



# VoIP: Challenges, Drivers, Hurdles and Recommendations

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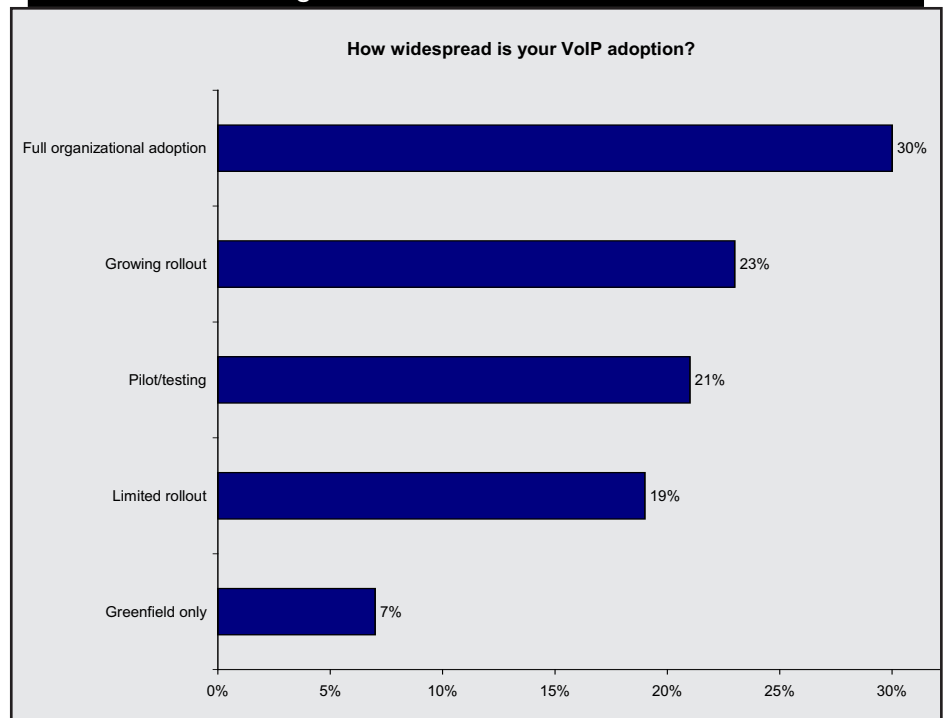
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**Ask any IT executive about his or her plans for Voice over IP**, and the door opens for a full-blown conversation. Opinions about cost savings or lack thereof, vendors vs. carriers, end-user adoption and management complexity could make you wish you never asked the question! Indeed, it's rare to find anyone who isn't doing *something* with VoIP. That "something" can range from light assessment to company-wide adoption — and it almost always includes a strong opinion on some aspect of the technology.

About 71% of organizations are using VoIP in some capacity, according to Nemertes' "Convergence: Reality at Last" benchmark, which includes detailed plans and data from 65 IT executives across a range of industries and revenues. Only 4% have no plans at all, and the remainder (25%) plan to use the technology within the coming year.

Figure 1 describes how those 71% of companies are using VoIP. Only 30% — mostly small and midsize companies — have it deployed throughout the organization. Another 23% are engaged in a "growing rollout." They have made the decision to adopt VoIP and are in the process of installing it. About one in five simply is running a pilot, and 19% have a "limited rollout," meaning they are tactically deploying VoIP at specific locations only. And 7% — all large companies — only are installing VoIP in a new building or location.

Figure 1: VoIP Rollout Details



IT executives also are becoming more comfortable with VoIP as a technology. They are confident that it works and that sound quality, providing the network is architected properly, will be up to par. (In fact, in many cases, the sound is too clear, causing end users to think they've lost the connection during momentary lapses in conversation. IT managers actually tune the phone systems to add slight static into the call so it sounds more like a traditional phone call.)

Organizations have a few options for implementing VoIP. They can do an in-house project, whereby they install the IP call servers onsite. In that case, they would either replace the current infrastructure with pure IP (31% adopt this approach); or implement a "hybrid" approach, by either adding IP cards to current TDM PBXs, or by running some pure IP call servers, some pure TDM PBXs, and gateways (69% adopt this approach).

There is a growing interest in carrier-based offerings, as well. Currently, only about 11% of the participants in Nemertes' benchmark use services, and these are primarily companies with international traffic that want to save on toll charges and don't have the IT resources to deploy and manage a global VoIP infrastructure. However, in the next 18 months, Nemertes expects companies to adopt carrier services — including managed PBX, hosted PBX, and hosted collaborative applications — more readily, particularly as they try to extend the technology to branch offices.

