

IP Telephony Executive Guide 2007



The latest best practices
to design, implement
and deploy a successful
IP phone system.



Welcome to the IP Telephony Executive Guide

IP is the standard for data communications worldwide, and now many organizations use their IP infrastructure for voice communication as well.

As voice becomes more and more critical to the way people do business, IP telephony is a viable alternative for organizations that want a solution that will improve productivity, lower management and administrative costs, and reduce overall complexity.

But the transition from traditional PBXs to IP PBXs doesn't just happen overnight. Enterprises need to plan for IP telephony and have a firm grasp of the technologies and standards behind it. They need solid technology solutions in place that will give them the best of the traditional voice world, coupled with the improved security, manageability and flexibility that IP telephony brings to the table.

To lead you on your way to migrating to IP telephony, turn to the ShoreTel IP Telephony Executive Guide 2007. You'll find the latest tips including answers on everything from how to prepare your enterprise for an IP telephony rollout and optimize your network for voice to making sure your IP telephony network can handle E911 and support the latest security standards.

As these articles appeared in our recent 2006 newsletters, be sure to pay attention to some of our readers' favorites. "E-911 Systems Enable Communications Safeguards for VoIP" shows you how to provide your employees with a vital communications link in the event of an emergency. In "Disaster Recovery: Planning for the Unthinkable" you will learn how to craft a disaster recovery plan for your IP telephony systems. And "Make Your Converged Network a Power Play," discusses in detail the different architectural possibilities for your IP telephony infrastructure.

A smooth migration from legacy voice to IP telephony is the key to success. Learn everything you need to get started at the IP Telephony Executive Guide 2007. And if you would like to receive ShoreTel's monthly newsletter with best practices for planning, deploying and managing IP telephony, please sign up at www.shoretel.com or e-mail info@shoretel.com.

Thank you,
The ShoreTel Team

IP Telephony Executive Guide: Best Practices for 2007

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Is Your Network Ready for Prime Time?

Most networks need some fine-tuning before they are prepared to handle IP telephony. Take some simple steps to test your network's readiness for voice before deployment, and you can ensure exceptional voice quality and a successful deployment.

IP telephony promises businesses a compelling combination of features, efficiency, manageability and cost savings. Not surprisingly, IP PBX sales are soaring. However, too often companies make the leap to convergence without being absolutely certain that their network infrastructures are ready to handle the special requirements of voice. The less-than-prepared find unpleasant surprises waiting for them after deployment, ranging from poor voice quality to overall network instability.

That said, there are enough success stories to fuel the rising demand for IP PBX solutions. So what is the secret to success? In a nutshell: network preparedness. The best IP telephony network implementations start with a complete network readiness assessment and continue with ongoing network assessments.

A Required Assessment

Tony van Kessel, Regional Manager with Viola Networks, a network testing and diagnostics vendor, says that ShoreTel is a leader in the advancement of IP telephony readiness. ShoreTel requires all of its customers to perform a complete pre-deployment network, which uses the Viola Networks NetAlly assessment tools. The network assessment can be performed by a reseller or by ShoreTel Professional Services.

To accomplish this test assessment, agents are deployed at critical points on the customer network. The assessment is typically conducted over five business days. When the assessment is complete, the reseller or ShoreTel Professional Services prepares a report identifying what, if anything, must be done to make the infrastructure VoIP-ready.

The network assessment determines if:

- The necessary network protocols and standards are supported

- The infrastructure is architecturally compatible with VoIP traffic
- Installed WAN technologies are compatible with VoIP
- The network has the capacity to support the planned VoIP installation
- Delay, loss and jitter are below the acceptable thresholds for toll-quality voice

The reason for the requirement is simple—most networks haven't carried time-sensitive voice traffic and aren't designed to handle the unique demands that voice places on the infrastructure. Unlike data, voice is not tolerant of delays and the latency that's inherent on a wide-area network.

"VoIP is a real-time application," says van Kessel. "150 milliseconds of delay is noticeable as degraded voice quality. You don't have the luxury of letting packets zing all over the Internet at whatever path is the best one at the moment and then arrive at the far end in their own time and get reassembled. Voice has to move in real time."

Tuned for Performance

In practical terms, companies must ensure that their switches and routers prioritize voice traffic over less delay-sensitive data traffic. "You want to give higher priority to voice packets than email," van Kessel says.

The assessment process starts with collecting inventory information and other configuration information, including connections between offices. This information can be assembled from a questionnaire, a detailed network diagram, as well as automated discovery.

In addition to technical information, the survey takes in business-oriented information, such as call volume information between branch offices. "You need to understand what is important to

keeping your business running smoothly,” van Kessel says. For instance, if it is crucial that headquarters talk to all of its branch offices simultaneously, a company needs to verify that its network can deliver acceptable voice quality for the appropriate number of concurrent calls.

The expected call volume indicates the traffic volumes the network will need to handle to meet business requirements. van Kessel says this historical information often comes from the call records database, which provides details on how often branches talk to each other, to headquarters and to customers and partners. Using this data, the test is set up to simulate the call volume and measure voice quality. From there, you can determine the needed network capacity or diagnose problems, thus ensuring a successful IP telephony deployment.

All of this testing can be performed remotely. “Our system steps through an increasing number of concurrent calls,” van Kessel says. “This process can be done without any real-time interaction with people at the company.”

A Process, Not a Project

Because networks are dynamic, van Kessel emphasizes the importance of reassessing the network to get in front of problems that could stop voice traffic in its tracks.

The two most common problems are related to switches—duplex mismatches and speed setting differences. van Kessel cites these problems as a prime example of why businesses need to continually evaluate their networks.

Ideally, when network devices are connected, whether it’s switch to switch or switch to router, they must have the same settings and speeds to

The best IP telephony network implementations start with a complete network readiness assessment and continue with ongoing network assessments.

communicate. In a duplex mismatch, the settings aren’t in synch. One device may be set to operate in full duplex and another may be set to run in half duplex. Similarly, in a speed setting difference, a 10Mbit/s Ethernet switch that’s plugged into a router or another Ethernet switch capable of transmitting traffic at 100 Mbit/s, the two will communicate, but at the lower speed.

These problems can crop up over time. If one LAN switch is powered down, it probably won’t auto-negotiate the correct settings with its neighbor when it comes back up. Anything that

causes a LAN switch to go down—whether it is maintenance, a thunderstorm or fluctuations in the AC power—can result in a mismatch when the switch recovers, notes van Kessel.

For this reason, companies should periodically reassess their network’s ability to carry voice to avoid the kind of performance degradation that can level the network.

“The pre-assessment is great,” van Kessel says. “You do your diligence, you design a network, you test it fully, everybody tips the champagne, and you walk out of there. And the next day there is a thunderstorm. Your network is totally buttoned down only when you continuously assess it.”

Select a vendor that not only does a thorough pre-assessment but also offers post implementation options like system health checks and network monitoring services.

Resources

[Learn more about ShoreTel Implementation Services.](#)

[Learn more about ShoreTel System Monitor.](#)

Preparing for Your IP Telephony Rollout

Assessing your network environment, training your users and administrative staff and counting up your cost savings are all critical steps for organizations to take as they prepare to deploy an IP PBX.

You've heard about the benefits of IP telephony. You've done your research and secured funding. As you plan your organization's cutover to IP telephony, keep in mind that not only are you pulling out your old PBX boxes, but you must take a proactive stance to ensure your network infrastructure is ready to handle the load you'll be putting on it.

Know Your Environment

First, note that an IP telephony solution is somewhat less forgiving than a traditional PBX-based phone system. In a PBX environment, even taking into consideration small problems with cables and hubs or the use of lower-grade equipment, "things will generally work fine without an IP system in place," says Michael Landry, Manager of Professional Services at ShoreTel. However, "you will find that any networking issues that exist at the LAN or WAN levels will be exposed very quickly when you put an IP phone system in place." Discovering these problems following the deployment of your IP telephony solution, Landry warns, is about the worst possible time you can uncover them.

To that end, he advocates designating an IT staffer to go through the network well before any IP telephony equipment is installed, inspecting the organization's cable plant and Ethernet switches in order to identify problem areas. It's also well worth considering the purchase of Layer 3 switches to not only bump up the quality of your

LAN infrastructure but enable administrators to segment voice and data traffic for improved performance and security.

Perform a Network Assessment

Another good pre-implementation move: Do a network assessment. The network assessment can be performed by a reseller or by ShoreTel Professional Services. To accomplish this assessment, agents are deployed at critical points on the customer network to simulate transferring from agent to agent. The agents report back to the server, which will compile the results over several days to paint a picture of the overall network performance, smoking out weak spots or unusual traffic patterns. "You might find that on a Tuesday at 5 p.m. there is a spike in activity, and the performance takes a dive," Landry notes.

To understand the reasons for this detective work, consider the following scenario. "If it takes you 20 seconds to receive an email, and not 10 seconds, you don't really care or even know that it happened," he says. "But if you get a significant amount of delay on a phone call, the delay will definitely impact your voice quality tremendously." Identifying pain points ahead of your deployment can help you iron them out prior to the rollout of an IP telephony solution. ShoreTel works with more than 300 partners who conduct these pre-deployment network assessments as well as implement IP telephony gear.

Following the deployment, “if things have gone right, users won’t really see any difference” in the way the phones look and work. However, organizations that choose to deploy ShoreTel Personal Call Manager will have access to a new batch of value-added features, such as on-the-fly conferencing; the FindMe feature, which lets callers search for users at multiple numbers; and integration with Microsoft Outlook.

Calculate Your Cost Savings

On the back end, some of the expense of maintaining a phone system may decrease, Landry notes. If the IP phones are being rolled out across multiple locations, the company will likely get the advantage of being able to consolidate trunks into a common branch.

More meaningful cost savings may accrue in terms of reduced administration costs, though. “You don’t have the headache of managing multiple systems, or for hiring multiple administrators who are responsible for the individual branches,” he says. “One or two people can manage the entire system from a common point.”

Cross-Train Your IT and Telephony Staff

In terms of day-to-day management, IT and telephony staff members need to undergo a shift in the way that they think about the parts of the

Do a network assessment before you deploy your IP PBX. With the right tools, you can simulate the process of voice calls to ensure the best quality experience when you go live.

telephone and computers for which they are responsible; in the IP telephony world, both groups of staffers bring value to the table.

“You’ve got two camps: the IT guys that have already dealt with the networking side of the environment and now have to learn about telephony, and the telephony guy who now has to learn and understand the data side of things and how it impacts their voice system,” Landry says. The second group tends to be “good at configuring those features end users will use, though they may not have a strong background in data-switching.”

Landry recommends that training for all takes a holistic view by including information about what’s involved in making IP phones work within the larger context of an organization’s communications network.

“The whole idea is that you are replacing a phone system and making it seamless to the end user, but reaping the benefits and the performance gains on the back end,” he concludes.

Make Your Converged Network Architecture a Power Play

Businesses have several architectural options for building an IP telephony network. Here are key choices to consider when supporting converged communications.

Choice can be a wonderful thing, but too many options add a layer of complexity to even the most straightforward projects. When businesses migrate to IP telephony, they need to consider different architectural approaches to building a converged network than they did when voice and data ran on separate infrastructures. There are some clear differences in converged network architectures and at least one choice that helps make network planning easier and the outcome more successful.

Three Architectural Options

Businesses can take three general approaches to building a converged network, each with varying levels of actual convergence, according to Peter Newton, director of business products for networking vendor NETGEAR.

Newton describes the most conservative approach as the “not-so-converged network.” In this design, the only convergence of voice and data traffic is at the network core. Voice and data traffic run on separate network equipment and cabling. However, companies incur costs from additional switches and cabling that is unnecessary if they use a more advanced design.

A more converged architecture is to use Virtual LANs (VLANs). With VLANs, the network is configured through software so that the same network hardware can logically have two separate networks, one for voice and one for data. The voice and data traffic are separated in different VLANs, so the time-sensitive voice traffic is not impacted by large file transfers and other data traffic. In this manner, similar types of devices, such as IP phones, can be in physically different places, but still part of the same logical network.

In the most converged architectural option, traffic is handled by using priority tags within the packets themselves. The switch uses tags to determine the order of precedence to keep voice and data traffic flowing. Newton recommends that most businesses using VLANs should deploy a converged network, because it allows for segregation of the traffic to ensure priority is given to voice and other applications that require it. In a fully converged architecture, there’s a risk that the applications that need priority may not be given it due to congestion of various types of high-priority traffic, which could lead to poor voice quality and other performance issues.

“If you use a VLAN-supported model, you won’t overbuild your network and don’t pay twice to get the functionality,” Newton says. “VLANs work very well by segmenting the traffic within the switch, and keeping the voice and data traffic separate.”

