

VoIP AND BEYOND

Along with streamlining telecommunications and reducing TCO, Voice over IP provides a cornerstone for UC capabilities.

Executive Summary

Faced with economic challenges, many businesses are looking for new ways for staff to not only communicate but also find, reach and collaborate more effectively – all while reducing costs. Fortunately, telecom technology – IP convergence to Voice over IP (VoIP) and eventually to unified communications (UC) – is a way to accomplish these objectives.

With increasing awareness of its value, VoIP business penetration is currently pegged at slightly less than 50 percent. However, a 2010 report, from the research firm In-Stat, predicts VoIP implementation at around 79 percent for businesses in the United States by the year 2013.

So what's driving the enterprise toward VoIP? Basically it's the opportunity to cut costs and increase productivity. This is made possible by the convergence of voice and data into a single unified network. The scaled-down infrastructure is easier and less expensive to maintain. Furthermore, migration can be gradual without abandoning legacy systems.

While VoIP offers benefits to businesses, the technology comes with a promise to alter the way businesses do business. This is especially true when upgraded to a unified communications infrastructure offering increased productivity, better business responsiveness and an improved customer experience.

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IP Telephony as a Strategy

According to a 2011 survey conducted by the management consultancy firm Inzenka, 27 percent of small- to medium-sized businesses (SMBs) already use VoIP, with 50 percent planning to deploy the technology in the next two years. The same research shows the large business VoIP adoption rate at 43 percent.

While VoIP technology is becoming more popular with businesses, industry experts note that a capricious economy may be one reason for less than stellar current adoption rates. In addition, large businesses may be dealing with some inherent assumptions regarding the VoIP solution set.

Telephony has traditionally been held to a standard of five nines uptime – basically, 10 minutes of downtime per year – as well as having a very high level of voice quality. There have been concerns in telecom departments about the ability to provide both of those metrics through Voice over IP.

In addition, companies worry about moving from a proprietary voice network, that is particular to just carrying voice, to a converged network where voice becomes an application. Larger firms have also succumbed to the misconception that they must totally abandon current phone assets to adopt the new technology.

Fortunately, beliefs based on these assumptions are fading among enterprise IT managers. Eventually, every business will have to replace its legacy telecom system. The question is the best way to effectively integrate converged voice and data networks into a firm's existing systems and processes.

The Benefits of Internet Telephony

Keep in mind, VoIP is more than a replacement for applications provided by outdated legacy key systems and private branch exchange (PBX) technology. Instead, it's a server-based app that is very similar to the data applications already in existence in corporate IT shops.

In the past, voice had been treated as its own silo in the IT environment. Now it's becoming another application on the network and therein lies a large number of efficiencies.

The economic climate has, not surprisingly, had a significant impact on the buying patterns of companies. They're more cautious in their spending. A primary promise of VoIP is lower cost as well as increased productivity. This is based on the efficiencies assumed when converging voice and data into a single unified network.

Other benefits attributed to the technology include the ability to provide rich media services – presence, instant messaging (IM), video calls and more. And with proper IP connectivity, VoIP offers number mobility with a phone device capable of using the same number virtually anywhere.

Further payback stems from the elimination of unused capacity in individual voice and data lines that often translates into wasted budget dollars. For example, combining access lines can

Combining IT Staff

After deciding on Voice over IP (VoIP), it's not uncommon for a company to move the telecom function to an IT department managed by the CIO. However, the CIO, as well as the IT department, may not have sufficient knowledge regarding voice communications. To help assure success, both the telecom and IT staff should be trained in each other's technologies. Points to keep in mind include:

- Make the telecom staff aware of the complexities and nuances of IT systems.
- Work with telecom staff to learn how to manage the VoIP system and train staff on voice communication requirements.
- New voice servers, and likely new operating systems, will be more mission-critical than the systems managed prior to VoIP implementation.
- Hard phones – and softphones – will require higher-priority voice applications and reliable operation when compared to data apps.
- Network engineers may need additional training to provide a high-performance network with Quality of Service (QoS) and improved management systems to support VoIP.
- VoIP can bring security vulnerabilities requiring new security measures. In most cases, these vulnerabilities will have no equivalent in data security.
- The data center manager may require increased knowledge regarding the operation of real-time apps like VoIP.

allow companies to save on WAN costs. According to Nemertes Research, typical savings can be in the area of 23 percent.

Furthermore, according to Nemertes Research, replacing PRI lines with SIP trunks can save about 40 percent off monthly circuit costs. And companies with many mobile employees can eliminate costly roaming charges by moving mobile calls to the corporate IP backbone.

