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CDW·G REFERENCE GUIDE

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UNIFIED COMMUNICATIONS AND COLLABORATION
REFERENCE GUIDE

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WHAT IS A CDW·G REFERENCE GUIDE?

At CDW·G, we're committed to getting you everything you need to make the right purchasing decisions — from products and services to information about the latest technology.

Our Reference Guides are designed to provide you with an in-depth look at topics that relate directly to the IT challenges you face. Consider them an extension of your account manager's knowledge and expertise. We hope you find this guide to be a useful resource.

Bringing Together Communication Channels

UC offers valuable efficiency gains across the organization.

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

UC environments also bring together various endpoint devices, including desktop and notebook PCs, desktop and mobile phones, video conferencing equipment and more.

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.

Five capabilities in particular characterize mature UC environments:

Messaging: A UC environment lets users message each other with both real-time and non-real-time media. Non-real-time media include voice messaging, e-mail, short message service (SMS, or more commonly, text messaging) and fax. Real-time media, such as instant messaging (IM, or more commonly, chat) enable users to quickly type back and forth to ask and answer questions, resolve problems, coordinate schedules and remind each other about upcoming project deadlines.

Conferencing and collaboration: A robust UC environment empowers groups of two or more users to collaborate in real-time conferences via web, audio (voice) and video. The most basic type of conferencing allows users to see and speak to each other. More advanced conferencing allows participants to do things such as share PowerPoint presentations, browse the web together and draw on interactive whiteboards.

Mobility: Because today's information workers are reliant on their smartphones, UC implementations must support mobility. That is why robust UC environments automatically redirect voice calls to users' mobile devices when they are out of the

EXTENDING UC TO THE OUTSIDE WORLD

While most organizations focus their initial UC implementation on internal users, there are many advantages to be gained by extending UC to clients, suppliers and partners as well.

Three factors drive deployment of UC to the outside world: the "consumerization" of IT, the rise of virtual teams and cloud computing.

The consumerization of IT refers to the phenomenon of people becoming increasingly accustomed to interacting with private and public-sector organizations through computers and smartphones. As a result of this interaction, they have heightened expectations about the kinds of online services that should be provided. These heightened expectations place more pressure on organizations to provide UC-based services, such as "click-to-talk" options, on their websites.

Organizations create virtual teams when they supplement their internal staff with outside contractors on a temporary, as-needed basis. Extending these UC applications to those outside contractors ensures that their virtual teams operate with the same speed and efficiency as traditional teams comprised entirely of internal staff.

With the cloud, IT managers can extend UC capabilities to participants without having to manage remote connectivity themselves. Instead, they simply connect to an appropriate cloud service provider who makes the necessary connectivity available to users outside the organization.

This combination of a tech-savvy general public and readily available cloud services is already beginning to create an environment in which organizations can use UC to quickly, easily and securely collaborate with outside participants to reduce costs, improve service and accelerate critical workflow processes.

office, enable users to access their organization's UC voice capabilities from their mobile devices, and unify voicemails for both desktop and mobile phones in a single inbox.

Call control on the network: UC performs call control on the same IP network that transports an organization's data traffic, rather than on a separate telecom network. Call control on a converged network ensures that voice conversations can be immediately connected between any two points based on the users' present locations or their participation in a conference that is using other networked capabilities, such as video or interactive whiteboards.

Presence: UC environments also feature "presence," which is the ability to automatically detect a user's current availability status. Users can also set their status manually as "available" (currently logged on to a device on the network), "busy" (logged on but not immediately available for real-time communication) or "away." Users can also add a message to their status information to let other users know where they are and when they will be back.

The Value of UC

These five UC capabilities, combined with the centralized management of all communication media, generate a wide range of extremely valuable benefits.

Organizations, after all, depend on fast, accurate communication between people. People are constantly asking each other questions, exchanging information and collaborating to make optimized decisions. The more efficiently they can do this, the more productive they are.

But all kinds of inefficiencies can creep into day-to-day communication. For instance, projects may not get done because someone is waiting for a reply to a voicemail they sent to someone else who happens to be out of the office attending an offsite meeting. Or a meeting may be postponed because one team member has an emergency and will be out of town. Such delays erode productivity and slow down critical processes.

UC eliminates these delays by enabling people to communicate with each other more quickly and reliably through whatever communication medium makes the most sense at any given time.

If someone needs to ask a brief, urgent question, they can check the other person's availability, type out an instant message, and get a reply right away. If the person replying wants to give a more detailed explanation, UC makes it easy to move to a voice call, regardless of whether both parties are in the office or not.

UC also allows organizations to quickly and inexpensively bring geographically dispersed teams together using virtual conferencing, eliminating the need to assemble

everyone in the same physical room at the same time. This eliminates the substantial costs and logistical headaches associated with travel.

Cutting back on staff travel also helps fulfill green mandates by reducing an organization's carbon footprint. Plus, by making it easier to bring together multiple busy people with many other pressing responsibilities, UC conferencing helps get things done sooner rather than later.

These benefits are particularly valuable today as organizations are under constant pressure to do more with less. Tight budgets and hiring freezes are forcing organizations to find new ways of making current staff more productive. At the same time, the expectations of the general public are rising because of superior service offered by innovative leaders in the private sector.

UC solutions can play a pivotal role in enabling organizations to fulfill these expectations for service, despite resource constraints. With UC, people waste less time and get more done. UC also helps make sure that the right person with the right knowledge can share that knowledge wherever and whenever it is needed, so tasks are completed correctly the first time.

UC's Evolution

UC as a distinct solution set evolved from the way organizations historically developed their voice, data and video communication capabilities, with voice being the first to develop.

Organizations built and refined their telecom infrastructures for several decades before they began implementing data infrastructures. By the time the first computers were being installed, organizations had already invested significantly in creating dedicated voice infrastructures that were highly reliable and efficient for their own narrow purposes.

The data infrastructures that were first implemented were also designed for a very narrow purpose: to store and retrieve information in digital form. No one thought about piggybacking on the existing voice infrastructure because it hadn't been designed for that purpose. And no one wanted to put the reliability of an organization's voice communications at risk.