For example, a company can use a 24-port switch with two uplinks so that one uplink is dedicated to voice traffic and the other handles data. Thus, there is no contention on the links to the backbone. Then the company can use half of the ports for phones and the other half for PCs. The phone ports on the VLAN associated with the voice uplink and the computer ports can be associated with the voice uplink.

“By doing that, you only buy one switch, but you have the benefits of two switches,” Newton says. “And your voice traffic doesn’t get bogged down behind a file transfer or some other bursty application.”

Consider Business Continuity

A critical element in ensuring a reliable IP telephony infrastructure is the ability to guarantee the continuity of data and voice applications in the event of a system-wide failure or other event. At the most fundamental level, Newton points out this means making sure IP phones, computers and other network devices have a reliable power source if an electrical outage or disruption occurs. Given the increasing demand placed on the United States' electrical grid and the dependence of IP phones on electricity, companies need to be especially mindful of power considerations.

Using Power over Ethernet (PoE), which uses standard twisted-pair cable to convey electricity to IP phones, wireless access points and other devices, is ideal. PoE isn't a new idea. Utilities have been putting power and voice over the same lines for decades, but until recently it wasn't widely used for data networks. PoE technology is highly reliable and an ideal way for businesses to save on their communications infrastructures by transmitting power and data over the same wire.

Business can take three approaches to building a converged network, each with varying levels of actual convergence.

"When deploying VoIP, we recommend Power over Ethernet switches, because it allows IP phones to be powered reliably if local power is lost," Newton says. By using centrally located uninterruptible power supplies (UPS) to provide backup power to PoE switches, companies can make sure their operations, including voice communications, remain available in the event of an outage.

Solutions From NETGEAR

NETGEAR makes a range of PoE switches that fit the bill. The company offers switches with four to 48 ports that are

suitable for enterprises, branch offices and small businesses. The NETGEAR ProSafe PoE switches support multiple VLANs so businesses can take advantage of that architectural approach. NETGEAR also promises redundancy with Quality of Service (QoS).

Power over Ethernet also helps businesses simplify IP phone handset installations because phones can be connected to the power source and the data link using one cable. The ShoreTel IP phones plug into the NETGEAR PoE switch while computers are connected to an Ethernet port on the phone.

High-Performance Network Delivers Rock-Solid VoIP

Quality voice calls depend on a reliable network foundation. ShoreTel partner Foundry Networks explains the architecture, components and must-have features that will deliver the call quality your users expect. As a bonus, Foundry offers VoIP market predictions and a sneak peek at upcoming feature enhancements to its switch family.

To deliver the call quality you promised users and the reliable voice service you presented to your executive management, you must have a reliable, highly available VoIP network. The underlying network foundation will make—or break—your VoIP deployment. A solid network infrastructure ensures that your VoIP solution can meet the business needs of tomorrow.

Foundry Networks, a ShoreTel partner, designs and manufactures high-performance enterprise networking solutions that help enterprises deliver reliable, secure and high bandwidth IP services with assured performance levels. Well known as an innovator of industry-leading technology, Foundry has led large and small VoIP deployments within multiple customer environments. This experience gives the Foundry team a unique insight into the key factors that ensure that a VoIP rollout delivers on its promises.

Gary Hemminger, director of product marketing at Foundry, describes a reliable VoIP network as one that consistently delivers high-quality calls that are equal to—or better than—traditional time division multiplexing (TDM)- based systems. To deploy a VoIP network that performs at this level, Hemminger recommends that your networking infrastructure include these key components:

- integrated quality of service (QoS) for superior voice calls
- integrated power management to support IP phones and ensure network uptime
- redundant system architecture for consistent network availability
- embedded security to protect the network
- easy migration path to wireless mobility

Before deploying a VoIP network, Hemminger advises that you interview more than one networking manufacturer and test the routers and switches to ensure that the devices deliver the reliability at your desired cost. Another consideration is open standards. “Proprietary systems cost much more in the medium to long term,” says Hemminger.

Network Convergence with Foundry and ShoreTel High-performance products, open-standard support, ease of management and quality customer service are characteristics that both Foundry and ShoreTel share. Hemminger attributes a portion of the partners’ success to the solutions’ ease of use.

“Other products are difficult to set up and manage. Foundry switches and the ShoreTel platform can be set up and running in no time,” he explains. “They are high-quality products that have a nice form factor and the flexibility to support traditional and IP phones at a reasonable cost.”

Customers are already leveraging the capabilities of this powerful duo. McKenzie Sports Equipment, Mortgage Information Systems of Cleveland and RHI are experiencing the benefits of ShoreTel's innovation-leading IP-PBX and Foundry's award-winning FastIron switches.

At Mortgage Information Services (MIS), the company added Foundry FastIron switches to support the increasing need for power over Ethernet (PoE). MIS has been making latency-free calls over the ShoreTel IP telephony solution

successfully for the past four years. As the company replaced its analog phones with more feature-rich IP phones, it needed a network that delivered PoE to keep the IP phones in working order.

McKenzie Sports migrated its voice and network infrastructure to ShoreTel and Foundry simultaneously (See the customer case study "VoIP Hits the Bull's Eye for Sporting Goods Supplier's Call Center." The rapidly expanding business chose Foundry and ShoreTel because both solutions are scalable and have open-standard support. As McKenzie Sports added office locations and phones, Foundry and ShoreTel could accommodate the company's future growth.

VoIP Market Projections

Foundry envisions an extremely positive future for VoIP. Hemminger forecasts that VoIP will be a key networking infrastructure investment by 2008 as more enterprises retire their PBXs for IP and hybrid PBXs. "By 2008, VoIP will be mainstream. VoIP will be a dominant enterprise application, and every company will be making calls over IP or planning to deploy VoIP," he says.

A reliable VoIP network consistently delivers high-quality calls that are equal to—or better than—traditional TDM-based systems.

The customers' decision to migrate to VoIP will not be based on cost, he adds, but companies will shift to VoIP because of the applications that they gain. "The ability to integrate the computer and phone so that while you are working in a document you can easily call or email a person using your computer is very compelling," he says.

As Foundry looks to a future where VoIP reigns, the networking manufacturer intends to add feature enhancements that will add security, ease of management and reliability in the VoIP infrastructure.

New features on the drawing board include support for link layer discovery protocol (LLDP) and security features to prevent malicious VoIP attacks. Using LLDP, the Foundry devices will be able to automatically find phones connected to the network. The new security features will prevent hackers from hijacking VoIP calls and other network threats.

These types of technical innovations will further gird the network infrastructure, ensuring that the network delivers VoIP calls consistently and reliably.

When Best Effort Isn't Good Enough: Creating a Comprehensive Support Strategy for Your IP Phone System

Companies often discover the hard way that having an equipment warranty isn't enough to ensure maximum availability of their new IP PBX phone systems. So what are the essential components of an effective VoIP support strategy?

The most common cause of problems on an IP telephony network is change. Whether companies are a sprawling multi-site enterprise or a small firm, most organizations regularly add users, applications and even locations. Any time an organization adds or changes the network configuration, there can be a domino effect that disrupts data and voice services. And when companies have an urgent problem with their IP phone system, they often discover belatedly that they don't have an adequate IP telephony support strategy in place to assure business continuity.

A comprehensive support strategy for IP telephony has four crucial elements, according to Barbara Bjornstad, senior manager of installed base marketing for ShoreTel. These elements include: effective administrator and end user training, high quality telephone technical support, a way to repair failed hardware expeditiously and a mechanism for software upgrades.

Too often, a comprehensive support strategy is an after-thought. Creating the right IP telephony support strategy for your business requires that IT administrators ask themselves key questions before they deploy the IP phone system. For instance, how will I get my system administrators and users trained? Who will have the technical expertise to answer an IT administrator's question? How will the company make the transition from one software version to another as transparently as possible?

Make sure your IP telephony provider offers a full complement of training for both administrators and end users. The IP telephony provider should provide a mixture of live and self-paced training in both face-to-face and web venues.

Considering how your organization will isolate problems with the IP telephony network is critical before you plug in a single new phone. The IP phone system will generally come with a basic warranty, which protects your business from equipment defects. However, that warranty alone is not sufficient for organizations that consider the phone as a lifeline for business communications.

If there is a hardware defect, most warranties require the IT administrator pack up the failed equipment, ship it to the manufacturer and wait while the vendor repairs it on a best-effort basis. The process could take weeks. But most organizations simply can't tolerate days of outage on their phone system. Many companies stock spares of critical equipment, but having a support services agreement with the vendor assures you of a speedy response.

Having an extended services contract is also vital to minimizing business-crippling downtime. "Having a service contract with your IP telephony makes you a top priority," Bjornstad says. "The vendor commits to you in terms of service-level agreements as compared to best-efforts response provided for non-contract requests. The resources are already in place when a problem occurs, which speeds problem resolution."

Your IP telephony provider should offer a full complement of live and self-paced training in face-to-face and web venues.

Having a support services contract with your IP phone vendor can also give you telephone access to experienced systems engineers who can help your IT team identify the source of a problem so it can be resolved quickly, with minimal pain to the organization. These same experts can be invaluable when you make changes or upgrades to your IP telephony network.

Also consider how the IP telephony vendor will provide software upgrades so that your organization can take advantage of capabilities such as web conferencing and integration with your critical business applications.

Before selecting an extended service contract, Bjornstad advises organizations to do their homework, including asking the IP phone system manufacturer about key statistics like time-to-close ratios and customer satisfactions rankings. Looking for independent research on customer

satisfaction from firms like Nemertes Research will also help organizations gauge how well an IP telephony vendor performs against its competitors.

“Every customer should talk with their reseller about support, because their reseller can offer them a number of options for structuring a services contract,” Bjornstad says. It is also important to choose an IP telephony vendor that offers a full portfolio of assessment, implementation and optimization services. These proactive services give customers an extra level of control by addressing issues before they impact the system and ensuring that customers get the maximum benefit from all included product features.

Considering VoIP? Don't Forget To Plan for the Unthinkable

Anxiety-inducing though it may be to contemplate, organizations migrating to VoIP must build a plan to restore voice and data communications after a widespread disaster.

Before you plug in your new IP phone system, you should establish a plan to restore voice and data communications in the event of a widespread power outage, natural disaster or terrorist attack. Being prepared for a disaster is more than just good business planning. Some outages are minor, but more severe outages can put your company out of business. And if you are a public company or are in a heavily regulated industry, business continuity may be required by law.

What's Your Recovery Strategy?

Begin your disaster recovery strategy with a thorough assessment of your business risks, including an analysis of the most likely risk scenarios. As part of your disaster recovery plan, you must consider how your business will serve customers, how you will restore computer and phone service, and even who should come to work and who should stay home.

You need to establish a backup strategy for your data and voice systems, as well as a documented plan that details the steps to restoring service, and when to escalate at critical decision points. Knowing what hardware and software you need to restore voice and data communications—and having it at a backup site in advance—is critical for a speedy recovery.

Organizations with multiple locations should consider where they will locate their backup IP telephony systems, according to Keith Ennenga, technical marketing engineer at ShoreTel. "Ideally, the backup location has dedicated networking infrastructure that connects back to the primary VoIP site," he says. The secondary location might be in another town, state or country, depending on your organization's size, clients and business coverage area.

If you have the occasion to need the backup site, you can be assured that key capabilities of the ShoreTel IP phone system remain intact during the switch from the primary server to the backup server, Ennenga notes. The ShoreTel system is a fully distributed IP phone system with no single point of failure. Call control is distributed to intelligent gateways—called voice switches—and voice applications, including voicemail and automated attendant, run on standard server hardware from anywhere on your IP network. The result is a single-image system across all geographies, with complete feature transparency.

The switchover takes seconds or minutes depending on the network configuration and where the primary and secondary ShoreTel sites are geographically located. "If you run the primary server in San Francisco and the secondary server is located in a nearby branch office like San Jose, and you have a dedicated network pipe between them, the cutover could happen in seconds," Ennenga says. "If your secondary server were in New York, though, it might take a few minutes because of the physical distance and the type of network in place."

If a disaster or outage prevents workers from going into the office where their usual ShoreTel phones are located, ShoreTel's Office Anywhere feature simplifies the process of working remotely—however long it lasts. With Office Anywhere, "Users can use any other telephone on or off the network, including a cell phone," Ennenga says. "Users simply log into their voicemail and assign their internal ShoreTel extension to an external phone number. It's that easy."

