APRIL 2012

UNIFIED COMMUNICATIONS AND COLLABORATION

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Essential Capabilities Delivered Efficiently

Doing more with less through UC

Doing more with less – it's become the unspoken mantra for organizations of every shape and size. This mantra also often translates to: How can the IT team deliver more efficiencies?

The extended economic downturn has put constraints on resources, particularly making organizations wary of hiring (or even replacing) people or expanding. Yet, at the same time, the expectations for IT resources in particular continue to escalate. Enterprises have to move aggressively to empower their staff to work better, smarter, faster and more efficiently.

Unified communications can serve as the heart of any such effort. UC weaves together the communications technologies that people use on a day-to-day basis to connect, collaborate and generally get things done – including voice, e-mail, video and chat. By doing so, a well-thought-out UC strategy can overcome the inefficiencies and limitations in organizations where communications previously were fragmented.

UC Results

What an enterprise can hope to gain from a UC implementation typically includes the following:

- **Dramatically increased staff productivity:** When people can get quick answers from one another and avoid playing phone tag, they get more done. Through features such as "follow me" calling and presence, UC consistently delivers productivity gains.
- **More responsive service:** In addition to improving communications within an organization, UC can significantly improve communications with the outside world. This responsiveness empowers organizations to provide service that is consistently faster and more accurate than pre-UC – without requiring increased staffing in the contact center.
- **Fewer costly errors:** Mistakes often creep into work processes because of miscommunication or because someone was unable to geta hold of the right person at the right time. By

improving communication and collaboration, UC helps organizations eliminate such potentially costly mistakes.

- **Better innovation and problem solving:** The more readily people can share thoughts and insights, the more likely they are to come up with new, worthwhile ideas. UC can therefore help transform an organization's culture to promote innovation and creative problem solving.
- **Hard cost savings:** The efficiency that UC brings to communications and collaboration results in quantifiable costs savings — including reduced travel expenses, lower monthly telecom bills and lower IT administrative costs.

UC IN THE CLOUD

Cloud computing offers an enterprise an attractive model for deploying technologies generally, and some components of UC specifically.

Under a cloud-provisioning model, a third-party provider can host and manage many communications components in an interwoven communications environment on a subscription basis.

Why is the cloud model attractive? There are several reasons:

- The cloud's pay-as-you-go model eliminates the need to make the upfront capital outlay typically associated with internal technology deployments.
- An organization can often activate these solutions quickly and achieve extremely rapid time-to-benefit.
- Running UC components in the cloud offloads responsibilities for ongoing management, software upgrades and troubleshooting to a service provider.
- Service providers can offer elastic scalability of both capacity and costs so an organization can adapt to changing demands.

The cloud may not be the perfect solution for every UC need. Factors such as application performance, compliance and vendor lock-in must be considered in any cloud-sourcing decision. But selective use of the cloud (known as a hybrid cloud approach) can help make it easier and less expensive to execute a broad, high-impact UC initiative.

What's Driving UC Implementation

Although these benefits make UC a highly compelling investment on their own, there are several workplace changes occurring now that make this technology nearly indispensable. These include the following trends.

Social networking: The rise of Facebook, Twitter and other social media has led people to become increasingly accustomed to interacting with one another in real and near-real time via web-based interfaces. It simply makes sense to be able to chat with colleagues in a manner similar to the methods being used to interact on a growing range of social media platforms.

Increasing use of video: Built-in webcams come standard on equipment ranging from desktop systems and notebooks to tablets and smartphones. Another closely tied trend is that services such as Skype have made online video conferencing a fairly commonplace activity for a growing number of people.

Add to this all the nuance and sense of "being there" that a visual element brings to human communications, and the use of video conferencing can be viewed as a worthwhile addition to the contemporary workplace.

The virtualized organization: To expand capabilities without committing to the hiring of additional full-time staff members, organizations increasingly are expanding their use of contractors and other external partners. UC can play a powerful role in ensuring that these organizational "outsiders" can function seamlessly as "insiders" by including them in the organization's core set of communications.

The proliferation of smartphones: People are used to being able to do whatever they want with their smartphones (talk, chat, browse the web, check on work projects remotely, send e-mail, shop) regardless of where they happen to be. UC supports this model of anytime, anywhere productivity by extending a common set of communications capabilities to smartphones, tablets, notebooks and desktops.

The generational shift: Users entering the workforce are digital natives; these communication tools are pervasive in their lives. The implementation of UC allows an organization to harness the technological savvy of its youngest workers to increase organizational productivity. ■

Collaboration: Interactive Upgrade

Creating effective sharing environments

Once upon a time... life was simpler and more moderately paced. Manufacturers obtained raw materials from a limited number of suppliers, workers performed repetitive tasks on assembly lines to mass-produce standardized products.

Government agencies provided a relatively fixed set of services to constituents whose expectations of these services were minimal. And educational institutions delivered curricula that were also relatively fixed to students who were pleased to attend the best school that would accept them.

Indeed, times have changed. Today, companies dynamically reconfigure supply chains to minimize costs and ensure uninterrupted access to resources. They also have to respond adaptively to customers who might be across the globe or across town — and who expect products and services personalized to their individual requirements.

Government agencies are likewise asked to respond to constantly changing conditions and to satisfy constituents who expect services to mirror those experienced in the private sector. Educational institutions meanwhile must compete for students who have unprecedented choices of where and how they learn.

The implications for all enterprises operating in this increasingly complex and fast-paced world are substantial. For one, knowledge is now the cog of organizational performance. An enterprise can't optimize its supply chain if it doesn't know where disruptions are occurring or can't pinpoint viable alternatives.

It also can't respond to constituents' needs and desires if it doesn't have access to implicit and explicit feedback from those stakeholders. What's more, an organization can't cater to users if it's unaware of conditions and trends within and outside the organization.

The immediacy with which knowledge must pass across enterprises — from one person to another — has become critical. People are impatient, opportunities wait for no one, and the

consequences of mistakes can grow and fester if not addressed quickly. Slow, therefore, is not an option.

The result? The performance of most organizations hinges increasingly on how rapidly people can share and act upon critical information. Organizations that successfully facilitate the sharing of such information will consistently achieve better outcomes in a world dependent on fast, fact-based decision-making. Enterprises unable or unwilling to accelerate the sharing of information, on the other hand, will consistently suffer less-desirable outcomes.

The set of functional capabilities necessary to rapidly share and act upon critical information can be collectively referred to as collaboration. *Webster's Dictionary* defines it as "the act of performing work or labor together."

In the context of IT, collaboration refers to technologies and practices that organizations can adopt to overcome impediments that limit the ability of people to work together effectively. Clearly, data, voice and video communications let people across and beyond an enterprise interact as necessary to make decisions, take actions, formulate plans and achieve goals.

Share and Share Alike

Several key attributes characterize effective organizational collaboration.