Nemertes also sees organizations gaining interest in video over IP and in VoIP over wireless. About 40% of companies are doing some video over IP, 30% have no plans, and the remainder are assessing or planning to run video over IP within two years. Today, we primarily see companies shifting their room-to-room traffic from an ISDN-based carrier service over to IP for cost savings. Though some are running desktop videoconferencing, those are typically in the trial stages. Interestingly, one CIO says he prefers desktop videoconferencing over voice alone: "My tendency is to do a videoconference rather than a phone call. Our usage for [long-distance] internationally has dropped significantly because it's so easy. You can sit there and do the video," says the CIO of a manufacturing company that runs video over IP.

Integrating the features of VoIP with wireless or cordless devices also is gaining some interest. About 24% of the partici-

pants of the Nemertes' benchmark are using wireless/cordless over IP today; 32% have no plans, and the rest are assessing or planning to integrate VoIP with their wireless infrastructure within the next three years. Companies in healthcare, manufacturing, financial, and higher education are finding the greatest success today with wireless VoIP phones that work with their current Wi-Fi infrastructure. "Hospitals have no power over the doctors," says the CIO of a large Midwest healthcare company, which is building a high-tech hospital that will include wireless IP phones. "Healthcare is becoming more of an information business. Pressure is on the doctors to take care of more patients. To do that, they have to have access to the information."

The bottom line: A majority of companies are discovering compelling reasons to use VoIP, from both financial and productivity perspectives. A minority of the benchmark sees no value in VoIP, citing lack of cost savings, no need to change a TDM system that works, and a lack of applications as primary reasons. But even the naysayers admit that they'll eventually get there (even if they're kicking and screaming) because vendor support and innovation in TDM systems is waning. Like it or not, we're looking at a future that ultimately is all IP.

### Business challenges

That future affords many advantages — if a network is architected properly. Staffs enter VoIP projects thinking they're simplifying their infrastructure by eliminating two distinct

## Voice over IP

Smart planning and choosing the best tools will ensure your ability to monitor, manage, troubleshoot and test for VoIP on your network

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networks for one. Initially, that's true. But VoIP typically is the first application on a larger converged infrastructure — one that is growing ever more complex.

Typically, VoIP implementations are the first phase of a larger convergence project. As companies invest and upgrade their IP infrastructures to support voice traffic, executives want to see the network further leveraged. In doing so, they're considering several applications, though they typically roll those out at least six months after the voice traffic is running predictably over the IP network. The applications include audioconferencing, desktop/Web/room videoconferencing, presence, instant messaging, CRM/contact-center integration and those that are industry-specific.

Combine voice and other real-time applications with additional business apps, Web services and customer-facing portals, and the result is an increasingly complex network. Yes, applications ride over a common infrastructure, but each application has different performance requirements and expectations — and that puts a heavy burden on network managers to make sure their networks perform reliably, consistently, and predictably.

Making matters more complex is the increase of remote workers. On average, 90% of employees work away from corporate headquarters. And, within the past five years, the number of employees working away from their supervisors has risen 800% there are good reasons for these trends: Real estate is cheaper for smaller suburban or home offices. Companies pay between \$11,000 and \$20,000 per year, per employee in real-estate costs in major metropolitan areas, according to Nemertes' "The Virtual Enterprise" benchmark. Move employees to suburban areas, and that cost drops to \$5,000 to \$7,000 per employee. And to set up an employee at home costs an average of \$6,000, but it's a one-time fee.

The real-estate figures are compelling, so it's important for IT not to throw cold water on this successful financial strategy. In order to ensure employee productivity, regardless of where they're located and how mobile they are, companies must invest in collaborative tools. What's more, remote workers expect little to no performance degradation when accessing data and applications over a WAN or when using VoIP.

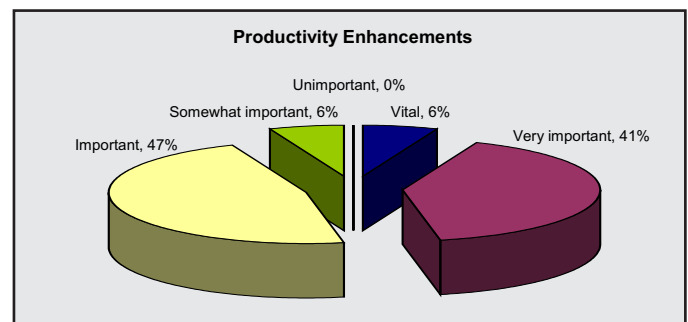
## Business drivers

The challenges of converging network traffic are plentiful. So what's driving companies to implement the technology? The business reasons for such strong VoIP adoption are compelling. They fall into three main categories: cost savings, productivity improvements and competitive advantage.

