IP COMMUNICATIONS SOLUTIONS

for Today’s Business Challenges
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Enabling anytime, anywhere business communications

To achieve success in life and in business, people need to understand one another. Everyone has wrestled with misunderstandings and differing interpretations. There is no way around it: interpersonal communication is challenging, and the globalization of business makes it more so. As project teams become more geographically dispersed, they need technologies that facilitate effective collaboration. These technologies should break down distance barriers, overcoming traditional limitations with new ways to share information and enhance discussions, ultimately leading to better decisions and business growth. That’s why businesses need IP communications.

IP communications encompasses IP telephony, video telephony, unified messaging and voice mail, IP video- and audio-conferencing, customer contact solutions, voice gateways and applications, security solutions, and network management. It exemplifies the systemic approach inherent in intelligent networking. “Where the network has always provided connectivity, now it also solves business problems,” says Rob Redford, vice president of Product and Technology Marketing at Cisco. “With intelligent networking, the network, applications, and other components interact in a systemic way—the right function finds the right place in the system. This systemic approach is less complex, application-aware, and secure.”

Industry analysts and vendors alike agree that network convergence using IP technologies is inevitable, yet conversions occur only when there is a strong business case for them. According to META Group research, the business case for IP communications must prove operational cost savings, end user productivity gains, capital expenditure savings over private branch exchange (PBX) replacement, and a competitive advantage through new capabilities. According to findings from “Enterprise Convergence 2003: Issues and Trends, a META Group Multi-Client Study” (January 2004), some businesses wait for current PBX contracts to expire. Others deploy it in new facilities or branch offices. Still others—especially small and midsized businesses—will only converge as IP Centrex services become available from service providers.

What Enterprises Want
A technology solution proves itself with a “killer” application—the thing that no one can live without. This application differs widely with IP communications depending on the nature of the business, according to Elizabeth Ussher, vice president of technology research at META Group. “The killer app is what is most useful to the customer, and that varies by vertical market and even by department,” she says. For example, a human resources professional might use video telephony to help manage personnel issues, while a customer support desk might need flexible automatic call distribution (ACD) capabilities, and sales people might need access to their e-mail via the telephone. Fortunately, the horizontal nature of IP communications allows deployment of not one but many killer applications, such as enterprise-wide employee communications deployed on IP phones, integrated access to data from enterprise business applications such as customer relationship management (CRM) or workforce management solutions, or Extensible Markup Language (XML)-based applications customized for a specific department or use in a vertical-market segment (for more on XML-based applications, see page 13).
META Group research indicates that the number one application driving network convergence is conferencing. Other popular drivers are IP phone-based productivity applications such as integrated directories or local transit schedules, remote user access to mission-critical applications, user mobility, and networked voice mail. META Group’s January 2004 multi-client study shows that these applications should come from a technology leader that reduces risks associated with convergence, provides high-quality service, reacts to changing customer needs, and helps enterprises target and address their own customers more effectively.

“The enterprises that most successfully adopt IP communications are those with a solution-oriented corporate culture,” says Ussher. “But first they have to converge their data and telephony groups.” The converged staff should cross-train so that data people acquire telephony skills, and telecom people learn IP. And despite dire predictions several years ago, network convergence does not equal job loss. “I’ve never seen a client fire any telecom staff after converging their voice and data networks. Voice people are not going away,” observes Ussher. “In fact, as they increase their skill sets, they command higher compensation.”

Cisco has been a leader in the drive toward network convergence, starting with its 1998 acquisition of Selsius Systems and its IP telephony system. The recent acquisition of Latitude brings critical Web and audio-conferencing technology to the Cisco portfolio. And the latest innovation, Cisco VT Advantage, adds video telephony to the mix.

**Video Telephony**

The first video telephone was introduced at the World’s Fair in 1964. “It was an interesting concept, many years ahead of its time,” says Rick Moran, vice president of Product Technology Marketing for IP Communications at Cisco. Video telephony has had a hopeful and stormy history, because vendors were unable to solve critical problems of economics, bandwidth, and ease of use. “I believe our implementation is different, because it is cheaper, it is part of the phone call, and it doesn’t require any special gear. You are really off to the races,” says Moran.

Traditional videoconferencing and corporate television have been cost-prohibitive for widespread business use. Cisco’s solution is an extension of an existing IP communications infrastructure, and the video telephony component itself is attractively priced, making it economically available to more users.

Traditional video bandwidth, like traditional videoconferencing, is expensive, which limits deployment of in-house television networks and videoconferencing systems. Ethernet is far less expensive than television coax or leased lines, and the cost continues to drop. Enterprises can afford to install enough bandwidth to reach every user. For branch offices and teleworkers, the cost of broadband services has put video telephony within reach. Picture quality does not suffer. Video compression techniques assure smooth, natural motion over broadband links.

Also, traditional videoconferencing gear is notoriously difficult to use, often requiring dedicated staff to operate it. Cisco’s new video telephony solution—Cisco VT Advantage—integrates a Cisco IP Phone with an associated PC to deliver a rich-media video tele-
phony experience. Once the requisite Cisco CallManager functionality is in place, users simply plug the Cisco VT Camera into their computers, install a small PC application, and obtain permission from the Cisco CallManager administrator to transmit video over the network. When a call is placed, the IP phone automatically detects another video-enabled phone at the other end and makes the video option available. “If you don’t want video, you can suppress it,” says Moran. “You have a ‘bad hair day’ button.” (For more on Cisco’s video telephony solution, see “The Video Advantage”, page 19.)

With the economic and technology issues of video telephony solved, do enterprises really need it? “It has serious business benefits,” says Moran. “We have had a lot of discussion about the impact of video telephony on corporate culture. Will it replace face-to-face meetings? Absolutely not. Is it a great augmentation to voice? Absolutely. It changes the tenor of a conversation and builds bonds between people. If you’re looking at the person you’re talking to, you have to give the conversation your undivided attention. You can’t be composing e-mail or playing solitaire. Body cues help you guess how people are responding to your messages, and you can modify your delivery.”

Corporate users spend about half their time in conference calls, and the Cisco video telephony solution supports multipoint conferencing capabilities for any combination of video-enabled and voice-only users. Video automatically switches to the speaker during conferences. Users require minimal training, because conferencing is transparently embedded into the Cisco IP communications infrastructure and is available on a scheduled or ad-hoc basis through the telephone interface. All of Cisco’s IP communications solutions offer productivity, mobility, and resilience features designed to enhance communications among employees, customers, vendors, and partners. Cisco’s IP communications portfolio includes enhancements that tie the network and applications into systems that solve customer problems. The most notable enhancements tighten communications security and improve user productivity. They include Cisco CallManager version 4.0, Cisco Security Agent for IP Communications, and Cisco MeetingPlace 8106 Rich-Media Conferencing Server.

**Cisco CallManager Version 4.0**

Among its many enhancements and new features, Cisco CallManager 4.0 enables video telephony and enhances voice security. It provides secure connectivity with media encryption (initially supported in the Cisco IP Phone 7970G with future extension to other endstation platforms) and signaling encryption. When media encryption is active, the IP phone displays a small icon to confirm secure call status.

The 128-bit Advanced Encryption Standard (AES) media encryption is implemented via the Secure Real Time Protocol (SRTP), a standards-based extension to the protocol that transmits voice in IP telephony environments. Because the latency introduced by SRTP is so small, “adding encryption has no detectable impact on call quality—users can’t tell the difference,” says Roger Farnsworth, senior manager in the Product and Technology Marketing Organization at Cisco.

