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*Internet telephone technology, rapidly displacing the traditional kind, isn't just inexpensive. It's revolutionizing the way companies coordinate people and information, connect with customers, and compete with one another.*

## Using VoIP to Compete

by Kevin Werbach

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Since Alexander Graham Bell's day, businesses have bought telephone services the same way they've purchased electricity, janitorial functions, and water for the cooler—as packaged offerings defined by an outside provider. Sure, companies could choose from a menu of configuration options and service plans, but, in the end, the phone company or vendor called the shots. The breakup of telephone monopolies such as AT&T in the 1980s changed the mix of providers, but it left intact the century-old public-switched telephone network they employ, and it left service decisions up to suppliers. As a result, companies have been constrained—more than they know—by the legacy phone systems they've depended on.

That's changing fast. While the vast majority of individuals and companies still rely on conventional phones, an estimated 10% of international phone traffic now travels over the Internet using voice over Internet protocol, or VoIP. Most telling, this year, for the first time, U.S. companies bought more new Internet-phone connections than conventional phone

lines (see the sidebar “How Big Is VoIP?”).

VoIP isn't just a new technology for making old-fashioned calls cheaper. What makes it so potent is that it turns speech into digital data packets that can be stored, searched, manipulated, copied, combined with other data, and distributed to virtually any device that connects to the Internet. Think of it, basically, as the World Wide Web for the voice. IP, or Internet protocol, simply refers to the technical standards that govern how digital information is encoded. Because of these common standards, VoIP can interact seamlessly with other Internet-based data and systems.

These might seem like technical nuances best left to your CIO. But consider this: Since VoIP turns voice into Internet-friendly data packets, it can—and will—replace the rigid, packaged phone services that most companies still use. And because it will allow businesses to create their own customized phone *applications*, it will shift control of phone services from providers that have historically defined (and limited) them to the companies that use

them. VoIP will serve as the unifying platform for such applications, supporting ever more customized, intelligent, and strategic uses of voice communications. As some innovative firms are already showing, this flexibility can fundamentally affect how companies use voice to compete, allowing them to set up and conduct business in ways that simply couldn't have been done before—or that were so impractical that no one would have bothered.

### VoIP as a Platform

When you call a colleague's office from yours using a traditional circuit-switched phone, the call originates from the hardware on your desk, travels along one of a limited number of paths on dedicated telephone networks, and arrives at a specific location—the phone on her desk. VoIP calls, by contrast, are just bits of data on the global Internet. They are not tied to physical locations (such as the building where you work) or specific devices (such as your office or cell phone). And because VoIP uses common standards, it can talk to any device that uses Internet protocol. It can just as easily go to an e-mail in-box on a laptop computer connected to a wireless network in a London café as to the phone on that colleague's desk.

Making VoIP calls need not involve any visible changes for users. A caller can use an ordinary telephone connected to a VoIP converter box, which plugs into an Internet connection. Or he can use an IP phone that looks like a conventional telephone but connects directly to the Internet instead of a phone jack. Finally, he can install "softphone" software on any personal computer (and many personal digital assistants) and use a headset or microphone to make VoIP calls.

Installing front-office devices—the phones, converters, or software that employees see—is the initial step in developing a VoIP platform. Next, companies must install VoIP gear to replace their back-office private branch exchange (PBX) equipment—their conventional phone networks. The new VoIP software and hardware infrastructure controls what features are available and how the VoIP devices connect with corporate IT systems. (Smaller organizations may outsource this infrastructure function to a provider or simply link together individual VoIP phones and other devices.)

In a VoIP world, a phone system isn't static;

it's an environment for developing and managing any capabilities that use voice or other IP communications. Building applications to take advantage of all the newly accessible IP resources is where the real benefits arise. Adding a function like videoconferencing to a VoIP system doesn't involve a major equipment change; it's akin to installing a software package on your PC. More significant, it means VoIP will be able to support new communications functions that don't even exist today. Just as the initial wave of static corporate Web sites a decade ago gave way to dynamic, interactive, truly business-enhancing uses of the Internet, VoIP will serve as a platform for more strategic communications that combine voice with other data—so-called "converged communications."