Not only can workers use all the ShoreTel features they rely on, but they can also launch Personal

Call Manager and access their unified messaging features, phone numbers and perform call-control functions like transfer and conference. In such a scenario, the PSTN handles the voice calls, but the network still sends status information to the ShoreTel phone system.

After the Hurricane

At least one ShoreTel customer had an all-too-painful reminder of why a disaster recovery strategy is so crucial. Balch & Bingham LLP, a law firm with multiple offices—including one in Gulfport, Miss.—implemented a ShoreTel IP phone system in early 2005. Following 2004's Hurricane Ivan, when at least one of the firm's offices closed due to flooding and its old phone system had to be moved to another floor, the company devised a disaster-recovery plan that included a move to VoIP.

Perhaps the ultimate test of that strategy came in August 2005, when Hurricane Katrina wreaked its deadly havoc on the Gulf Coast. Balch & Bingham's Gulfport office sustained major storm damage, and worse, about 20 employees' homes were destroyed.

In terms of restoring business connectivity, the firm fared better. The ShoreWare database and routing information were loaded into a new server, and within a day voice and data communications were back online.

Establish a backup strategy for your data and voice systems that includes a documented plan that details the steps to restoring service and when to escalate at critical decision points.

"Events like Katrina tend to make people think more about disaster recovery," Ennenga says.

"Companies considering a voice or data network overhaul not only begin to ask tough questions such as, 'How much would it cost us if this location went down?' but they also begin to think of disaster recovery as an insurance plan."

Get Help from Global Support

ShoreTel's Global Support Services team works hard to understand a customer's business model as it plots out a disaster-recovery strategy, Ennenga says. "Global Support Services approaches it from a productivity standpoint," he says. "They try to understand the

customer environment and business requirements." By analyzing a customer's existing network, from the current number of calls to future bandwidth requirements, ShoreTel's aim is to create a network with more resiliency and availability, the better to withstand manmade or natural disasters of any kind.

For more information on ShoreTel's approach to designing VoIP networks that can recover quickly from minor outages and major events, see "[Building Reliable IP Telephony Systems](#)," a whitepaper by Ed Basart, ShoreTel's CTO. Basart lays out some of the best practices inherent in designing a VoIP system that can deliver superior uptime, use network redundancy in the most effective manner, and hold applications to the same standards as network hardware.

Prioritizing Voice Quality

Quality of service is essential for a high performing converged network. With today's easy-to-manage solutions, businesses of all sizes can keep voice and data traffic running smoothly over their IP networks.

IP telephony's appeal is undeniable. Convergence offers a compelling list of benefits to businesses running the gamut from cost savings to portability. The result is an explosion in the number of IP telephony implementations. Yet as promising as the technology is, running voice over the same IP network designed to carry bursty data traffic poses distinct performance challenges.

Simply put, unlike the circuit-switched networks that traditionally carried voice, IP networks don't inherently give voice the priority it needs. IP networks operate in an almost round-robin style, transferring data at whatever speed is necessary. Each user gets the bandwidth they need to transmit, though not necessarily immediately when they request it.

Voice not only requires sizable bandwidth, but also the traffic needs to be moved in real time. A robust IP telephony deployment requires the ability to prioritize voice traffic—or else your organization runs the risk of distorted voice quality or prematurely dropped calls.

"With data, it doesn't matter if a packet comes through now, a half second from now or two seconds from now," says Greg Iverson, executive vice president of business development for Kentrox. "Data is not real-time traffic."

Quality of service (QoS) can be added to the IP network to provide the prioritization that voice requires. QoS is a proven solution, and large organizations have used it for years. However, with the advent of QoS solutions that are easier to use, QoS is within the reach of the small- and medium-sized business.

The Bandwidth Myth

So why not simply throw more bandwidth at the problem? Iverson says that it is a myth that bulking up bandwidth delivers voice quality. When a user visits a graphic-intensive Web site or downloads a large email, all of the available

bandwidth is consumed, says Iverson. The net effect on the voice traffic during these data-intensive periods is that the voice call is distorted or dropped. QoS also helps businesses minimize bandwidth costs by better allocating the bandwidth they already have.

"The right answer is to deliver comfortable listening quality," Iverson says. "The way to do that is to put quality of service in the network. QoS helps the IP network behave more like a traditional telephony network."

QoS performs something of a balancing act. It minimizes delay, manages the disparities in delay, and manages packet loss for high-priority traffic, like voice, without jeopardizing the performance of lower priority applications. So an administrator can determine, for instance, that voice gets top priority and always has access to a certain amount of bandwidth, while lower priority traffic, like email and Internet traffic, use the rest of the bandwidth as it is available.

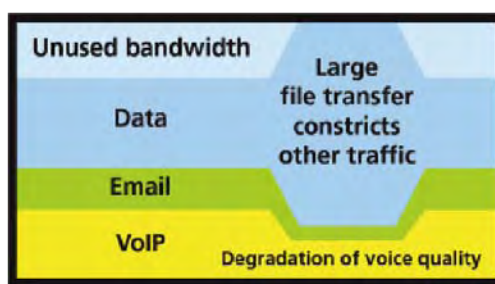


Figure 1: Lack of QoS support results in unacceptable VoIP performance.

With its Q-series appliances, ShoreTel partner Kentrox offers a snap-in QoS solution. The Kentrox appliances sit at either end of the WAN link, prioritizing voice traffic delivery and providing traffic management information. Iverson says an administrator can configure the devices in literally minutes.

A robust IP telephony deployment requires the ability to prioritize voice traffic—or else your organization runs the risk of distorted voice quality or prematurely dropped calls.

Using IP DiffServ or administrator-specified policies, the Q-Series router classifies traffic before putting it into the appropriately prioritized queue, so that it can be transmitted. The Q-Series shapes traffic to a specified bandwidth so you can allocate how much bandwidth each type of application uses.

The Kentrox appliances are easy to manage, even for those IT administrators with little voice experience. “We built all of the graphics and all of the utilities for managing QoS right into the product,” Iverson says. For those administrators who do want to manage QoS from a separate management console, the Kentrox appliances are SNMP-manageable.

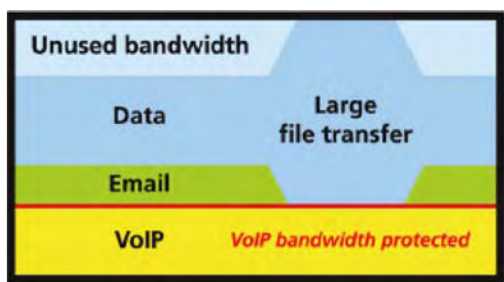


Figure 2: Prioritization ensures high-quality VoIP performance.

Kentrox’s Q-Series solutions provide graphical reports that help administrators chart performance over time and troubleshoot problems quickly and accurately. Iverson says that if, for example, there is a performance glitch in the middle of the night, the administrator can look at traffic activity earlier in the day to see if something in the network is not tuned properly or if some other aberration occurred.

Plan for Success

Companies should plan their QoS strategies before they cut over to convergence. Too often businesses have severe voice quality issues before they recognize the need for QoS or delay the VoIP deployment because they think QoS will be too complex.

Kentrox defies the perception that QoS is too complex to setup and manage. “Our products are all plug and play. Once you connect them, you can see an instantaneous change in the quality of the network,” Iverson says.

WAN Optimization

As businesses expand VoIP deployments beyond the enterprise campus to remote call centers and branch offices, they're bumping up against limited-capacity WAN links. They're discovering that WAN acceleration solutions can open up a lot more capacity for voice traffic.

Convergence projects are fast-tracking beyond the pilot stage in many businesses, with VoIP installations leading the charge. Two-thirds of surveyed enterprises have moved past limited IP telephony deployments, according to Nemertes Research. There's good reason why. By providing new opportunities for companies to better serve customers, partners and suppliers, converging voice and data onto a single network offers a competitive advantage.

Multi-channel customer management and advanced data analytics in the call center, for example, enable companies to serve constituencies as they prefer to be served, and to personalize the experience while increasing cross-selling opportunities. Corporate leaders clearly see the value in using convergence as a business initiative, according to a speech given by Eric Shepcaro, vice president of business and consumer strategy and development for AT&T, at ITExpo West in October. A survey conducted by AT&T reveals that 89 percent of CEOs and CIOs believe that network convergence is critical to achieving organizational, strategic IT and business goals, Shepcaro said, which is up from 45 percent in 2005.

But as businesses expand VoIP deployments beyond the campus to remote call centers and branch offices, they're bumping up against limited-capacity WAN links. Latency, jitter and packet loss, which are tolerable in data applications running over the WAN, are killers for real-time voice applications. Simply upgrading network bandwidth is not the solution, costs aside: You simply can't change the laws of physics that result in latency on the WAN. Without the ability to prioritize voice traffic over less time-sensitive data traffic, businesses risk sacrificing the quality of voice service — as well as their relationships with customers and partners.

Meeting Expectations

"Voice is one of the most strategic applications," says David Colodny, director of business development at Juniper Networks. "People have certain expectations about voice." Juniper is a ShoreTel solution partner. Latency that halts conversation between a customer and service representative or packet losses that break up conversations create frustration for the client—possibly right at the point where they may be influenced to make a purchasing decision or are in immediate need of help.

Delivering a high-quality VoIP service across WAN links actually is reliant upon optimizing all the other kinds of traffic competing for the same bandwidth, reducing latency, increasing WAN throughput and opening up more bandwidth for voice services. (Voice traffic itself is already pre-compressed, though it is possible to compress headers on that traffic—which can be significant as a percentage of total packet size—to further reduce total VoIP traffic.) Despite best efforts, congestion can still occur on the WAN link. That's when quality of service (QoS) rules come into play to ensure smooth end-to-end voice transmissions.

"You want to create as many unimpeded bandwidth channels for voice traffic as you can, and then prioritize that traffic over other flows so that it gets guaranteed bandwidth," says Colodny.

Many organizations are turning to WAN optimization solutions to ensure that voice calls don't suffer from the latency inherent in the WAN link, by VoIP protocols themselves, or by jitter and packet loss, organizations should put in place a comprehensive WAN optimization solution. WAN optimization solutions typically include compression and caching for more effective use of available capacity, application control for quality of service, and visibility for real-time management.

To deliver toll-quality VoIP, a certain amount of bandwidth must be allocated per office specifically for VoIP – otherwise the callers will hear degraded voice quality or worse, experience a dropped call. VoIP requires about 15Kbps of dedicated bandwidth per user. By deploying compression solutions, organizations can reduce the bandwidth consumed by other enterprise traffic, which can make room for VoIP.

Quality of service isn't the zero-sum game it once was, in which one application was prioritized over another. More sophisticated solutions allow IT organizations to define QoS policies based on which applications are most critical at which locations. The Juniper Networks WX and WXC application acceleration platforms, for example, offer multiple priority levels for classifying application traffic such as voice. QoS tools enable highly compressible applications to exceed throughput parameters, provided they do not impede on other applications' guaranteed bandwidth.

The results of such compression and prioritization capabilities can be dramatic in terms of increasing existing WAN capacity, achieving toll-quality voice, and multiplying VoIP call volume over the existing WAN—not to mention the cost savings achieved by avoiding a WAN upgrade.

Management's a Mainstay

But equally critical to successfully delivering VoIP services across WANs is a robust and centralized management platform that provides real-time visibility into traffic parameters, including application-level views of WAN traffic and

Latency, jitter and packet loss are killers for real-time voice applications. Simply upgrading network bandwidth is not the solution. You simply can't change the laws of physics that result in latency on the WAN.

utilization, compression performance, and the impact of QoS parameters. By understanding how WAN links are used, businesses can anticipate problems and head them off before they impact performance.

Indeed, in a recent Nemertes Research report, respondents were asked to rank the features they most wanted to see in a VoIP management tool. High on the list were bandwidth utilization stats and QoS data (both real-time and historical), prompting Nemertes to comment that the growing complexity of converged infrastructures is driving a need for data not just about how applications are consuming bandwidth, but how people are consuming it as well.

The partnership of Juniper Networks and ShoreTel brings together two leading performers well-equipped to deliver to enterprises an IP telephony solution that will keep voice quality high, regardless of network congestion. Given the critical role converged networks are playing, enterprises can't afford not to have a sound platform.

After all, says Colodny, the future will bring new challenges: "Even if you are doing all the correct things around WAN optimization, you still need to consider whether you'll max out anytime soon as you start to add more users and more VoIP channels on the voice network."

Resources

[Download the VoIP solutions brief from Juniper Networks and ShoreTel.](#)

MPLS: Convergence's Class Act

The right managed MPLS service gives businesses the quality, scalability and security needed to support exceptional IP telephony network performance. But buyers beware: All services are not created equal.