Placing an encrypted call is easy and secure with new trust and identity management features. Where some vendor phones require manual encryption authentication that can be spoofed, Cisco CallManager 4.0 and many Cisco IP phones now include support for an
X.509 version 3 digital certificate, which embeds the encryption key to automate the call encryption process. The solution also supports third-party certificate authorities, protecting existing investments. “With the trust afforded by digital certificates, you have absolute certainty that you’re talking to the correct person,” says Farnsworth. “So encryption is not only cool, it becomes useful.” What’s more, encryption and secure key exchange enables the software images in the IP phones to be signed and verified using the Message Digest 5 (MD5) Secure Hashing Algorithm (SHA), certifying the legitimacy of the image. On top of that, when in secure mode, the signaling used in the IP telephony system can be encrypted through the use of Transport Layer Security (TLS), or Secure Sockets Layer (SSL) version 3.0, thereby preventing man-in-the-middle attacks from compromising system integrity.

Cisco Security Agent
Cisco CallManager 4.0 provides improved threat defense with an embedded version of Cisco Security Agent for IP Communications included at no additional cost, which contributes to the vision of the Cisco Self-Defending Network by adding anomaly-based intrusion protection and policy control to the IP communications infrastructure. (For more on the Self-Defending Network, see Packet® First Quarter 2004, cisco.com/packet.) Cisco Security Agent is now also included with such Cisco IP communications applications as Cisco Unity™ and IP Contact Center.

Cisco MeetingPlace 8106
The new Cisco MeetingPlace 8106 conferencing system integrates secure multimedia conferencing with enterprise groupware applications. Conferencing capabilities support both ad-hoc and scheduled voice, video, and Web conferencing. It enhances user productivity through integration with existing applications such as Microsoft Outlook and IBM Lotus Notes. It can also interact with Microsoft NetMeeting, Lotus Sametime, or an intuitive Cisco MeetingPlace Web conferencing application for sharing presentations, applications, or desktops. Participants can “upgrade” a conference in progress to include another person or show everyone a document.

“Cisco is redefining voice as another application on the network,” says Moran. “As an application, voice should seamlessly integrate with other applications and pass information back and forth.” This integration is intuitive and requires minimal user training. For example, a user can book a Cisco MeetingPlace conference through the Cisco IP Phone, and then find it later on the Outlook calendar on the PC desktop. Conversely, she can book a conference through Outlook and it automatically communicates with Cisco MeetingPlace to reserve the conference. Later, she can look up the reservation using the IP phone interface, and then initiate the call.

More IP Communications Solutions
The Cisco IP communications solution also includes voice gateways, unified messaging, IP-based contact centers, and management tools. Most Cisco switches and routers can become a voice gateway with the addition of a module or software, allowing ubiquitous deployment of IP communications systems throughout enterprise campuses, full-service
branch offices, and teleworker locations. Specialized gateways provide protocol translation between legacy audio and video equipment and the primary IP communications infrastructure.

While unified messaging has been available for more than a decade, customer adoption has been slow. “The challenge was that it was difficult to implement. That’s not true any more,” says Moran. Enhancements to Cisco Unity unified messaging simplify deployment and management. More enterprises are using the integration functions of Cisco Unity to support convenient message retrieval by increasingly mobile workforces. For example, people can now connect their laptop to a public network such as an airport lounge or coffee shop, establish a VPN connection to their corporate network, and download both e-mail and voice-mail messages.

Cisco offers IP-based contact center functionality through its Customer Interaction Network architecture, which includes Cisco IP Contact Center (IPCC) Enterprise Edition, Cisco IPCC Express Edition for companies that need an entry-level or midmarket contact center solution, and Cisco Internet Service Node (ISN), which offers Web-based interactive voice response (IVR), queuing, and IP switching services. While META Group notes that IP-based contact centers are not as important to enterprise IP communications strategies today as they were two years ago, Ussher suggests that IP-based systems are more cost-effective and flexible than their traditional counterparts, particularly for installations up to 75 agents.

For management, the CiscoWorks product line includes comprehensive network management tools that cover the full management lifecycle, from planning and design through implementation/deployment, operations, and maintenance. (For more information, see “Managing Your IP Communications Network”, page 14).

**Building Understanding**

IP communications offers tremendous potential for easing the logistical barriers of time zones and geographic dispersion between companies and their branch offices, teleworkers, customers, partners, and vendors. For example, it can enhance collaboration between design teams in the US and Europe, manufacturing in Asia, and sales and distribution centers worldwide. It simplifies the process of connecting with your customers, while enhancing the value of your interactions with rich-media sharing and video telephony. With such enormous potential for increasing productivity and sales through effective collaboration, can you afford to wait?

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IP communications is transforming business as usual in many industries. Wasn’t that Air Canada ticket counter a Lufthansa ticket counter earlier in the day? It could be so if you’re at Toronto Pearson International Airport in Canada. Until last year, Pearson assigned each airline its own counters, with phones dedicated to the airline’s own extension and speed-dial numbers. Now the Greater Toronto Airports Authority (GTAA) management can assign any airline to any unused counter: agents personalize the Cisco IP phones and PCs at the counter in just a few minutes, with a single sign-on. “The inability to shift unused counters to another airline has long been a problem for the airline industry, creating the potential for wasted resources,” says Thomas Tisch, the airport’s general manager of electronic systems and technology. “Now, with Cisco CallManager and its Extension Mobility feature, we have far more flexibility and can use our space more efficiently.”

IP Network as “Communications License”
Pearson’s application is a prime example of innovative uses of IP telephony across the spectrum of industries, including transportation, manufacturing, government, education, insurance, healthcare, and financial services. “In any industry, IP communications is changing the way people work to make them more productive,” says Alex Hadden-Boyd, director of marketing for IP communications in the Product and Technology Marketing Organization at Cisco. “Just as a driver’s license gives you permission to drive any number of cars, an IP network gives you a license to communicate using any device—phone, PC, fax, or videoconferencing terminal from any location.”

Transportation: “Virtual Gate” Application
The “virtual gate” application at Pearson International Airport runs over the GTAA’s optical backbone network, based on the Cisco 7600 Series Router, and was introduced in 2003 to replace 82 separate data, telephony, and video networks. “Agents in our new terminal can customize both the PC and Cisco IP Phone 7960G’s at the gate with a single sign-on,” explains Ian Grant, manager of electronic systems for the GTAA. The first agent to arrive logs on to the airline’s Common Use Passenger Processing System (CUPPS), which runs on a PC. The airport uses the Cisco CallManager application programming interface (API) to instruct CUPPS to alert Cisco CallManager when the airline identity changes, at which time Cisco CallManager automatically pushes the new airline’s profile to the Cisco IP phones at the gate. The profile includes the phone number as well as the airline’s speed-dial numbers. “Those features make the Cisco IP Phone behave like the phones the agents are accustomed to, which eliminated our airlines’ training concerns,” says Grant. “Then we took advantage of unique features of Cisco IP communications solutions to add even more value.”

For instance, to make the directory more relevant for airline employees, the GTAA divided it into two branches: one with numbers important to “above the wing” employees such as airline agents, and another for “below the wing” employees such as baggage handlers and maintenance staff. And the airport also wrote another Extensible Markup Language (XML) application for the airport’s Resource Management Group that lets...
employees receive calls pertaining to a particular function, such as baggage, simply by logging onto that screen on their Cisco IP phones. “IP telephony has created new application possibilities that weren’t possible with standard phones,” says Grant. “Cisco CallManager and Cisco IP phones enable the airline industry to take advantage of a common format, XML, to cut costs and to improve service for our passengers.