As data infrastructures became more reliable and robust, and as innovative applications began to provide evidence of the potential benefits in combining voice, data and video, organizations began to question why they should continue to maintain separate infrastructure for separate communication media.

Today, organizations typically use a single converged infrastructure for voice, data and video. Because they are under pressure to do more with less, they often seek to improve user productivity by harnessing UC in ways that enable staff and stakeholders to more quickly exchange ideas and information, regardless of where they are at any given time.

UC Going Forward

The latest innovations in UC involve the integration of communication with productivity applications themselves. For example, instead of having to look up the e-mail address or phone number of the author of a document on an organization's intranet, UC-enabled applications allow users to simply click on the author's name and choose from a menu: initiate a voice call, send an e-mail message or launch a chat/IM session.

Further refinements of UC are being fueled by the habits and preferences of a new generation of knowledge workers who have grown up with the Internet and mobile technology. As network bandwidth increases, as the functionality of all kinds of endpoints continues to expand, and as knowledge workers become more accustomed to fluidly mixing and matching communication media, UC will become even more sophisticated and feature-rich.

This will empower people to more quickly and easily expedite critical tasks whether they're at their desks, at home or on the road. ■

Convergence on the IP Network

Properly planning for and maintaining a UC-enabled network is worth the effort.

To implement UC, organizations 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 UC, which won't work without a well-designed, well-implemented and well-managed network.

Organizations once had different physical networks for different purposes. The oldest of these was the telephony network that carried analog voice signals between users' phones and the analog public branch exchange (PBX) that connected the organization to the public switched telephone network (PSTN). This network was specifically designed to transport analog voice, making it suitable for carrying digital data.

With the dawn of modern IT, organizations began to install data networks to address their computing needs. Often, they wound up wiring multiple data networks. For example, there may have been one network that carried data traffic between the mainframe and dumb terminals over coaxial cable. The IT staff may then have implemented another network to carry data between servers and desktops over a network of twisted-pair wiring.

With the arrival of the Internet, IP became the protocol of choice for data networking. Its packet-based approach to data transport proved to be practical, reliable and highly adaptable to multiple purposes.

Various types of content could be carried in each IP packet payload. And IP packet headers made it easy to switch and route traffic across any kind of network path, from the simplest LAN connection in the office to the most complex series of Internet hops around the world.

An initial wave of network convergence occurred when all data from all computing platforms and applications (including mainframes, midrange systems and PCs) was moved to a single IP-based infrastructure.

The next wave of convergence

occurred with the advent of Voice over IP (VoIP) technology, which allowed analog voice signals to be digitized and carried on an IP network. While early versions of VoIP were of relatively low quality, the technology matured to the point where it closely matched the quality of traditional analog telephony.

IP networks themselves also became more reliable, allowing IT leaders to feel more comfortable pushing out essential voice communication over a shared infrastructure.

What's more, digital PBXs allowed organizations to interface their VoIP communication with their carriers' networks, taking advantage of all the features and functionality of traditional analog PBXs. In fact, digital PBXs even began to surpass analog PBXs for functionality and cost efficiency. This made the switch to VoIP very compelling.

As organizations increased the bandwidth on their IP networks (and as VoIP technology also matured), it became possible to include video on a converged network as well.

Convergence: Wide-reaching Benefits

The use of a single, converged network for all media types offers many benefits, cost reduction being chief among them. It simply costs less to build and maintain one robust, reliable all-purpose network than to build and maintain multiple networks with multiple cable runs, for multiple types of devices from multiple manufacturers.

With multiple networks, organizations 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. Organizations 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 his 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 organizations must nimbly respond to changing requirements.

Most important: With UC, common transport of all communication media enables voice, data and video to be integrated in new and effective ways. It would be much more difficult, if not impossible, to give users the ability to manage their voicemail from their PCs or use their phones to access their e-mail if data and voice travelled over separate infrastructure. This is why network convergence is the underpinning of UC.

Building a Converged Network

To understand the challenges associated with creating a converged network, one must first understand two attributes that characterize IP networks: bandwidth and impairments.

Bandwidth refers to the capacity available on any given network link. Every network link has finite capacity. Every application or service on the network uses a different amount of that capacity.

Utilization of the capacity available on any given network link is also affected by user activity. As more users do more things on the network, they consume more bandwidth. Eventually, utilization can reach the point where packets can no longer move freely across the network.

In addition, no IP network transports every packet perfectly every time. As a best-effort protocol, IP does not depend on every packet moving across every network connection at exactly the same speed. In fact, the ability of IP networks to cope with impairments in the transport of packets makes them practical for real-world communications, in which multiple interconnected networks may have very different performance characteristics.

What follows is a list and explanation of typical IP network impairments:

- **Latency** is the delay in the transport of packets over the network.
- **Jitter** refers to differences in the amount of delay experienced by different packets.

- **Packet loss** is the percentage of packets that don't make it from their point of origin to their destination.
- **Packet reordering** refers to packets arriving at their destination out of sequence.

Each of the different types of network traffic (voice, data and video) that a converged network carries has very different attributes.

Voice traffic, for example, is intolerant of network impairments, because sound quality is dependent upon packets moving across the network in real time. Human hearing readily notices any irregularities in this stream of sound.

On the other hand, digitized voice traffic can be compressed so that each individual conversation consumes relatively little network bandwidth. Voice conversations tend to require uniform amounts of bandwidth, making bandwidth needs relatively predictable.

In marked contrast, data traffic tends to tolerate impairments, because most data applications are designed to deal with moderate amounts of jitter and latency. A web page, for example, may load a little slower if there is extra latency on the network, but it will still load.

Data traffic is also variable in the amount of bandwidth it utilizes. Simple e-mail messages, for example, consume little bandwidth. On the other hand, sending all the data from a server to a backup device will consume a lot of bandwidth.

As for video traffic, its real-time nature makes it intolerant of impairments. The human eye is very sensitive to irregularities in an image. Unlike voice, however, video streams consume a tremendous amount of network bandwidth.

What this means is that networks that are perfectly capable of supporting non-real-time data traffic may not be capable of supporting voice and video traffic.

When an organization introduces multiple streams of data, voice and video traffic to a shared IP network, these different streams must compete for the same limited network bandwidth. Some of them may not get the bandwidth they need.