Believe the hype: MPLS has finally arrived. Seventeen percent of enterprises finished an MPLS implementation in 2005, and another 17 percent will wrap one up by the end of 2006, according to Forrester Research. What is driving this action after so many years of talk is widespread carrier MPLS adoption. Service providers like AT&T are building their managed service portfolios around the promise of multiservice networks delivered via MPLS.

As carriers adopt MPLS in their core networks, enterprise businesses are getting access to the quality of service, scalability and the tight protection that multi-protocol label switching (MPLS) has long promised. For businesses deploying multi-site IP telephony networks, MPLS is the WAN technology of choice for cost-effective and secure integrated voice and data service.

Businesses can use MPLS to prioritize their WAN traffic end-to-end to ensure they get the level of performance demanded by time-sensitive voice and other business-critical applications. MPLS has a particular appeal for companies that are moving to convergence but want to keep expenses down while ensuring the best network performance possible. Not only does an MPLS-based WAN promise the kinds of quality of service capabilities that voice applications require to avoid lost packets, distortion and dropped calls, but MPLS also scales easily to support growing businesses.

Traditional private line and frame relay WANs use a hub-and-spoke architecture. But because MPLS uses a peer-to-peer networking architecture, each location can communicate to all other branch offices through just one connection to the WAN cloud. That keeps capital equipment costs to a minimum. MPLS also delivers a high level of security to protect both voice and data applications.

Priority Order

Part of the beauty of MPLS is that it removes much of the complexity that is associated with traditional telecom network services. Now, instead of needing a private line or frame relay network to handle mission-critical applications like supply chain management or customer resource management (CRM) and a separate network for voice, businesses can use a common managed carrier service using the same network to transmit all their traffic across the WAN, says Rick Stein, Executive Director of Business Voice over IP Product Management for AT&T.

Stein says the customer can use one common network and just assign different classes of services to different applications based on priority. For example, voice applications would be assigned Class of Service 1 for real-time delivery. Video, enterprise resource planning (ERP) or other mission-critical applications that require near real-time could be assigned to Class of Service 2. And email and Internet traffic would be assigned a lower priority.

To signify to WAN devices what class of service a particular application should receive on the WAN, Label Edge Routers (LERs) issue an identifier that includes information from the routing table entry, such as destination address, bandwidth, and source address. The identifiers—or labels—are instrumental in maintaining security by hiding the actual IP addresses and other information about the packet stream. While this makes security comparable to the protection provided by frame relay or ATM, MPLS doesn't guard the packet contents within the packets.

Many Happy Returns

So how can an effectively managed MPLS-based VoIP service benefit a business' bottom line and help improve corporate-wide productivity? At the most basic level, consolidating applications onto a

single network saves companies the cost of capital equipment, management expenses, and bandwidth. But that isn't the only cost benefit that comes as a byproduct of consolidating traffic that otherwise might have to run across multiple networks onto a single infrastructure.

In managed VoIP services such as AT&T's, edge devices rely on compression technology that fits more high priority voice packets onto the network than a frame relay or private line network, thus saving bandwidth without sacrificing quality. MPLS also helps companies tap all the cutting-edge IP telephony features that have such a broad appeal to businesses that are looking to convergence to improve their corporate productivity.

The benefits of MPLS are many. Stein points out that AT&T's VoIP service supports things like number portability and "find me, follow me." This helps one employee locate another fast and with minimal hassle.

"With new technologies coming, employees have the ability to go into a phone directory and see not only the names and numbers in that directory," says Stein, "They can also see where that person is and to which device he or she is currently connected. They can click on that person or number in the directory and be connected."

At Your Service

MPLS promises a host of benefits to companies making the move to VoIP, but businesses should proceed with caution when it comes to selecting a carrier. So what should a business look for in an MPLS-based managed service to support its move to convergence—and what should it avoid?

Seventeen percent of enterprises finished an MPLS implementation in 2005, and another 17 percent will wrap one up by the end of 2006, according to Forrester Research.

Reputation and expertise certainly count, but when it comes to choosing an MPLS-based managed WAN, businesses should focus on the carrier's network itself. Does the network have sufficient bandwidth to support its customers' capacity requirements? Is the network limited in its geographic reach or is it flexible enough to cover a company's local, national and global communications needs? And has the carrier cut any corners when it comes to the way their network is architected?

AT&T's Stein points out that not every carrier employs MPLS throughout the core of the network, and many

implement MPLS at the endpoints only. The result is less than stellar performance that doesn't live up to MPLS' promise.

"Unless the carrier uses MPLS throughout the network, there is a risk of bottlenecks and other issues that could derail network services and impede operations—or worse," says Stein.

Companies need to be aware of how the managed service provider handles voice engineering and traffic shaping. Does the carrier oversubscribe its network and hope for the best? Of course this approach won't cut it when it comes to keeping voice traffic flowing, because a delay can diminish voice quality or even worse.

Thus it is critical that companies select an MPLS-based managed service that provides the kind of guaranteed quality of service throughout the network they need to maintain exceptional voice and data performance. Luckily, companies have more options to choose from than ever before to help them become more efficient and productive businesses.

IP Telephony Security: Mitigating Risk

The best defense for a converged network begins with a set of best security practices.

IP telephony usually makes headlines for its explosive growth, but the recent arrest of a Miami man for allegedly defrauding VoIP providers of \$1 million by infiltrating their networks to sell minutes on their dime put a spotlight of a different kind on convergence. Though this was a breach of service provider networks, the incident still serves as a reminder to the enterprise that its IP telephony network is not immune from an attack. The upshot for any organization running voice traffic over its IP infrastructure is that it needs to have a vigilant defense.

This defense starts with knowing the risks to IP telephony networks and establishing a strategy to prevent criminals from surreptitiously gaining access to the corporate network. So what are the biggest threats to an IP telephony network? And what should a company do to mitigate these risks?

Lisa Lorenzin, a Juniper Networks consulting engineer focused on security, says businesses should be aware of two general categories of threats against IP telephony environments. The first category includes VoIP communication-specific threats that breach the network through vulnerability on an IP PBX or softswitch. VoIP-specific threats typically involve the hijacking of the PBX or softswitch to make unauthorized calls. Hackers also may eavesdrop on calls or launch a denial-of-service attack derailing all traffic, including delay-sensitive voice calls.

The second and more prevalent type encompasses generic network threats that use vulnerability in a traditional network device as a gateway to enter the network. Lorenzin cautions that just because an attack passes through a device on the underlying network instead of an IP PBX doesn't make it any less of a threat to VoIP communications.

"Even if the general network itself is attacked, VoIP traffic might be interfered with as collateral damage," Lorenzin says.

Start at the Beginning

To prevent this kind of an attack, businesses need to make security an ongoing process instead of a one-off project. Like all of the most effective technology initiatives, security should be an integral part of the IP telephony implementation from the start.

"Too many people are attracted to VoIP because they see they can save money by running VoIP and security is just an afterthought," Lorenzin says.

IP telephony networks aren't static, so the security protecting them shouldn't be either. Lorenzin advises companies to continually assess their networks, looking to repair vulnerabilities.

"The systems should be reviewed every six months to a year. As the technology evolves and the demands on the network evolve, the security implementation also needs to evolve," Lorenzin says.

For businesses that know their security is lacking, Lorenzin suggests starting with a best-practices document that specifies the course of action the IT organization should take to protect its IP telephony network. She says the company should walk through each component on the network to make sure security is sufficient.

Layered Protection

Some basic best practices can serve as a guideline for good IP telephony security. Layered security is essential, providing a multi-faceted defense against a diverse group of threats. Layered security is made up of a number of elements, starting with the most fundamental – making sure all network security patches are up to date and having good anti-virus software in place that scrubs out malicious code.

An IP PBX running on Windows can be a risk unto itself. As a contrast, ShoreTel call control runs on Wind River VxWorks operating system, which is the leading embedded operating system.

“But if you are running an IP PBX on a Windows operating system and there is a vulnerability on the underlying system that can be exploited, that exploit is going to cause you as much trouble as if someone attacked the VoIP software directly,” Lorenzin says.

Layered security should also include other elements such as firewalls and intrusion prevention systems (IPS) to sniff out malicious traffic that otherwise might slip onto the network. Lorenzin says companies need firewalls that can do application-layer interrogation of traffic, dynamically opening ports to permit calls onto the network as needed. She adds businesses need an IPS to identify and block attacks against the H.323 or SIP protocols used to transmit voice. An IPS makes sure the traffic is clean before letting it pass onto the network.

In Tune

Lorenzin observes that IP telephony security is a balancing act. Most vulnerabilities are related to VoIP control traffic, which puts the emphasis on protecting the control traffic from exploitation while keeping jitter from affecting the network.

However, companies tend to look at IP telephony security as one dimensional—keeping unauthorized users off the network. Instead, Lorenzin says businesses need to see it in a more balanced way with two aspects – securing traffic and assuring traffic moves through the network at a good pace.

QoS is one way for businesses to prioritize voice traffic so that even the most congested line delivers the best possible service. Implementing

Virtual LAN (VLANs) is another option. VLANs isolate voice traffic from data traffic. Using VLANs can lessen the impact of a denial-of-service attack, because the voice traffic is isolated.

And In Control

One issue associated with layered security is managing all the disparate security solutions. Lorenzin says companies need a strong centralized management platform from which all the components can be correlated and managed.

Having a centralized system to view security information makes it easier to configure, upgrade and view system logs. Blending all of these elements under one management umbrella helps businesses better maintain their equipment. This manageability is a key element of IP telephony security for the simple reason that it consolidates a number of different tasks and ensures all the security components perform their tasks adequately.

Juniper and ShoreTel offer a joint solution that combines ShoreTel’s IP phone system with Juniper Networks’ security solutions. Juniper’s contributions include its NetScreen firewall/IPSec VPN and J- or M- series QoS routers, all of which can be centrally managed from a single console. The result is an effective IP telephony solution, which takes the perspective that security is a fundamental part of the network.

“Companies need to design security into the solution from the beginning rather than designing an infrastructure for voice and trying to retrofit security into it,” Lorenzin says, adding that only then can the IP telephony network be truly secure.

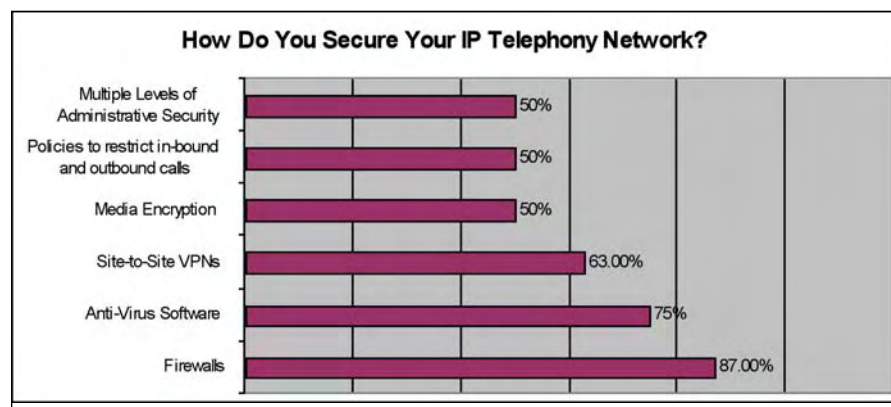


Figure 1:
We asked ShoreTel News readers what measures they take to protect their IP telephony network. Here’s what they said.

An Ounce of Prevention is Worth a Pound of Cure: The Case for Ongoing Network Assessments

A regular network checkup can help you optimize your network infrastructure for the best voice and data performance and address the factors that inhibit performance.

Just as an annual checkup of your physical health by a medical doctor is a good idea, a yearly overview of your IP telephony network is a smart move. Your network environment is constantly changing:

- Users are added
- Locations are added or changed
- Applications are added or changed
- Service providers change
- User traffic is constantly changing
- Users may use unauthorized applications

Regular assessments of your VoIP system and the underlying network infrastructure can help you optimize server configurations, correctly segment voice and data traffic, and smoke out any weak points where throughput could use a boost. Over time, these regular inspections will help you paint a broad picture of your network's optimal performance and understand the factors that inhibit or enhance it.

Just as your M.D. takes your resting pulse or tests your body's reflexes, you need to gather some basic facts about your network before you can attempt to conduct a yearly checkup. Especially when your IP PBX is new and you're attempting to assess its impact on data traffic—or vice versa—you must examine the flow of different types of data around the network to develop a solid understanding of what's "normal" network behavior—and what's not.

According to Michael Landry, Implementation Services Manager at ShoreTel, the addition of two key elements to your IP telephony network—people and applications—may alter its capacity to manage throughput effectively. "Having sufficient capacity to support the applications you must run is the number-one concern," he says.