VoIP can reduce overall network operational costs considerably: International toll rates can decrease by 20% to 40% depending on the country; local loop cost reductions range from 25% to 60%; and moves, adds, and changes (MACs) drop nearly \$100 per incident.

Furthermore, many companies have found substantial cost savings by moving their audioconferencing and videoconferencing traffic to the IP network. For example, a manufacturer had been paying a major carrier \$317,000 per year for conferencing services. After spending about \$170,000 on IP video equipment and running video traffic over the IP network, the company realized a five-month payback.

Productivity is more difficult to measure in hard dollars. Nemertes has documented that employees are able to save anywhere from 10 minutes to one hour per day because of tools companies have implemented in conjunction with their VoIP rollout. For example, knowledge workers typically save 10 to 20 minutes per day by using unified communications (reading their voice mail rather than listening to it) and other collaborative tools such as presence (knowing how to track someone down right away). However, it's difficult to verify that they're spending that extra time for the company and not to make a phone call confirming the evening's party plans.



There are some clear productivity benefits when it comes to automated attendant features on most VoIP systems. One entertainment company, for example, eliminated or re-assigned all but three receptionists to field calls for and between 10 U.S. offices. With VoIP, transferring calls between cities doesn't result in toll charges. The company saved more than \$90,000 per year in salaries.

VoIP also can provide some competitive advantages. For example, by using collaborative design tools, manufacturing companies can bring products to market quicker than their competitors. The individuals involved save time by not having to travel, and the company can better afford the real-time portion of the tools when they're running over an IP infrastructure. In other companies, salespeople trying to close a deal, but who need a critical piece of information, often rely on presence. By reaching the person immediately to get an answer, they're able to close deals on the spot, rather than getting back to the prospect later — and losing that momentum that's crucial to any sales process.

## Implementation hurdles

As companies start their VoIP implementations, they face several obstacles. Chief among these are business, product assessment and a variety of technical challenges.

Developing a compelling cost assessment is a task that IT executives should not underestimate. It's time-consuming, requires information-gathering and some solid spreadsheet skills. Nemertes recommends the following best practices:

- Spend time with your staff and the business units to determine the primary business drivers. Is it cost savings? Revenue generation? Improved productivity? Improved competitiveness? Then, create cost models around the key drivers. Additionally, ask department heads about the challenges they face. Chances are, you'll find IT — and specifically VoIP or collaborative applications — can solve some of them, though the department head didn't realize it.
- Assess raw cost savings, productivity enhancements and general business improvements that come from converging your traffic. Gather hard numbers from department heads on current costs, and then evaluate potential benefits.
- Make sure productivity enhancements directly tie to hard-dollar savings or revenue generation. Stating that each employee will gain 30 minutes per day because of a collaborative tool doesn't guarantee that the employee will use that 30 minutes for the company's benefit. However, showing that access to the right individual at the right time will close more deals, and thus, boost revenue, will get the CFO's attention.
- Don't overlook the business value of network optimization, VoIP-specific management tools, reduced cabling costs, and the monthly savings that quickly add up with telecommuters. Assess current TDM, broadband access, and cellular costs and compare with a converged solution. The results are typically compelling.

Once the cost-model is developed, document the success and productivity of the project. Conduct baseline network performance tests immediately so that it's easy to see how the network, application, cost, and end-user satisfaction change or (hopefully) improve. These data points make it easier to gain budget and support for project expansion or related technology rollouts in the future.

Organizations should benchmark performance levels prior to adding any voice traffic onto the network so that they have a basis for comparison. The second benchmark should be conducted after the network is optimized for voice traffic,