Accelerated interaction: Effective collaboration speeds teamwork and the sharing of information through a combination of real-time, near-real-time and non-real-time communications.

Real-time communication occurs immediately among all parties. It might include phone conversations, chat, text messaging and video conferences.

Non-real-time communication involves a delay between sender and recipient — as is the case with e-mail, voicemail and online resources such as wikis, blogs and document repositories. Some communications, such as chat and text messaging, occur in near-real time because users don't necessarily respond immediately to one another.

In well-designed collaborative environments, people can choose the most appropriate communication tool for a given situation. When facing an urgent situation that demands immediate action, for example, someone might choose a real-time option such as a phone call or text message.

To simply schedule an appointment or share background information on the other hand, an e-mail or voicemail message may be acceptable.

Anyone to anyone: Collaboration tools further remove "drag" from organizational processes by allowing anyone to communicate with anyone, as necessary. This means that everyone who needs access to phone, voicemail, e-mail and chat service (and the like) has it.

It also means that people have the ability to easily find other people in the organization with whom they may need to communicate at any given moment. Typically, some type of directory service provides the capability for people to find one another by name, department, job title, location or other attribute.

Of course, this does not mean that everyone in the organization will be able to strike up a real-time conversation with the top executive on a whim, for instance. That directness ultimately might result in chaos, not collaboration. Highly collaborative environments therefore also make use of technology to create profiles and permissions so they can control information overload and irrelevant interruptions.

Even so, effective collaboration frees communication from all unnecessary constraints so that people can quickly and accurately convey information in ways that improve outcomes for individuals, teams and the enterprise as a whole.

Location independence: Such environments can overcome a growing problem for many organizations, the issue of geographic distance. People working in the same organization may be scattered across multiple locations, yet need to share information at any given time.

In fact, as organizations become increasingly virtualized (by making use of outside contractors and other third parties to complement conventional in-house staff), effective collaboration with people at disparate locations becomes an operational necessity.

Demands on individual productivity combined with a growing use of portable devices means users within an organization are also increasingly mobile. They need (and want) to be able to collaborate whether they are at their desks, at another location or in transit.

Support for diverse content: Effective collaboration isn't just about putting people in touch with one another. It's about empowering them to exchange content they need to share. Sometimes that's merely a brief conversation. Other times, it could be a Word document or a PowerPoint presentation. In other instances, an organization's users may need to share within a context that requires the subtlety of human gestures and facial expressions.

An organization's collaboration tools therefore should provide support for the full range of content used in today's workplace — from text and data to documents, diagrams and video.

Ease and convenience: Sharing, interaction and innovation, however, don't take place merely because certain technology tools exist. People are busy; they have their own work domains to worry about. So technology must make it as easy and convenient as possible for people to interact and share. The tools must be intuitive to use, provide features for communicating effectively and integrate well with one another.

Tools for Anytime, Anywhere

Although people can collaborate with all kinds of tools, the following three types of collaboration technologies are particularly important in anywhere, anytime environments.

Presence: This technology automatically detects whether a specific individual is using a device on an organization's network. It may also detect other information about that person's availability status and let the individual post information about status manually.

The granularity of presence status can vary, depending on the technology and how it is implemented. On the simplest end of the spectrum, presence can be a binary state — either "online" or "offline." In more sophisticated implementations, presence status has a range of possibilities:

- **Offline:** The user is not detected as present on any device anywhere on the network.
- **Offline with a specific status:** The user sets a status manually (for example, "on vacation" or "back Tuesday p.m.").
- **Away or idle:** The user has only recently stopped actively using a device on the network.
- **Busy:** The user is on a device and actively using a communication feature such as voice or video conference.
- **Do not disturb:** The user is present but has manually set this status to avoid interruptions.

COLLABORATION: REMEMBER THIS

The latest generation of collaboration tools can do a lot for an organization's performance, but they also create new challenges.

Any organization implementing these tools will need to make appropriate policies and best practices an integral part of the effort.

Here are three factors to consider:

- **Confidentiality and privacy:** Although openness within an organization can be a positive value, it's not always wise to share certain information beyond the organization. Users may also have concerns about how much of their work and communication will be visible to others. And they may want to be able to work from home or on weekends without making themselves overly available to coworkers and people outside the organization.
- **Compliance:** Expanding communication also increases the opportunity for people to reveal inappropriate information — or to share private content restricted by regulatory mandates. Users need clear guidelines about what is and is not considered acceptable use of collaboration tools, including both public and private social media.
- **Security:** Collaboration tools also present a new path for viruses and other malware to be introduced in the IT environment — especially if the tools extend to users outside the firewall. Protective measures should be taken to ensure security at the application and file levels.

- **Online:** The user is detected as present and available.
- **Online with a specific status:** The user is detected at a specific location (for example, "at my desk" or "mobile in Atlanta") or sets a status manually (for example, "prepping for sales meeting" or "leaving at 2:30 today").

By making such information available to other users on the network, presence technology can facilitate effective interactions. People don't waste time waiting for return calls from coworkers who aren't available — and they can quickly pinpoint someone who is.

This is often referred to as the "presence effect" — giving interested parties an awareness of one another that somewhat reflects what they would experience if they all worked in the same physical space. It has been shown to enhance the cohesiveness of workplace teams, above and beyond simply facilitating communication and accelerating the completion of collaborative tasks.

Chat and instant messaging: Chat and IM let users exchange text messages in real time. Some people prefer to use the term "instant messaging" to refer to chat that is specifically enabled between known sets of users (also known as "buddy lists"). This differentiates IM from the kind of web-based chat found on Internet sites that supports open participation.

IM is extremely useful for rapidly exchanging small amounts of information and getting immediate acknowledgement from other parties. It can eliminate communication problems such as phone tag or the sending of a follow-up e-mail to confirm that a recipient received, read and is acting on an earlier message.

IM is not necessarily limited to simple text. Some applications allow file attachments, file sharing, shared web browsing, voice communication and video. It's not restricted to real-time communication, either. Users can send messages to offline users, who can then read them when they are back online. In this way, IM is like voicemail or e-mail.

Some applications let users manage contacts in hierarchical groups. That can be useful in large organizations where a long scroll-down list would be unwieldy. It also helps people find the right source for a question or issue, even if they do not know that person themselves (for example, someone in a particular department or regional office).

Social media: Social media platforms such as Facebook and Twitter have dramatically demonstrated how communities of people can interact online to share ideas and manage actions collectively.

Millions of users are now familiar with social media functions such as "liking" and "retweeting."

Organizations can take advantage of these mainstream services in a variety of ways. They can use Facebook groups to build relationships between internal groups and external constituencies. They can use Twitter feeds to keep up to date with the latest news, or to provide news about themselves. And they can use blogging sites to share useful information on a regular basis and gain insights both internally and externally.