While thorough, once-a-year network checks are a requirement; they are no substitute for more frequent assessments. "Ideally, companies should monitor their networks on a daily basis to observe trends in bandwidth utilization and other network events," Landry says.

The Impact of More People

The number of users added to the network through routine hiring, acquisitions made by your company or other means will affect your VoIP system, Landry notes.

Additional users create an additional load over time. Their presence on the network translates to more network devices, from printers to PDAs. As users are added, pay attention to any changes in overall traffic flow. "You might see that during a particular time of the week, usage ramps way up," Landry says. Maybe a videoconferencing application is used simultaneously by dozens of people on Thursday mornings, or a spike in Web audio streaming routinely takes place around lunchtime. Noting these trends can help you plan where and how to place hardware and software to make the best use of network resources.

Regular close examination of network traffic is also a good way to pinpoint unauthorized traffic, such as video or music downloads that may violate corporate policy or compromise network performance. "You can trace from where the downloads originate" and notify the user and/or other appropriate individuals that the downloading is not authorized, says Landry. Regular network assessments can also turn up unnoticed changes in device configurations. "You may find that a mismatch between your networking gear and other devices that causes poor performance," Landry says. "Poor network performance can indicate that a switch was not configured properly."

Software Configuration

Not only the ways in which applications are configured but also the kinds of applications in use can hamper your IP telephony network's optimal performance. What's key, Landry says, is ensuring that the software does not impact the real-time exchange of information that makes an IP telephony call work: even a small amount of latency can result in a dropped call or a poor connection that doesn't let callers communicate easily.

Videoconferencing is an increasingly popular real-time application that will suffer if the network is not optimized and adjusted over time. Streaming video is less susceptible to real-time traffic issues because it's generally one-way communication. But because audio streaming is more widely used, IT staff should watch this application during network checks to ensure it's not compromising the quality of voice or data traffic.

"A few short years ago, people weren't routinely streaming audio from the Internet to their computers," Landry says. Yet these days, that sort of usage—both authorized and unauthorized—is prevalent among users, possibly affecting your IP telephony call quality.

Month over Month

Traffic patterns you observe in January may differ significantly from those you see in December; tweaking hardware configurations may address issues that arise.

If over time you observe the same regular and specific end points on either side of a heavily used application, "you may be able to isolate them to a common Ethernet switch so the traffic is not moving across the network backbone. You can put two servers on a common blade or switch so that they are really just talking to each other, even though they have network access," Landry says. "Look at your whole network deployment strategy and consider what's really communicating between key applications."

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Watch out, Landry says, for bandwidth-intensive data applications. "Maybe you've got a bandwidth hog, like FTP, which sends large amounts of information between client PCs," he says. In networks serving companies in the medical, engineering or design fields, an application that captures a lot of precise detail—such as software for storing MRI scans or generating CAD drawings—may need to be segmented on a virtual LAN. "That way, you're isolating that data traffic from voice," Landry says.

Of course, not all applications will need adjustment to run optimally in a VoIP environment. Email, for one, is fairly immune to blips in network performance; if an email message takes four seconds or 11 seconds to arrive at its destination, chances are neither sender nor recipient will be the wiser.

Even as daily scans of the network may reveal valuable details about your VoIP system, the information you gather will help you as you take the long view in annual network health scans.

"Over time, because your network is changing," Landry says, "you are going to want to reset your expectations and re-evaluate its support capabilities."

Need Help?

ShoreTel Implementation Services offers a System Review and Health Check service to proactively identify potential problems and hot spots in the ShoreTel system—before they can do any real damage. Health Checks also offer a detailed report diagnosing the situation, enabling ShoreTel customers to take the necessary corrective action. For an even more proactive approach ShoreTel offers the ShoreWare System Monitor ensures a high level of voice quality through continuous monitoring of your network and follows up with automated alerts of potential issues. Eliminating potential problems before they can become real ones boosts overall system performance, enhances availability and increases your return on investment.

E911 Systems Enable Communication Safeguards for VoIP

With E911 capabilities, your IP phone system can pinpoint the extension and name of a 911 caller to onsite first-responders during an emergency.

In a natural or manmade disaster, minutes—sometimes seconds—can mean the difference between an incident and a catastrophe. Your employees may be the first responders if a perilous event takes place in your offices, and the ShoreTel E911 Notification Application provides them with an internal vital communications link.

Preparing for E911

Before your organization migrates to VoIP, you should understand the specific E911 requirements for your state and locality. You should also be aware of which 911 services are available from your carriers, including the roles and responsibilities each participant has in a 911 call. Companies reusing analog phone lines, for example, can request the necessary 911 information from carriers and duplicate it for the ShoreTel IP phone system. However, multi-site locations present different challenges. Companies beginning a VoIP rollout at multiple sites are advised to consult with their reseller or ShoreTel professional services.

Integrated E911 Notification

In addition to the native E911 support built into the ShoreTel system, organizations have the option to add an E911 Notification Application that boosts E911's basic capabilities by providing three additional services:

- Notifies users running the associated ShoreTel 911 client application
- Calls each party in a configured list of internal and external numbers
- Logs the 911 call and all notifications and acknowledgments

The E911 Notification Application software enhances the native support for E911 in the ShoreTel phone system by helping organizations ensure a coordinated response to emergency

situations. For example, when someone uses a phone in the ShoreTel system to place a 911 call, the phone system provides the appropriate caller ID information to a local Public Safety Answering Point (PSAP) to ensure that emergency personnel are dispatched to the correct location. However, since on-site personnel may be able to assist in an emergency situation more rapidly than first-responders from outside your organization, ShoreTel's E911 Notification Application takes this critical communication one step further.

In response to a 911 call, the application notifies any connected clients. Client users are presented with a pop-up window and optional audio message or tone. They must click the Window's OK button to acknowledge the 911 event. Both the fact of the notification and the acknowledgment are logged by the application. The client also provides a simple integrated instant messaging feature that can be used by client users so personnel can track emergency response actions, assign personnel to appropriate tasks, and otherwise stay in close contact.

The application also calls the parties in a configured list of contacts. Each party who answers receives a notification message alerting them to the 911 call, the extension of the party who placed the call and a request to acknowledge the call via a digit press on their phone. By default, the message is repeated three times or until acknowledged. The results of the calls including any acknowledgements are logged by the application. Internal parties will see "***911 CALL***" on the display of their ShoreTel phone as well as the extension that placed the emergency call. For external parties where the trunk passes outbound caller ID, that information will be as specified in the route point's configuration.

Before your organization migrates to VoIP, you should understand the specific E911 requirements for your state and locality.

The ShoreTel Notification Application automatically logs all 911 call activity, including any client and contact acknowledgments, providing a complete record of how your employees used the software to respond to the incident. Such information is useful to develop internal crisis-response policies and for safety training as well as to manage public relations if the event garners outside attention.

The new product consists of three Microsoft Windows applications: the E911 Server, which continuously monitors all trunks in the system for 911 events; the E911ServerConfig, a configuration client that guides IT personnel in deploying the Server; and the E911 Client, which runs on client PCs.

ShoreTel's E911 Notification Application provides crucial communications and safety benefits in settings ranging from businesses to universities to nursing homes to military bases. By adding another layer of protection, E911 can help contain a crisis, minimize property damage and save lives.

Optimized for use with ShoreTel's high-availability IP phone system, the E911 Notification Application complements ShoreTel's robust and easy-to-use VoIP technology. If you're considering a VoIP deployment, see a ShoreTel representative to learn more about how the E911 features already built into ShoreTel VoIP can help protect your organization—and its people—in the event of an emergency. You may also contact ShoreTel's professional services at 800-425-9385, ext 3331 or send email to professionalservices@shoretel.com.

Free to Move with Wireless Voice

Voice over wireless frees you from your desk, so you don't miss important calls. Are you ready for the coming wave of wireless voice?

Voice is the killer application for wireless LANs. That revelation is no surprise to those of us addicted to our wireless PDAs and mobile phones. The ability to stay connected and productive will now be extended to our phones inside our building walls thanks to voice over wireless IP (VoWIP).

Wireless voice is at the crossroads of two fast-growing markets. The enterprise telephony market is undergoing a swift transition from circuit switching to packet switching, as organizations use their data networks for telephony. At the same time, enterprises are rapidly adopting wireless LANs for the productivity and mobility they afford.

The VoWIP market is expected to grow steadily over the next several years. Sales of WiFi phone units grew 112 percent between 2004 and 2005 and are projected to grow 158 percent in 2006, according to Infonetics Research. WiFi phone revenue will hit almost \$1.9 million by 2009. Two-thirds of WiFi phone revenue came from single-mode WiFi VoIP handsets in 2005, although sales of dual-mode handsets is expected to grow, and dual-mode handsets will make up three-quarters of total revenue by 2009, says the market research firm.

Clear Business Benefits

Hospitals, retailers and educational institutions are rapidly adopting VoWIP because their workers are mobile and don't sit behind desks. Increasingly, companies that occupy "traditional" office spaces are also rapidly adopting wireless voice because information workers rarely sit at their desks anymore.

VoWIP brings many benefits to an organization, including:

- **Improved employee productivity.** VoWIP gives workers more flexibility. Workers don't miss calls when they are not at their desks because their phones are always with them.

- **Improved customer satisfaction.**

Customers get answers faster when employees have VoWIP. Callers don't have to wonder whether to dial a cell phone, home office or office number; they just dial, and the phone call follows the mobile worker.

- **Cost savings.** VoWIP eliminates or reduces the need to wire buildings, which can be a significant cost savings in new deployments. It also can reduce operational costs associated with cell phones and private radio walkie-talkie systems in the enterprise. Being able to reach the intended party no matter where they are means additional cost savings, because your company isn't footing the bill of returning missed calls.

Are You Future-Proofed for Wireless Voice?

Wireless voice may appear on your strategic planning horizon sooner than you think. If you plan for the intersection of VoIP and wireless today, your infrastructure can gracefully adapt tomorrow.

"No organization should build its wireless network without considering the implications of emerging applications on that infrastructure," says Sarah Kim, Manager of Channel and Partner Marketing at Meru Networks, a ShoreTel partner that provides wireless VoIP infrastructure. "It's especially critical to future-proof your network for real-time applications such as telephony."

Here are some specific issues to consider:

Support for Session Initiation Protocol (SIP). Your IP PBX should support SIP if you want to be able to choose broadly from wireless devices. SIP is the common language for establishing, modifying and terminating voice calls and other multimedia sessions on IP networks.

A PBX with a native SIP interface, like ShoreTel 6, can support a wide variety of SIP-based products and services, including phones as well as conference room phones, residential access devices for teleworking, and domestic and international trunking services. SIP trunks connect systems from switch to switch or from switch to wireless access point, and handle the basic requirements such as on hook, off hook, ringing and busy.

Because SIP is an emerging standard, ShoreTel works closely with partners to ensure that your choice of SIP handset will work reliably and smoothly.

High capacity and density. Voice demands ubiquitous wireless coverage, so workers on VoIP handsets don't lose calls in the stairwells or as they walk around corners. Start with a thorough understanding of the number of simultaneous users and the bandwidth requirements of their applications.

Increasing the WLAN capacity—essentially deploying more APs and switches—is a common approach to delivering the necessary capacity. However, increasing the number of APs in a given zone also increases interference from different radios on the same frequency band. This can result in poor performance for both data and voice applications. Designing the WLAN to minimize this co-channel interference while maximizing capacity is generally a complex process, requiring costly site surveys and on-going configurations.

Meru's patented Air Traffic Control technology eliminates this challenge by managing signal contention with sophisticated time-based traffic controls. The technology delivers predictable bandwidth, free of latency and jitter problems, to increase user density and application performance. Unlike other WLAN systems in which access points work independently and must be laboriously configured to deliver adjacent, non-overlapping coverage, the Meru WLAN System utilizes system-wide coordination to manage channel contention within and across cells.

Voice quality and system reliability. Users are less forgiving of poor voice quality and dropped calls than they are of intermittent data connections. Excellent quality and reliability are essential.