In thinking about VoIP's potential as a strategic tool, consider its roles in terms of three types of capability: virtualization, customization, and intelligence.

### Virtualization

VoIP makes it simple to take a virtual version of one's phone to any location at any time. And it makes it possible to launch service for an unlimited number of phones anywhere in the world with a few mouse clicks. This combination of portability and scalability takes features of conventional communications that are fixed and expensive and makes them variable and cheap. It allows companies to build inexpensive redundancy to manage risk, and, most important, it gives companies flexible communications that can easily adjust to fluctuating demand.

**Portability.** With VoIP service, a businessperson in the U.S. could take a VoIP terminal adapter—a converter currently about the size of a paperback—to Tokyo, plug it into a broadband connection at a hotel, and seamlessly receive calls at her U.S. office phone number. (If she has VoIP software on her laptop or a portable IP phone, she could use those instead of the adapter.) She'll have all the capabilities of her desk phone—call features, directories, and security—and callers on the other end will have no idea she's answering from halfway around the world. Neither party pays anything extra.

Consider how the government of Marin County, California, uses VoIP to give its employees and officials home-office capabilities

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wherever they are. Using a system that integrates VoIP, voice recognition, voice synthesis, and e-mail, they can listen to and compose e-mails by phone, check and schedule appointments, create task lists, and launch calls from a contact list. They can also set preferences for notification based on priority level or sender. For example, sheriff's deputies investigating a crime could tell the system to put supervisors' calls directly through while shunting less important calls to voice mail.

**Scalability and Redundancy.** The same functionality that makes a person's phone number and associated services portable also makes it simple to add phone lines wherever and whenever they're needed. Every time a new employee arrives at a company, or an-

other employee moves to a new office, hooking up that person's phone service is simply a matter of changing a setting on a Web page. Similarly, a company with an established VoIP infrastructure can just point and click to outfit a new office anywhere in the world with the full suite of corporate communications capabilities—and shut it down just as easily.

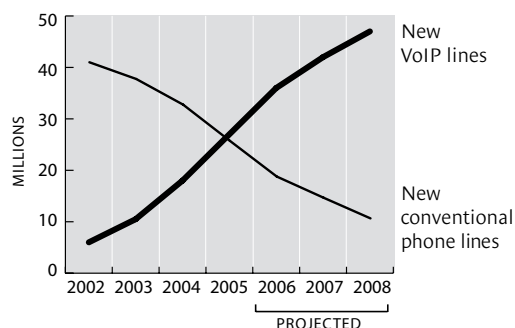
One Wall Street investment bank, for example, realized after the attacks on the World Trade Center that it needed greater operational resilience in the event of a disaster. It created a backup location just outside New York City, linking it to headquarters through VoIP. In a disaster, all calls can be rerouted to the new location in minutes. Without VoIP, such rerouting would have required days or

## How Big Is VoIP?

Today, all major phone service providers are incorporating voice-over-Internet-protocol technology into their networks. BT, the dominant carrier in the United Kingdom, plans to convert its entire infrastructure to VoIP by 2009. Soon, even when calls originate and terminate with traditional telephone technology, they will be carried over the phone companies' VoIP networks. In 20 years, and probably much sooner, the global telephone system will run largely on Internet technology. There will be no distinction between VoIP and the phone network.

VoIP's simplicity and low cost are driving its rapid adoption by both consumers and businesses. The leading U.S. retail VoIP provider, Vonage, has about 600,000 customers and is adding about 15,000 each week. A host of start-ups are marketing competing services, as are incumbent phone and cable TV companies such as AT&T, Verizon, Time Warner Cable, and Comcast. And the U.S. is hardly a leader in this field. In Japan, where broadband service is cheap and much more widespread than in the U.S., over 4 million customers—representing more than 10% of all homes—subscribe to VoIP offerings. Over 35 million people worldwide

In 2005, companies worldwide installed more new VoIP phone lines than conventional lines.



Source: Avaya analysis from multiple analyst reports.

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have the free Skype VoIP software on their PCs.