Internal Social Media

But these services are only one way to take advantage of social media for enhanced collaboration. Many organizations have found that they can replicate the tools and techniques internally to gain advantages without sacrificing control and security.

Blogs can be especially useful for team leaders who want to regularly share guidance and insights with groups of internal or external "subscribers." They also offer a useful way for people to keep peers and colleagues informed about their work. By increasing everyone's visibility into active projects, interests and areas of expertise, internal blogs foster teamwork and facilitate innovation.

Microblogs differ from blogs in that their content tends to be shorter and simpler — often just a sentence or two. They can keep teams up to date, for example, on a project's milestones. Microblogs can also eliminate the inefficient e-mail chains that can occur when multiple users take part in a message exchange to do something simple such as set a meeting or come to consensus about an action.

Wikis are informational websites that multiple users can edit from their web browsers. They provide a useful means for a community of users to collaboratively and continuously edit, update and fine-tune content about a specific topic.

The most popular wiki, Wikipedia, gains its breadth of coverage by attracting a large number of qualified participants from all over the world. Internal organizational wikis work similarly — providing a mechanism for authorized users from across and outside an organization to create rich, accurate and up-to-date content that all users can reference.

Social search and tagging can also cultivate cooperation by adding a social component to the search and use of existing documents and information resources in digital formats. Some other typical approaches include:

- Tracking searches that users perform over time, so that search tools can determine personal preferences — and anticipate content that may be of use or interest to users;
- Letting users rate content, so that the resources they find most helpful on the job bubble up to the top of other users' searches;
- Allowing users to add topic tags to content, so that it becomes easier for other users to find when searching on those topics;
- Letting users annotate and add comments to content, so that the intranet begins to behave more like a wiki — while preserving the integrity of the underlying documents, as appropriate;
- Serving up subject matter experts within the organization when users perform document searches — done by associating content with individual user identities;
- Providing social graphing, idea banks and other tools designed to make it easier for people in different locations (or time zones) to work together.

Organizations will obviously mix and match these diverse collaboration capabilities in different ways, depending on their size, structure, geographic dispersion and culture. But every organization can benefit from adopting the right mix of collaboration tools. In fact, given the demands placed on knowledge workers in today's fast-paced, resource-constrained environments, the adoption of such tools is an outright necessity. ■

Optimizing Voice Communications

Laying the digital telephony foundation

Everyone's familiar with the old adage "If it ain't broke, don't fix it." In most circumstances, these are wise words to be heeded. Unfortunately, they don't ring true when it comes to telephony.

Most organizations' phone systems are not broken in the sense that they no longer function; people can still make and receive calls. But outdated phone systems are most definitely "broke" in the sense that they no longer optimally serve the needs of the organizations and the people who use them.

Voice calls are central to the work lives of staff. All day, every day, people talk to one another, leave messages for one another and keep track of one another's phone numbers. It's so routine that most people don't even think twice about how they do it.

But legacy phone systems spawn numerous inefficiencies in the way people communicate. Think about it: People play phone tag — a lot.

One person rings another's office line. If there's no answer, after leaving a message, that same person then rings the other person's cell. Still no answer. Another message. Then it's time to try additional phone numbers available. More messages. The minutes spent trying to move work forward, but making little progress, add up to lost productivity.

When people start their workdays or get back from a meeting, they check their office voicemail, their mobile voicemail and one or more e-mail accounts.

Legacy phone systems also create costs for organizations. For example, private branch exchange (PBX) equipment often requires expensive upgrades and maintenance fees. Ongoing management and administration of a separate analog phone network is expensive as well. Plus, the overall functionality of analog phone systems is quite limited compared with more modern digital telephony solutions.

Digital Telephony Gains

A migration to converged digital telephony can provide a range of benefits, including the following.

Lower lifecycle costs: Converged telephony delivers substantial savings because an organization needs only a single network. This equates to less equipment to maintain and upgrade, lower administration costs every time a user is moved or added, fewer potential points of failure, and reduced workloads for technical staff. Modernized telephony also frees organizations from legacy PBX licensing costs.

Less wasted time: UC enhances staff productivity by eliminating or minimizing time spent playing phone tag, checking multiple inboxes, looking up and dialing numbers, and rekeying numbers into personal phone directories. Individually, these tasks may seem trivial, but the cumulative time savings can be substantial.

Richer communication features: The intelligence of computer systems enhances all aspects of voice communications on the converged network. It's easier for network administrators (and users) to create rules for call routing, to set up voice conferences, to automate outbound calls, and make use of voice communications in new and creative ways.

It's true that a migration to converged digital telephony may require a substantial capital investment in infrastructure, but that investment typically pays for itself many times over as organizations take advantage of the new, advanced capabilities.

The Purposeful Cutover

Few organizations make the transition from a conventional legacy analog phone network to a state-of-the-art digital voice environment overnight. Such migrations typically involve three stages.

STAGE 1. Converged Network: The first step in achieving a fully optimized multimedia communications environment requires implementing a converged network that supports data, voice and video traffic. It will serve as the platform for both digital telephony and any broader UC deployment.

Generally speaking, a converged network requires converging an organization's infrastructure, technical staff and management.

Rather than two sets of wires and devices, a converged network uses common physical infrastructure to transport data, voice and video. This physical infrastructure is essentially an upgrade of the classic Ethernet-over-IP data network, enhanced to support the special performance requirements of voice and video.

If an enterprise converges its communications on a single network, then it obviously needs only one set of

technicians to support that network — a significant change for many organizations.

Finally, there's the management factor. To keep a converged network running properly, technicians need a robust set of tools that give them full visibility into the end-to-end performance of data applications, voice and video — plus the ability to zero-in on potential problems before they impact service levels.

(For a more detailed look at the technical requirements of a high-performance converged network, see Chapter 6.)

STAGE 2. VoIP Telephony: Once an organization has a well-managed, high-performance network in place that can support the convergence of voice and data traffic, it can start migrating to Voice over IP. The first step on the path to VoIP entails replacing the organization's legacy PBX or Centrex service with either an on-premises IP PBX or a hosted (or cloud-based) IP telephony service.

A private branch exchange manages call traffic between an organization's internal phone network and the public carrier network. It also provides call functions such as routing, conferencing and voicemail.

Legacy PBX systems are designed for circuit-switched networks, which create temporary dedicated channels between call endpoints. IP PBX systems support the Internet Protocol, allowing voice signals to travel as digital packets, just like data, across shared channels.

They can be routed and switched in the way that makes the most sense at any given moment, depending on current traffic loads and available network bandwidth. Hosted and cloud-based IP telephony services perform these same functions, but do so using equipment located in a service provider's operations center, rather than at the organization.

In addition to replacing the legacy PBX, organizations moving to VoIP will also need to swap out their legacy phones with IP sets to gain the advanced features of digital telephony. But even this stage does not have to be done all at once. Most VoIP systems provide reasonable support for legacy equipment, so organizations can scale up gradually to full VoIP.