VoIP and Beyond

Most businesses will use one of several different strategies to deploy IP telephony (IPT) – leading to VoIP and eventually to a unified communications infrastructure. In reality, a company can find itself at any of three different stages with each level offering more features and capabilities. These include:

1. Converged Networks
2. Telephony and VoIP
3. Unified Communications

Converged Networks

In order to implement VoIP, businesses must first move all of their different types of communication media – voice, data and video – onto a single, converged network. This convergence is essential for integrating all aspects of VoIP, which won't work without a well-designed, well-implemented and well-managed network.

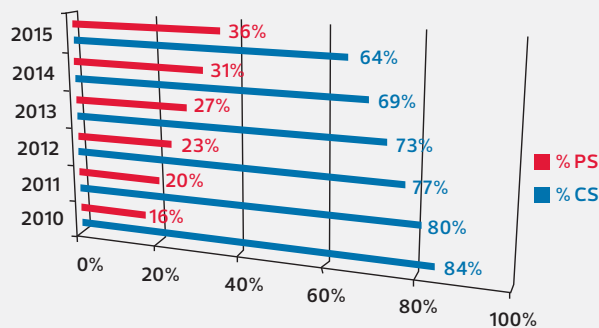
With multiple networks, companies have to run multiple cables through their buildings to each user's office. They have to purchase different types of devices for switching and routing traffic on each network. Technical staffs with expertise on these different devices are required. And separate service contracts with the various manufacturers of these numerous different devices have to be managed.

With a single, converged network, all of these inefficiencies are eliminated. The enterprise can buy less equipment, operate with fewer technicians and maintain relationships with fewer vendors.

Convergence also eases administration. With a single network, technicians can perform moves, adds and changes just once – instead of having to perform duplicate tasks to provide a user with both data and voice service. Converged networks reduce errors because they eliminate the possibility of moving a user's phone service to one location and data service to another.

What's more, because technicians have to perform only one set of operations instead of two, using a single converged network allows adds, moves and changes to be made more quickly. This benefit can be especially valuable today when companies must nimbly respond to changing requirements.

Packet Switch and Circuit Switch Percentage of Total Installed Lines



In the next five years, TDM technology will slip to less than 50 percent of the installed base of telephony lines in North America and Western Europe.

Source: HEAVY READING; UBM TechWeb

Managing Converged Networks

For most companies, voice is a mission-critical application. In a converged communication infrastructure, access often depends on a multifaceted mix of technologies from an assortment of different suppliers.

This puts IT teams face-to-face with the daunting task of ensuring that an assortment of moving parts function flawlessly. In addition, they must subscribe to the premise of delivering the necessary voice quality and service levels to meet company requirements – often within demanding budget and time parameters.

So, how do IT shops reduce the complexity of this critical communication environment and cost effectively manage infrastructure? The solution includes providing high visibility to key performance indicators and critical metrics provided by network management tools.

Typically, when network issues occur, support teams must take action to review and compare data. Often this information comes from an assortment of network devices in different locations. This type of disjointed feedback can serve as a disadvantage, often tending to magnify the overall complexities of the environment.

Instead, IT support specialists are better served with end-to-end network visibility including in-depth access to every side of a multifaceted communications environment. This includes a single, consolidated view encompassing everything from core SIP trunks and IP-PBX to smartphones and softphones at the edge.

The ability to see the converged network in total and comprehend the relationships between individual components can help to reduce network complexity. At the same time it can serve to cut the operation expense often associated with delivering communication service levels that prove essential to the organization.

With this type of holistic network visibility, coupled with comprehensive voice metrics, the difficulty of determining the source of communications issues is substantially reduced. Using network monitoring tools, IT support can narrow down and determine real issues fast and more cost effectively.

Fortunately, these types of tools, available from a number of vendors, can serve to keep firms ahead of the seemingly increasing plethora of converged network changes and demands. In addition to being technology enablers, these solutions can serve as catalysts to improve service quality, reduce cost and enhance security.

WAN Architecture

Converged voice and data networks require WAN optimization and acceleration technologies. For this, the enterprise often relies on the Multiprotocol Label Switching (MPLS) network.

MPLS is a scalable technology that consolidates all data-carrying transport media regardless of protocol. With MPLS there is no need for specific Data Link Layer (Layer 2) technology or networks. Instead, it allows for the prioritizing of network traffic and applications across the WAN and this prioritization is required for the successful deployment of voice, video and data across one network.

MPLS offers the ability to ensure sufficient bandwidth, avoiding congestion and sending business-critical traffic over the guaranteed shortest distance and lowest latency path.