Consumer VoIP may get most of the attention, but there has been a steady drumbeat of enterprise VoIP adoption. Last year, Bank of America committed to deploying 180,000 Cisco VoIP phones across its 5,800 branches and offices. Boeing signed a contract to provide VoIP to its 150,000 employees, and Ford signed a \$100 million deal with telecommunications carrier SBC to deploy 50,000 VoIP phones. Smaller firms are embracing VoIP as well. Cisco, one of the largest VoIP vendors, has sold more than 4 million IP phones to

businesses.

Most of these initial VoIP deployments are simple ROI-driven technology investments, akin to buying sales-force automation systems or human resources software. VoIP cuts costs by replacing separate voice and data networks (both users' and providers') with one common infrastructure, eliminating duplication. Thus, instead of paying phone companies to carry their voice traffic, companies can send much of it over the spare capacity on their own data networks. Moreover, VoIP allows providers to replace centralized, proprietary "switches"—essentially, main-

frame computers—with standards-based devices that drop in price as rapidly as PCs do.

In large enterprises, communications is a big enough line item that savings can add up. SunTrust Banks, for example, found that their VoIP deployment saved over \$5 million annually. Although significant, such cost savings are not game changing—even Cisco claims only a 15% cost reduction from VoIP. For most companies, therefore, the initial impact of adopting VoIP will be modest. It will center on efficiency gains from replacing or consolidating legacy systems and avoiding usage-based charges from phone companies.

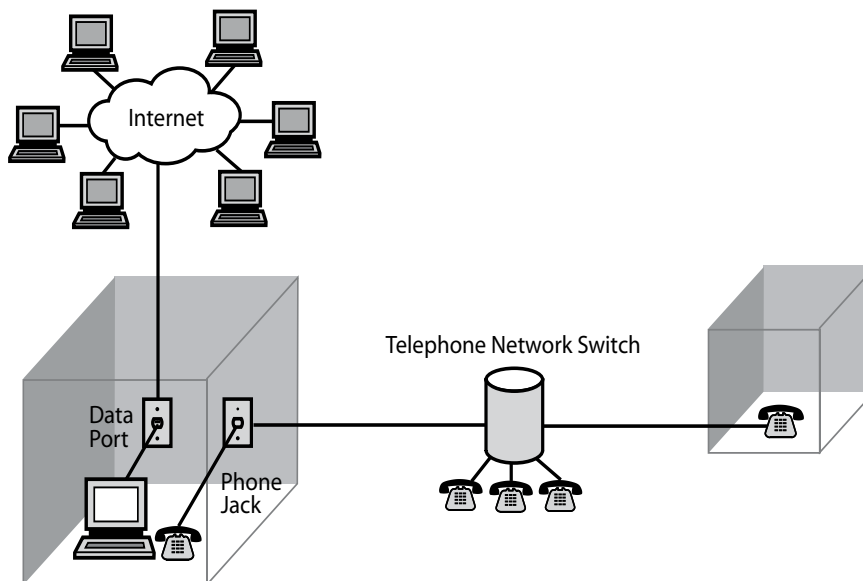
weeks of rewiring and reprogramming. VoIP made it easier to add true redundancy, not just in equipment but in the continuity of business operations.

**Flexibility.** Other businesses are being built from scratch entirely around VoIP, because it allows them to respond flexibly to fluctuations