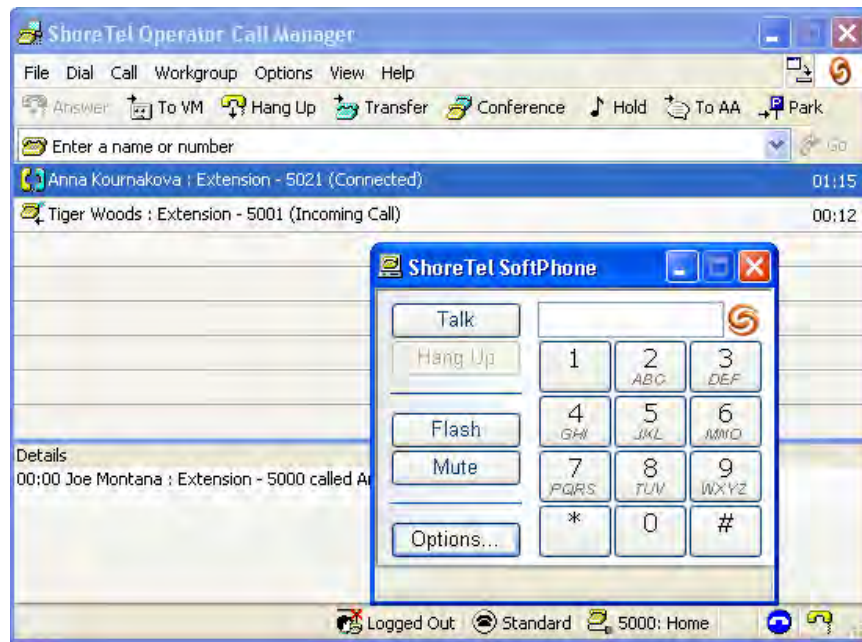
The distributed intelligence of ShoreTel's architecture delivers excellent availability. Administrators can rest easy knowing that ShoreTel ShoreGear voice switches deliver 99.999 percent reliability and use an embedded, real-time operating system. And you can be assured of outstanding sound. The ShorePhone IP 560, IP 530 and IP 210 feature a wideband audio codec delivering seven octaves of range instead of the three octaves associated with traditional phone systems.

"Understanding how to deliver end-to-end quality of service for voice is critical," notes Kim. Guaranteeing voice quality dynamically over other applications minimizes the packet loss, delay and jitter that cause poor voice quality, clicks and silent periods.

802.11e, the IEEE standard for wireless QoS, is the first step for meeting enterprise requirements for voice, but it does not provide QoS per packet flow. Instead, if a mobile handheld user is running a soft phone and checking email, the device receives the high priority assigned to it, not the voice application. A high quality voice call is not guaranteed with 802.11e.

To solve this problem, Meru supports fine-grained QoS per application, user, and flow, both upstream and downstream between the client and the access points. This enables the same wireless LAN to be used for both data and voice while ensuring optimum performance for every client.

Seamless roaming. In the enterprise, AP densities are high, which means that roaming can occur every few seconds at normal walking speeds. As users roam from AP to AP and across subnets, the underlying WLAN infrastructure must "hand off" these users quickly enough that their voice connections don't drop. The re-association and re-authentication to the APs, plus wireless encryption, contribute to the delay.



A flexible choice for mobile workers, ShoreTel SoftPhone extends the capabilities of your desktop extension to your computer - even over wireless networks. Mobile workers can enjoy transparent access to enterprise telephony features while on the road.

Associating and de-associating with an AP may take from 150 milliseconds (ms) to 500 ms. VoIP performs optimally with a delay of less than 50 ms, otherwise callers will hear noise and degraded voice quality. VoIP calls drop when delays approach 150 ms.

Meru delivers zero-loss handoff between APs. With Meru's Virtual Cell feature, multiple Meru APs act as one powerful, wide-ranging AP, providing "invisible" links across physical APs, as users roam in and out of the range of various physical access points.

Are You Ready?

Wireless voice technology is rapidly evolving, and you may find that the biggest challenges you face are political rather than technical.

"The conflicting approaches towards networking among voice and data experts within an organization are not insignificant," says Kim. "Now you have telephony over a wireless data network, so who makes the decisions regarding the "right way" to deliver voice?"

On the Record

Integrating call monitoring and recording into your new IP telephony network helps your call center improve service and increase business productivity.

IP telephony delivers tangible benefits that make the move to convergence a no-brainer for businesses. Not only does VoIP promise companies significant cost savings and improved manageability, but it also delivers features and functionality that help organizations increase their productivity. Convergence makes certain applications that were out of reach in traditional voice networks not only possible, but practical.

Companies can now count IP call monitoring and recording among these applications. Call center-type computer telephony integrations are now practical for small and medium businesses that make the move to convergence. As a result, businesses that did without a call recording solution in their circuit-switched voice network are discovering first-hand that deploying an IP telephony network with a call recording solution can deliver a host of advantages to help their companies comply with regulations, improve customer service and meet corporate objectives.

The desire of executives and IT managers to achieve quality assurance and make sure their call center agents interact effectively with internal and external clients is a big driver of call recording solutions. By listening to the recorded call after it takes place, call center managers can better train agents to respond to customers' needs and in turn meet their corporate performance goals, according to Louis Person, president of IP telephony solution provider and ShoreTel partner Traxi Technologies, which offers managed services in the New York metropolitan area. A new IP telephony implementation creates an ideal opportunity for businesses to add call monitoring to their call center operation.

The need for call recordings to provide proof of transactions for regulatory compliance, such as brokerage orders, is clear. However, any business with a call center will gain perspective when using IP telephony software with a call recording solution, says Person. For example, managers can play back call recordings to staffers as a very effective way to offer constructive suggestions to help them improve their interactions with customers. "You are going to get a fast return on your investment from playing back those calls," Person says.

Call Recording Solutions

Traxi Technologies offers the Web-based Volcrum call recording solution, which tightly integrates with ShoreTel's IP telephony solution so companies can capture, store and replay any call. Administrators can filter and record calls using almost any criteria in the ShoreTel call detail records. For instance, they can record calls by user, time of day, area code or number.

"Volcrum ties directly with the ShoreTel system so we get all the logging information, all the ShoreTel error codes," Person says. "We fully leverage the ShoreTel architecture."

Person acknowledges that security concerns have made some companies wary of using call recording software. But Person says call recording is very secure, noting that Volcrum can encrypt call recordings for additional security. Volcrum also efficiently compresses and archives call recordings.

The best IP telephony network implementations start with a complete network readiness assessment and continue with ongoing network assessments.

Though companies in the financial services and other heavily regulated industries are leading the call monitoring and recording charge, businesses in other sectors are eagerly integrating the technology into their new IP phone systems, according to Person. He notes strong interest from industries like trucking and distribution that are centralizing their operations.

Call recording gives businesses accurate insight into their call center operations, offering the kind of concrete information they need to speed their

responsiveness and better meet their customer needs. Only when that happens can a business guarantee its success. Person says all companies can benefit from this technology, even those who think they are performing well.

“If businesses think their customer service is adequate, that might be a false impression,” Person says, “But if they listen to the calls, they might think differently. Even highly tuned businesses have room for improvement.”

The Customer Satisfaction Manifesto

ShoreTel's passionate pursuit of customer satisfaction touches every aspect of the company's operations. With a foundation of product excellence and outstanding services, ShoreTel customers and partners are consistently delighted.

Most companies pay lip service to customer satisfaction, noting it in their annual report and the CEO's speeches, but few companies put in place the business processes and metrics that are necessary to deliver on their words. ShoreTel is an exception.

'World-class customer satisfaction is ShoreTel's commitment to our partners and customers,' says John Combs, ShoreTel's president and CEO. 'We measure and invest in customer satisfaction as intensely as we do revenue and profitability.'

ShoreTel consistently achieves greater than 90 percent customer satisfaction – a ranking that's world-class by any measure. ShoreTel launched its customer satisfaction program in 2004, using a methodology similar to the American Consumer Satisfaction Index (ACSI). The ACSI is an economic indicator that tracks the quality of products and services from the customer's perspective. Top ranked companies in the ACSI study include Toyota (87), Pepsico (86) and Apple (83).

How Does ShoreTel Do It?

ShoreTel does it the old fashioned way: they earn it. ShoreTel's customer satisfaction program is based on an extensive survey process and metrics, which are translated into action by ShoreTel employees and reseller partners alike.

'You can't manage what you don't measure,' says Combs. An independent research firm surveys every ShoreTel customer 90 to 120 days after the phone system is installed, either by telephone or via a Web-based survey.

The interview consists of more than 40 questions that cover areas such as:

- Overall satisfaction with the ShoreTel telephone system
- Willingness to recommend the ShoreTel system to a friend

- Customer intent to re-purchase ShoreTel
- Satisfaction with the distribution partner
- Satisfaction with the partner's sales force overall
- Training satisfaction
- Resolution of technical issues
- Timeliness of resolution of technical issues
- Partner's technical ability
- Overall satisfaction with ShoreTel

At ShoreTel, an obsession with customer satisfaction may start in the executive suite, but it permeates product development, channel programs and customer service. ShoreTel employees are measured by the customer satisfaction results, so they are incented for continuous improvement in the scores.

The customer satisfaction program creates a direct channel of communication to ShoreTel's product management team, which they can use for new product enhancements. 'We view the customer satisfaction program as a great way for us to communicate directly with end-user customers,' says Regina Moore, senior director of systems product management at ShoreTel.

ShoreTel also uses the customer satisfaction results to develop better training for end users, administrators and channel partners. ShoreTel is well known for its exceptional ease of use, and to complement that usability, the company has developed a broad range of training programs. 'In addition to high quality courses, our customers want a variety of training venues to choose from,' says Barbara Bjornstad, senior manager of installed base marketing for ShoreTel. 'Consequently, ShoreTel training is available in classroom, on-site, web-based and self-paced formats.'

ShoreTel also strongly supports the channel, so channel partners can provide outstanding service to their customers. As part of the satisfaction program, customers provide feedback on their reseller partners, which ShoreTel uses to ensure that its channel partners deliver the highest quality services. Channel partners that receive the highest rankings get incentives from ShoreTel, while the lowest-ranked partners receive special assistance from ShoreTel to improve their services.

The channel partners themselves are surveyed throughout the year to get their feedback on ShoreTel's channel programs, which include extensive training programs, sales and marketing tools, and lead generation efforts. Through this initiative, ShoreTel is able to continually offer and refine programs that help channel partners directly with their business needs and objectives.

Keys to Customer Satisfaction

The ability to deliver world-class customer satisfaction starts with product excellence. ShoreTel's phone system is built with world-class capabilities and availability, delivering the 99.999 percent reliability that the industry expects. ShoreTel is consistently rated as the easiest IP telephony solution to implement, manage and use, has the best support and customer service, and has the lowest startup costs, according to the independent firm Nemertes Research. 'IT executives say ShoreTel's products are easy to implement and use, and as a result, their overhead costs are low and the value is high,' says Robin Gareiss, Nemertes executive vice president. 'Additionally, ShoreTel's customer service, both from the company itself and its VARs, is solid. If there is a problem, ShoreTel helps the VARs resolve it. And ShoreTel follows up with all customers regularly to make sure they are satisfied.'

ShoreTel sees four proven steps to customer satisfaction, including:

- **Network assessment:** A comprehensive network assessment is performed prior to installation to verify that the network is ready to support an IP phone system. A network assessment prior to

deployment can ward off many potential reliability and voice quality issues.

- **Project management and system design:** Rigorous attention to best practices ensures that the ShoreTel IP phone system is installed right the first time. ShoreTel's ControlPoint tool provides customers a clear roadmap for the actions they take between purchasing the ShoreTel system and when it is installed.
- **Training:** Training everyone—from the people who will use the phones every day to the administrators who manage the system—is vital to overall satisfaction.
- **Support services:** ShoreTel provides a broad range of services during implementation services and post-sale to support customers. With ShoreTel's implementation services, experienced engineers manage the implementation process to ensure a smooth and risk-free transition. Post-sales support services help customers with technical questions, advance hardware replacement and the latest software revisions through annual service contracts. ShoreTel's professional services can help organizations develop custom software and integrate voice communications into core business processes.

'Customer satisfaction really amounts to a sign of good management,' says Ben Marbury, an expert in customer satisfaction programs and president of TD Marketing. 'Strong customer satisfaction demonstrates that the company's management has the controls and measurements in place to keep customers satisfied. And if a company has good management and satisfied customers, it will be profitable and successful.' That's ShoreTel.

ShoreTel's New IP Phones Offer Desirable Features, Best-in-Class Communications

Get rich functionality and superior sound quality in a well-designed IP phone that your employees will love.

ShoreTel has expanded its line of unique, ergonomic IP telephones, which are now available in six different versions to meet the needs of a broad range of users. ShoreTel's brand-new phones—the IP 230, IP 212k and IP 560g—are the next steps in the company's commitment to phones with rich functionality, superior sound quality and scalability for organizations with 10 to 10,000 users.

"We have a phone to meet the needs of all businesses at the appropriate price points," says Rich Winslow, senior director of product management at ShoreTel. The new ShoreTel phones are designed with both ergonomic and aesthetic principles in mind, Winslow says. "Everything we do around our phones is done to make them visually appealing, nice feeling and great sounding."