This type of staggered approach also minimizes disruption and allows for the staggering of costs.

A rollout in phases also allows for pinpointing, diagnosing and fixing any initial problems that might occur within a more manageable group. The VoIP footprint can then be expanded as more capabilities are needed.

Maintaining VoIP Security

VoIP introduces a variety of new security vulnerabilities to the network. For example, an intruder could potentially eavesdrop or record voice communication and access user voicemail. Or someone could use VoIP traffic itself as a means of gaining access to the network as a whole.

Because the protocols and mechanisms that support real-time VoIP traffic are fundamentally different from traditional data applications and traffic, IT security staff should re-evaluate existing network security measures and consider what additional steps should be taken to protect voice conversations and the converged environment as a whole, for example, adding voice virtual LANS or VLANS.

Consider encrypting VoIP management traffic – that is, the packets that signal switches and applications to set up VoIP calls between various endpoints. This helps protect the environment from spoofing attacks that gain access to network infrastructure by making illicit users appear to be legitimate endpoints on the network.

In some cases, it may also be advisable to encrypt VoIP packet content itself when it traverses the WAN. This kind of encryption probably isn't necessary across a company's LAN because eavesdropping on properly protected LAN exchanges requires physical access to network wiring. But voice communications travelling beyond those premises and onto the Internet are much more vulnerable to being hijacked.

Popular VoIP protocols such as SIP also create vulnerabilities by forcing access control lists to open up multiple ports for a single session. This can expose multiple unused ports to hackers. To address this threat, organizations should consider using UC-aware firewalls and other proxy devices that can enforce device-level authentication that protects the call control infrastructure from rogue endpoints.

PBX: End of Life

Some organizations simply need to migrate to IPT because their PBX systems have been shelved or are no longer supported by the vendors. When fewer vendors are left to provide support for older systems, it can be costly to maintain them.

An ROI study is necessary to show the cost benefits of upgrading now versus later. In some circumstances, it depends on when the firm last invested in the current PBX system. Companies have to consider existing assets before it makes more sense to deploy new technologies.

What is true today is that many businesses can get a hosted VoIP service and pay less per user/per month than they are

currently paying per user/per month for maintenance on their legacy PBX system. The cost savings from SIP trunking and free internal calls are good reasons to upgrade.

For business justification, the ROI needs to be compelling. But it can be a slow path showing how companies can save money mapping to the specific needs of the organization including collaboration or PBX consolidation. The first step is to identify specific initiatives and determine how the workforce in the business communicates best and map that to the system selected.

Keep in mind, the business case for upgrades can prove challenging since VoIP solutions need to be refreshed more often and voice is less relevant to the workforce that needs multiple forms of communication. Transferring to UC offers companies seamless and integrated communications

A Business Case for VoIP

When is the right time for a company to implement VoIP? Here are some steps to assess the situation.

1. Determine savings in hard costs.

- Reduced toll charges from long distance, conference bridges and public switched telephone network (PSTN) service providers
- Capital and operational savings from utilizing shared resources for multiple sites and reducing administration tasks
- Current maintenance cost increases vs. going to VoIP

2. Determine soft benefits and related incremental sales increase or loss avoidance.

- Increase in staff productivity
- Added resiliency and business continuity
- New and integrated applications for facilitating collaboration

3. Understand where the firm is in the cycle of its current telephony infrastructure.

- How long is the lease on the current telephony system?
- Will the businesses be relocating or opening a new office in the near future?
- Are productivity features available that are not found in the present system?

4. Assess the IT environment.

- Is the network ready for voice and data convergence and what will it take to get there?

5. Have a people plan.

- Staff and support groups will need to be trained in the new technology

Telephony and VoIP Solution Components

An effective telephony and VoIP solution can consist of one or more of the following capabilities:

Single-Number Reach

This feature integrates multiple devices regardless of platform (cellular, analog, digital or IP) into a single number allowing the simultaneous search and ring of desk phone, cell phone, smartphone, etc. Consequently, customers and colleagues only require one number rather than multiple numbers, thereby eliminating guesswork.

Soft Phone

This VoIP application places handset functionality onto a notebook PC. As long as staff has access to the corporate network, they can send and receive calls, check voicemail, view call logs, initiate and participate in conference calling functions and access any other feature of the desk phone.

Voice and Data Services

These services encompass both wired and wireless lines that provide access to voice and data communications. Planning a telephony and VoIP solution is an ideal time to revisit existing coverage, plan options and rates to achieve greater efficiency and cost savings.