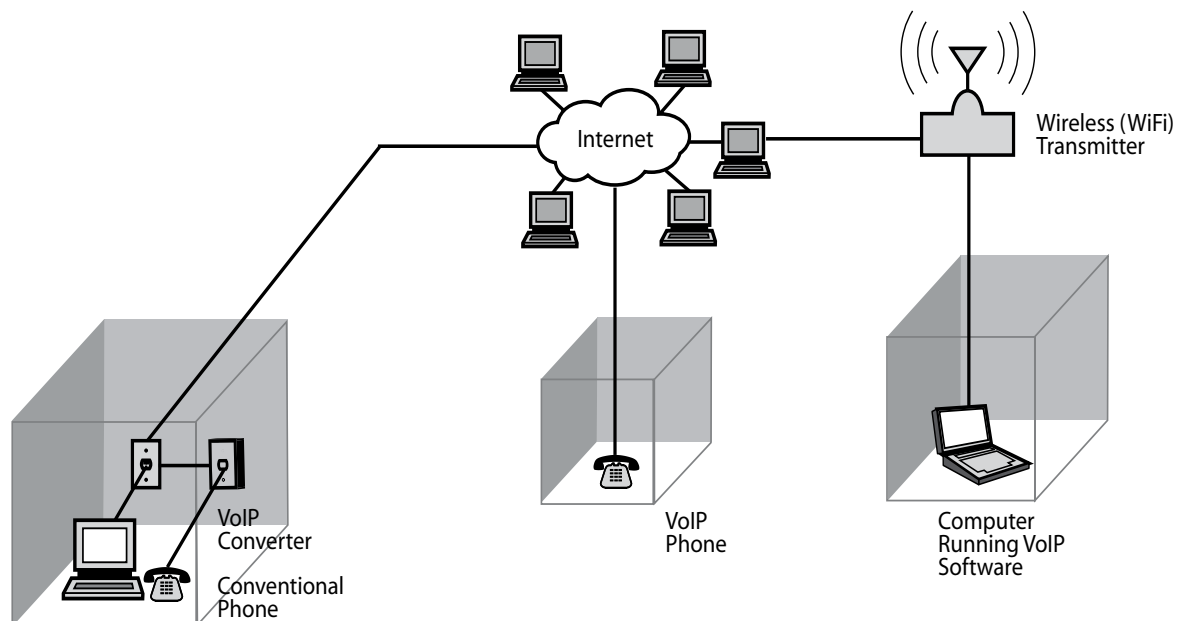
in demand across time and space. LiveOps, a Silicon Valley call center start-up, made VoIP central to its strategy of servicing direct-response television advertisements, where demand comes in bursts. It's inefficient to maintain a full call center staff when the flow of calls is so variable. So LiveOps' 5,000 agents

## Conventional Calling Versus VoIP

**Conventional telephony** sends voice communications over a dedicated telephone network that is separate from the Internet.



**VoIP telephony** turns speech into digital packets that can travel over the Internet and interact with other data and devices that use the Internet. Calls can move between conventional phones with VoIP converters, specialized VoIP phones, and computers running VoIP software.



work part-time from home and are tapped or taken off the clock as soon as demand changes.

VoIP allows LiveOps to give its agents the same sophisticated computer-based tools they would have in a traditional call center. For example, a call can be switched from an agent to an interactive voice response (IVR) system that allows the customer to type in a credit card number and audibly record her agreement to certain terms, as required by regulations in some industries. The call can then be switched back to the agent without ever losing the tracking, analysis, and management capabilities that allow LiveOps supervisors to evaluate the call for quality assurance purposes.

Similarly, Amicus, a call center outsourcer in the UK, created a network of stay-at-home parents, disabled workers, and others from underutilized labor markets. Using VoIP, these far-flung customer-service agents can work from home and still have call center features such as call tracking and personalized computer screens that provide scripts and customer information. By avoiding the overhead of a contact center, and by tapping relatively inexpensive labor, Amicus has lowered its call center costs by about a third. That has brought its expenses close to those of call centers based in developing countries. Able to compete directly with these centers, Amicus has carved out a strategic niche: It targets UK companies that avoid offshore call centers for political or regulatory reasons.

## Customization

The biggest advances in the traditional phone network, such as caller ID and voice mail, took decades to design and deploy. With VoIP, new calling features, or voice applications, are easy to build and refine. Although off-the-shelf VoIP software and hardware come with a variety of features, organizations are busy writing custom applications that can reinforce branding, enhance customer service, and improve internal communications.

**Brand Building.** Fandango, an online movie-ticket service, wanted a phone-based system that differentiated it from its competitor Moviefone. VoIP allowed the company to easily experiment with and hone its customer interface. Working with Tellme, a Silicon Valley provider of voice application technology, Fandango tried out more than 30 options for background music, prompts, and recorded voices before finally settling on a theme built around a classical guitar piece (a fandango, appropriately enough). The system allows Fandango to rapidly tailor and swap in new local welcome messages and movie highlights, making it an extension of the online brand.