Manufacturing: Rapid Response to Change
The ability within IP telephony to quickly set up new phones solved a different business need for Ingersoll-Rand, a leading manufacturer of solutions for security and safety, climate control, and industrial solutions and infrastructure. In late 2003, the company sold a division in Torrington, Connecticut, and needed a quick, cost-effective way to set up a telephony network for the 30 executives who remained behind—with no local IT staff. The company didn’t have the luxury of waiting weeks to order and deploy a small PBX and order phone service. Instead, Ingersoll-Rand had a fully functional IP telephony service just days later, by setting up the office as a satellite off of an existing, centralized Cisco CallManager call-processing cluster in the company’s Huntersville, North Carolina office. Besides PCs and printers, the only new hardware needed to bring up a fully functional new office was a Cisco 3745 Router and Cisco IP Phone 7960G’s. “All routing, switching, and voice and data connections to the IP network and PSTN (public switched telephone network) terminate in that one little router,” says Damon Cahill, manager of infrastructure strategy at Ingersoll-Rand.

Employees in the satellite office have access to all features enjoyed by their corporate counterparts, over the WAN. Should the WAN link fail, telephony service continues without interruption, thanks to the Survivable Remote Site Telephony (SRST) feature, a standard feature of Cisco IOS® Software that, when enabled, automatically begins routing calls over the public PSTN. “Centralized call processing means we need less hardware at local sites and less administrative burden, which translates to lower costs,” Cahill notes. Ingersoll-Rand plans to use the same centralized call-processing model for its other smaller sales offices. “The business case for centralized call processing with SRST is very compelling for offices with 100 or fewer users, and we can cost-justify it for certain larger sites, as well,” says Cahill. “It’s simple: the cost of a Cisco router and Cisco IP phones is far less than that of a PBX.”

Unified Messaging Boosts Productivity
The Cisco CallManager cluster at Ingersoll-Rand’s Huntersville office also provides Cisco Unity® unified messaging, which lets employees retrieve both voice mail and e-mail from their IBM Lotus Notes groupware e-mail inbox. “Before I leave for the airport, I replicate my inbox locally so that I can compose responses when I’m on the plane,” says Cahill. “Next time I connect to the network I send them out. Now, with Cisco Unity, I can listen to and compose responses to voice-mail messages as well, with my laptop and headset.”

Hadden-Boyd of Cisco has a similar approach to productivity during airport layovers, but uses a cell phone instead of a PC. “If I’m in the airport and have ten minutes before my flight, I don’t necessarily have time to find an Internet connection to check e-mail
from my PC. With Cisco Unity unified messaging, I can call on my cell phone and listen to both voice mail and e-mail using text-to-speech translation.”

Unified messaging improves productivity during Ingersoll-Rand’s meetings, as well. Come break time, participants use their laptops on the Ingersoll-Rand wireless network to retrieve and respond to e-mail and voice-mail messages. “In this case, people like the fact that they don’t have to listen to every voice mail in order, as they would on their phones,” says Cahill. “They see all the callers’ names or numbers in their inbox and can jump directly to the most urgent.”

In addition to unified messaging, the Cisco CallManager cluster at the Ingersoll-Rand Huntersville office supports a 25 to 30-person contact center whose agents field questions about employees’ pensions and benefits. “Cisco IPCC Express Edition software provides us more capabilities than we had on our small PBX system, like recording conversations, allowing supervisors to enter a call midstream, and historical reporting,” says Cahill. “And we no longer have to pay someone $250 an hour to add a queue, for instance. Now we can make the change ourselves, using the simple interface. In the manufacturing industry, where it’s fairly frequent that we would add or divest ourselves of a company, the ability to make changes easily is very valuable.”

**Measuring the Cost Savings**

Organizations in all industries are likely to cite cost savings as a chief benefit of IP communications, and Ingersoll-Rand has the metrics to prove it. For conference calls, the company traditionally has used a managed service. In the Huntersville facility, where executive meetings might have 100-plus participants, the bill amounted to US$15,000 a month. Now, the company has eliminated the need for that service with Cisco Conference Connection software, which integrates with Cisco CallManager to provide audio-conferencing. Total monthly costs have plummeted to US$4000 for infrastructure. “Employees like being able to go into a Web interface to schedule their own calls instead of calling the carrier,” says Cahill. People join the conference call by dialing a four-digit extension, or by scrolling down on their Cisco IP phones to see the call and then pressing the Join button. Callers from outside the network can join over the PSTN.

Ingersoll-Rand determined that the Cisco IP communications system will slash equipment costs by 38 percent, maintenance costs by 18 percent, and conference call costs by 70 percent. Factoring in the one-time installation charges, the company estimates it will save US$1.17 million over five years.

**Information Services:**

**Combined Audio and Data Conferencing Cuts Costs**

LexisNexis Group, the global legal publishing arm of Reed Elsevier, the Anglo-Dutch world-leading publisher and information provider, uses a large-scale Cisco conferencing solution, Cisco MeetingPlace, both to cut costs and to safeguard its proprietary data presentations. Until 2002, the company had used two different service providers for external audio and data conferencing. “We were paying US$1.29 million a year,” says Jeff Sira, manager of conference services. “As long as we were billed per minute, we knew the costs would grow each year.”
The company not only wanted to slash its audio and data conferencing costs, but also wanted to address a key security concern regarding intellectual property. “Our data presentations deal with strategic issues such as acquisitions, confidential communications with major shareholders, and R&D that we wouldn’t want our competition to be aware of,” says Sira. “It bothered us to upload this type of asset to someone else’s server and then just take their word that it was deleted when the meeting ended.”

LexisNexis Group found the answer in Cisco MeetingPlace, which it uses to handle both audio and data conferencing. “It’s been extremely cost-effective,” says Sira. “We expected to see ROI (return on investment) in 18 months; instead, Cisco MeetingPlace paid for itself in just 7 months, because our conferencing calling volume increased. And because we own MeetingPlace, it won’t cost us more to conduct more conferences as the business grows.” The company began with 360 seats, recently added another 240, and expects to add another 240 by the end of 2004.

Government: Low-Cost Application Delivery

Located 20 miles northwest of Washington, DC, the Town of Herndon, Virginia took up IP telephony for one reason, and now appreciates it most for an entirely different one. “We adopted IP telephony for scalability and to reduce our phone bills,” says Bill Ashton, the town’s director of IT. “We succeeded: we’re already saving 30 percent every month and expect that to rise to 50 percent when we add the police department to the system. But the more remarkable gain is that we’re using IP telephony as a low-cost platform to deliver applications.”

For instance, the town has begun pushing AMBER alerts, about missing or abducted children, to its employees’ Cisco IP Phone 7900 Series, using the PhoneTop AMBER Alerts system from Cisco Premier Certified Partner AAC Inc.

“When we see an AMBER alert for a child within a 50-mile radius, we push it to all Cisco IP phones using XML,” says Ashton. A distinctive ring tone sounds, and then employees have the option to press soft keys on their phones to see more information, including suspect and victim pictures, on the phone display. “With the PhoneTop AMBER Alerts application, we suddenly have six times the number of eyes looking for abductees than we have police officers alone,” notes Ashton.

The Town of Herndon is also planning to deploy AAC’s PhoneTop EAS Alert Service to push other critical information to employees’ Cisco IP phones. “If we receive any kind of emergency message from the county into our database—tornado watch, heightened terrorist alert, major accident on a heavily trafficked highway—we can immediately route it to municipal employees who need to see it,” says Ashton.

The benefit potential of IP telephony during disasters hit home when Hurricane Isabelle struck in 2003. Local government offices were closed, but the Town of Herndon nonetheless had to call in certain employees to deal with problems with the water system. Ashton plans to install Cisco IP SoftPhones on key employees’ home PCs so that they can work from home during hazardous conditions, which will help to ensure their safety and alleviate traffic on the roadways.
“If you give me enough money and time, I can deliver any application you want me to,” Ashton continues. “But if you want to save money and time, the Cisco IP Phone is a superior delivery platform. It’s low cost, always on, and I already have a phone everywhere in the organization. I have fine control over the applications because I subscribe employees to the service, which runs in the background. To have that level of control if I delivered an application to the computer, I’d have to deal with operating system concerns, and buy and install backend software. This way, everything I need is native to Cisco CallManager.”