A sudden influx of bandwidth-intensive video traffic, for example, can crowd out the voice traffic on the network, making phone calls difficult to understand. In the same way, a massive data backup can impinge on a network's video traffic, undermining the image quality of a video conferencing session.

Prep Steps for Convergence

There are several steps that organizations can take to ensure that their converged networks are capable of supporting all the media types associated with UC.

Assess network capacity and utilization. Obtain a baseline of current utilization of the network's bandwidth. A data network operating at or close to capacity will require some upgrades before it can handle the demands of voice and video. Generally speaking, capacity issues will show up on WAN connections between locations, rather than on LANs within individual facilities, because LANs typically have plenty of bandwidth to spare.

Periods of peak network utilization can be of particular concern when it comes to ensuring voice and video quality. Organizations tend to consume much more of their available network capacity during times of intense activity, such as the end of the month or the beginning of program enrollments. Converged networks must be able to handle these period spikes in traffic without excessive impairment.

Evaluate network performance. In addition to baselining utilization, IT departments should review current performance metrics such as jitter and latency. Organizations will need latency of 80 milliseconds or less to truly match the voice quality of the public landline network, though latencies of 160 ms can be tolerated without excessive degradation of voice quality.

Jitter on the network should not exceed 30 ms. Many VoIP and Video over IP solutions include capabilities such as buffering that help improve tolerances for these network performance issues.

Deploy Quality of Service (QoS). Don't address performance issues over the WAN and the LAN with bandwidth alone. Additional WAN bandwidth can be expensive, and applications can behave in ways that grab as much bandwidth as is available.

Implementing QoS mechanisms allows application traffic to be appropriately prioritized. This way, real-time voice and video streams can be given performance priority over more latency- and jitter-tolerant data applications.

Reserve bandwidth. QoS ensures that traffic is appropriately prioritized. However, IT staff will want to ensure that prioritized applications don't crowd other applications off the network. Bandwidth reservation mechanisms allow network managers to allocate a specified percentage of available capacity to particular applications, thus ensuring consistent performance for all essential network services.

Implement virtual LANs (VLANs). Segregating voice, data and video traffic onto separate VLANs can optimize quality by creating distinct logical connections between endpoints over shared physical wiring. VLANs also provide an added measure of security by allowing different access rules to be applied to different endpoints and types of traffic.

Manage network address translation issues. Many organizations secure their networks with firewalls that use network address translation (NAT). NAT protects networks by concealing internal IP addresses from the outside world, instead providing proxy addresses for external data connection.

Unfortunately, these proxy addresses pose problems when attempting to establish real-time IP connections for voice and video between internal and external endpoints. Advance planning will help IT staff work around NAT-related issues.

Build in network redundancy. Once the IP network starts carrying voice traffic, the tolerance for outages on the network will approach zero. Design the network to be as resilient as possible against the failure of any particular component or device.

This can often be accomplished by making the right addition to the configuration of the network; it may also require adding more redundant network devices. Some VoIP devices further protect essential voice traffic by detecting when conditions on a particular network link are not conducive to voice quality, and then automatically switching VoIP traffic over an alternative route.

Add an uninterruptible power supply (UPS). UPS devices can protect critical network services from potential failure by ensuring that switches and other components continue to function even in the event of a power outage.

MAINTAINING VOIP SECURITY

Voice over IP (VoIP) introduces a variety of new security vulnerabilities to the network. For example, an intruder could potentially eavesdrop or record voice communications 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 reevaluate existing network security measures and consider what additional steps should be taken to protect voice conversations and the converged environment as a whole.

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 an organization'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 Session Initiation Protocol (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.

Carefully consider codecs and compression. Sound and video are converted into digital signals capable of being transported over an IP network by codecs, which can differ significantly. Some codecs achieve greater efficiency through greater compression of the signal, but do so at the expense of quality. Others offer superior voice quality, while consuming more network bandwidth.

Compression can also be applied to data application traffic in order to conserve the capacity of WAN links. Decisions about codecs and compression are therefore crucial to ensuring both service levels and voice and video quality.

While technical metrics are a key consideration in implementing a converged network, subjective assessments are useful too. The subjective assessment of voice quality on a network is known as a Mean Opinion Score (MOS). These scores range from 1 to 5, with 5 being excellent ("imperceptible" impairment) and 1 being bad ("very annoying" impairment). Similar assessments, such as the Double Stimulus Impairment Scale (DSIS), have been formulated for video.

Subjective assessments should not be neglected when building a converged network, because the success of convergence ultimately depends on the satisfaction of the people using the network's applications.

Managing a Converged Network

Once an IT department builds and implements a converged IP network capable of supporting UC, it must maintain that network over time. The following are a few of the factors to consider to effectively manage a converged network.

Network monitoring: All networks require diligent monitoring of devices and links. But convergence makes it all the more important to maintain continuous operation of the network, because most organizations have near-zero tolerance for interruptions of voice services. Organizations will want to implement network management tools and best practices that rigorously safeguard service uptime.

Application-level management: Because of the particular sensitivities of real-time UC application traffic, it may not be sufficient to simply monitor the status of network links and devices. Complement conventional network monitoring capabilities with tools that provide visibility into the end-to-end behavior of data, voice and video applications. This will speed troubleshooting and help IT staff proactively avoid service disruptions.

Capacity planning: UC rollouts typically begin with limited early adoption that expands dramatically as users realize the benefits of multimedia communication and collaboration. This can lead to rapid, substantial growth in network traffic. To prevent this growth from compromising performance, network managers should track and anticipate utilization trends and proactively adjust the network to accommodate projected use.

Predeployment application testing: Because data-only networks are relatively tolerant of impairments, developers have become accustomed to building new applications without considering how they will impact the production network. Once real-time voice and video are added to the network, however, the risk associated with the deployment of bandwidth-hogging applications becomes greater.

Organizations with converged networks should encourage their developers to carefully consider the network impact of new applications, and assess that impact using some sort of test bed or network simulation before rolling out new applications to the production network.

In addition to keeping their network infrastructure running properly, organizations need to consider the limitations of the WAN connections they obtain from their network service providers. Most carriers have more than sufficient speed and capacity at the core of their networks to support high-quality voice and video, and most use protocols such as Multiprotocol Label Switching (MPLS) to ensure that real-time traffic gets the preferential treatment it needs.