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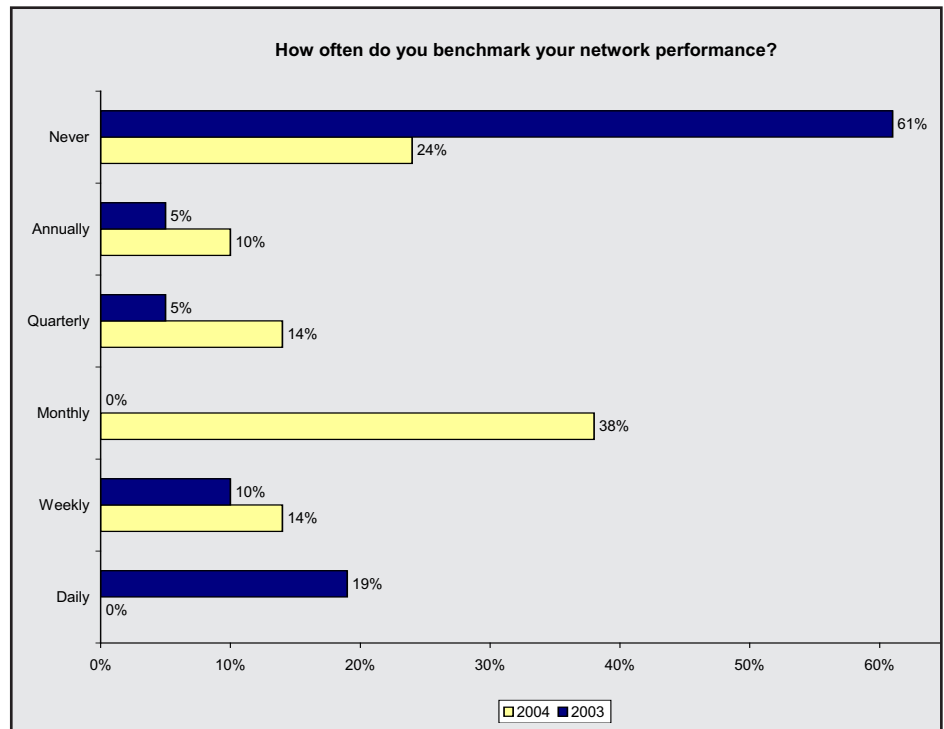
and the third immediately after voice traffic runs successfully on the IP network. From that point, Nemertes recommends benchmarks monthly for at least the first year, and quarterly after that.

There are some key reasons to benchmark performance. If end users complain about quality, and network managers can quantitatively show that the performance benchmark has, in fact, improved, it helps resolve the perceived problem. Or, if it's time to request budget funding for the next project, before-and-after benchmark figures showing success will breed confidence in upcoming IT projects. Nearly 25% of companies don't benchmark their network performance at all — and that's a big problem. On the bright side, though, that number has decreased significantly from 2003, when 61% of companies didn't benchmark performance at all.

In addition to straight-forward benchmarks, organizations must conduct or hire a third party to conduct a baseline network assessment, or a network readiness test, prior to adding voice traffic onto the network. The purpose of these tests is to make sure the network infrastructure is architected for various traffic types, from real-time to chatty to file-transfer applications.

About 60% of companies conduct these assessments today — a percentage that is way too low. The tests typically run simulated voice traffic over the IP network and determine whether both the LAN and WAN are poised to handle the additional load. A test should include the following:

- Check to see if all the routers and/or switches will be able to handle voice traffic over the network, in terms of capacity and QoS capabilities.
- Assess the average utilization of the WAN. Nemertes typically finds average utilization ranges from about 30% to 60%, and peak utilization ranges from 40% to 80%. By analyzing the on-net traffic percentage (average in the Nemertes' benchmark is 30% to 40%) they get an idea of how much internal voice traffic may end up riding on



the IP network. (Typically, voice increases the traffic load by about 30%.)

- Send simulated voice packets over the network to model how it might perform once the traffic is converged, and adjust the network accordingly.
- Evaluate the need for network-optimization tools that can leverage current bandwidth through compression and latency-reduction techniques.

All too often, IT executives, vendors, and resellers say, "Voice is just another application. What's the big deal?" Voice and other real-time applications are *not* the same as data applications in terms of tuning and ongoing management. The media — and some of the equipment vendors — have conditioned network managers to think that VoIP makes everything simpler. As long as they can measure the basics, such as latency, packet loss, and outages, the network will be fine — or so they think.

As organizations forge ahead with their VoIP rollouts, IT and network managers say they're becoming overwhelmed with the growing complexity of the network. They notice degraded

performance from specific locations at certain times of the day, but they don't have the tools in place to drill down and figure out why the problem is occurring. A well-run network, therefore, requires more detailed data, often in real time.

What do network managers want? They want management tools that detail which applications use how much bandwidth and when; mean opinion score of selected voice traffic; root-cause analyses for network slowdowns or outages; QoS performance in the routers and in the carrier networks; policy-based QoS; business/financial impacts of outages; and performance characteristics of the network and of branch office locations. They also want tools that provide end-to-end management data, giving them a holistic view of the network from edge to core.

The problem is that very few management products or services actually provide all of this information. That's why it's imperative for IT staffs to evaluate what they need early in the process so that they select the right management tools. Admittedly, this requires some crystal-ball forecasting to determine what parameters will emerge as the network evolves. But by adding a line item for management tools in the initial budget, organizations will ensure that funding exists when they need the tools. Midsize companies should budget about \$50,000 for management tools; large companies should budget a minimum of \$100,000, though this figure often climbs higher.