**Education: Facilitating Communication**

The benefits of IP communications extend beyond cost and productivity. In education, IP telephony is changing the way teachers, students, and parents communicate. The impact is especially noticeable at Washington School for the Deaf (WSD) in Vancouver, Washington. Since WSD transitioned from a traditional telephone system to Cisco IP communications with NXi Telephony Services (NTS) text-messaging software from NXi Communications, all WSD employees—hearing and deaf—have enjoyed equal access to communications services.

When WSD relied on a traditional telephone system, a teacher who was deaf and needed to talk to a hearing person by phone either needed to use a relay service or ask another staff member to call the parent and then interpret using American Sign Language. “Apart from the obvious privacy and independence issues, this system increased WSD’s phone bills because the relay service charged more for long-distance calls than the school would pay if the caller had dialed directly using the low-cost, state-controlled access network,” says Lorana Myers, supply officer at WSD.

Now WSD staff and faculty, both deaf and hearing, can make and receive calls independently using either their Cisco IP phones or NTS client software on their PC or laptop. “One of our deaf teachers used to e-mail me if she had questions during her prep time,” says Myers. “Sometimes we barely had enough time to resolve the issue before class started—and that’s if I received and opened her e-mails immediately. Now she uses her NTS client software to call me and we can converse in real time, resolving questions much more quickly. With our Cisco IP communications solution we can now do all the things that hearing people take for granted.”

Two redundant Cisco CallManager servers form the core of the solution, providing telephony services throughout the school’s 12-building campus fiber network. One Cisco CallManager server includes Cisco IPCC Express Edition software, which provides automatic call distribution (ACD) of calls from hearing and non-hearing callers. People who call the school’s main number are given a voice prompt to press 1 to continue. “Callers who don’t press 1 are presumed deaf and are automatically transferred to the NTS server,” Myers explains.

Both the Cisco IP Phone and NTS client provide visual indicators not only for dial tone, but also for ringing, hold, call termination, message waiting, and the like. A strobe light connected to the Cisco ATA 186 Analog Telephone Adapter provides another indication of incoming calls. The dial-tone indicator enables deaf employees to use the two-stage dialing required to access the low-cost, state-controlled access network.
Remarkably, WSD now provides equal access to voice mail, as well. A Cisco Unity server residing on a Cisco MCS 7835 platform can handle voice-mail sessions for both hearing and deaf users. When a hearing person calls a deaf person’s extension, the system issues a voice prompt that the person called does not accept voice messages, and offers the caller the option to either insert the telephone handset into the teletypewriter (TTY) coupler to leave a text message or be routed to a hearing operator, who takes a TTY message. Either way, the message is delivered to the deaf user’s NTS client software on the desktop. “With Unity and NTS, parents and others without TTY devices for the first time have the ability to leave messages for deaf staff and faculty,” says Myers.

“\textit{If you give me enough money and time, I can deliver any application you want me to. But if you want to save money and time, the Cisco IP Phone is a superior delivery platform. It’s low cost, always on, and I already have a phone everywhere in the organization.}”

– Bill Ashton, Director of IT, Town of Herndon, Virginia

\textbf{Freedom to Innovate}

“Before we built our Cisco IP communications network, I was in the business of saying ‘no’ to requests for telecommunications service changes, because they were too costly and time-consuming,” says Ashton, from the Town of Herndon. “Now I’m in the business of saying ‘yes.’” Case in point: the town is engaged in an ongoing debate about extending rail service to Dulles International Airport. The train would roll just outside the town limits, so at one point the town became a focal point for the media, and Ashton needed a media center for the major news services—and in a hurry. “Six months ago I would have declined,” he says. “But with the Extension Mobility feature in Cisco CallManager, I just grabbed a few phones from stock, plugged them into a conference room, and added the newscasters and their phone numbers to the system. Within 20 minutes we had our media center.”

Communications is the lifeblood of many industries and, like Ashton, IT people are waxing creative with new, IP-based solutions for improving productivity. For instance, when Cisco recently had a power outage, the company broadcast instructions on how to leave the building to employees’ Cisco IP phones, which remained on because they drew inline power from Cisco routers.
“IP is the universal translator that integrates voice, video, and data,” according to Hadden-Boyd. “The end user has the freedom to choose what media they want, and what device they want to use to receive it. Hearing about some of these applications, people might ask, ‘Weren’t they possible ten years ago?’ The answer is yes. The difference is that today, technologies like IP and XML have made it so much easier. Something that used to be either impossible or incredibly complicated, like walking down the hall talking on a Cisco Wireless IP Phone 7920 and then switching to a Cisco IP Phone 7970G, with color touch-screen, when you arrive in your office, or adding video to a call midstream with Cisco VT Advantage software, can now be done with the press of a button. What once was very difficult is now casual and ad hoc.”

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XML applications demonstrate the power of IP phones to streamline business processes and bolster productivity.

In real estate, it is oft-stated that the three most important considerations are location, location, location. In the world of IP communications, and specifically as it pertains to Cisco IP phones, it can be said that the three top considerations today are applications, applications, applications.

The business value of a converged voice and data network has grown beyond the proven 20 to 50 percent (or sometimes greater) savings companies yield by eliminating leased-line charges and lowering maintenance fees and management costs. The value proposition now taps directly into a company’s existing investments in IP communications and the customizable, easy-to-use nature of IP phones to enable innovative, business-enhancing applications. Viewed as a strategic business asset, these applications marry communications with business processes to boost employee productivity, drive new efficiencies and revenue, and enhance customer service and satisfaction.

“In addition to the total-cost-of-ownership benefits of running a converged network, IP telephony has the ability to transform business processes and deliver improved user productivity and satisfaction,” according to Zeus Kerravala, vice president of enterprise infrastructure at the Yankee Group. “The applications running on an IP phone over a converged network will transform enterprise communications from a static, delayed communications environment to one that is more real time and proactive... The IP telephony applications will make convergence more of a business decision rather than one focused primarily on technology.”

Just ask Maurice Ficklin, director of technical services at the University of Arkansas, Pine Bluff. For more than two years, Ficklin has managed approximately 2000 Cisco IP phones and Cisco CallManager clusters in each of four cores at the university campus with “no complaints, no problems,” he notes. Slowly but surely, however, Ficklin moved toward a more technologically self-sufficient IP network, offering phone, data, and wireless services to students and faculty, including using Cisco IP phones to conduct surveys and enable other productivity-boosting applications. “Of course, the return on investment is very important to us, but we look far beyond that now,” says Ficklin. “We have gone from paying for something (the IP phones, for example) to receiving cost recovery on something.”

A 2003 survey conducted by Sage Research offers further evidence of the benefits of IP communications. One hundred organizations that have deployed IP communications reported the following:

- Faster moves, adds, and changes—respondents report an average saving of 1.5 hours per move
- Easier-to-use features on IP phones—average saving of 5.5 hours per week for each IT employee involved in phone support
- Less “telephone tag” among employees—average saving of 3.9 hours per week (or 25 days a year) per employee
- Improved remote worker productivity—average benefit of 4.3 hours per week (or 28 days a year) for each remote worker
Managing Your IP Communications Network

To successfully administer, maintain, and plan for the present and future of an IP communications network, network managers must fully understand their voice and data traffic and how it can affect the behavior of corporate networks. Establishing a process to evaluate, document, and monitor this important operational resource is imperative. The CiscoWorks product line includes comprehensive network management tools that cover the full management lifecycle, from planning and design through implementation/deployment, operations, and maintenance. They are designed to improve productivity and lower total cost of ownership (TCO) through automation, integration, and simplification.

CiscoWorks software includes tools to centrally manage critical network characteristics such as availability, resilience, responsiveness, and security. Among these tools are CiscoWorks IP Telephony Environment Monitor (ITEM), CiscoWorks QoS Policy Manager, and the Cisco Catalyst® 6500 Series Network Analysis Module. The Cisco CallManager user interface also simplifies the most common subscriber and telephony configuration tasks by adding software and Web-based applications.