Sleek, Elegant Design

ShoreTel retained the services of a design company to consult on the new phones' sleek concave profile. What's more, ShoreTel phone features are designed with an eye toward the user's comfort and convenience. For example:

- The message light on the phones is visible from 360 degrees
- The keypad is positioned horizontally to make dialing smoother
- The LCD display is positioned vertically to make it easier for the user to view it
- Soft labels and colored buttons eliminate the need for paper labels many workers have used historically to note each line's function, which results in easier installation and labels that are always correct
- The phones are available in silver or black, and the IP 560 and IP 560g are even made with an aluminum top cover



ShoreTel also pays close attention to how phones feel in users' hands. The handset of the new models is weight balanced. The handset is not too heavy, since that would lead to fatigue, and not too light, since that would feel "cheap." "The handset feels like a fancy kitchen utensil," Winslow says. The handset is contoured and cushioned, with a rubber over-molding and the capacity to adapt to four different hand positions.

What's more, the sound quality in ShoreTel's new and existing phones is second to none, Winslow says. The new phones have a wideband audio codec, with seven octaves of range versus the three octaves that most phones have. "It's crystal-clear sound," he adds. The new models also feature high-gain microphones and hi-fi, high-output speakerphones.

Let's look at each new IP phone in detail:

- **IP 230.** ShoreTel's brand-new IP 230 phone has a similar price point to the company's IP 210 model. But Winslow notes, "The 230 packs a more powerful punch, because it has three lines, not one, as well as a large LCD versus a two-line LCD." In addition, the 230 includes a headset jack and eight function keys to the 210's four, as well as four softkeys; the 210 had none.

"The IP 230 is the phone for the general user and the office worker," Winslow says.

- **IP 212k.** The IP 212k is aimed at customers reliant on key systems—telephone keys that quickly link callers to different employees or departments within a smaller organization, such as a retail location or branch office with 20 to 50 employees.

"Smaller organizations and branch offices need phones that behave differently than those in a headquarters building with 500 people," Winslow says. For one thing, customers in small firms or branch offices desire plenty of programmable lines, and, in response to customer demand, the 212k phone supports 12 programmable lines.

The IP 212k features transfer, conference, intercom, redial, voice mail, hold, options and directory keys as well as two soft keys. A new feature, bridge call appearance,

enables faster call handling mimicking line appearances on a key system. And a new Centrex flash feature on the system allows you to flash an analog loop start trunk to transfer external calls to external numbers and make more efficient use of trunks.

- **IP 560g.** The 560g is a specialized phone optimized for use in organizations that have gigabit networking to the desktop. Architectural firms, media companies, or graphic design firms often have gigabit connections to their desktops, because their employees work with large files and collaborative design applications.

The IP 560g is expected to ship this summer; the IP 230 and IP 212k are available now. Contact your ShoreTel reseller for pricing information and other details.

One at a Time or All at Once

New customers may choose to tackle an IP telephony rollout gradually, starting with the headquarters office and then adding branch offices one by one. Or, they may work with a ShoreTel channel partner to install IP phones company-wide all at once, Winslow says. The choice is the customer's and is based on the type of business, number of employees and locations.

While current ShoreTel customers upgrade to the 6.1 version of the phones' software, companies just moving to VoIP are well positioned to begin their ShoreTel implementation with 6.1, Winslow says.

ShoreTel 6.1 Adds Key System, SIP, International Benefits

ShoreTel 6.1 offers unsurpassed scalability to meet the needs of small to large businesses.

ShoreTel 6.1 includes improved key-system functionality to rapidly connect callers with different employees or departments, enhanced scalability for large IP telephony deployments, and other enhancements.

The rich key-system functionality is perfect for small branch offices and small businesses. With this capability, the ShoreTel phone system behaves as key systems do rather than like a PBX. That can result in reduced training times, as users can quickly get accustomed to their new IP phones, as well as increased end-user satisfaction.

Smaller offices will also benefit from key-system features supported prior to ShoreTel 6.1, such as intercom, transfer, conference and redial. Overhead paging lets users make announcements through their phones' speakers. Group paging lets users communicate with a selected group of users also through their phones' speakers. The system also supports whisper paging, or letting a second call through while someone is on the phone. The park/unpark capability lets users "park" callers in a space where someone else can retrieve the call. This permits multiple calls on hold at the same time.

ShoreTel's 212k IP phone includes ShoreTel 6.1's new bridged-call appearance feature, which emulates classic line appearances in key systems and works with both digital and analog trunks.

Bridged-call appearances are useful office-wide for shared call answering environments typical of smaller offices. For example, blinking green lights on multiple phones signal that a call is incoming. When someone answers, the light turns to solid green on his or her phone and to solid red on all

other phones. If the employee places the caller on hold, the light associated with the call blinks green until the call is picked up again.

In terms of outbound calls, someone can press a bridged-call appearance, enter a trunk access code, and then place a call. The caller ID for the bridged call appearance is delivered, and the correct button on the phone will light up as solid green while the same button on other phones will be solid red. The multiple appearance buttons allow multiple inbound and outbound calls to be shared among users.

ShoreTel 6.1 also supports a Centrex flash feature that allows you to flash an analog loop start trunk to transfer external calls to external numbers and make more efficient use of trunks, which is especially important for smaller offices with limited trunks.

In addition, ShoreTel 6.1 includes ShoreTel's Branch Office Solution, a package of survivable voice mail and unified messaging services optimized for locations with 100 or fewer users.

Enhanced Support for SIP

ShoreTel 6.1 includes new features that take advantage of SIP, or Session Initiation Protocol. SIP initiates, modifies and terminates interactive communications sessions—from voice to video to chat to interactive games—among users, and works in tandem with other technologies, such as VoIP and XML.

ShoreTel 6.1 supports additional SIP trunk features including Dual-Tone Multi Frequency (DTMF), support for the Backup Automated Attendant so that when a caller connects he or she is given the

ShoreTel's rich key-system functionality is perfect for small branch offices and small businesses.

option to dial individual extensions. ShoreTel 6.1 includes support for ring-back tones when a calling party gets transferred into a hunt group or work group as well as support for music on hold and fax improvement across SIP trunks.

Expanding to Europe Made Easier

Bolstering ShoreTel's rapid expansion into Europe, ShoreTel 6.1 adds support for the dialing plan in Ireland, as well Belgium. This allows dialing from both ShoreTel Call Manager and ShoreTel IP phones, as well as proper dial plan signaling to a central office in Ireland and Belgium. Customers with offices in Europe as well as Australia and New Zealand should definitely consider delivering the cost savings and productivity benefits of ShoreTel multi-nationally.

In addition, ShoreTel has exposed QSIG in ShoreWave Director to make it easier to configure PRI tie lines to third-party devices, including legacy PBX systems. This capability is important in Europe, where QSIG is the de facto standard, rather than Euro-ISDN for PBX-to-PBX networking.

More Phone Options

ShoreTel's IP phones have a unique focus on ergonomic design. The phones are designed to look beautiful, feel great and deliver superior sound quality. ShoreTel expanded its line of IP telephones to include the 212k key system phone, the 230 staff phone and the 560g executive phone, giving customers more options.

The phones include features such as a message waiting light that's visible from 360-degrees and a highly visible LCD display. The phones have an array of soft labels and colored buttons that users can customize with their most frequently dialed numbers. The wideband audio codec provides seven octaves of range that translates to crystal-clear sound. And the ergonomic design means the handset feels good whether held in the hand or tucked in the crook of the neck.

Getting Started with ShoreTel

Ultimately, ShoreTel 6.1 is the only IP phone on the market that can scale from a small business of 10 employees to a large corporation of 10,000 users with one hardware and software platform. ShoreTel 6.1's capabilities match and exceed those of much more complex and costly IP telephony solutions.

New customers may choose to tackle an IP telephony rollout gradually, starting with the headquarters office and then adding branch offices one by one. Or, they may work with a ShoreTel channel partner to install IP phones company-wide all at once. The choice is the customer's and is based on the type of business, number of employees and locations.

Resources

[Learn more about ShoreTel 6.1.](#)

ShoreTel Enhances Collaboration with Converged Conferencing

Audio and web conferencing, enterprise instant messaging and document sharing boosts employee productivity while greatly reducing costs.



ShoreTel's Converged Conferencing delivers an intuitive, easy-to-use interface that brings audio conferencing, desktop/application sharing, instant messaging, virtual meeting rooms, on-line presentations, and multimedia recording together in one solution.

ShoreTel has been making its mark as the fastest-growing IP PBX company in the U.S. and as the leader in customer satisfaction, but now the company has taken its reputation even further with a new conferencing solution that's designed to enhance collaboration and productivity across the enterprise.

Converged Conferencing 5.6 is an integrated conferencing and collaboration platform that works seamlessly with the ShoreTel 6 IP telephony system to provide integrated audio and web conferencing, enterprise instant messaging (IM) and document sharing.

Built on a secure, reliable Linux-based appliance, the flexible conferencing system allows users to schedule one-time, recurring or reservation-less conferences, while providing the flexibility to smoothly blend audio, text messaging document sharing and web collaboration during the call. And, with integrated recording capabilities, users can also record both audio and presentations from a conference for archives or for sharing with more people at a later time. The system is also integrated with Microsoft® Outlook®.

All of these features are tightly integrated into a single platform that is hosted locally in the phone system. By combining so many integral functions into one system, ShoreTel brings companies a number of advantages, including enhanced real-time collaboration for faster business results. Plus, companies can save money by bringing conferencing services in-house and reducing the need for travel. They'll experience improved security by keeping instant messages and collaboration exchanges secure within the corporate walls. And customers will be happier because of the immediate gratification of IM. And with ShoreTel Converged Conferencing's highly intuitive interface, IT doesn't have to worry about a flood of calls to the help-desk looking for assistance with an overly complex collaboration system.

The new version of Converged Conferencing features several enhancements, including:

- An improved user interface that integrates audio controls, document sharing and chat windows to simplify the conferencing experience.

- Enhanced performance because a participant's window interface is refreshed immediately when the leader moves to a new slide, resulting in a more real-time experience.
- Application and desktop sharing so that with the click of a button, a call leader can share an application window or entire desktop or give control of their computer to a participant.
- Built-in enterprise-wide instant messaging so users can see who is available and exchange text messages without relying on an external IM system.

Improve Productivity, Reduce Cost

Companies can reap significant savings with Converged Conferencing, either by bringing conferencing in-house rather than using an expensive outside service, or by upgrading an aging conference bridge. Companies can anticipate recouping the costs of a 12-port Converged Conferencing system in only seven months and a 24-port system in a mere nine months. Over a three year period, that 12-port system can save your company more than \$37,000, and a 24-port system can save you more than \$48,000.

ShoreTel Converged Conferencing comes in several configurations. The base option supports up to 48 ports, and an extended option supports up to 96 ports. The product is available as an audio-only system that supports audio conferencing and audio recording, as well as enterprise instant messaging. Audio and web conferencing systems support all the audio features and the sharing of individual applications and the entire Microsoft Windows desktop.

In addition to offering a strong, cost-effective alternative to in-house conferencing systems and

the integration of audio conferencing, web collaboration, instant messaging and multimedia recording, Converged Conferencing features web-based management and reporting. It includes a flexible prompt system so administrators can quickly customize the user's experience to meet their needs. An automated notification system lets administrators know about key events and updates.

The system is also very easy to manage, starting with an auto-discovery feature that seeks out a company's ShoreTel phone system, once connected to the network, and adds ports automatically. An administrator simply needs to assign extensions to the ports, import the users, and the conference bridge is ready to go.

Besides saving money over per-minute, third-party conferencing systems, an advantage of bringing collaboration capabilities in-house is the inherent security of the system. With Converged Conferencing, corporate documents are stored within the enterprise rather than with an external provider. Additional security measures supported by ShoreTel's system include individual user authentication, multiple level authentication, one-time use conference access codes, password-protected documents, LDAP and local database authentication, and individual user privileges.

Effective enterprise communication is critical to doing business in today's world. ShoreTel has taken the lead by giving companies a way to allow employees to conference and collaborate with each other and with remote sites on a moment's notice to enhance the flow of information within an organization.

Resources

[Learn more about ShoreTel Converged Conferencing.](#)

Collaboration Pays

Boost employee productivity with ShoreTel Converged Conferencing, and reap the rewards of your investment in a matter of months.

Companies look for any opportunity to cut costs and boost productivity. The two goals may seem at odds, but with the right tool they can both be accomplished.