STAGE 3. Unified Communications: Once an organization makes significant progress rolling out VoIP, it can complement that effort by implementing other UC capabilities — including conferencing and collaboration, messaging (e-mail, voicemail, IM, mobile SMS text messaging), and IP-based contact centers. *(For more on these capabilities, see Chapter 5.)*

As with VoIP, any of these UC capabilities can be deployed incrementally. A good strategy is to start with a specific location or department. This lets the technical staff address any glitches on a small scale and avoids negative early experiences across the entire organization.

Subsequent stages of the rollout will go more smoothly. Also, incremental rollouts let organizations stagger the funding for such implementations over an extended period of time.

When setting a timeline for migration, organizations should plan their ramp-ups by various departments' particular needs — for example, fielding advanced mobility features to service staff, or data-driven calling applications to contact center teams.

It's important to recognize that because UC capabilities are diverse, they're almost never all available from a single vendor. So a robust UC environment requires integration by an enterprise's technical staff and its IT contractors so that communication functions work together and users can easily share resources. This prompts many organizations to implement solutions supporting common standards, such as Session Initiation Protocol (SIP).

The Basic UC Package

Because digital telephony vendors continue to aggressively innovate to differentiate themselves competitively, the features and functionality of advanced telephony solutions vary significantly. However, there are several capabilities common to most popular solutions, which follow.

Mobile voice access: The pervasive use of mobile phones and smartphones makes incorporating them in the communications environment a necessity. MVA capabilities allow people to use their mobile phones as if they were attached to the physical IP network. This is done through integration of the IP PBX (or a host IP service provider's systems) and a cellular network.

For example, a person who has to leave the office in the middle of an extended conference call can seamlessly switch over to his or her mobile phone and participate in the conference without interruption. Similarly, a person who is

out of the office can transfer someone they are speaking to on their mobile phone to a colleague's extension.

MVA can also reduce monthly mobile phone costs by letting people "hop on" or "hop off" the organization's IP PBX to make out-of-network calls. In this scenario, the first hop of a person's call goes between their mobile phone and the organization's IP PBX (which, in a typical "calling circle" voice plan, would be included in the person's unlimited minutes).

The second hop of the call goes from the IP PBX to the out-of-network recipient (which, in a typical enterprise phone plan, would be either free or charged at a much lower rate than overage minutes on a mobile voice plan).

Single number reach: SNR takes mobile voice access a step further by using presence technology *(as described in Chapter 2)* to determine whether someone is actively using an office phone or a mobile device. It then uses the information to automatically route incoming calls to the appropriate device. This "follow me" capability can nearly eliminate phone tag, as well as the need to maintain multiple phone numbers for users.

Unified inbox: Knowledge workers spend considerable time checking messages, often in multiple inboxes. They may have one voicemail for their office phone and one for their mobile phone, a separate e-mail inbox and, if they're using IM, still another location for offline messages.

With a unified inbox, these inefficiencies evaporate. Unifying inboxes requires that an enterprise provide each user with a single voicemail account along with SNR.

Next, the organization must incorporate other messaging media such as e-mail and IM into the users' unified digital inboxes. A unified inbox gives a user the ability to scan e-mail, voicemail and IM messages in a single queue — and even have messages automatically read aloud through synthesized voice technology.

A unified inbox enables people to quickly and easily check messages they may have missed and act on them. It also helps them identify critical items requiring action. ■

LOCKING DOWN VoIP

Although a move to Voice over IP can substantially enhance personal productivity and organizational performance, it can introduce new security risks not present in traditional circuit-switched networks.

This is because VoIP shares the same potential security exposures as data on an IP network. Packets traveling across an IP network can theoretically be "sniffed" (allowing unauthorized parties to eavesdrop), and denial-of-service (DoS) attacks can disrupt voice communications by swamping the network.

Fortunately, sound security measures such as the following can safeguard VoIP traffic:

Encryption: To some extent, the codecs used to convert human speech to digitized packets inherently obscure VoIP traffic from eavesdroppers. It is usually prudent, however, to encrypt voice files to more completely mask VoIP transmissions.

Virtual LANs: VLANs create segregated broadcast domains within the IP network infrastructure. By creating VLANs for voice, organizations can provide an additional layer of protection that can potentially insulate voice communications from DoS attacks and other risks.

Port administration: Session Initiation Protocol (SIP) applications tend to open multiple ports on network devices, creating additional exposure to hackers. Therefore, the IT staff needs to implement firewalls and other security administration tools that can discover and close unnecessarily opened ports — and rigorously authenticate devices attempting to use those ports.

Multimedia Conferencing Solutions

Redefining meetings and increasing collaboration

While it's human nature to complain and joke about meetings, they are integral to the functioning of every organization. Team members need to exchange ideas and plans. Managers need to communicate interactively with their staff members. Discussions need to take place with users and with partners, suppliers and those outside the organization.

But meetings can be disruptive and costly. People may have to travel to participate in face-to-face meetings with teams at other locations. This drives up overhead expenses and can impede productivity for those in transit.

As a trade-off, organizations often opt to exchange information by e-mail or conference call. But these forms of collaboration may be insufficient, can create misunderstandings and might lead to project delays (that can lead to still more meetings).

The Benefits of Multimedia Conferencing

Multimedia conferencing offers a highly compelling alternative to the conventional approach to meetings. With the right capabilities, organizations can effectively and flexibly apply whatever type of conferencing technology is most appropriate — whether it's audio conferencing, web conferencing, video conferencing or some combination thereof — for any given situation.

Using UC to support multimedia conferencing, the enterprise can gain numerous benefits, including the following.

Provide faster, more effective collaboration: When team members can get together quickly to share ideas and critique plans, organizations make fewer mistakes and achieve better outcomes. They're simply more agile.

This is especially true as knowledge work becomes increasingly specialized and as conditions in the outside world change at a faster rate. Typically, no single individual will have all the information necessary for a team or organization to make the best decision or plan the best course of action.

The use of video and shared applications further enhances collaboration because interpersonal communication relies heavily on gestures and facial expressions.

Reduce costs: Effective multimedia conferencing can drive down an organization's budget for airfare, lodging, rental cars and meals associated with travel — without compromising the quality of the discussions and decision-making that take place during meetings.

Reclaim productivity: Although mobile technologies enable people to be reasonably productive while away from the office, that productivity is rarely equivalent to what they can accomplish in their normal working environment. By providing the tools for people to participate in meetings from their desks or in nearby conference rooms, multimedia conferencing helps users stay focused on their primary responsibilities.

Reduce the carbon footprint: In addition to reducing costs generally, many organizations also want to reduce energy consumption and spending. By eliminating air, train and car travel, multimedia conferencing supports green initiatives by delivering quantifiable reductions in energy consumption.

