



Optimize

Ideas. Action. Results.

Voice Over IP: The Right Call?

Easy provisioning and unified messaging are clear advantages, though rollout costs and voice quality could give some the jitters



by Andrew Conry-Murray
August 2006, Issue 22

Photo by
Marcio Jose
Sanchez/AP

One of your many jobs as CIO is to ensure the free flow of information across the company, regardless of communications platform. But as your workforce expands numerically and geographically, how do you keep satellite offices and remote employees in the loop? Voice over IP (VoIP) could be the answer if you can look past some of its challenges, which include high implementation costs and occasional lost or delayed packets.

On the upside, using a single network for both voice and data lets converged communications applications streamline the tangle of voice, instant-messaging (IM), and E-mail channels. Current IP PBXes are viable replacements for circuit-switched telephone systems based on time-division multiplexing (TDM). IP has already established a stronghold in the marketplace, and its role should expand.

One key advantage of IP PBXes is that they ease deployment and provisioning, especially for companies with mobile workers, or those seeking to connect new employees quickly or to move people to new locations. All a worker needs is an Ethernet jack and a handset or softphone, a software-based phone for VoIP that's installed in the user's PC.

Just ask Gregg Davis, senior VP and CIO at Webcor Builders, a construction company based in San Mateo, Calif., about the provisioning speed afforded by VoIP. Webcor regularly sets up offices at multiple construction sites—currently, it has 31. Whereas it might take weeks to set up a traditional phone line at a job site, Davis says an Internet connection is available in days. "We just hand employees a VoIP handset and say, 'Here's your phone and computer—plug it in anywhere you have Internet access.'"

Davis finds VoIP superior to cell phones. For one thing, it provides PBX features, such as four-digit dialing and interoffice transfers. In addition, cell coverage is often spotty at remote sites; Internet access is more dependable, Davis says.

Of course, VoIP requires sufficient bandwidth to ensure call quality, which means you have to choose an appropriate Internet connection. For a small remote site with just a few employees, you may make do with a broadband connection such as DSL, which runs about \$40 a month. However, any site with more than a handful of employees will require a T1 if you plan to use VoIP with E-mail, Internet access, and other applications. Depending on the carrier, a full T1 connection (1.5 Mbps) will cost from \$400 to \$1,000 per month. Fractional T1s cost less.

Michel Labelle, network manager of Terminal Systems Inc., a port-management company based in Vancouver, British Columbia, cites provisioning as a key VoIP driver. His company is adding employees and moving others between a pair of office buildings. Adds, moves, and changes were cumbersome with a TDM network. "With VoIP, they simply log in to the phone to get access," Labelle says. Phone-service provisioning time has dropped from an hour per user to minutes or seconds—a significant time-saver.

Another major advantage is unified messaging. Many VoIP vendors include an IM client, videoconferencing, and a presence feature that lets users check the availability and location of co-workers. Other capabilities, such as the ability to forward a VoIP call to a cell or home phone, or to leave a voicemail message in an E-mail in-box, also promise to streamline communications.

And because VoIP runs on the same network as your business applications, you can enhance mission-critical business functions by adding voice. For instance, if VoIP is integrated with a CRM database, call-center employees can have key customer details on-screen during the conversation, helping them to provide better service.

Money on the line

But as your CFO will be sure to point out, a VoIP rollout is expensive. Costs can vary, depending on the size of your organization and the condition of your network hardware. A 1,000-line system will run between \$750,000 and \$900,000, according to research firm Current Analysis. Other costs include consultant fees and training for the IT staff and users.

If your current PBX is still providing acceptable service, a wholesale replacement will be difficult to justify—especially if the main incentive is convergence, where ROI is difficult to quantify. What's more, none of VoIP's advantages will mean much if your network can't provide sufficient call quality.

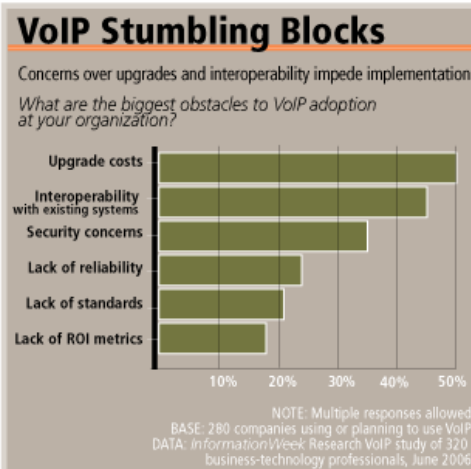
VoIP calls are susceptible to delayed and lost packets, and they can't tolerate network congestion. And because calls are in real time, there's no second chance to transmit packets. So, aside from buying VoIP equipment, you may have to upgrade your network to support packetized voice. First, be sure that your switches can support virtual LAN (VLAN) and quality-of-service (QoS) standards—switches that don't will require a software upgrade, at a minimum. Second, make certain that your network architecture is sufficiently provisioned.