CiscoWorks ITEM, through the WAN Performance Utility (WPU), is used for both the planning phases as well as routine operations phases of managing your IP communications network. CiscoWorks ITEM uses Service Assurance Agent (SAA) functionality of Cisco IOS® Software to measure latency and jitter between key points in a network that deploys Cisco IP telephony. WPU is used to help assess IP telephony readiness of Cisco-based IP networks. It also provides real-time health and fault monitoring of converged IP networks, and the ability for operations and administrative staff to monitor and manage telephony resources to capture and record performance and capacity management data. Powerful tools, such as CiscoWorks IP Phone Help Desk Utility, enable operations and help-desk staff to respond to customer issues efficiently and maintain surveillance on the introduction and movement of IP phones in their environment.

Another important application in the CiscoWorks ITEM suit—CiscoWorks IP Telephony Monitor 2.0—features a user interface with a Web-based operations screen that gives you real-time network status and alerts of actual and suspected problems in the underlying IP network and IP telephony implementation. This Alerts and Activities Display (AAD) can be customized to show all or selected elements in the managed space.

Call control is also critical in managing your IP communications network. Management applications help to assess the aggregate number and distribution of calls, identify peak hours, and monitor analog FXO/FXS connections and PRI channel activity. This data can be used to assess best and worst performance and to support trend analysis and forecasting. Platform metrics such as CPU utilization and memory allocation can also be tracked.

Another IP communications management application, CiscoWorks IP Phone Information Utility, can assist with system maintenance, monitoring, and reporting by providing real-time fault analysis and management, including fault history and information about all the phones on the network, their operational status, and implementation details. Utilities such as CiscoWorks ITEM Gateway Statistics Utility collect key performance and behavior statistics about the gateways and trunks to ensure systemwide health and device availability.

Learn more about managing your IP communications network at cisco.com/en/US/netsol.
Open Standards, Easy-to-Deploy Apps
Cisco IP phone applications are based on open industry standards such as Extensible Markup Language (XML), Telephony Applications Programming Interface (TAPI), and Java-based TAPI (JTAPI), which provide the ability for software developers to create telephony applications. Because developers write to the intuitive, point-and-click, browser-based interface, there’s no need for IT personnel and other end users to know anything about the lower layers.

Enterprises can take data from their back-office business applications and deliver select information to the LED screens of their Cisco IP phones. Softkeys on the phones are used to access and display data from the XML applications—extending real-time business information, services, and enhanced images to every corner of an organization, even in settings where PCs are typically inaccessible to employees such as warehouses, factory floors, and sterile lab environments.

XML support is available on the Cisco IP Phone 7905G and 7912G monochrome displays for text-based applications; the Cisco IP Phone 7940G and 7960G with monochrome displays for both text-based and graphics-based applications; the new Cisco IP Phone 7970G model that features high-resolution, 234-pixel color graphics on the phone display along with touch-screen access to features and applications; and the Cisco IP Communicator (Softphone). For Cisco IP Phones 7940G and 7960G, Cisco CallManager Version 3.1 or higher is required for XML support. Cisco IP Phones 7905G, 7912G, and 7970G require Cisco CallManager Version 3.3 or higher. CallManager upgrades are available free; to download, visit the Cisco Software Center: [cisco.com/packet/162_6c1](http://cisco.com/packet/162_6c1) (Cisco.com login is required for full access to the software downloads).

To date, the most prevalent Cisco IP Phone applications have been developed for use in information-laden vertical-market industries, notably in education, retail, hospitality, and government. Among the many applications being deployed are administrative and attendance solutions for school districts and universities; inventory tracking and lookups for retail branches; concierge, restaurant listings/reservations, and other guest-service applications for hotels; emergency notification and audio streaming systems for government and public-safety personnel; and time-clock applications for use on manufacturing floors, and in hospitals, bank branch offices, and other work environments with large numbers of hourly-wage employees.

Likewise, enterprise applications readily available on desktop PCs—e-mail and unified messaging, corporate directories, conference-room booking, and expense reporting, for example—can be provided on IP phones. In this way, the phone serves as an always-on communications and information vehicle for business, critical, and time-sensitive communication with employees—anymore and anywhere they are. No doubt, the simplification of menu-driven information access improves efficiency and expedites day-to-day business processes.

Another benefit of Cisco IP phones: they are managed like PCs. Deploying new applications and services to the phone sets is as easy as distributing software and automating installation on a remote PC. Upgrading business applications, enhancing telephony services, and extending phone-based transactions can be accomplished smoothly and rapidly (see the previous page, “Managing Your IP Communications Network”).
IP Phone Productivity Applications

Many of the XML-based, off-the-shelf productivity applications are being developed by, and can be purchased from, Cisco partners for easy customization to suit a company’s business requirements. What’s more, these applications are already proving their worth in both measurable productivity gains and cost savings, results that were demonstrated with enthusiasm at the Cisco Innovation Through Convergence (ITC) Expo last September.

More than 70 Cisco AVVID (Architecture for Voice, Video and Integrated Data) IP communications and wireless technology partners showcased their integrated voice and data software applications for IP phones. An independent panel of judges from the CIPTUG selected 13 application developers that demonstrated the most compelling benefits in categories such as “Employee Productivity,” “Return on Investment and Innovation in a Vertical Market,” “Cost Controls and Reductions,” and “Best Innovative Single Idea,” among others.

The PhoneTop K-12 application from AAC Inc., for example, won for customer satisfaction and best innovative use of technology in education and government. PhoneTop K-12 (see Figure 1) lets grade-school and high-school teachers use their Cisco IP phones to perform tedious, otherwise-manual administrative tasks such as taking daily attendance and managing student hall passes.

AAC’s application is helping Frederick County Public Schools in Virginia streamline communications between its 20 networked facilities, and reduce costs by eliminating the 20-plus different existing phone systems (offered by half a dozen vendors) and centralizing telephone processes into a single, easy-to-manage voice and data IP communications structure.

In the government arena, AAC is applying its PhoneTop AMBER Alert Services software to help find missing children in and around the Town of Herndon, Virginia. For more on this and other IP communications applications being deployed in vertical markets, see “License to Communicate” article, page 6.

Chosen best in the category of “Cost Controls and Reductions” was Aptigen Designer from EDGi, a horizontal application that allows anyone to create IP telephony prototype solutions quickly and easily—no XML coding skills required. “Ninety percent of Cisco CallManager deployments don’t have applications deployed to them,” says Aptigen Vice President Nick Tseffos. Aptigen Designer is helping to change that.

With this application, you can design, demonstrate, and deploy the full value of IP phone technology immediately, emphasizes Tseffos. Instead of merely talking through the productivity benefits of an IP phone application, you can use Aptigen Designer’s Windows-based interface and drag-and-drop environment to create a custom application, publish it to a phone emulator to check your work, and instantly deploy it to the enterprise, thus increasing your ROI and reducing development time to production.

Named best in the “Return on Investment/Vertical Market” category was Vytek’s ExtendTime application. A complete time and attendance solution targeted at a broad range of industries, ExtendTime replaces traditional time clocks, and automates time data...
collection, auditing, and reporting via IP phones. With a unique employee ID number and password, workers can “clock in” and “clock out” using any Cisco IP Phone in their organization. They can also receive messages, view scheduled work hours and accrued benefits such as vacation or sick days, and locate company-wide resources using the ExtendTime directory (see Figure 2).