Support flextime schedules: To attract and retain high-caliber workers and to provide work-life alternatives to existing staff, many organizations now offer the ability to work from home for specified amounts of time. Rich multimedia conferencing capabilities help support such programs by making it easier for people to participate in the daily work of the office from home.

Improved external engagement: Multimedia conferencing capabilities can often be extended outside an organization to improve interactions with external parties such as suppliers, contractors, partners and constituents. The ability to better communicate and collaborate with people outside the organization can significantly improve performance and productivity — especially in cases where an organization has (or wants to have) an extensive geographical reach.

Combined, these benefits and others can make investment in multimedia conferencing capabilities highly worthwhile.

Mix-and-match Technologies

In the real world, an organization deploying multimedia conferencing will make use of audio, web and video conferencing capabilities in a variety of unique ways. Users will ultimately package and repackage multimedia conferences based on their needs and the requirements of the collaborative effort.

So what does UC bring to the table for each?

Audio conferencing

Audio conferencing, a staple of everyday workplace communication, brings together three or more people in two or more locations. Most phone systems provide at least rudimentary conference call capability. Enterprises can use these native capabilities for their most simple audio conferencing needs.

To support many simultaneous callers and gain additional call management features, organizations have two choices.

One approach is to turn to an external audio conferencing services provider. By using a services provider, an organization can avoid buying, installing and managing the audio bridge that provides sophisticated conference call management functions.

But service provider costs can add up over time, creating a disincentive for using the productivity-enhancing technology. Low-cost and free VoIP audio conferencing services are available, but they tend to suffer from low call quality, which makes them frustrating to use and unacceptable for most enterprise uses.

The second approach would be to install audio conferencing equipment onsite. The advantage is that it makes audio conferencing an essentially free resource. That encourages use and can improve collaboration day in and day out.

Regardless of the approach an organization takes, it is generally necessary to have specialized audio conferencing phone systems in each location so that multiple users can participate in an audio conference from a single location.

Factors to consider in choosing audio conferencing bridges and phone solutions include the following.

Sound quality: Problems such as echo, voice dropout and difficulty in distinguishing multiple voices simultaneously can make audio conferences annoying and unproductive. So features such as echo cancellation and noise reduction should rank high among selection criteria.

Call controls: Enterprises have varying audio conferencing needs, sometimes even from department

to department. For example, a college might hold large audio conferences during which just a few people speak, but many people listen.

A law firm might need to record and play back calls on demand. A police department may need security features that authenticate callers who dial in based on their phone numbers or network identification. To make sure that the solution implemented meets all necessary requirements, an organization should create and prioritize a list of its must-have functions.

Management and diagnostics: To ensure an optimized user experience, some audio conferencing systems provide capabilities such as the ability to detect and mute any lines that are causing distortion or noise. Some also provide reporting that documents who was on each call and for how long. These capabilities may be useful for organizations with special audio conferencing needs, especially as they relate to compliance or service contracts.

Web conferencing

This technology lets users share one or more display windows on their computer monitors. The display windows can include:

- Shared files such as PowerPoint presentations, Word documents and spreadsheets;
- Shared application screens that can be used for displaying information or demonstrating software;
- Cobrowsing for collaborative use of online resources;
- Whiteboarding that allows interactive typing, drawing, highlighting, cutting, pasting and working with visual elements in a screen area.

Web conferencing is often used in conjunction with other collaboration technologies such as chat, audio conferencing and video conferencing to create a truly rich and interactive communal experience.

As with other collaboration technologies, organizations can choose to implement web conferencing capabilities on their own servers or use a service provider. Many organizations do both, selecting the one to use based on the specific need.

For example, an organization might use an internal cobrowsing tool for training staff. But it might also tap a service provider to manage PowerPoint presentations for large numbers of external users. A consideration in this scenario would be the strain put on the host server by the number of participants.

Video conferencing

By conveying the richness and nuance of human gestures and expression, video conferencing delivers a level of communication no other medium can match. Facial interaction means a lot to humans.

Enterprises that want to communicate and collaborate effectively over long distances should include video conferencing in their UC portfolios. The specific video conferencing platform will depend on the particular needs and objectives of the organization. The following platforms offer a variety of options to consider.

Desktop-based: The simplest way to deliver video conferencing is to provide an inexpensive desktop camera to users who need it, along with the necessary desktop video conferencing application. Users can also set up video chats via a variety of online services.

Some UC solutions include native support for desktop video conferencing. Others can be integrated

DIGITAL SIGNAGE AS A COLLABORATION TOOL

They direct traffic, present reminders for on-campus events, detail conference agendas and a host of other things. Digital signage can be spotted in use just about everywhere.

Organizations can also use digital signage in locations such as building lobbies, contact centers and other common work areas to keep people informed about important news, progress on team goals and recent successes.

Digital signage typically consists of LED, LCD or plasma display screens networked to a management console that controls content. The content can include text, images and video, as well as accompanying audio. Digital signage systems also typically provide automatic rotation of multiple messages.

When choosing a digital signage system, it's important to consider the size and resolution of the displays, the transmission distances supported and the sophistication of the management console.

into the UC infrastructure. Integration is essential for combining video chats with file sharing, whiteboarding and other collaboration tools.

The primary advantage of desktop video conferencing is its low cost. But video quality and participant limits make it unattractive for large-team use or for projects needing quality image transmission.

Room-based: This approach to video conferencing entails the use of specialized cameras, microphones and displays to deliver optimal audio and video quality. In some cases, room systems can be integrated with desktop systems so that remote users who can't get to a fully equipped conference room can still participate in virtual meetings.

To ensure the delivery of high-resolution, jitter-free video, an organization will need robust network connectivity. *(For further information about these network issues, see Chapter 6.)*

Telepresence-based: At the highest end of the video conferencing spectrum, telepresence systems provide a life-size display of participants on high-resolution monitors. By precisely orienting cameras and monitors (and carefully matching lighting and decor), telepresence environments give the illusion that all the participants are in the same room.

Although telepresence systems are relatively expensive and require high-availability networks, they provide a uniquely powerful way to communicate across distances and can be extremely useful in organizations where people in distant locations need to work together closely and continually.

Distance learning and streaming video: A special case for video conferencing is distance learning, or any use that requires that video be streamed to large numbers of users viewing on their own on remote desktops or in a group on a large display. Because of the need to broadcast a large number of streams without adversely impacting the local network, these setups require special configurations.

Many organizations will mix and match these platforms so that, for example, they can use simple desktop video conferencing for ad hoc collaboration and room systems for more critical and planned interactions.

To optimize return on investment in video conferencing, organizations should take steps to promote its use. This can be done by rewarding teams for using video conferencing instead of travel, by posting cumulative savings achieved and by recognizing especially creative uses of video conferencing in conjunction with other UC tools. ■

The Contact Center

Bringing efficiency and excellence to external communications

An enterprise's contact center serves as its face to the outside world. It's critical to ensuring an organization can efficiently and effectively deliver products or services, maintain good relationships with users and customers, and establish a positive reputation with the public.