But MPLS doesn't always extend from the core of the service provider's network to the last mile that connects that core to an organization's premises. IT managers should pay particular attention to how voice and video performance are affected by the limited bandwidth that may be available between their internal networks and their service provider's MPLS core.

Consideration should also be given to how utilization of that limited bandwidth increases over time as user behavior changes and new applications are introduced to the network.

It's important to make network monitoring, application testing and other activities as easy and convenient as possible for IT staff. If it takes too much time and effort to manage the converged network, ownership costs will rise and return on investment will be reduced. Organizations that devote excessive IT resources to network ownership also tend to lose some of their ability to innovate technologically.

Fortunately, the right solutions and proven best practices can minimize the burden of managing a converged network. As a result, organizations can reap all the benefits of convergence while still maintaining their ability to invest in other high-value technologies. ■

Communication and Collaboration

UC applications offer numerous capabilities to users.

Communication and collaboration are the cornerstones of productivity. When staff can quickly get in touch with each other, easily share important information and avoid redundant tasks, organizations 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, removing the obstacles that typically limit both individual productivity and team performance.

A simple example of this kind of UC application, the softphone, enables users to manage their phone activities from their PCs through software. Without a softphone, a user making a series of outbound calls has to read a list of phone numbers, dial those numbers manually and check them off one by one after each call is completed.

With a softphone, the PC does much of the work. The user simply clicks each number to dial it or has the PC run through the numbers automatically after each call. The PC can also automatically mark each call as completed. This saves time and eliminates manual errors.

But once data, voice and video are well integrated with each other on a fully converged infrastructure, the possibilities for UC applications are virtually limitless. For example, the latest version of a publication that a team is working on together could be automatically distributed to all members of the team, whether they are in the office at their PCs, at home on their notebooks or on the road with their smartphones.

Each member of the team can then provide feedback in the form of text, voice annotations or markups to the file itself. The project manager can immediately review that feedback, forward it along to the production team and launch a quick virtual face-to-face meeting with the production manager to ensure that the instructions for the next iteration of the project are perfectly clear.

The result: The project is completed more quickly with less effort and produces a higher-quality finished product.

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 an organization. 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."

This capability accomplishes several things. First, it allows UC applications to connect users to the rest of the organization regardless of their current location, empowering them to stay fully productive wherever they are.

Second, it lets other people know whether or not a user is available for immediate collaboration, and if not, when he or she may be available. This eliminates the phone tag and guessing that slows down communication within an organization.

If the time is 12:45 p.m. and a user's away message says that the user will be busy until 1:00 p.m., other team members have an approximate idea of when they can get real-time answers from that user. On the other hand, if the away message says that the user won't be back in the office until the next day, other team members will know immediately that they may need to turn to another staffer to resolve their problem.

Presence can be combined with other data to further facilitate workflows. For example, users can have areas of expertise associated with their directory listing. So if someone has a question about topic A, a UC application can automatically look for any staffer with expertise on topic A who is currently available. This helps ensure that people inside and outside the organization get accurate answers to their questions as quickly and efficiently as possible.

Presence can even provide value simply by letting people in the organization know whether a given user is around. For example, if a user has been ill or on vacation, presence lets others know at a glance that the user has returned to work.

By decreasing workflow interruptions, minimizing phone tag and ensuring that users are easily reachable regardless of their current location, presence enhances the functionality of all UC applications and significantly enhances both individual and team productivity.

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 public and private organizations 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. If so, the user can type a message to that person, automatically opening a chat window on both users' devices. After a quick exchange of typed messages, both users can return to the work at hand.

Chat is faster than e-mail because 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.

IM delivers value in other ways too. For example, a user can copy and paste a web URL into an IM. The recipient of the IM can then simply click on that URL to connect to the link. Many IM applications offer the ability to transfer files, launch a video session or open a shared interactive whiteboard.

Staff commonly use IM as a back channel during conference calls. For example, when a topic arises during such a call, two of the users may want to make sure they are on the same page before speaking to the group. Without IM, those users can only do so if they are in the same room and can scribble notes to each other. IM allows them to simply communicate with each other on their computers, without interrupting the flow of the conference call.

IM applications also typically allow users to maintain different buddy lists that they can organize according to a variety of criteria. Again, combined with the benefit of presence, these lists allow staff to quickly find anyone who is available in a particular department or location, eliminating the need to make multiple phone calls or send multirecipient e-mails.

The ease and immediacy of communication enabled by IM invariably makes it an indispensable productivity tool at most organizations as soon as it's deployed.

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 organizations, 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 Mobile Voice Access, for example, a user who is out of the office can transfer a call to any other extension on the organization's network right from a smartphone.

This is vastly more convenient than asking the person on the other end of the call to hang up, dial into the main office number, and then navigate the organization's phone directory. Mobile Voice Access lets users take advantage of office phone functions such as hold and conferencing.

The ability to tap into an organization's internal network creates other possibilities as well. For example, users can avoid additional phone charges by making out-of-network calls via the organization's network, rather than dialing them through their service provider.

With Mobile Voice Access, users can also seamlessly switch between their smartphones and their office phones in midcall — for instance, when a conference call starts to run long and a user needs to leave the office to head out to another appointment. It can also save minutes when users take calls on their way to the office and then switch to their office phone when they arrive at their desks.

These capabilities provide value beyond situations where users are out of the office. Increasingly, people use their smartphones even when they are at the location where they work — just not right at their desks. So whether they're walking down the

UC IN THE CLOUD

While organizations definitely should build a converged infrastructure and implement UC capabilities internally, they should also consider where and when it makes sense to supplement these internal capabilities by exploring UC offerings from cloud providers. There are numerous advantages associated with such cloud offerings.

Rapid time-to-benefit: It can take several months to test and deploy a new UC application. A cloud provider, on the other hand, may be able to activate UC capabilities within days or even hours.

Avoidance of capital costs: Internal deployment of new UC apps can require upfront spending on additional server, storage and network infrastructure. Cloud-based services allow organizations to avoid these expenditures.