Flexible, Instant Communications

The flexibility and advanced capabilities of IP phones offer the opportunity for software developers to use text, graphics, audio, alerts and now, with the Cisco IP Phone 7970G, color to deliver a rich user experience. Many of these users, for example, are benefiting from an application developed by Twisted Pair Solutions called WAVE (Wide Area Voice Environment). Chosen for “Best Innovative Single Idea” at ITC Expo 2003, WAVE allows integration between IP-based networks and other systems such as IP telephony and mobile radio environments—enabling you to create new, scalable group communications consisting of audio, video, and data content.

WAVE not only leverages your existing IP network but brings together communications among previously disparate groups. A firefighter and a police officer, for instance, with their different VHF and UHF radio communications, can now instantly talk to each other while their streams of audio are carried over an IP infrastructure.

As Twisted Pair Solutions and many other software developers are demonstrating, IP communications solutions can be considered strategic business assets that are transforming how organizations communicate—internally and externally. Productivity gains result not simply from adding applications to your network, but by integrating business processes with communications to tap into your network and the technology that will make those applications work for you.

To learn more about the applications showcased at ITC Expo 2003, and for general information on developing and deploying XML applications and IP phone services, visit Cisco IP Communications Applications Central (AppsCentral) at cisco.com/go/apps.
Net Impact 2004: From Connectivity to Productivity

A newly released study by Momentum Research looks at the effects of integrating Internet applications, networking technologies, and business processes on the public sector in Europe. The study—called Net Impact 2004: From Connectivity to Productivity—asked nearly 1400 IT and business decision makers in eight European countries what technologies, applications, and processes they had implemented to accelerate e-government or e-health. The survey found that organizations were between three and seven times more productive than their peers if they invested in network functionality beyond the minimum required to support their applications (for example, deploying layered security or sophisticated traffic management tools), changed their business processes before deploying a new application aimed at increasing efficiency, and automated business processes with Internet applications and integrated those processes with other service functions. Interestingly, but not surprisingly, a desire to accelerate operations and improve citizen satisfaction ranked significantly higher than cutting costs as the top goals among respondents for improving productivity.

Net Impact 2004 is the fourth in a series of research projects sponsored by Cisco to evaluate the impact of Internet technologies on organizations and productivity. For more on the Net Impact research, see netimpactstudy.com.

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Expanded IP communications Portfolio enables rich-media calls and conferences.

Studies have shown that at least 60 percent of human communication is non-verbal—conveyed by hand motions, facial expressions, and body language—so a video image that enhances an audio conversation is a tremendous asset. Until recently, however, video telephony and conferencing systems have been expensive and difficult to use. The networks used were not architected for video, so the quality was poor and the pictures were grainy and jerky. Despite the lofty promises of converged IP networks that could seamlessly transmit voice, video, and data, only about 2 percent of today's meeting rooms are equipped with video-conferencing equipment, much of that still running over ISDN, and video is almost nonexistent on the desktop.

That's changing fast with the introduction of Cisco CallManager Version 4.0. This mature, IP-based business communications system is the heart of Cisco's video telephony (VT) solution. Along with the new desktop product called Cisco VT Advantage, Cisco CallManager 4.0 adds video telephony functionality to Cisco IP phones. Cisco's video telephony solution enables real-time, person-to-person video sessions to be transparently added to telephone calls and conferences. Video telephony is now simply a phone call.

Instead of working as a standalone system with separate endpoints, administrative systems, and dial plans, Cisco's new VT solution uses the same IP network that carries a company's data and voice communications, enabling real-time videoconferencing and collaboration for an incremental cost of less than US$200 per seat. Cisco CallManager, enabled by Cisco AVVID (Architecture for Voice, Video and Integrated Data), is the software-based call-processing component of the video telephony solution.

“We have finally delivered on the promise of the second ‘V' in AVVID,” explains Hank Lambert, director of product marketing for Enterprise Call Control at Cisco. “In the past, Cisco AVVID customers could send H.323 video over the IP backbone, but the video applications were never closely coupled with IP telephony.”

Cisco VT Advantage

Cisco VT Advantage application software coupled with a Cisco Universal Serial Bus (USB) camera allows a PC co-located with a Cisco IP Phone to add video to phone calls without requiring any extra button-pushing or mouse-clicking. When registered to Cisco CallManager, the Cisco VT Advantage-enabled IP phone has the features and functionality of an IP videophone. With Cisco VT Advantage, call features such as call forward, transfer, conference, hold, and mute are now available with video—and are easily initiated through the Cisco IP Phone.

“By connecting a computer with a Cisco IP Phone and equipping it with a small camera, the PC monitor can work as the phone's video screen,” explains John Restrick, software development manager for Cisco CallManager. “Although Cisco VT Advantage harnesses the display power of desktop computers, all calling functionality runs through the phone. The broadcast-quality video images can run at speeds of up to 30 frames per second in a window about one-fourth the size of a typical computer screen.”
Restrack believes Cisco’s forward-looking transition from time-division multiplexing (TDM) to IP-based PBX systems makes it easy for customers to adopt Cisco CallManager and related video telephony technology. They don’t need separate networks for voice and video, and IP phones can be used as endpoints for both types of calls. This makes it very simple to deploy and use the technology. “With Cisco VT Advantage, users have all the functionality of the PBX system,” he says. “They can put a call on hold, transfer the call, or press a conference button to initiate a group meeting.”

Cisco VT Advantage works with Cisco’s midrange and high-end IP phones, including the 7940G, 7960G, and 7970G Cisco IP phones. Video endpoints are configurable from 128 Kbit/s for low-resolution video, to 4.5 Mbit/s for broadcast-quality displays. Two-GHz Pentium processors are required to enjoy maximum resolution video, and 1-GHz Pentium processors are suggested for all video applications.

**Cisco CallManager 4.0**

Cisco CallManager 4.0 also provides video telephony functionality to IP-based H.323 video endpoints from Cisco AVVID partners, allowing customers to preserve and enhance their expensive videoconferencing equipment without requiring a complete upgrade to existing video equipment. Calls can be made to and from endpoints, regardless if they are audio or video calls. This increases call completion rates, thus increasing productivity.

Calls can also be made to executive desktop and conference room video systems from TANDBERG; the systems are specifically enhanced for use with Cisco CallManager 4.0 and employ a user interface that is the same as a Cisco IP Phone, including hold, transfer, conference, and directory services buttons.

Cisco CallManager version 4.0 also works with Cisco IP videoconferencing solutions such as the Cisco IP/VC 3500 Series, enabling multiple users to be connected into video-conferences simply by pressing the conference button on their phones.

“It’s much more convenient now than ever before,” says Lambert. “There’s no need to preschedule through a reservations center or Website—as you had to do in the past. You just dial the phone and use the conference button to add more people.”

**Technology Convergence**

Evolving technologies have converged to make Cisco’s video telephony solution possible: the advent of centralized configuration, management, and call control for scalability and ease of management; unified voice and video dial plans for ease of use; merging voice, data, and video equipment and applications on a single network; and the descending cost of network bandwidth.

Additionally, Cisco recently introduced the Cisco MeetingPlace 8106 Rich-Media Conferencing Solution, an IP-based meeting environment that provides organizations with easy access to secure, integrated, rich-media meetings that combine voice, Web, and instant messaging capabilities. Because MeetingPlace runs “on network,” behind the corporate firewall, meeting content is secure. Cisco MeetingPlace also allows users to participate in and control audio and Web conferences through their Cisco IP phones, traditional
phones, or network connected desktop PCs. Cisco IP Phone users can easily view schedules, set up audio conferences, attend real-time meetings using soft keys on their phone display screens—even initiate a meeting through the corporate instant messaging client.

**Video Revolution**

Many corporate networks already have the fundamental infrastructure in place to enable easy-to-use, easy-to-manage, broadcast-quality video to the desktop. Cisco features the latest technology and advancements available with true IP communications today.

Enterprises can now take full advantage of their IP networks to deliver enterprise-class business communications that extends voice and video to every user in their organization.