**Customer Service.** And consider how one resort has used a customized VoIP system to address changing demand and differentiate its service: Over the past ten years, the primary revenue source for Las Vegas resorts has shifted from gambling to guest services such as entertainment, dining, and recreation. Recognizing this, billionaire developer Steve Wynn installed VoIP as part of a strategy to pamper and delight guests in his new Wynn Las Vegas luxury hotel and casino.

Using the VoIP phones available in every room, guests will be able to call the concierge to arrange dinner reservations while browsing menus and pictures of dining rooms on the phone's color display. When a guest calls the service staff, VoIP rings a staffer's cell phone and desk phone to assure that the guest gets through. Staff can use speech commands to manage their voice mail messages and calendars, access directory listings, and launch conference calls from any phone. And calls can be recorded and archived for managers to review, part of the overall quality assurance effort. Ultimately, the system will include features similar to those found in advanced call centers that give priority to high-value calls. In effect, Wynn is using VoIP to turn the entire resort into a

## How Secure Is VoIP?

Early quality and reliability problems with VoIP have largely been overcome, but security remains a real issue. As the Internet has shown, a flexible, open, digital communications platform attracts parasites. It's only a matter of time before we see voice spam on VoIP systems, along with viruses, worms, and security breaches. Any business looking at VoIP systems should carefully assess its security needs and ensure that vendors can meet them. It should look at securing its VoIP infrastructure the same way it secures its intranet, e-mail system, and corporate databases.

There is no technical reason why VoIP systems can't be as good as, and probably better than, conventional phone systems in these areas. Skype, for example, encrypts every call end to end, providing more privacy than any traditional phone company. The potential security threats to VoIP are real but are no more worrisome than the security issues that are an accepted part of using the Internet in business. Companies simply need to appreciate that VoIP makes their phone systems part of the IT infrastructure, rather than a black box they trust a phone company to secure and manage.

state-of-the-art contact center. The phone is no longer just a communications channel; it's a form of customer service in its own right.

**Internal Communications.** Fandango and Wynn Resorts use VoIP's customizability to improve customer service; but other types of organizations are finding different ways to exploit this flexibility. At the U.S. Department of Commerce, for example, CIO Tom Pyke couldn't find the budget to deploy VoIP. However, a renovation of the sprawling Washington, DC, headquarters building was in the works, including plans to add a stand-alone public address system for emergency communications. Pyke realized that the same emergency communications capability could be built into a VoIP infrastructure. The customized system the department ultimately installed not only saves money but provides better emergency communications than a standard public address system. Administrators can broadcast voice messages that override every phone in the building and also come through speakers in common areas.

The Commerce Department's experience exemplifies VoIP's ability to evolve sometimes in unexpected directions, as needs change. At Commerce, it was attractive initially because it saved money, as part of a larger capital project. Yet it wound up doing something the old phone system never could have supported. The system was so well received, incidentally, that its developer has sold it to many other enterprise VoIP customers. This highlights another feature of the technology—customers are contributing to its rapid evolution.

### Intelligence

As these cases show, companies are already using VoIP's customization and virtualization capabilities, although these are among the few so far to have gone beyond basic cost-saving deployments. The greatest potential of VoIP will come as companies design increasingly intelligent systems to link communications and business processes and improve the productivity of knowledge workers.

Exactly how VoIP will evolve is uncertain, but the early outlines are clear enough to allow informed speculation. Communications have always been linked to business processes. The ability to coordinate activities across distances and firms was, after all, what first made the telegraph and telephone important busi-

ness tools more than a century ago. With VoIP, that coordination can become much tighter. Instead of a phone call being a shot in the dark aimed in the general direction of the intended recipient—the phone on her desk—every communication can be precisely targeted on the basis of when and why it is being sent, and to whom.

### Linking Communications and Processes.

Avaya Labs, the research arm of one of the largest VoIP vendors, is experimenting with VoIP to enhance supply chain management. In one project, a simulated supply chain disruption automatically launched a multicompartment VoIP conference call. The VoIP system reached participants through whatever device they were closest to and then automatically linked their computers to instant messaging, streaming video, and a secure Web site with key documents.