Conferencing

This key component of a VoIP solution incorporates audio, video and web-based technologies. It can be designed for peer-to-peer communication, room-to-room or high-definition, lifelike conferencing.

Reporting Analytics and Management

These VoIP tools allow organizations to run detailed call reports and monitor telephony systems

anywhere, for any type of device, which often provides the ROI necessary to justify the change.

Unified Communications

UC technology integrates diverse communication media such as voice, e-mail, chat and video into a single, centrally managed environment. Typically, a company's communications travel over the same network, utilize the same directory services and are integrated to some degree with each other.

Because UC encompasses so many diverse capabilities, it is generally not implemented as a single product or solution. Instead, it entails the integration of multiple types of software and hardware into one seamless multimedia communication environment.

Four capabilities in particular characterize mature UC environments within larger organizations:

1. IP telephony: A key capability of UC is the transport and management of voice communication over the same IP network that carries data traffic, rather than on a separate telecom network.

2. Conferencing and collaboration: Here UC leverages video, web and audio conferencing systems to empower users to collaborate as needed in real time.

3. Messaging: The UC technology allows users to flexibly utilize all types of nonreal-time messaging. These can include e-mail, voicemail, short message service (SMS text messaging to and from mobile phones) and fax, along with real-time IM.

4. Contact center: By integrating voice communications onto the IP network, UC significantly enriches the capabilities available to agents in inbound and outbound contact centers.

Game-Changing UC Capabilities

Conferencing and collaboration are considered the cornerstones of productivity. When staff can quickly get in touch with each other, easily share important information and avoid redundant tasks, companies become more productive and efficient.

UC applications are particularly useful for improving communication and collaboration because they unify, simplify and automate the workday activities of knowledge workers. They remove the obstacles that typically limit both individual productivity and team performance.

Several component technologies of UC aid in building advanced applications for optimized communication and collaboration.

Presence: A presence application registers and shares the status of any individual user within the enterprise. Presence automatically detects if a user is logged into any device anywhere on the network, currently on the phone or using some other UC application that would prevent that user from being available for immediate contact.

UC presence mechanisms also let users manually set their status as "Available," "Busy" or "Away" – along with an active status message, such as "In meetings until 4 p.m." or "On deadline: do not disturb."

Presence can be combined with other data to further facilitate workflows. For example, users can have areas of expertise associated with their directory listing and contacted based on that criteria.

Instant Messaging: Real-time text communication in the form of instant messaging first became popular as a way for individuals to communicate with each other over the Internet. Chat technology has now been widely embraced by businesses of all kinds.

IM's immediacy offers a major advantage. With the benefit of presence, users can see whether the person with whom they want to communicate is available.

Chat is faster than e-mail because, in some cases, users can see each other's messages as they type them. And IM does not require the dialing and social conventions of a typical voice conversation.

Mobility and Mobile Voice Access: Smartphones have become a fixture of modern life, and they play an important role in organizational productivity. Staffers now take it for granted that they will be able to have a conversation with anyone at any time, no matter where they happen to be at the moment.

But at many firms, smartphones still do not function in exactly the same way as office phones. They allow users to make and receive calls (and perhaps check and send e-mail messages), but little else. As a result, user productivity is still somewhat limited when users are away from the office.

One option available, Cisco's Mobile Voice Access, addresses these shortcomings by enabling smartphones to harness in-office telephony and UC functionality. With MVA, for example, a user who is out of the office can transfer a call to any other extension on the company network right from a smartphone.

Single Number Reach and Single Voicemail: SNR makes smartphone use even more transparent by eliminating the need to use one number for the office phone and a separate number for the smartphone. Instead, SNR combines automated call management with presence detection to automatically direct incoming calls to the active phone.

In fact, by using call forwarding in conjunction with SNR, users can create a truly universal "find me/follow me" model that can turn any phone anywhere into their office phone.

Single voicemail allows users to consolidate all messages left at both the office phone and smartphone into a single mailbox. This saves users time by allowing them to check all of their messages in one place.

Unified Inbox: Companies can take a step beyond single voicemail by implementing a unified inbox, which allows users to manage all forms of communication, including voicemail, e-mail and fax, in a common application.

With a unified inbox, staffers gain significant productivity advantages. They can find and organize all of their messages in one place, eliminating the need to continually toggle between multiple applications. This also makes it much easier to find information located in past messages.

Conferencing and Collaboration Applications: By flexibly mixing and matching multimedia capabilities, UC conferencing applications can significantly improve all types of collaborative activities.