When an organization's contact center functions inadequately, problems may result. People who call or e-mail the center can wait an inordinate amount of time for assistance. The center's staff may have to spend excessive time with each caller — driving up costs per call. Or the staff members can mistakenly provide people with inaccurate, out-of-date or misleading information.

By integrating UC technologies into call center operations, an organization can meet several goals:

- Improve response times across all communication channels; (including voice, e-mail and chat)
- Provide consistent, accurate and up-to-date information across all communication channels;
- Make more efficient use of staff resources;
- Improve ability to scale to address sudden workload shifts;
- Gain full visibility into contact center activity, enabling changes or improvements in operations on the fly based on metrics.

Organizations that establish these five attributes will be in a position to continuously improve the quality and speed of their communications with the outside world, while simultaneously driving down operational costs.

By tying together voice, e-mail, presence, IM and other communications capabilities, a UC environment can provide the technical foundation for a high-quality, high-efficiency contact center.

Next-generation Contact Center Tools

The advent of UC has spawned a wide range of available features. What follows are five must-have functions for a high-availability contact center.

1. Screen pops: Screen pops take advantage of the integration of voice and data to automatically present contact center agents with information about callers on their computer screens. This can be done by capturing a caller's number using caller ID and then retrieving the associated caller record in the center's customer relationship database.

Alternatively, it can be done by having callers provide information such as account numbers via an interactive voice recognition (IVR) app before speaking to live operators.

Screen pops save contact center agents the time it takes to ask callers for this information and wait while a database query loads on their computers. It also gives a positive impression to the caller about the sophistication of the organization's systems.

2. Skills-based routing: Not every agent in a contact center has the same experience and knowledge — nor would that be necessarily desirable. Contact centers tend to experience high staff turnover, so they often have a large number of relatively new hires.

An enterprise's products or services may also be so broad that no one agent can be an expert on everything. Or it may be necessary to have agents who specialize in certain aspects of the organization or the information that it provides.

Skills-based routing allows direct calls to the most appropriate agent through a combination of data-driven call switching and presence. The process starts with the caller identifying a category of need via an IVR app. The system then identifies agents with the corresponding skills, uses presence to detect which of these agents is available, and routes the call accordingly.

3. Voice and web self-service: Most centers find that a large percentage of their interactions involve a relatively limited number of common questions. Rather than have an agent handle such queries, centers can deploy self-service apps that provide information on the organization's website or through an IVR prompt.

The caller gets an immediate answer, and the center saves on overhead by being more efficient. Multiply this savings by hundreds or thousands

COUNTDOWN TO CONTACT: METRICS THAT MATTER

Ready to UC-enable that contact center? Be sure to consider the following factors in the planning phase.

Workloads: Analyze historical data to estimate the number of interactions that the center will likely need to support on each communication channel. These projections should include the size and frequency of peak workload spikes.

Budget: Compare the current agent headcount to what might be needed to support anticipated workloads. If the personnel budget is low in proportion to the workload, for example, it may be imperative to focus on moving some interactions to automated channels such as web and voice self-service.

Service-level objectives: Be sure to include both time and quality metrics. Time metrics might be the average and maximum times for waiting on hold, the length of calls and the total time for ultimate resolution. Quality metrics might involve post-incident surveys that allow people to rate their satisfaction on a numeric scale and provide anecdotal information.

It's important for IT management to keep in mind that the public's expectations regarding a contact center continue to rise as they encounter organizations that have achieved exceptional levels of responsiveness. So all enterprises should thoughtfully examine their historical service levels and set goals for improving upon them.

of repetitive calls, and the ROI can be substantial.

Voice self-service works similarly to screen pops and skills-based routing. Callers respond to voice prompts with numeric entries or spoken keywords. Then, instead of being routed to an agent, the system provides the automated answer. If the answer satisfies the caller, they can simply hang up. If not, they can request an agent and be given priority in the call queue (since they have already been on the line without getting the answer they need).

Web self-service enables site visitors to search an online knowledge base through some combination of browsing, keyword searching or plain language queries. In the past, many organizations would post a page with a simple list of frequently asked questions or "FAQs."

But this model is outdated and insufficient for today's demanding website visitors. Organizations must now maintain more comprehensive online knowledge bases and make sure site visitors can pinpoint the particular information they seek within a few keystrokes or mouse clicks.

4. Remote-agent desktops: Historically, agents all worked in the call center proper. It was a technical necessity. Today, with the appropriate technology, agents can work from remote desktops. An IT team can program its contact center voice switch to forward incoming calls to external phone numbers. The agent can log in securely and gain access to screen pops, order entry and lookups, and any other necessary functions.

Voice calling, data applications, chat and other agent tools can be integrated just as they are in the physical contact center. The result is a virtualized environment that lets agents work wherever and whenever they need to — assuring the organization's continuity of operations.

5. Multichannel interaction: People contact organizations through multiple communication channels — even about a single issue. For example, someone may send an e-mail, receive a reply that doesn't fully resolve an issue and then call the contact center to follow up. Or during a specific event, several people may contact the center through multiple channels about one information item.

If an organization doesn't have a well-integrated approach to managing its communications across e-mail and voice channels, these queries all become "new" interactions with agents rather than a chain of events. That's both unproductive for the agents and frustrating for people seeking information.

A better approach is to allow users to freely access whichever communication channels are most appropriate for them — voice, e-mail, chat, web form — and then integrate those channels so that agents can view any and all relevant previous interactions.

Back-end Software

While UC, query and information-routing functions are critical to agents, underlying database systems and management software are equally critical to day-to-day operations and management. The diagram below highlights some of these necessary support solutions. ■

CALL CENTER SUPPORT SOLUTIONS

Support Solution	How It Helps
Customer Relationship Management (CRM) Database	Serves as a repository for agents when helping people who have an existing relationship with the organization
Knowledge Management Tools	Assists agents in finding relevant, up-to-date information to respond to queries in near-real time
Trouble Ticket System	Escalates issues to subject-matter experts when front-line agents cannot resolve them, and it can send alerts to contact center supervisors if an issue is not handled in a timely manner
Management Dashboard	Provides supervisors with real-time and historical data to spot areas for potential improvement — such as agents who take too long to resolve issues, indicating that they may need additional training

A Network Built for UC Success

A converged network as the foundational infrastructure for UC

Many networks that are perfectly capable of transporting an enterprise's existing data traffic are inadequate for UC's triple threat of data, voice and video transmissions. This additional traffic can quickly overwhelm an unprepared network. Organizations need to plan and design carefully, looking closely at network performance, when considering new UC features.