Flexible scalability: Some large conferences may attract hundreds or even thousands of participants outside the organization. It may not pay for an organization to build the capacity necessary to support such events if they are only held infrequently. In these cases, it may make sense to tap a cloud provider's capacity on a temporary basis.

Platform support: The IT team may not have the internal expertise necessary to support the diversity of smartphone and tablet platforms in the marketplace. Cloud providers, on the other hand, may specialize in that type of diverse support. This is another instance in which tapping a cloud provider's capabilities makes sense.

Budget allocation: Sometimes a department or team has a need (and the budget) for a capability that internal IT cannot provide with its limited resources. The cloud allows these groups to purchase the capabilities they need directly, without disrupting the organization's existing infrastructure.

Again, in most cases the cloud should not be a substitute for well-planned, well-implemented network convergence. In fact, most UC cloud services require that the subscribing organization has convergence to the user's desktop. But when logistics and resources dictate, the cloud can be a useful supplement to internal UC capabilities.

hall or in the copy room, Mobile Voice Access provides users with fully functional equivalence to office phones.

Single Number Reach and Single Voicemail

Single number reach (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.

SNR provides value by eliminating a common, inefficient ritual: calling a user at an office number, leaving a voicemail, then trying a smartphone number and leaving a second voicemail. SNR can also significantly reduce smartphone minutes because, after going through the aforementioned ritual, many callers simply decide going forward to call a user's smartphone first. This can rack up a lot of wireless minutes unnecessarily for the message recipient.

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. It also minimizes the likelihood that an important message will be missed because it was left in the wrong place at the wrong time. Single voicemail can also help reduce wireless bills by reducing the number of minutes users spend checking their smartphone mailbox.

Unified Inbox

Organizations 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, users 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.

Unified inboxes also do away with the difficulties users sometimes encounter when trying to work with multiple communication media. For example, a unified inbox makes it easy for a user to forward a voicemail to another user as

an attachment to an e-mail. This spares the sender the trouble of typing out a description of what was said in the message and allows the recipient to hear the tone of voice in the message, which can be as important as its verbal content.

Unified inboxes do more than just save time and increase convenience. They can greatly improve the quality with which users communicate and the effectiveness with which they respond to critical situations.

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.

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.

UC applications enable workers to hold multimedia-rich meetings with participants in different locations. This substantially reduces costs by eliminating travel expenses such as airfare and hotel accommodations. It also improves user productivity by eliminating the downtime users experience when they're in the air (or recovering from jet lag).

By making it easier for people to attend meetings from anywhere at any time, UC conferencing and collaboration applications also help make those meetings happen sooner, rather than later, which means that important project milestones get accomplished more quickly.

Conferencing also improves the quality of collaboration. Instead of just describing something during a phone call, users can show things to conference participants via a browser window.

These visual tools help everyone communicate more clearly and accurately, reducing the chance of costly miscommunication. Participants can also quickly access and share content stored anywhere on the organization's network or on the Internet, making information dissemination much more efficient and reliable.

Virtual meetings are especially valuable when outside stakeholders must attend a presentation or participate in a collaborative effort. These people might not normally have the time or inclination to physically attend a meeting that requires travel on their part. But with UC, they can easily participate from their own office or from home.

UC-enabled collaboration also offers the ability to tap the expertise of individuals across multiple locations. Organizations often have subject-matter experts at one location, but not at others. By making it possible to put these experts virtually in the same room at any location, at any time, UC conferencing multiplies the value these individuals can deliver on a daily basis.

Advance Preparation

Organizations must take a variety of steps to take advantage of the diverse components of UC.

Check the network. As outlined in Chapter 2, a healthy converged network is foundational to UC success. Be sure that an appropriate level of performance can be delivered for voice and video, as well as data applications.

Evaluate and prioritize organizational requirements. Few organizations can afford to implement a complete state-of-the-art UC environment all at once. IT leaders should determine which UC capabilities would be of the greatest immediate benefit and focus on those first. UC advocates can use the success of initial unified communications implementations to make the business case for deploying additional capabilities.

Don't ignore training. A common mistake is to deploy UC applications and assume users will take advantage of them. But the users who will benefit most from UC are not necessarily those who are most comfortable with technology. To raise the comfort level of these users, provide sufficient training.

Promote adoption. Along with training, the IT group should encourage staff to maximize their use of new UC applications. This can be done through newsletters, recognition of exceptional users and the inclusion of UC use as a criteria in performance reviews. Organizations can also encourage adoption by tying UC use to themes such as environmental awareness and green IT.

Consider archiving and compliance. Organizations must formulate and implement policies for archiving their growing volume of UC-related content (especially IM), just as they did with e-mail a decade ago. These policies should align with regulatory mandates for paper and electronic documents.

Adopt clear acceptable-use policies. UC applications such as IM and Mobile Voice Access can potentially be misused for harassment, hate speech and the like. Organizations should protect themselves from these potential abuses by creating, publishing and circulating well-defined use policies.

UC communication and collaboration offer tremendous benefits to organizations under pressure to do more with less. Implementing these applications in a well-disciplined manner can result in reaping the benefits while avoiding common pitfalls. ■

The Contact Center

UC provides many opportunities for maximizing contact center processes.

For organizations that offer services or information, overall performance is closely tied to the performance of the contact center. After all, the contact center is where an organization interfaces with the people it serves. So, if the contact center doesn't work well, it won't serve those people very well.

When it comes to optimizing the efficiency and effectiveness of the contact center, UC really shines. By bringing greater intelligence and flexibility to communication with people outside the organization, across all communication channels, UC can bring about dramatic improvements in productivity and quality of service, ultimately enabling an organization to better fulfill its overall goals.

The contact center offers many UC capabilities.

Screen Pops

Computer-telephony integration allows UC applications to associate the originating phone number of an incoming call with a customer record from the database. This lets the application instantly populate a contact center agent's computer screen with that customer's current information.

This empowers agents to start handling calls right away, without first having to ask customers a lot of questions or having them wait as agents key in a record search manually and pull up the corresponding data.

Skills-based Call Routing

UC applications can help organizations better serve their callers by making optimum use of each contact center agent's particular skill set. This is accomplished using a combination of interactive voice response (IVR), a skills database and presence detection.