UC conferencing features include voice conferencing, shared content viewing (such as PowerPoint presentations, software demonstrations and instructional videos), shared web browsing, use of interactive whiteboards (which allows one or more users to draw, type or write on a shared display) and live video. There is also a collaboration component behind presence in which multiple individuals can be pulled together quickly to discuss a problem via IM and then voice, then video.

These collaborative multimedia applications allow users in multiple locations to participate in interactive virtual conferences where they can readily exchange information, ask each other questions and build a strong team consensus.

Top 10 Tips to Prepare Network for Unified Communications

Unified communications and collaboration place new demands on infrastructure and staff. Consider the following in order to take advantage of the diverse components of UC.

1. If you haven't already done so, install redundant WAN links between critical sites to ensure a network outage does not disrupt communication between sites.
2. Implement QoS enforcement in the edge routers to protect critical SIP, VoIP and video traffic as well as other mission-critical traffic.
3. Consider WAN optimization controllers (WOCs) that provide deep packet examination to inspect and mark the traffic.
4. If bandwidth is scarce and expensive, consider a combination of the following:
 - Offload less critical traffic (web surfing, file transfers, e-mail) to an Internet virtual private network (VPN) to preserve bandwidth on the QoS-enabled network for performance-critical UC traffic
 - Use advanced platform application delivery controllers (AP ADCs) and WOCs to offload busy links where more bandwidth is not practical
5. Ensure that multiparty services, such as shared whiteboard or multiport voice and video bridging, have adequate capacity for anticipated use.
6. Implement redundant servers (often as distributed redundant links) with load balancing for all critical functions.
7. While attacks against UC systems have been few and far between, UC systems can be easily attacked and rendered inoperable, particularly by insiders. The level of protection for a UC system should match the criticality.
8. Consider general purpose network monitoring tools, rather than point products that can only monitor UC traffic.
9. Employ network emulation, simulation and modeling tools to determine if network latency and bandwidth limitations will negatively impact the end user perception of UC applications.
10. Upgrade network engineering and operations staff tools and training.

Source: *Exinda Blog*; Joe Skorupa, Debra Curtis and Lawrence Orans of Gartner; March, 2011

CDW: A VoIP Partner That Gets IT

By integrating voice traffic over the network, companies are realizing cost savings on their telecommunications service charges and reducing costs typically associated with deploying or relocating employee phone systems.

In addition, by integrating with existing communication systems such as e-mail and IM, VoIP implementation results in a more effective way to communicate, providing for a seamless communication experience that can enhance the bottom line.

Telephony and VoIP solutions can benefit a business in a number of ways including:

- Savings over traditional PBX-based telephony systems
- Connect users quickly and easily regardless of location
- Add phone lines more quickly and cost efficiently

CDW can assist with VoIP migration in a number of ways. Along with products and services, our network infrastructure audit can help determine if your network is ready for voice and data convergence. In addition, we offer a variety of third-party telecommunication-related services including WAN, Internet, voice and hosting.

Your CDW account manager and solution architects are ready to assist with every phase of choosing and leveraging the telephony and VoIP solution for your IT environment. Our approach includes:

- An initial discovery session to understand your goals, requirements and budget
- An assessment review of your existing environment and definition of project requirements
- Detailed manufacturer evaluations, recommendations, future environment design and proof of concept
- Procurement, configuration and deployment of the final solution
- Telephone support as well as ongoing product lifecycle support

To learn more, contact your CDW account manager at 800.800.4239 or visit CDW.com/telephony-voip



Cisco Unified Communications System Release 7.0 can help your organization create adaptive workspaces that build productivity, business agility, security and competitive advantage. With Release 7.0, Cisco has focused on three critical customer priorities:

- **Providing open systems** – To enable smooth interoperability and deep integration with third-party solutions
- **Enhancing the user experience** – To build productivity and accelerate business transformation with comprehensive unified communications capabilities that are available anytime, anywhere, and on any device
- **Improving total cost of ownership (TCO)** – By optimizing and securing network platforms and network management

CDW.com/cisco



ShoreTel offers a wide range of telephones for use within its business communication solution, each designed to help boost productivity and meet the needs of every user—from busy executive to remote worker, and from operator to contact center agent. Each phone is preconfigured for quick and easy installation with the ShoreTel Unified Communications (UC) system and offers all the advanced features, high performance and quality required in today's constantly connected workplace.

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Polycom creates location liberation so people can have more engaging conversations in new ways that defy the boundaries of distance, cost, time and significant business disruptions, such as terrorist attacks, pandemics or acts of nature.

Through a highly visual and immersive unified communications (UC) experience, people can connect, speed their decision making, and increase their productivity to benefit their companies and individuals inside their organizations and beyond.

CDW.com/polycom



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