ShoreTel has made it much easier to eliminate expenses and improve productivity with Converged Conferencing 5.6, an integrated conferencing and collaboration platform that works seamlessly with the ShoreTel 6 IP telephony system to provide integrated audio and web conferencing, enterprise instant messaging and document sharing.

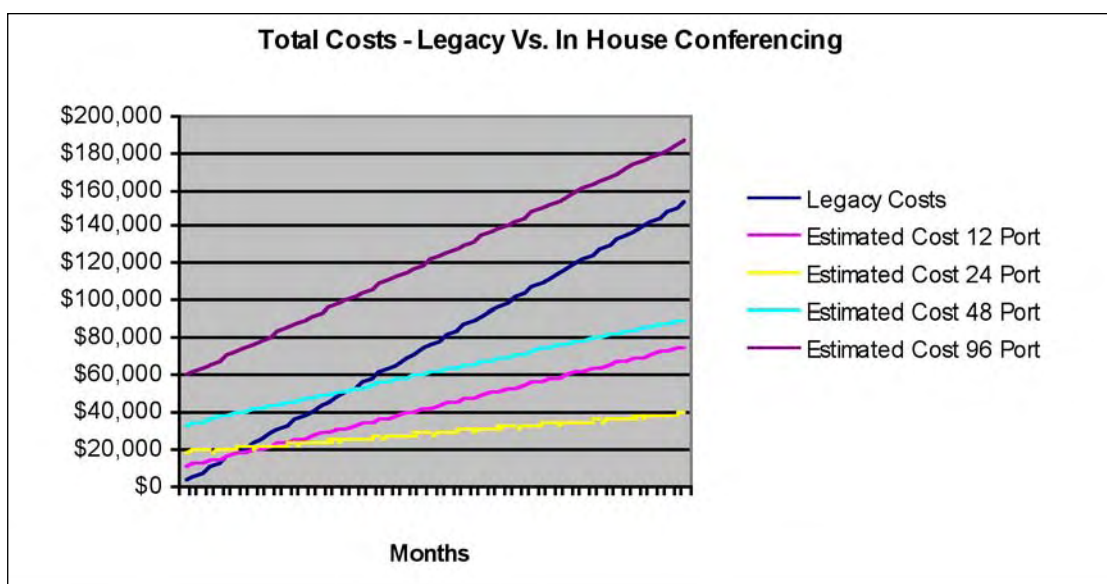
With Converged Conferencing, your company will be able to increase employee productivity by quickly establishing collaboration sessions within the enterprise or with external parties. Security is improved because an in-house solution eliminates the need for an external service for sending sensitive information. You will be able to reduce costs with the enterprise instant messaging and multimedia recording features, which combine two traditionally disparate tools into one solution. And you'll improve customer satisfaction through

the ability to deliver fast responses to customers with instantaneous communication.

ShoreTel Converged Conferencing is easy to use. Employees will spend less time and effort to set up and manage collaborative sessions and more time getting meaningful results for their business. The system's intuitive interface makes it easy to schedule a call, invite participants or add participants without waiting around. The ability to set up conferences from inside a user's Microsoft Outlook calendar also helps improve employee productivity, as does the ability to quickly create an ad-hoc meeting without having to set up multiple collaboration services.

Replace Your Conference Bridge

This integrated system can help improve ROI in several different ways. In the first case, companies that switch from an in-house conferencing system to ShoreTel Converged Conferencing can reap significant savings. Businesses can save up to \$1,658 per month on a 12-port conference bridge and up to \$2,250 per month for a 24-port system.



Going beyond one-time acquisition costs and taking a closer look at long-term ROI yields even more significant savings when choosing ShoreTel's Converged Conferencing over an in-house system. By the third year of system ownership, enterprises can save more than \$38,000 with the 12-port system, with the total payback coming in seven months. And for a 24-port system, companies earn back their investment in just nine months and save more than \$48,000 over three years.

Retire Your Service Provider

Choosing ShoreTel's Converged Conferencing can also slash costs for companies that currently use outsourced collaboration services, which incur high per-user costs. With conferencing services, companies often turn to multiple providers to deliver a complete conferencing solution, which multiplies the expense. With ShoreTel's Converged Conferencing, your company can host its own scheduled audio conferences as well as web collaboration and data sharing with a system that resides locally in your phone system. This arrangement ends your company's dependency on expensive hosted services.

Using Converged Conferencing can slash costs for companies that use outsourced collaboration services, which incur high per-user costs.

New to Conferencing?

Enterprises that are new to the world of conferencing and collaboration will also win with the ShoreTel Converged Conferencing system. Rather than sending employees in the field to collaborate on a project, you can reduce your travel expenses with a collaboration solution. Employees can share documents and presentations and work interactively on the same desktop application with anyone, anywhere, right from their own desk. Employees can also quickly and cost-effectively communicate with large numbers of coworkers by recording and distributing

messages to groups within an organization. This makes it easy for people who have missed a meeting to stay in the loop, thereby enhancing the return on time invested.

In many different settings and scenarios, ShoreTel's Converged Conferencing has shown over and over its ability to improve ROI and reduce expenses with an all-in-one collaboration system.

ShoreTel Contact Center 4.6 Makes the Right Call for IP Call Centers

Learn how to bring email and online chat together onto a single, unified platform.

As customers become comfortable with doing business via email and online chat, companies need to be prepared to incorporate these communication methods into their daily customer interactions. ShoreTel has incorporated email and online chat into ShoreTel Enterprise Contact Center, which leverages the company's distributed, real-time IP communications platform to deliver reduced costs, enhanced customer service, and a more intelligent enterprise. By bringing together voice and data into a single, unified platform, ShoreTel has taken an evolutionary leap in customer service while lowering the costs of starting up and maintaining an IP-based call center.

Improving upon IP Contact Centers

ShoreTel Contact Center 4.6 takes the benefits of an IP contact center, such as robust data reporting, scalability and virtualization, and adds numerous significant features that make Contact Center truly indispensable for enterprises. The new release delivers a universal queue for enterprise resource matching, a high availability solution in the event of server failure, several enterprise-level agent productivity improvement features and beefed-up management functionality.

ShoreTel Contact Center leverages the distributed nature of the ShoreTel IP PBX. Agents can be located anywhere, and administrators can easily manage the contact center from a single interface. The product's universal queue feature selects the right agent for each individual call by comparing customer and agent profiles and then directing the call to the best agent anywhere on the network.

Voice, chat and email contacts are routed via the standard mechanisms and routing rules, and

contacts are routed to agents based on system-wide business rules configured by the contact center administrator. This virtual contact center feature allows companies to bring widely dispersed agents into a single, seamless organization where calls can be routed based on parameters such as longest wait, priority, service level, queue conditions or customer identity or intent. Each customer has a unique caller profile, so enterprises can treat each customer uniquely, which improves loyalty, revenue and profitability.

Another key feature of version 4.6 is high availability in the event of server failure. Contact Center takes advantage of the inherent reliability of the ShoreTel distributed IP architecture, so that calls can be answered in the event of system failures. Contact Center 4.6 adds an automatic protection mechanism, where a backup server assumes the network identity of the primary server, so that the contact center can resume normal operations without any manual intervention. Even if a failure should occur on the agent PC side, agents can remain logged into the system and continue to take calls as usual.

Also on the agent side, several enhancements have been added to boost productivity. They include giving agents the ability to simultaneously handle one email and one voice contact as well as auto-answer to immediately connect inbound voice contacts to agents to save time and reduce unnecessary repetitive activities. Also new is the ability to release calls with reason codes so agents can account for their time and make the most of their schedule. Contact Center also includes real-time agent group reports that support simple, two-click agent state changes for improved management of service levels.

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Wrapped around this wealth of new functionality are robust reporting capabilities that provide enhanced analysis of historical reports. Multi-entity reports cover agents and groups that traditionally had to be run individually. Also new is the ability to synchronize scheduled reports with their source.

On the management front, the new version boasts simplified IVR port configuration, dial lists for outbound campaigns, overdue callback timeout, the ability to filter abandoned callbacks, and a forced time release enhancement.

And if your organization is already a ShoreTel IP phone system customer, it's easier than ever to smoothly integrate the Contact Center into your enterprise without complex CTI platforms. Workgroup routing services run on your ShoreWare server, while Contact Center and

Enterprise Contact Center reside on a dedicated server. Supervisors and agents are connected to the server via intuitive user interfaces that provide the tools and information your workforce needs to deliver top quality customer service.

Most businesses consider their call centers as mission critical. Failure is not an option, so the high availability and other features in Contact Center 4.6 will help you improve your operations while watching your costs go down. IP telephony is the future of enterprise communications, and who better than ShoreTel, the fastest growing IP PBX company in the world, to bring you the simplicity, reliability and productivity of IP in a feature-rich call center solution.

Resources

[Learn more about ShoreTel Contact Center.](#)

Support Services Foster Success

Businesses need adequate support and training resources to ensure exceptional voice quality. Here is some expert advice on how to help users make the successful transition to convergence.

The ShoreTel system is built from the ground up to be the easiest to use, easiest to manage, full-featured IP PBX system on the market today. Ensuring sufficient support services and training and using all of the resources available will help companies get the maximum benefit from their ShoreTel rollout.

A cornerstone for a successful IP PBX rollout is for the company and its support services provider to have a common understanding of what the provider will deliver, and when. This includes defining the severity of a range of potential incidents and issues, and agreeing on exactly how the solution provider is going to handle them.

“As long as the solutions partner communicates expectations with regard to service delivery and can meet those expectations, then everybody can be happy,” says Ron Slater, Technical Services Manager for ShoreTel.

To get the most from an IP PBX phone system, a company needs to take advantage of the appropriate support services. Deciding the right level of support is essential, and the preparation should start during the sales process, not during implementation, advises Christine Graham, Installed Base Business Manager for ShoreTel.

Graham, who is in contact with customers shortly after they choose ShoreTel, counsils that to ensure the greatest success for the IP PBX rollout, companies should understand the support services available to them, including training, and how to contact a support resource if they require assistance. It’s critical to know whom to contact if a problem occurs. Get the essential information, including service hours and phone numbers, from your solution provider.

Maximum Benefit Through Training

Communication between a support provider and the customer is as important as communicating the phone system’s features and benefits to users, notes Slater. It’s critical to train users so they can use the practical features of the phone system. Knowing how to use the IP PBX’s features enables them to perform their jobs better and more efficiently. With the right training, employees will be more satisfied with the phone system, and the company will realize a faster ROI.

One easy way to do this is to tap into the wealth of support services and training available. ShoreTel also provides a broad range of support services, including a technical assistance center, software updates and remote support as well as professional services.

“When something is new, you see the glitter, the sparkle, and the bling,” Graham says, adding that some tech-savvy companies are so enamored of IP phones’ sexier features that they forget that the average employee needs to have the basics in check first. Teach the fundamentals—functions like call pickup, transfer and hold, and get users comfortable with those functions before adding more sophisticated ones.

To help companies that have contracted with ShoreTel for support services get the most practical use from their IP phone system, Graham outlines where they can get the information and training they need to maximize all of ShoreTel’s capabilities. ShoreTel’s website has a rich set of resources, including computer-based training (CBT) and extensive documentation. Customers can also get involved in ShoreTel’s Power User group to learn about product capabilities in a practical way.

"The Power User group and training truly enlightens customers," Graham says.

Ongoing training is an important element in ensuring the success of an IP telephony implementation. With the availability of a broad range of CBTs on the ShoreTel website, businesses have powerful tools to help their employees advance their system knowledge and increase their confidence in using the phone system. Graham suggests hosting lunch-and-learn sessions to encourage greater attendance and enthusiasm from users for training sessions.

Train Your Opinion Leaders

Let the good news spread among your opinion leaders, and let them foster user acceptance. Training all users is important, but certain individuals should receive special attention. These users act as champions of the new phone system and provide an important bridge between the IT staff and the business workers.

The receptionist or operator is the single most important person who should receive highly

As you plan your move to an IP PBX, you should decide the right level of support services your organization needs.

focused and extensive training. Not only does he or she handle all the incoming calls, but the receptionist is the "face" of the phone system to both employees and customers.

"All your employees will say hello to the receptionist when they walk through the door," Graham says, "So if the receptionist is positive about the phone system, that excitement will spread throughout the organization."

Make sure executive management is also trained on the phone system, as executive buy-in is make-or-break.

Graham observes that system administrators are often leery of requiring executives to be trained on the phone system.

"If executives are proficient with the phone system, that proficiency is going to ripple throughout your organization," Graham says.

Resources

[Learn more about ShoreTel's support services.](#)

[Learn more about ShoreTel's training resources.](#)



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