When callers dial into the call center, they can be prompted by the IVR system to enter a number corresponding to the nature of their current concern. The UC application can then direct the call to the next available agent who has skills corresponding to that issue.

In addition to ensuring that callers

get the best possible service, skills-based routing lets organizations make the best use of the personnel who are available (determined via presence) in the contact center at any given moment. Organizations can't always be sure of having the same people with the same skill sets staffing the contact center on any given day. With skills-based routing, calls can be dynamically assigned to whoever is staffing the phones on any given shift.

Voice and Web Self-service

Using a combination of capabilities such as IVR, speech recognition and speech synthesis, UC applications can automate routine contact center tasks such as payment processing and retrieving account balances. Callers can be prompted to enter numeric information with their phone's keypad or provide spoken responses.

These same capabilities can be provided on the organization's website to further reduce contact center workloads and provide a better customer experience.

Routine questions can be answered on the phone or on the web by building a knowledge base of frequently asked questions (FAQs). Callers can search this knowledge base by typing their question in plain language or by saying it on the phone. This technique can be especially effective for organizations that get a large number of similar questions.

Self-service can also help keep the contact center from being inundated with a large number of similar questions resulting from seasonal needs (such as enrollment periods and tax deadlines) or emergencies and crisis situations (such as natural or human-caused disasters).

During these times of peak volume, a relevant special announcement can be set up on the phone system and on the home page of the website to preempt the need for an actual interaction with a contact center agent.

Remote Agent Desktops

Many organizations are making greater use of home-based contact center agents. Some do so because it costs less to hire home-based agents as contractors than it does

to hire in-house staff. Others give agents the option to work at home in order to retain their best staff by offering them a higher quality of life or because they are single parents with children to care for.

Regardless of why an organization chooses to do so, UC can facilitate the routing of calls to home-based agents by using technology similar to single number reach and Mobile Voice Access. Calls can be routed to remote agents based on their skills and availability, just as if they were physically situated in the contact center.

Multichannel Interaction

It is becoming increasingly common for people to contact organizations via different communication channels at different times for different reasons. For example, a person may at first ask a question via e-mail; then, if he or she doesn't get a satisfactory reply, follow up with a phone call.

At many organizations, these different communication channels are poorly integrated. One application is used to track voice calls. Another application is used to manage e-mail correspondence. And still another may be used for live chats on the organization's website.

This siloed approach to multichannel interaction can lead to poor service and operational inefficiencies. A contact center agent who can't quickly and easily see all previous relevant interactions across all communication channels may start asking redundant questions that waste time and frustrate the end user with the problem.

UC offers a better solution by managing e-mail messages, call records, chat exchanges, faxes and even written correspondence in a common manner. As with the unified inbox, unified customer communication records make it easier for contact center agents to quickly view all relevant information without toggling between applications (and possibly missing a key piece of information).

From the customer's perspective, fluid movement between communication channels also makes sense. For example, UC applications can enable implementation of a "click for a call" button on an organization's website. This type of website feature allows site visitors who can't find what they're looking for to request a call from a contact center agent. This call request can then be routed to an agent in much the same manner as a live inbound call would be.

CONTACT CENTER METRICS

By allowing all customer interactions to be managed in a common, trackable manner, UC applications can give contact center managers rich insight into how to improve both efficiency and effectiveness.

The same mechanisms that enable skills-based routing, for example, also allow contact center managers to see how well specific agents are handling calls or e-mail messages related to those skills.

Of course, managers can't judge how well an agent has handled a particular interaction simply based on how quickly a call was closed. Those managers must also take into account how satisfied the customer was with the service received. UC applications can be programmed to automatically send out post-interaction surveys to gauge that satisfaction, asking just a few brief questions after every tenth or twentieth interaction.

Incident records can also be enhanced with emotion ratings. These ratings can be useful in differentiating trivial problems that affect a lot of people from problems that affect fewer people but are more serious.

The insights that contact center managers get can also be very useful for the rest of the organization. If a large volume of contact center interactions relate to a particular service an organization offers, then it would be helpful to let the right people know that something about that service is generating a lot of confusion or complaints. This helps organizations to continuously improve their services.

By quantifying the amount of money the organization has to spend every month to answer questions or handle complaints about the service, a contact center manager can actually help other managers determine just how worthwhile it would be financially to make changes to the service.

Contact Center Software

At the heart of a UC-enabled contact center is software for managing and monitoring the environment using the following administrative functions:

- **Defining the rules for call routing:** Such rules may include skills-based routing and the prioritization of concerns. They may also involve routing and prioritizing calls based on the caller's profile.
- **Resource allocation:** This function helps managers ensure that the right number and type of agents are available to handle various types of incoming calls and e-mail messages as necessary to maintain desired service levels.
- **Agent desktop management:** Contact center software allows organizations to design the screens that agents use as they handle phone calls, e-mail messages and chats. This typically includes integration with other systems in the organization, such as databases and transaction processing systems.

Monitoring functions include the real-time tracking of wait time, queues and agent workloads. A monitoring dashboard usually features alerts that notify managers if conditions in the contact center are threatening the ability to deliver desired service levels.

Planning for a Contact Center

There are a variety of steps organizations need to take to ensure that they are getting the maximum benefit from UC applications in the contact center.

Inventory workloads by topic. Before implementing a UC contact center environment, it's wise to get a good handle on exactly what kinds of information callers need. Are there specific concerns that generate most of the call and e-mail volume? Can answers to these issues be provided in an automated way? Or can the concern itself be eliminated by improving some aspect of the organization itself?

Understand communication behavior. Organizations should also take stock of how customers communicate. If there is a FAQs page on the website, do they use it? What percentage of the contact center workload takes place on the phone?

It is obviously more expensive for a contact center agent to handle a phone call than it is for a customer to find answers on a website or via voice self-service, so IT managers should look for ways to direct more people to those less expensive channels.

Beware of information overload. When implementing screen pops, it's tempting to populate the agent's desktop with as much information as possible. But this can be a mistake, because the more nonrelevant information agents have on their screens, the harder it is to find the relevant information.