When TSI decided to move to VoIP, Labelle ripped out and replaced the existing switch architecture and upgraded to Gigabit Ethernet to the desktop. The new switches also support Power over Ethernet, which Labelle uses to supply electricity to VoIP handsets. Webcor's Davis upgraded his infrastructure as well, with GigE to the desktop and 10GigE on core switches.

You can hedge your bets with a phased deployment of VoIP. Some vendors, such as Avaya, can support both VoIP and TDM phones on the same PBX.

VoIP deployments make especially good sense for enterprises using GigE to the desktop. Packetized phone calls can capitalize on the additional bandwidth. In fact, users can enjoy business-quality phone calls on a Fast Ethernet network. In either case, architects should avail themselves of the QoS standards—802.1p/Q and DiffServ—to ensure that voice packets get priority treatment in switching and routing queues.

If you're running 10GigE in the data center and GigE to the desktop, you're well-provisioned for VoIP. A 10GigE backbone should support more than 100,000 simultaneous VoIP calls, depending on the codec used. Of course, VoIP doesn't require a GigE network; 100-Mbit access switches will suffice.



From a network standpoint, architects can't rely on bandwidth alone to ensure that calls travel smoothly across the network. VoIP traffic must get priority treatment as packets pass through switching queues, which means setting up standards-based VLANs and QoS. To preserve QoS for voice on routers, you must implement DiffServ, a standard that creates class-of-service categories.

VoIP still aspires to deliver call quality on a par with plain old telephone service. So even with traffic prioritization, you'll need to measure VoIP traffic to monitor internal service-level goals, identify potential trouble spots, and respond to end-user complaints. Traditional network monitoring and management systems from vendors such as Concord Communications, Micromuse, and NetIQ are slowly integrating VoIP call-quality capabilities. Meanwhile, a newer crop of vendors—including Brix Networks, Clarus Systems, and Qovia—is selling VoIP-specific testing and monitoring equipment. Some VoIP phones and gateways generate operational statistics that can be correlated with call quality or used to identify poorly performing systems.

To evaluate QoS, it's important to understand how metrics devised for circuit-switched networks apply to the world of packets. In the old-telephone world, call quality is measured subjectively by a Mean Opinion Score, which has a range of 1 to 5. A score of 4.0 is "toll quality," telephony's gold standard. The International Telecommunication Union offers two alternative, objective standards: the Perceptual Evaluation Speech Quality test, which measures distortion by comparing a sound file with an ideal sample; and the E-Model, which tests for delay, echo, and distortion using a metric called the R-factor.

Tools that make use of all of these tests are just now becoming widely available in the VoIP realm. Some technology is embedded in third-party VoIP gateways, IP phones, chipsets, and network-management systems. For instance, Nortel Networks uses Telchemy software in its VoIP phones, and Micromuse licenses technology from Psytechnics.

Making the switch

Sales of traditional telephony systems are plummeting while IP PBX sales are on the rise, a clear indication that VoIP systems are stable and sufficiently feature-rich for the enterprise. If your company hasn't already switched to VoIP, the question isn't whether to make the move, but when.

While impediments to deployment exist, VoIP advantages outweigh disadvantages. Provisioning new users and moving or changing existing employees truly are cases of plug and play. This reduces IT costs and gets users on the job right away.

Even more compelling is the integration of business applications with your telephone service. VoIP can enhance communication through presence functions that help users find the best way to contact co-workers—whether through a phone call, IM, or E-mail. In addition, it can boost productivity by letting users place a phone call simply by clicking on someone's name in a Word document or Web browser. When integrated with applications such as CRM, VoIP can improve business processes as well.

So when is a good time to switch to VoIP? If you're ready to replace an aging PBX, have at least two VoIP vendors on your shortlist. If your current telephony infrastructure is sound, consider a phased rollout using a hybrid TDM/IP PBX, particularly if you can identify multiple business applications that voice integration could enhance. And strongly consider a VoIP deployment if you've undergone a significant network overhaul or have one on the drawing board.

Keep in mind that to get the most out of VoIP, you must have the proper network infrastructure and a good set of voice-quality testing tools. That said, the future of business telephony is clearly moving toward VoIP—and the future is now.

Andrew Conry-Murray is business editor at Optimize's sister publication Network Computing.

Is VoIP right for your organization? [Tell us.](#)

