capable of supporting voice, video, and multimedia. The first step was to upgrade its cabling from category 3 to category 6 to handle the demands of video, which is used increasingly by NFL coaches on their laptops, says Mark Feller, the team's technical director. "We upgraded because we were thinking ahead. VoIP demands less bandwidth than video. We put in cable that could handle video."

At Erlanger Health System, it was hard for the IT staff to believe that their tried-and-true switches and cabling would prove unworthy of voice. After close inspection, Haltom says, substantial changes were necessary. "We were hesitant at first to 'doubt' our network because we had just gone through a complete core/edge upgrade with all new [Nortel] Passport 8600 and BPS2000 edge switches," he recalls. "In terms of deployment, we think of this as 'distributing' all the things you may take for granted in a larger computer room facility. Push larger UPS and HVAC units, as well as more and more switch ports out into the closets. ... Layer in the redundant infrastructure and fiber-optic paths to mission-critical areas, and you have effectively

converted your campus, or campuses, into giant computer rooms."

To keep voice moving in Martin County, Kryzda says voice-packet prioritization by means of service-based "tagging" is one way to ensure that voice data gets delivered to where it needs to go first. This method assigns priority to voice traffic and thereby allows it to move on the network at an acceptable rate. It differs from the other common technique, in which a portion of available network bandwidth is "carved out," or reserved for voice services.

With plenty of available bandwidth, Kryzda says the QoS technique did not have to be implemented. "We also had concerns about having to implement QoS to guarantee delivery of voice traffic, preventing echo and warble, but we seem to have enough

bandwidth to have precluded implementing this feature."

Tagging voice packets allows Kryzda to assign packet-tagging priority to the VoIP traffic and monitor it using network monitoring tools for packet loss on each link.

"We upgraded network switches where necessary to support this service-based QoS. We proactively monitor all voice and data network connections using open source-based software monitoring tools, checking for performance and outage issues," Kryzda adds.

A big part of initial planning should be devoted to how to manage the increased load of voice data. Voice data comes with a raft of additional require-

ments, such as increased bandwidth and packet prioritization, and several tactics must be employed to minimize voice disruptions.

"The biggest area of concern for IT managers is performance management," says Irwin Lazar, senior analyst at Burton Group. Managing a real-time application such as voice across a data network can be problematic, he notes, because IP networks were never designed for the strict latency and jitter requirements of voice. "Enterprises require not only a good QoS architecture, but the tools to manage voice performance in real-time, and to be able to both proactively and reactively troubleshoot problems as they occur."

Telecom vendors such as Alcatel, Avaya, Cisco Systems, Nortel Networks,

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— Alan Clark, Telchemy

and others provide management tools along with their VoIP product offerings while network management software vendors, including Brix, NetIQ, Qovia, and Telchemy, have licensing agreements with vendors or sell their products directly to end-users.

The software usually consists of a console that lets IT staff view how well voice traffic is moving across the network, and agent software, which gets

embedded in equipment that sits in the VoIP calling path—gateways, routers, switches, vendor-supplied appliances, and, more recently, IP phones. The agent can report in real time on VoIP quality of service problems, such as packet loss, discard, latency, jitter and signaling issues. But VoIP management software alone is no substitute for expertise in telephony.

At what part of the network should

you measure voice performance? There are several options: at switches, routers, and gateways, for example. The most crucial spot, however, is at the end point where problems are most noticeable to users.

“Nothing can substitute for the end-user experience,” says Alan Clark, CEO of Telchemy, a provider of network management software to telecom vendors. “There are 12 different rout-

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VLANs Avoid the Migraine of Maintaining Separate Networks

ALTHOUGH THERE MAY BE NO SUCH THING AS A DUMB QUESTION, there is a persistently misguided one involving VoIP deployments: Should VoIP be installed on a dedicated network separate from the data network?

It would seem to make sense, but according to Kevin Kryzda, CIO of Martin County, Fla., a separate deployment negates the primary advantages of VoIP. “The physical considerations of deploying separate networks flies in the face of the whole game, which is convergence,” he says.

When Martin County began to consider adding VoIP, back in 2001, Kryzda’s IT staff explored the idea of separating the voice network and its services from the rest of the county’s IT infrastructure but soon abandoned the idea. Because the county uses 100Mbps fiber-optic cable broadband connections to its VoIP sites and keeps the number of desktop computers to a minimum — fewer than 10 — on that segment, bandwidth has not been an issue. In some cases, the IT department used dedicated fiber for voice traffic over its Alcatel-supplied IP PBXes for PBX-to-PBX node connections, which also helps keep voice data moving evenly across the network. “Instead of building a separate network, you build a virtual network, or VLAN,” Kryzda says.

Essentially, you want to place your IP PBXes in different VLANs than your other application servers and put them behind a firewall. This separation doesn’t mean you need two different infrastructures, but it does mean using your switches’ 802.1Q capability. By setting up your VoIP network using VLANs with dedicated QoS resources, IT managers can divvy up traffic into data packets, voice packets, and signaling. In the case of VoIP, the VLAN sits between the desktop and IP phone, and the closest IP-enabled network-attached switch.

IT staffers at Erlanger Health System went through a planning

process similar to Martin County’s and asked the same question. The answer was still no. The organization’s voice services switches are isolated in its computer room — otherwise, it has maintained a unified environment. Although the VLANs prevail, Erlanger is holding out until the technology can support port-level segmentation, says John Haltom, network director at Erlanger.