Addressing Network Concerns

Before an organization moves to broad UC deployment, it will need to address the following network concerns.

Insufficient bandwidth: While individual voice conversations do not consume excessive bandwidth, they cumulatively add nontrivial demands on network capacity – especially during periods of peak utilization. Video, on the other hand, consumes substantial bandwidth.

Other UC collaboration tools can also add to network utilization rates as users begin to actively, even aggressively, share files and other data. Organizations therefore often need to increase bandwidth, identifying choke points on the network, to adequately support UC services.

Latency, jitter, reordering and dropped packets: Most data applications are relatively tolerant of network characteristics such as latency (a delay in packets getting from one endpoint to another), jitter (variability in how quickly packets get from one endpoint to another), reordering (packets arriving at an endpoint out of sequence) and dropped packets.

Voice and video traffic, on the other hand, is rather intolerant of these characteristics. The human eye and ear readily notice even slight distortions in images and sound. So measures have to be implemented that will minimize or eliminate these characteristics for real-time UC components.

Insufficient reliability: No one likes it when a network interruption interferes with the availability of critical applications and data. However, loss of voice communication is absolutely unacceptable.

If someone calls an organization and is told "the computers are down," they might be annoyed, yet probably not shocked. But if someone repeatedly calls the organization and no one picks up the phone, that's a major reputation and trust problem. Enterprises often have to significantly improve the reliability of their data networks before they integrate voice and video traffic.

Inadequate manageability: Both applications and users of those applications have certain tolerances when it comes to network disturbances. When a hiccup occurs with a data application, the root cause typically involves a glitch in the software, a server malfunction, an operating system bug or a problem on the user's device. The network is rarely at fault.

Because of these realities, many network management teams are more reactive than proactive when it comes to network monitoring and troubleshooting. (And many aren't particularly speedy in reacting.) But the criticality and sensitivity of voice traffic on the network make this approach unacceptable. There's no longer any wiggle room — avoiding problems becomes paramount. Therefore, organizations typically have to upgrade their network management tools and practices as part of a UC migration strategy.

Balancing Bandwidth & QoS

Enterprises have two tacks for creating the high-availability infrastructure that a converged network demands: bandwidth upgrades and establishing quality of service (QoS) controls.

To address bandwidth issues, many organizations upgrade their networks from Gigabit Ethernet to 10 Gig-E (and even 40 Gig-E). They are not doing this just to support convergence.

In many cases, other changes in the IT environment, including faster servers, virtualization and the movement of more data across the network (especially between storage devices and servers) are also driving up demand for network capacity. The introduction of real-time voice and video traffic on the network is one of many factors making upgrades necessary.

There are several reasons that upgrading to 10 Gig-E at critical choke points on the network may now be compelling for organizations that had not considered doing so before. Beyond the need for more bandwidth, the newest generation of 10 Gig-E switches boasts latency that can be 20 percent to 60 percent less than typical Gig-E switches.

Also, the per-port price for 10 Gig-E connectivity has dropped below the $1,000 mark, making it cost about the same as four Gig-E ports (which only deliver 40 percent as much capacity). Network managers may also find the virtualization features of 10 Gig-E network interface cards (NICs) attractive because they allow a single card to support multiple separate

connections to user-facing LANs, storage and out-of-band management solutions.

Network managers have to take several issues into account when upgrading to 10 Gig-E. In addition to the cost of the switches and NICs themselves, it may also be necessary to upgrade the cabling plant to either high-end copper or fiber optics.

The use of 10 Gig-E at the server tier of the network can also drive the need for implementation of 40 Gig-E at the core to avoid bottlenecks in aggregated traffic. These costs, however, will pay off over time as the network carries greater volumes of critical data, voice and video traffic at high levels of performance and reliability.

Although overprovisioning bandwidth can help prevent congestion from undermining the performance of applications and services across the network, it is not a complete solution. For one thing, a massive burst of traffic from an unanticipated source (such as the accidental replication of a large database) can suddenly consume even the most overprovisioned network connections, seriously undermining voice and video quality.

For another, a hardware or software problem on the network can temporarily reduce available bandwidth. It's important to make sure that the most critical and sensitive services are not adversely affected in the event of such problems.

There are basically two ways to ensure QoS for specific types of traffic on the network, packet prioritization and bandwidth reservation.

Packet prioritization: On a simple, unmodified Ethernet network, all data packets are treated equally. All of them will eventually get to their destination on a best-effort basis, but their trip there is essentially indeterminate. They will get there whenever the switches and routers between them and their destination shunt them there.

With packet prioritization, the switching and routing fabric of the network can give certain packets precedence. Packets can be labeled by their application or service type, or they can be left in a default traffic category. This allows real-time voice and video to pass through switches and routers ahead of other applications, so that traffic experiences minimal latency across the network, even when there is congestion.

UC AND THE CHANGING DATA CENTER

Data centers are in the midst of dramatic changes as demands on IT outpace infrastructure budgets.

Two of the most prominent changes derive from the adoption of virtualization and cloud computing. Virtualization technology lets multiple virtual servers run on a single physical machine. This provides better utilization of the data center's processing capacity.

Meanwhile, the use of cloud services allows IT departments to automatically and dynamically add, move and decommission virtual servers in response to constantly changing workload demands.

Virtualized cloud environments serve UC well. Workloads for collaboration applications, for example, can vary significantly as projects ramp up and deadlines approach.

With the new infrastructure flexibility provided by these technologies, the data center can adaptively respond to workloads— adding server capacity when it's needed and then releasing that capacity when it's not. That provides a much more agile environment for the enterprise and makes its use of UC apps equally flexible.

Virtualization and clouds also provide an extra measure of data protection and disaster recovery because they make it relatively easy and cost-effective to mirror applications and services on multiple machines.

Still, IT departments need to manage virtualization and clouds properly to avoid potential downsides. For example, the replication, movement and backup of virtual server images can create bursts of server-to-server traffic that must be prioritized to avoid interfering with other applications and services on the network.

Also, IT departments must be as diligent about decommissioning virtual machines that are no longer needed as they are about adding VMs during periods of peak activity. Virtual server sprawl undermines the overall performance and manageability of the data center.

With the right management tools and best practices, however, virtualization and cloud computing can be a major asset for UC implementations, allowing the IT team to optimally leverage the existing server infrastructure for optimum performance and reliability.

Bandwidth reservation: One reason that low-priority traffic can crowd out high-priority traffic on an unmodified Ethernet network is that all packets are contending for the same single connection between two points. Bandwidth reservation counteracts this condition by setting aside some specified amount of the total capacity on a given connection for a given application or service.

By estimating the maximum number of conversations that will traverse any network connection and multiplying that number by the amount of bandwidth a voice call requires, network managers can ensure that a surge in data traffic won't crowd out voice packets. Network managers can implement a combination of prioritization schemes and reservation protocols to achieve performance objectives.