In the Avaya demo, the VoIP platform “knew” whom to contact and how, because it linked into corporate directories, databases, and supply chain management applications. The business rules that guided the VoIP decisions, based on factors such as roles and approval processes within each organization, were fairly simple and concrete. By bringing together the right people efficiently, the VoIP system didn't substitute for human judgment; it facilitated it.

Avaya's supply chain system was a research project, but some organizations are using VoIP to link communications and business processes today. At Rhode Island Hospital in Providence, for instance, nurses wear small wireless badges made by VoIP start-up Vocera that are clipped to their scrubs. Instead of having to leave a patient's bedside for help or information, a nurse just pushes a button on the badge. The system uses speech recognition, connected to the hospital's directory system, to route the request to the right person or to broadcast it to team members.

The hospital is integrating its patient monitoring devices into the VoIP system as well. When there's an emergency—say a patient's heart starts beating erratically—the system will send a customized voice alert to the proper doctors or nurses describing the problem and indicating the patient's location. What would have been an undifferentiated call for help on an overhead paging system becomes a targeted message, informed by hospital poli-

cies, duty schedules, and individual roles. Moreover, the information generated—the sequence of calls and responses—can be captured and later analyzed in order to improve care.

**Enhancing Knowledge-Worker Productivity.** On a more mundane level, VoIP will improve workers' productivity by intelligently triaging calls. To take a hypothetical example, a businessperson who is out of the office might want calls to be processed as follows:

- If I don't pick up my office phone, route the caller to my voice mail.
- If the caller is my boss, forward the call to my cell phone, unless it's the weekend or after 8 pm.
- If the caller is an important customer, forward the call to my assistant, Diane. If she's not available, put the caller through to my voice mail, but send me an instant-message alert.
- If I don't pick up my voice mail in an hour,

forward a copy to me as an e-mail attachment.

- If it's John calling, check my calendar to see whether I'm in a marketing team meeting in the conference room; if so, conference John into the session.

Though VoIP can already handle routing and data management like this, writing the necessary rules for the system would be cumbersome. The major challenge now for designers, therefore, is to create simple ways to teach VoIP systems to do what you want them to do—integrate computer-based knowledge management systems and human intelligence. At Avaya Labs and Rhode Island Hospital, VoIP platforms are beginning to make such connections by tapping corporate databases, work flow and knowledge management software, and other resources to support decision making. This, in fact, is where VoIP vendors are focusing their attention.

## Taking a Test-Drive

Though VoIP's biggest payoffs will accrue to those who deploy it strategically, there are several approaches for test-driving the technology without betting the farm.

**Follow the upgrade cycle.** Many companies are deploying VoIP today because their phone systems are becoming obsolete. Companies should therefore look at their upgrade plans as opportunities to move toward VoIP. But this evaluation shouldn't be limited to a review of communications systems. Planned upgrades to the corporate data network and computer hardware also provide an opportunity to introduce VoIP. Some firms will find themselves deploying the technology first through their customer relationship management systems. Others will introduce it as a tool for supply chain management, to make it easier for supply chain partners to communicate. Others will deploy VoIP as a feature of the corporate help desk so that computer support calls can be handled more efficiently. These deployments may be more tactical than strategic, but that shouldn't delay the initial activity.

**Learn from back-door users.** In the late 1970s, Wall Street analysts brought in Apple II personal computers through the proverbial back door to run VisiCalc, the first spread-

sheet, because it gave them an immediate productivity boost. Most CIOs at the time considered PCs to be toys, not suitable for real business applications. Their own employees were ahead of them. A similar story played out when Mirabilis, a tiny Israeli start-up, launched ICQ, an Internet-based instant-messaging client. Most users downloaded the software to chat with family and friends, but a surprising number put it to work in business settings. AOL bought Mirabilis in 1998, and today there are hundreds of millions of instant-messaging users worldwide.