“All our IP Phones have pass-through hubs built into them, [and] we felt it was just too much of an administrative issue to maintain separate VLANs or voice and data. ... Just too much to keep up with for too little benefit,” Haltom says.

He adds, however, that Erlanger’s use of Nortel’s IP Media Gateway — part of the company’s IP multimedia server products — allows him to “extend analog and digital devices out into the edge closets and choose how best to get the traffic back to the core.”

In the future, Nortel’s Secure Network Access end-point security will help the organization segment voice and data, in effect creating VLANs at the port level, each with its own rules and policies, before an end device such as an IP phone can gain access to network resources. This will allow him to be “a traffic enforcer to interrogate packets and, with threat detection, shut off the port if necessary,” Haltom says.

In the end, nobody seems to savor managing two separate networks for voice and data. “That’s the old line of thinking,” says Hank Lambert, director of product marketing for the voice technology group at Cisco Systems.

William Stofega, VoIP research director at IDC, agrees. “There is no point in deploying VoIP if you do it on a separate network. I have talked to a few folks who considered it, primarily due to security concerns, but the idea was quickly dismissed.”

— J.S.W.

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Sticker Shock

Financial constraints are still an obstacle for many IT departments, according to Forrester Research, but users are finding ways to justify expenditures through significant ROI. (Hardware and solutions can range from \$10,000 to \$100,000.)

According to Erlanger’s Haltom, “Our fit is a pure ‘cost avoidance’ model where we utilize new construction and renovation in all areas and campuses to rip out existing voice and data networks and consolidate it all into one single network, thus avoiding the expense of [things like] the second line, patch panel ports, other materials, and the best part — managing one network infrastructure instead of two.” (See “VLANs Avoid the Migraine of Maintaining Separate Networks,” page 25.)

Those who have gone the distance say the cost is worth it. Hank Lambert, director of product marketing, voice technology group, at Cisco emphasizes the importance of an initial network audit, saying that it will save the company money in the long run.

In addition, “you have to look at the vintage of all the Ethernet switches,” Lambert says. “You should have Ethernet layer 2 and routing layer 3. You also do want to get the tools. Make sure they’re good and in your budget from the beginning. That causes disappointment among executives when all of a sudden the cost of tools is added to the equation. You can pay [up to] \$20,000 for Cisco’s tools in a medium-sized company,” Lambert says.

On the Horizon

Costs aside, performance stands to improve even more in the year ahead.

VoIP Management Solutions

Company	Product	Description
Agilent Technologies agilent.com	Agilent Voice Quality Tester	Performs voice quality testing and analysis for VoIP networks
Alcatel alcatel.com	OminVista 4670	Monitors VoIP call traffic and quality
Avaya avaya.com	Converged Network Analyzer	Assures availability of IP communications along with business applications
Brix Networks brixnetworks.com	BrixWorks, BrixMon	Provides carrier- and enterprise-grade control, visibility, and analysis of VoIP performance
Cisco Systems cisco.com	CallManager	Ships with Cisco’s Media Convergence Server and includes voice QoS features
ClearSight Networks clearsightnet.com	ClearSight Analyzer	Performs voice quality measurement and VoIP troubleshooting
Fluke Networks flukenetworks.com	OptiView, Netfool VoIP	Monitors and troubleshoots bandwidth usage and QoS for VoIP
NetIQ netiq.com	AppManager for VoIP, Vivinet Diagnostics, Vivinet Assessor	Monitors performance and availability of IP telephony systems and apps; performs call diagnostics and VoIP predeployment network assessment
Nortel Networks nortel.com	Enterprise Network Management System, Enterprise Policy Manager	Identifies and resolves problems and performance bottlenecks before they impact network services
Qovia qovia.com	Qovia for Cisco, Qovia E911 for Nortel, Qovia for NEC	Provides VoIP call quality monitoring and management across voice networks (used with Qovia Central software)
Siemens siemens.com	HiPath QoS 2000	Includes VoIP monitoring, policy, implementation, and reporting tools
Telchemy telchemy.com	VQmon series	Detects and diagnoses VoIP call quality problems
WildPackets wildpackets.com	OmniPeek Voice	Allows users to view, analyze, and troubleshoot VoIP traffic

For one thing, vendors are expected this year to offer products that allow for QoS reporting calls based on SIP. Meanwhile, standards such as RTPC-XR (RTP Control Protocol Extended Reports), currently in the RFC stage with the IETF, will allow for better end-point monitoring, according to Telchemy’s Clark.

“Performance management frameworks use these standards, and they need IP phone suppliers to support these,” Clark says. “Test-equipment vendors use them. We gave [the IETF] ... key information they needed about protocols,” Clark says.

Emerging standards will also help keep voice performance at a satisfactory level. Haltom says he looks forward to the IEEE’s emerging PVQM (Proactive Voice Quality Monitoring) standard,

developed with Telchemy and based on RTCP XR. “This is what we are truly waiting on to get [fully] implemented over the next couple of months in order to gain a pro-active handle on VoIP session-related issues such as echo, jitter, and other latency-type issues,” he says.

Whether these maturing technologies will entice the holdouts to move to at least the pilot stage in 2006 is uncertain. Being sure about what you’re getting into is the only way to craft a deployment strategy to carry your company forward.

“You’re blending two network worlds that are fundamentally different,” says Tim Gaines, vice president of field sales at Covad, a provider of integrated voice and data service. But, he adds, they can and do coexist peacefully. ☛