A better approach is to determine what kind of information agents typically need to answer calls, limit the initial pop to that information, and then make sure it's easy for agents to navigate to any additional information. Better yet, if there is a way to identify what information an agent will need for any given caller based on that caller's profile, an optimized initial pop can be created for each identifiable type of call.

Make escalation easy. While call center best practices encourage people to use web and voice self-service, don't make self-service a dead end. Anyone using self-service should be able to quickly and easily escalate their request to a call center agent via chat, phone or e-mail. If they can't, they will become frustrated and be less likely to use self-service in the future. Any easy escalation path away from self-service ultimately helps promote greater long-term use of self-service.

Voice quality can be even more critical in the contact center than it is in the rest of the organization. So, as with other UC implementations, contact center infrastructure needs to support multimedia communications. Additional training for contact center agents may also be necessary, because the ability to communicate well over the phone does not guarantee a similar ability to communicate well in a written medium such as chat. ■

Video Conferencing

Enhancing visual communication improves collaboration and reduces travel-related expenses for organizations.

Video conferencing aids people in communicating and collaborating across an organization despite the physical distance that may lie between them. A substantial portion of human communication is visual, communicated by our facial expressions, hand gestures and body language. By supplementing our verbal communication with these visual signifiers, video conferencing greatly enhances communication between individuals and among teams.

Video conferencing can take many forms. At its simplest, UC conferencing entails the use of a basic webcam to record the streaming image of a user's face to a recipient with whom they are having a voice conversation. If there are multiple participants in the conversation, their faces can be tiled in a display on each other's screens.

This rudimentary use of video conferencing yields significant gains in communication quality because people's facial expressions convey meaning and nuance.

A step up is video conferencing that uses high-resolution cameras and video displays (typically in dedicated conference rooms) to deliver a much richer multimedia experience and potentially accommodate more participants.

True telepresence is the most sophisticated form of video conferencing. With telepresence, conference participants are visible to each other on high-resolution, life-size displays. They are also seated in rooms with closely matched décor and lighting, which helps provide the sensation that participants are all actually physically present with each other.

The orientation of the cameras, which maintains the same perspective as the person would have if they were, in fact, seated across the table from the other participants, further enhances this effect.

Telepresence systems typically provide a complete, turnkey solution that fully integrates all of the components necessary for high-end teleconferencing. This reduces

the need for IT involvement each time a conference is scheduled.

Other UC conferencing capabilities, including shared visual content such as PowerPoint presentations, interactive whiteboards and shared PC screen displays, can be used to supplement video conferencing.

The Benefits of Video Conferencing

A variety of benefits make video conferencing increasingly attractive to organizations under pressure to do more with less, a list of which follows.

Improved collaboration: By enabling people to communicate more effectively with each other, video conferencing helps to improve critical collaborative processes.

Video conferencing also helps geographically dispersed teams build more cohesive relationships, which can lead to better decision-making. This benefit can be especially important to organizations with multiple branch offices that are located a significant distance from headquarters.

Reduced travel costs and downtime: Travel can be extremely expensive, especially if multiple people have to fly to a meeting location and stay at a hotel. Despite advances in mobility, travel also results in lost productivity because people are out of touch while they're in the air or on the road. By greatly reducing the need for travel, video conferencing drives down these costs and recaptures that lost productivity.

Reduced carbon footprint: By reducing travel requirements, video conferencing also helps organizations achieve quantifiable reductions in their carbon footprint. This is especially meaningful for organizations engaged in green initiatives by choice or by external mandate.

Flexibility and convenience: It can be extremely difficult for multiple busy people with numerous pressing responsibilities to find a time when they can all be in the same place at the same time. By allowing these people to meet with each other from their offices or a conveniently located conference room, video conferencing eliminates a significant barrier to timely, effective collaboration, thereby accelerating important work processes.

Support for flextime: Many organizations are trying to attract and retain top-tier talent by offering staff the opportunity to work from home. Video conferencing supports these flextime initiatives, mitigating the downside of having workers out of the office during the workweek.

Conferencing Components

Although rudimentary video conferencing can be set up using a basic PC webcam and a simple IM application, a typical business-class video conferencing solution will include the following components:

- **Software:** This component is needed for authenticating users, managing the video images and displaying other visual content (such as a shared PC screen).
- **Cameras:** Theses devices can vary significantly in terms of resolution, supported UC protocols and capabilities such as pan, tilt and zoom.
- **Microphones:** These devices can vary in terms of pickup range, sound quality and supported VoIP codecs.
- **Display screens:** These components can vary in terms of size, image resolution and the ability to show split screens.
- **Additional A/V equipment:** Other technologies, such as projectors and DVD players, can be used to enhance conferences with additional visual content.
- **Power protection:** Often overlooked, organizations will want to safeguard valuable video conferencing equipment from brownouts, spikes and surges.

Planning for Video Conferencing

To properly provision its video conferencing implementation, an organization should have a baseline of its current meeting schedule. This baseline should include the number of meetings that involve participants who have to travel to attend, and the costs typically associated with that travel.

Planners should also poll managers across the organization to get some idea of how much additional use the video conferencing system is likely to experience once users no longer have to travel to conduct their meetings.

This projected meeting volume and replaced costs will help guide a decision regarding the budget for the system. Planners should also consider user expectations regarding the quality of the video conferencing experience. The number of locations housing video conferencing gear is also a factor in determining the type of equipment that can be purchased within the budget.

In some cases, the video conferencing system already in use by associated or partner organizations may influence a purchase decision. The interoperability of those systems

will provide still another way to get value out of the technology investment.

Once a decision about video quality has been reached, IT managers must ensure that the network is capable of supporting the projected video stream. Telepresence systems, for example, consume much more bandwidth than low-end room systems.

Tests should be conducted on the network to confirm that it can deliver the requisite performance before IT staff purchase and install the system. If the network in its current state cannot deliver the necessary video quality, network technicians can try to resolve the issue by adjusting functional parameters such as QoS settings and bandwidth reservation.

Prepurchase testing of a prospective video conferencing system on the network also affords an opportunity to determine whether the system will run into any issues with firewalls and network address translation.