Only about 25% of companies budget for VoIP-specific management tools at the outset of their project. Only 41% actually have conducted a baseline network assessment; and about 60% conducted or plan to conduct a baseline network assessment. IT staffs increasingly acknowledge the need to conduct the assessment, but they often think that they don't need to continually monitor or benchmark the network once it's been optimized for voice traffic.

It's imperative for IT and network managers to have a clear view into the network — at all locations — to ensure predictable, consistent performance for all applications traveling across the WAN. Adding voice to the IP network adds a new level of complexity that current monitoring tools aren't equipped to handle.

It's also critical to tie network and applications testing and ongoing management capabilities to their strategic IT initia-

tives early in the process. Without proper testing, strategic initiatives can fail — with dramatic consequences. There is, of course, the hard-dollar cost associated with a failed project (reconfiguring networks and databases after the fact is always more expensive than doing it right the first time).

But there's also the opportunity cost: If a strategic initiative must be put on hold because of unforeseen problems, the lag time can cost the company millions in lost revenues and market opportunities. Moreover, highly visible failures cost IT credibility with executives and end-users.

A large healthcare firm takes in \$300 million per day, mainly from call-center traffic, so even a few minutes of downtime can cost millions of dollars. The call centers increasingly are using VoIP. "Performance management and capacity planning tools are vital," says the director of systems management. He rates the IP PBX vendor tools a "3" on a 1-to-5 scale, and says, "Many things are lacking." Finding the right management tools are top on this company's priority list.

## Vendor/carrier assessment

Another problem is that companies are not broadening their horizons when it comes to vendor evaluation. Nemertes strongly recommends that organizations cast a wide net when they're assessing VoIP providers. Today, 57% of companies assess one or two vendors, typically their incumbent PBX and/or router vendor. Companies should assess a minimum of four vendors and carriers because there are numerous options available beyond the incumbent providers.

Furthermore, IT and network managers shouldn't limit their assessments to phones and switches. Consider the following criteria during vendor/carrier evaluations:

- Engineering, design, integration capabilities. What services does the provider offer? What has the company done in the past, and can you speak to referrals?
- Applications. What applications are available? Do they provide unified communications, real-time communications dashboards, contact centers?
- Standards compliance. Do they support SIP or H.323 *today*? Few vendors do, and that could cause problems in the future when adding third-party applications or handsets.

- Installation assistance. What level of support do they offer with the installation and initial troubleshooting?
- Ongoing management tools or services. How sophisticated are the management tools? What data points do they provide? Are they measured in real time?
- Network optimization tools. Does the vendor/carrier integrate optimization technologies (compression, latency reduction, route optimization) in with its products? Do they partner with a third-party vendor? If not, assess a third party.
- Remote-office architectures. How does the vendor/carrier address remote/branch offices? Is there redundancy built in? Are they managed as silos?
- Overall solution experience. Does the vendor/carrier have experience crafting overall converged solutions? What have they done?

Provider evaluations shouldn't end with the PBX or router vendors. IT managers should take the time to assess VoIP-specific management vendors and third-party application providers. Typically, the PBX/router vendors, as well as the carriers, do a good job providing the basics for management data and additional applications (indeed, some vendors provide fairly compelling collaborative applications and real-time communications dashboards). But to get more sophistication and insight, particularly with management tools, specialty vendors offer the most value.

### Best practices recommendations

VoIP implementations are time-consuming, but IT executives consistently report that the effort was time well spent. Again, the key is proper planning and creative foresight.

At the outset, conduct a baseline network assessment to ensure the network is designed to handle additional traffic types. Benchmark network and application performance to measure success — or failure.

Cast a wide net for vendors and carriers, and look beyond the basics. Evaluate a minimum of four call server/PBX vendors or carriers. Assess specialty management tools and third-party applications, particularly those marketed for your industry. Budget for management tools.

Also, don't overlook training. Companies should plan on spending between \$1,700 and \$2,500 per person on IT train-

ing (though this is often a point of negotiation and vendors will provide this at no charge). End-user training works most successfully if conducted in-house. Initial training should take about 30 minutes, and companies address more sophisticated applications in follow-up sessions.

Finally, make sure you have the appropriate level of support during the installation and troubleshooting phases. Implement QoS in the LAN and WAN.

Keep in mind that there's no reason to rush into a deployment. About 25% of the IT executives who participated in the Nemertes' benchmark say this was one of their biggest mistakes. "Really investigate why you want to [deploy the technology], what your requirements are going to be, and whether your infrastructure can support it," says the senior technical director of a professional-services firm. Take the time to evaluate all credible options and make sure the cost analysis includes all possibilities.

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