It is a dynamic solution that is designed to grow with new system capabilities. For customers that already have Cisco CallManager, it’s a simple upgrade to get started. If they also have Cisco IP/VC video products, they can upgrade not only the call manager, but also the IP/VC Multipoint Conference Unit (MCU), to provide an even tighter coupling of the video infrastructure. Cisco has sold more than two and a half million IP phones to date—most of them with Cisco CallManager solutions—creating a ready market for the new video telephony technology.

“It is a technology whose time has come,” emphasizes Lambert. “Many Cisco customers have the necessary bandwidth for video telephony on their local-area networks, and some customers have the infrastructure to transmit video over metropolitan and wide-area networks as well. Typically, you will want Gigabit Ethernet or better for the backbone.”

Organizations that have already deployed redundant data centers and have invested heavily in their network infrastructure are immediate candidates for Cisco’s video telephony technology. “We’re seeing a lot of interest from customers in financial services, telecommunications, healthcare, education, and some sectors of the manufacturing industry,” adds Lambert (for more information, see “License to Communicate” article, page 6).

**Extending the Promise of IP**

Cisco CallManager 4.0 scales to support thousands of phones at multiple locations and offers a full set of business telephony features and a complete IP-based applications portfolio including unified messaging, unified communications, IP contact centers, and advanced conferencing services. Small businesses with fewer than 100 users can use Cisco CallManager Express to obtain some of the same benefits.

Running on the Cisco Media Convergence Server (MCS) platform, Cisco CallManager software delivers enterprise telephony features and capabilities to many types of packet telephony network devices. This includes not only IP phones, but also media-processing devices, voice over IP (VoIP) gateways, and multimedia applications.

According to Alex Hadden-Boyd, director of marketing for IP communications in the Product and Technology Marketing Organization at Cisco, VT Advantage is just one aspect of Cisco’s complete strategy for IP communications. “If you think of IP as a universal translator,” says Hadden-Boyd, “the various devices and applications on the network are starting to merge. PCs, PDAs, pagers, wireless phones, desk phones, and video...
endpoints are coming together. Users want to integrate not just the devices themselves, but also the desktop applications that run on them. Audio-conferencing, videoconferencing, video telephony, Web conferencing—they can all be tied together through IP.”

**Enhanced Security, Migration, and Interoperability**

Important enhancements in Cisco CallManager 4.0 improve security and interoperability. “CallManager 4.0 has many security features that help users verify the identity of the devices and servers with which they communicate, and ensure data integrity,” says Restrick, “and with the Cisco IP Phone 7970G, they can also ensure privacy through encryption.”

Additionally, Cisco has added digital certificates into each IP phone. When a phone is first connected, it goes through an authentication process. After that, when calls are placed, the setup is authenticated and audio data is encrypted. Cisco CallManager 4.0 also features an intrusion detection system (IDS), firewall, and audit logging through the inclusion of the new Cisco Security Agent, a key component of Cisco’s overall security strategy. Cisco Security Agent provides proactive and adaptive threat protection for Cisco IP phones, servers, and desktop computing systems. It brings together multiple levels of security functionality by combining host intrusion prevention, authentication to Cisco IP phones, distributed firewalls, malicious mobile code protection, operating system integrity assurance, and audit log consolidation—all within a single agent package. Cisco CallManager 4.0 customers, as well as Cisco Unity™ unified messaging and Cisco IP Contact Center customers, receive all of these additional levels of safety and protection for their converged networks at no extra cost.

Restrick spearheaded the development of video in Cisco CallManager 4.0 and coordinated the development of conference bridges, PSTN gateways, and Cisco CallManager integration with a wide range of video endpoint solutions. He says Cisco CallManager has native support for Q.SIG and Session Initiation Protocol (SIP) signaling, enabling the Cisco IP communications system to interoperate with new and old PBX systems. SIP is an IP telephony signaling protocol used by a wide range of hardware and software, including the Cisco MeetingPlace conferencing server. Q.SIG is the worldwide signaling standard for PBX systems.

Support for SIP allows Cisco CallManager 4.0 to interoperate with a variety of current and future communications systems, including Cisco MeetingPlace, the Cisco BTS 10200 Softswitch, and a variety of SIP proxy servers. These additions, combined with H.323 voice and video interoperability, make it easy for customers to integrate Cisco IP communications systems with existing voice and video communications equipment.
**Freedom to Roam**

Hadden-Boyd sums up the advantage of these expanded IP communications capabilities in a single word: freedom.

“I no longer have to worry about how I’m going to communicate at any particular time,” she says. “I have a lot of freedom over what medium I use, and when I’m going to use it. It doesn’t matter if I’m at home, at the office, or at a hotel in New York. My phone number is associated with whatever communications device I’m using, and Cisco CallManager knows how to deliver a message to me—any time, anywhere—based on the preferences I specify. With IP, users choose what works best for them.”

As Hadden-Boyd points out, when Cisco AVVID was introduced in 1999, the advantage was at the network layer. “The primary focus was on transport and its associated cost savings—the cost and productivity advantages of running voice and data over a converged intelligent infrastructure,” she explains. “Now that convergence is moving to the application level.”

Both the Cisco VT Advantage and the Cisco MeetingPlace solutions deliver on Cisco’s promise of a rich-media communications experience. “This is much more than just video to the desktop,” Restrick concludes. “We’re introducing a cohesive system for video communication. We have integrated access to the PSTN and provided simple-to-use conferencing and support for legacy systems—all with the scalability and manageability you expect from your phone system.”

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Top Ten Tips for Guiding a Successful IP Telephony Implementation

Often when an organization considers change that will impact every employee—such as an enterprise-wide IP telephony implementation—the process tends to focus on hardware, software, and getting the technology up to speed as quickly as possible. However, a company’s infrastructure is composed not just of hardware and software, but also of people. The successful conversion to IP telephony does not rest solely on viability or reliability. It requires a careful combination of the right products, people, processes, tools, services, best practices, and methodologies—all working in concert.

While the needs of every enterprise are different, some things are universal. Planning, communication, teamwork, and understanding your users’ requirements are as important as technical expertise. With this key objective in mind, I have compiled the following top ten tips for project managing an enterprise-wide IP telephony implementation. They are not meant to tell you how to technically architect your network, but to share best practices gleaned from Cisco’s own experience as well as customer engagements with phased migrations to a converged voice and data network. If your company is in the planning stages of an IP communications implementation, read on.

Tip 1. Build a Cross-Functional “Tiger” Team

The greatest up-front contributor to a successful, large technology migration is building a cross-functional team that not only has the requisite skills and technical expertise but represents users in every area in the organization impacted by the implementation. This team is responsible for ensuring rapid delivery of the migration that optimizes company investments. At Cisco, we called this group the "Tiger Team."

Key members of the team include an executive program sponsor and steering committee composed of organizational stakeholders; a project Tiger Team lead; technology experts; security specialists; and subject matter experts in the areas of design and engineering, support, finance, and project management. When global or multinational theaters are involved, include team leads for each theater who will represent the needs of that location and user community.

After skill sets are identified and all representatives chosen, this well-represented team should start off the implementation by clearly defining the objectives and overall goals of the project, and identifying the tasks necessary to achieve those goals. Also begin defining the change management process, at-risk factors, and problem escalation challenges, which will minimize the risks of integrating an enterprise-wide IP telephony solution.

Tip 2. Get Your Users On Board

Resistance to change is normal and should always be anticipated. Managing user expectations will be paramount to making the process run as smooth as possible. One key way to achieve this is to take away the mystery and uncertainty among the individuals affected through education, and open, honest, and frequent communication with the stakeholders. Create a plan that gives you the ability to be flexible and proactive. Anticipate the glitches and constantly improve the process along the way, tailoring it to the specific needs of the stakeholders and the users they represent.
In addition to managing users’ expectations, an IP telephony implementation typically will require significant business adjustments, staff training and education, and some redesigned business processes and fundamental shifts within the organization. All of these changes must be identified early and continually managed, and change initiatives coordinated and integrated in a timely fashion.