Another key functional issue that is best tested under live conditions before purchase is echo cancellation. Sounds coming out of the speakers from a remote location can be picked up by the microphone in a video conferencing environment and sent back to that remote location, creating an unacceptable echo or even the howl of feedback. Echo cancellation software prevents this phenomenon from ruining the conference experience.

The rooms that will be used for video conferencing should be carefully evaluated. Lighting and acoustics can have a significant impact on the quality of the conference experience, as can ambient noise: the potential intrusion of sounds from outside sources such as the conferencing equipment or emergency vehicles.

Software features and functions are another decision point. Some software solutions are relatively straightforward and simply deliver good video quality. Others offer all kinds of value-added features, such as the ability to poll conference participants.

It's best to choose the software solution that offers the right set of features from the start, rather than make a change after the system is implemented.

The software will also manage the encryption of conference streams, so buyers need to confirm that encryption key strength meets their requirements based on their organization's general security policies and the sensitivity of the content they are planning to share via video conferencing.

The cost and availability of technical support can also affect buying decisions. Organizations that are contemplating buying multiple components from multiple manufacturers should be prepared to address any interoperability problems that may arise.

Another factor to keep in mind: Different manufacturers upgrade their software and firmware according to different schedules. Video conferencing system owners have to exercise caution to avoid creating interoperability problems where none may have existed before.

As with other UC applications, adoption of video conferencing across the organization may have to be encouraged at the start if users lack first-hand experience with the technology. One way to do this is to have everyone spend a few minutes using the system to talk to peers in other offices. Once users experience video conferencing for themselves, their enthusiasm for the technology usually rises quickly.

This enthusiasm can create a new challenge: how to allocate and schedule access to the system. But this is a good problem, because it means that users are working more closely with their peers in other locations — and are doing it without racking up travel costs. ■

VIRTUAL LEARNING

As web access becomes nearly ubiquitous, virtual learning has grown in popularity. For educational institutions, virtual learning offers the opportunity to generate new revenue streams and extend market reach.

For government agencies and other public-sector organizations, it provides the ability to instruct the general public in critical skills, ensure accurate understanding of regulatory mandates and help individuals prepare for certification.

Virtual learning can take a variety of forms. Synchronous virtual learning is most closely related to video conferencing because it takes place in real time, allowing remote attendees to interact with instructors via VoIP or instant messaging (IM).

Synchronous virtual learning does not require attendees to have anything more than a PC. Video images can be received as normal Internet streaming media, and IM can be provided as part of the site or by any of the popular Internet IM services.

Organizations can also use the synchronous virtual learning model to make public announcements or hold other types of special online events.

Synchronous virtual learning sessions are usually larger in scale than a typical video conference, so they often require capacity that is beyond an organization's own infrastructure capabilities. That's why in many cases it can be beneficial to use a service provider to host streaming video.

With asynchronous distance learning, attendees access archived content at their convenience. This content does not, by definition, have to include any video. In fact, it can be as simple as basic HTML web pages. But it does require at least some kind of interaction with an instructor, typically in the form of e-mail.

To facilitate interaction between students and instructors in both synchronous and asynchronous environments, organizations can take advantage of UC capabilities such as single number reach, single voicemail and IM. These tools can make it much easier for instructors to respond to questions from students about content, assignments and other issues.

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 term refers to a network traffic management technique that allocates a fixed amount of available transport capacity to a specific application or class of applications to prevent it from contending with other applications for capacity.

Call control

A set of telephony functions, call control manages the behavior of voice connections on the network. It includes call routing, call forwarding and placing a call on hold.

Codec

A codec program codes and decodes a data stream from one form to another and back again. In the case of UC, the codec converts analog voice or video signals into digital packet payloads that can be transported over IP networks.

Computer telephony integration (CTI)

CTI represents a class of technologies that allow data applications to monitor and manage telecom functions such as call routing and queuing.

Double Stimulus Impairment Scale (DSIS)

DSIS is a subjective means of assessing video quality by comparing an unimpaired image stream with one that is impaired by a network.

Impairments

Impairments refer to the impact of any given network's functional characteristics on a data stream, including latency, jitter and dropped packets.

Instant messaging (IM)

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

Internet Protocol (IP)

IP is a popular protocol that

relays data packets from a source host to a destination host across one or more networks.

Local area network (LAN)

A LAN is the physical and logical infrastructure that transports signals within a building, campus or other restricted geographical area.

Mean opinion score (MOS)

A five-point scale, MOS measures the perceived audio quality of a voice connection.

Multiprotocol Label Switching (MPLS)

MPLS is a mechanism that enables high-performance networks to expedite the transport of packets between distant nodes.

Network address translation (NAT)

A security protocol frequently used in firewalls, NAT conceals an internal network's address structure from outsiders by replacing the IP addresses of an originating node in packet headers with fake ones.

Packet

A packet is a group of bits that carries data, voice or video across an IP-based network. It consists of a header (which identifies the packet for routing, security and processing purposes) and a payload (the actual piece of data, digitized sound or digitized image being transported).

Presence

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

Public branch exchange (PBX)

A PBX device 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 mechanisms give different applications, users or data flows different priorities in order to achieve a specified level of performance on a network and avoid bandwidth contention.

Session Initiation Protocol (SIP)

SIP is an industry-standard signaling protocol for managing multimedia communication sessions on IP networks.

Short Message Service (SMS)

SMS is the text communication service used by mobile devices.

Unified communications (UC)

UC integrates real-time communication services such as IM and VoIP with non-real-time communication services such as e-mail and SMS.

Uniform Resource Locator (URL)

URL addresses identify resources available on the web. URLs typically have a format such as http://www.domainname.com/resourcename.filetype.

Uninterruptible power supply (UPS)

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

Virtual LAN (VLAN)

A VLAN logically groups network resources to mimic a dedicated physical connection between them.

Voice over IP (VoIP)

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

Whiteboard

Interactive whiteboards allow users to collaboratively make annotations and alterations on a shared display screen, which can start off blank or with some initial image, such as a document or diagram.

Wide area network (WAN)

A WAN is the physical and logical infrastructure that transports signals across larger geographical areas, including between LANs.

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LOOK INSIDE FOR MORE INFORMATION ON:

- Making the most of UC's collaboration applications
- Optimizing contact center call routing
- Preparing the network for video conferencing
- Managing a converged network