A VoIP analog to VisiCalc and ICQ is Skype, the free VoIP software. Though it's used principally by individuals looking to save on their long-distance bills, half of Skype users say they have used the service for business communications. Managers should welcome employees' experimentation with Skype and similar VoIP software packages. The VoIP killer app in an organization may be one that the CIO doesn't anticipate but that an employee devises out of personal necessity. By observing users who bring in VoIP through the back door, often on their personal PCs, managers may gain insights into how the company can use the technology and the cost/benefit equation for bringing VoIP

through the front door.

Of course, companies shouldn't ignore the security issues that any software on the corporate network can create. The beauty of software like Skype is that it operates through the public Internet without requiring access behind the corporate firewall, obviating many security concerns.

**Create VoIP islands.** VoIP deployments need not be large scale or enterprisewide. One of the most compelling opportunities for using VoIP is in new branch offices or locations (although the full benefits of such outposts come when they can tie into a companywide VoIP infrastructure). In other cases, organizations create VoIP islands that are defined by function rather than location. Rhode Island Hospital kept its conventional phone system when it deployed the Vocera VoIP application for real-time communication among doctors and nurses.

The main advantage of this island strategy is that it gives companies a way to try out VoIP without making a huge financial or business commitment. CIOs who have presided over leading-edge VoIP deployments often point to smaller offices or departments that implemented early and gave them confidence that VoIP could meet their needs.

### Linking VoIP to Strategy

When the telegraph first appeared in the mid-1800s, savvy traders used it to obtain critical information about stock prices. Since the Philadelphia Exchange opened an hour earlier than the New York Stock Exchange, speculators used the telegraph to create artificial opportunities for arbitrage. That helped push the major exchanges to adopt standard trading hours. Before long, the telegraph was an essential and ubiquitous technology on Wall Street, in the form of the stock ticker, but it was no longer a competitive differentiator among firms.

VoIP will follow the opposite trajectory. It will become more strategically significant over time. Most companies will deploy VoIP at first in ways that give them a return on investment but little strategic value. They may not be ready to think about the deeper potential of VoIP but will still install VoIP equipment and software for practical reasons. With that infrastructure in place, though, companies are in a position to develop a true VoIP platform.

In deciding whether and how to adopt VoIP, managers will ask the usual questions that accompany any major technology investment: What's the ROI model? How "future-proofed" is the initial investment, and how much recurring investment will be required? What legacy equipment and software need to be thrown away, and what are the migration and integration challenges? Will we be locked in to the particular vendor or integrator we choose? Is the technology reliable, scalable, and secure enough for our needs?

But managers should also ask how VoIP can improve—or transform—how they do what they do. The most successful early VoIP adopters concentrate on two things. First, they focus on achieving business objectives more than saving money. Though cost cutting may be the deciding factor for firms in making the initial investment, VoIP's cost savings are unlikely to provide real competitive advantages. More important, viewing communications purely as a cost center can do more harm than good. As companies that rushed to outsource business functions in recent years have found, reducing

costs often has a cost. Saving money by alienating customers is not a good trade-off.

Second, early adopters view everyone in an extended organization as a resource. As Wynn Resorts is showing, the entire organization can become a contact center. Or, with a system that's slightly more sophisticated than the one at Rhode Island Hospital, a nurse confronted with an urgent medical need could scan a list of available doctors, and with the click of a mouse, speak instantly with the most appropriate specialist, wherever he or she was located. And VoIP, by linking with hospital databases and monitoring systems, could provide the doctor with a real-time view of the patient's history and vital statistics during the call.

Businesses that push VoIP capabilities out to their employees, partners, and customers will gain efficiencies over those who continue to think of communications as a scarce, centrally controlled resource. And companies that harness VoIP to achieve business objectives will find it is much more than an undifferentiated commodity technology.

Deployment may be incremental (see the sidebar "Taking a Test-Drive"), but companies should be thinking about where VoIP could take them. Executives should ask what they could do if, on demand, they could bring all of their employees, customers, suppliers, and partners together in the same virtual room, with shared access to every modern communications and computing channel. They should take a fresh look at their business processes to find points at which richer and more customizable communications could eliminate bottlenecks and enhance quality.

VoIP is coming. The important dividing line won't be between those who deploy it and those who do not, or even between early adopters and laggards. It will be between those who see VoIP as just a new way to do the same old things and those who use it to rethink their entire businesses.

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