Making Availability a Priority

In addition to ensuring the quality and performance of applications and services on a converged network, organizations must also take steps to ensure their continuous availability. On an unmodified network, a single point of failure or an overloaded server can bring service to a halt. But, with the right architecture, services remain reliable despite such occurrences.

Architectural approaches commonly used to ensure the uninterrupted availability of network services include the following.

Redundancy: Provisioning multiple cable runs, switches and servers eliminates the potential for single points of failure. In some cases, a device such as a switch or a NIC may offer built-in redundancy or failover capabilities.

Load balancing: When implementing multiple identical resources to support a common set of services, organizations typically use load balancing to make sure that no resource is underutilized or overutilized. The latter can result in impaired performance or outright failure.

Spanning Tree Protocol (STP): Although the creation of multiple paths between network endpoints is essential for ensuring reliability, it can also lead to the creation of "broadcast storms" on packet-based networks like Ethernet. To eliminate this problem, network managers implement STP, which disables additional paths for broadcast traffic once a single path has been chosen.

Useful variants of STP include Rapid Spanning Tree Protocol (which can respond faster than STP to changes in network topology) and Per-VLAN Spanning Tree Protocol (which is used on networks that are segmented into separate virtual LANs).

It is also a general best practice to use backup power supplies for critical devices on the network so that services will continue running for a reasonable period of time in the event of a power outage.

Proactive service-level management: Historically, many IT departments have monitored their environments primarily on a device-centric basis. That is, they use management consoles that let them know, for example, if any particular network segment is congested, if their switch ports are functioning properly, or if the load on any server's CPU or I/O is approaching critical levels. If any of these monitored device attributes generate an alert, the appropriate technical team jumps into action.

Although this approach may still be useful in some instances, it is by itself insufficient for protecting the performance of a critical real-time service such as voice on a converged network. Network management teams simply can't afford to wait until issues on the network threaten or begin to interrupt voice service. Instead, they have to proactively monitor end-to-end performance of services across the network as users are experiencing them.

In other words, instead of monitoring network components and servers to make sure they are operating correctly as individual devices, technicians also have to keep a close watch on how services themselves are performing and analyze trends.

There are basically two ways to maintain visibility into end-to-end service performance. First, the IT team can passively monitor the behavior of existing voice, video and data packet traffic as it moves across various points on the network. Second, the team can actively generate voice, video and data packet traffic at regular intervals to discover possible shortfalls in performance.

Regardless of which approach IT takes, the key is to maintain continuous visibility into conditions on the network — and to address any emerging issues before they begin to negatively effect users. ■

This glossary serves as a quick reference to some of the essential terms touched on in this guide. Please note that acronyms are commonly used in the IT field and that variations exist.

Glossary

Bandwidth reservation

This is a network traffic management technique that allocates a fixed amount of available transport capacity to a specific application or class of applications to ensure an app won't have to contend with other apps for that capacity.

Centrex

Shorthand for "central exchange," centrex is a service from a telephone carrier that remotely provides call management capabilities similar to an on-premise PBX.

Cloud

Broadly speaking, a cloud is a set of virtualized resources that provide computing power, storage, software applications and/or information as a metered service.

Cobrowsing

This term refers to a web-browsing session simultaneously visible to and/or controlled by multiple users.

Customer relationship management (CRM)

This is a software tool that maintains a database of an organization's in-coming contacts, as well as other information and workflow functions necessary to efficiently provide timely, personalized service.

DiffServ

This term refers to a networking technology that uses a 6-bit field in the header of IP packets to classify applications and assign them appropriate quality of service (QoS).

Digital natives

A term referring to people who grew up with digital technology, digital natives typically refers to people born in the 1980s or later and whose households had computers with Internet access.

Gigabit

When referring to network bandwidth, a gigabit (1 billion bits) is a unit of measure for the amount of data that can pass across any point on the network in one second.

Idea banks

This is a website where multiple authorized participants can openly suggest, critique and work on innovative concepts well before having ironed out all the details or problems.

Input/output (I/O)

I/O refers to the exchange of information between a system's internal environment and the external environment to which it is connected.

Instant messaging (IM)

IM is real-time text messaging between computing devices, plus any ancillary capabilities such as presence notification, status messaging and file transfer.

Interactive voice response (IVR)

IVR refers to any technology that lets people interact with computer systems via touchpad entry or verbal commands.

Internet Protocol (IP)

IP is the means by which data packets are relayed from a source host to a destination host across one or more networks.

Jitter

This term refers to the variability in the amount of time it takes for packets to move from one endpoint on a network to another.

Liquid Crystal Display (LCD)

LCD is a technology that takes advantage of the light modulating properties of liquid crystals to display high-quality images with relatively low energy consumption.

Light Emitting Diode (LED)

LED is a technology that uses an array of semiconductors as its light source.

Multiprotocol Label Switching (MPLS)

MPLS is a mechanism that expedites the transport of packets between distant nodes on high-performance networks.

Presence

This refers to the means by which applications detect and share the availability of a user on the network for real-time communication.

Private branch exchange (PBX)

PBX is a device that manages connections among an organization's internal telephones, as well as the connection between the internal network and the public-switched telephone network (PSTN).

Quality of service (QoS)

QoS refers to the mechanisms that prioritize applications, users and data on a network to achieve a specified performance level and avoid bandwidth contention.

Resource Reservation Protocol (RSVP)

RSVP is a networking technology that helps deliver the appropriate QoS for an application or service by allocating resources to specific packet flows.

Session Initiation Protocol (SIP)

SIP is a signaling protocol for managing communication sessions between two or more points on an IP network.

Short Message Service (SMS)

SMS is a text communication service used by mobile devices.

Social graphing

This is a technique for understanding the relationships between people and resources in an organization through visual representation of activity within a social network.

Social networking

This term can refer to any set of web-based technologies or systems that connect individuals to one another based on common interests or other characteristics.

Telepresence

This is a high-end video conferencing technology designed to closely replicate the sense of being in the same room with remote participants.

Unified communications (UC)

Broadly speaking, UC is the integration of multiple communications media, including real-time services such as instant messaging and voice over IP and non-real-time services such as e-mail and SMS.

Uninterruptible power supply (UPS)

This is a device that delivers emergency power to a protected resource in the event that the main power source fails.

Virtual LAN (VLAN)

A VLAN is a logical grouping of network resources that mimics a dedicated physical connection between them.

Voice over IP (VoIP)

VoIP is the transport of audio signals, as well as the management of associated session control functions, over an IP network.

Wiki

From a Hawaiian word meaning "quick," a wiki is a web page through which multiple authorized users can add, delete or modify content.

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LOOK INSIDE FOR MORE INFORMATION ON:

- Preparing the network for full UC
- Utilizing social networking resources
- Determining how cloud computing fits into UC strategies
- Staged UC deployments