Your change management plan should be created only after change impacts have been identified and organizational change readiness has been assessed. Consider first the impact change will have on employees—paying close attention to details and being considerate of the timetable (ensuring that the implementation cutover doesn’t take place during your company’s fiscal-quarter close or other critical event, for example). And do it right the first time so that when users experience the change, the effect is minimal and expectations are met.

Managing change involves four important components: Sponsorship, Resistance, Cultural Alignment/Communications and Skills. All team members should strive to understand the process in which change occurs, and incorporate the following recommendations into an effective organizational change plan:

- Know the tools and methods that can be used to analyze and manage change
- Plan and implement proactive change management principles
- Understand the nature and impact of change in the program environment
- Manage the negative implications of change
- Realign expectations
- Build commitment
- Drive cultural acceptance

**Tip 3. Do Your Homework**

Corporate culture is often defined as "the way we do things around here." Culture builds a common language and brings people together, enabling them to work toward a shared goal. Understanding and working with your organization’s culture is critical to successfully implementing new technology on a large scale. Does your company encourage risk taking? Is change incorporated often, and does the company embrace it? How has change been introduced and institutionalized in the past? Was the process successful or fraught with problems? Is new technology welcomed or resisted? Do employees solve problems in a team environment? Is communication a top priority? Is yours a virtual company with telecommuters or employees scattered across the globe? What have previous technology deployments taught you about how users prefer to be trained? All of these factors are part of your organizational culture and can influence your ability to integrate a new solution. Take the time to know your users. Do your homework, capitalize on what has worked in the past, and learn from the mistakes of others.

Equally important, it’s essential that you have the participation and cooperation of all Tiger Team members from the outset. A planning workshop will help you to educate and rally cooperation among the team, as well as ensure that the initiative stays true to the business requirements of your organization and meets implementation objectives. The
team should work together to plan project deliverables, address solution capabilities, define hardware, software, and security requirements, assign third-party implementation services, identify the project critical path and milestones, and outline the migration strategy. There is plenty of ground that should be covered, and you can use the “IP Telephony Migration Questionnaire”, page 30 to get your project team thinking and collaborating together.

**Tip 4. Ensure That User Requirements Drive Design Requirements**

Consider developing a "Voice of the Client" program that consists of client-targeted surveys and focus groups to benchmark and track user-preferred services, products, solutions, and features. Use the survey as a tool to identify critical phone features, validate key business needs, gauge risk tolerance and user discomfort, and identify key functionalities that are paramount to your business. You can also use the survey as an opportunity to incorporate features of the new IP telephony system and to help determine the priority of which features should be enabled.

Survey results provide the design and engineering team with a "report card" that validates their concept of the new design. Missing key design elements are a critical mistake that can be avoided by listening to your users, conducting traffic analysis, performing a network audit and readiness assessment, understanding how the technology will impact your current infrastructure, and familiarizing yourself with the new technology.

And, as daunting and overwhelming as all this may sound, remember that IP telephony is simply a new application running on your current network, not an entirely new network. Therefore, knowing how your users use the system today, aligning their goals with the design requirements, and setting the right expectations will go a long way in making sure that you design your network right the first time.

**Tip 5. Crawl First, Walk Proudly, and Run Aggressively**

Your implementation strategy should allow you to progressively go faster as your experience levels become more efficient (see figure). You don’t want to go too fast or, conversely, too slow. The number of employees, complexity of user requirements, size of the campus, and how widely all are dispersed will, of course, affect your migration strategy. Like most organizations, you are not dealing with a static environment. There will always be employees changing locations, getting hired or leaving, or exercising their mobility working on the road, at home, in the field, and places other than their office desktop. To accommodate this ever-changing environment, develop a migration strategy that takes into account all of the variables that can change, alter, or otherwise affect implementation of your new converged voice and data network.

Make sure no one falls through the cracks by dividing your migration into user- and/or site-defined categories. Your categories might be, for example, new employees; existing employees who are moving to a new location; buildings coming online (greenfields); retrofit of existing buildings; merger- and acquisition-related facilities; or buildings with upcoming PBX lease renewals.

And, as noted, don’t forget to take the time to learn from your mistakes, obtain feedback, build proven processes, and create standards for the entire team to adhere to. Minimize
your migration risk by starting in the lab, developing your proof of concept, and allowing time for training and practice. Follow that success with implementation in a non-critical field office. Then, apply what you’ve learned and start to build momentum by moving more aggressively with a campus-wide implementation.

**Tip 6. Follow the 80/20 Rule for Implementation**

When it comes to actual implementation, the success of your IP telephony migration will depend on several considerations: proper planning, creating consistent standards, identifying at-risk factors, having a ready backup/backout plan, customer service, doing the prep work up front, applying best practices, paying attention to detail, and automating as much of the process as possible. Of all these important factors, planning weighs most heavily. In fact, a winning formula for migration success consists of 80 percent preparation and 20 percent installation. Quite simply, if you focus on your plan first, the implementation will go a lot smoother.

The fruit of managing several implementations, Cisco’s "IP Telephony Steps to Success Engagement Guide" is a knowledge management portal designed to help Cisco IP telephony partners in creating their own implementation plans (cisco.com/go/stepstosuccess, Cisco.com login required). Following is a condensed version of the high-level steps that should be considered when beginning and completing the implementation phase:

**Step 1. Facilitate Implementation Planning**

**Step 2. Hold Implementation Planning Meeting**
Step 3. Define Project Monitoring and Control

Step 4. Develop Status Reporting Structure

Step 5. Begin Site Preparation

Step 6. Conduct Install and Configure

Step 7. Manage Test and Acceptance

Step 8. Deliver Knowledge Handoff

Step 9. Ensure Customer Acceptance

Step 10. Complete Closeout

A comprehensive depiction of the key implementation steps, the “Road to IP Telephony” mini poster, is available to download free at ciscopress.com/1587200880.

**Tip 7. Ensure a Successful Day 2 Handoff**

A successful Day 2 handoff requires a well thought out support plan (Day 2 is defined as the time period immediately following cutover of your new IP telephony solution). Four critical components are required to enable efficient operation and responsive support of your converged network: the support team, support processes, support services, and support tools.

**Support Team.** The primary goal of support is to have all issues resolved quickly and effectively. You need the right mix of people in place at the right time to resolve the entire spectrum of issues that can arise in a converged network environment. To streamline this process, consider creating a cost-effective, three-tiered internal structure to resolve issues based on the type of problems that arise matched to the skill set required to resolve them. Escalation is based on severity and complexity of the issue. Easy-to-solve or repetitive issues, such as IP phone resets and user access passwords, are handled by Tier 1. Tier 2 tackles more complex problems such as software issues, LAN support, and data problems. And Tier 3 requires the involvement of individuals responsible for the design and engineering of the IP telephony solution.

**Support Process.** Resist the temptation to completely reinvent your support model with each new application, a mistake often made during large-scale technology implementations. While the converged support model requires collaboration among multiple groups who are likely unaccustomed to working together, you should still consider and take advantage of much of your existing support processes.

**Support Services.** Many companies do not have the resources required to adequately plan, design, implement, operate, and optimize (PDIOO) a converged communications environment. When making the investment in an IP-based network, organizations need to look closely at their ability to provide all the required services and support parameters. Key elements for implementing, supporting, and optimizing IP-based communications consist of end-to-end PDIOO capabilities, expert internal and external resources, cutting-edge management tools, knowledge management and transfer, and global coverage.
**Support Tools.** Attentive management and monitoring of your new network will help to catch and resolve many problems before they become visible to users. With the right support tools, the network can maintain the highest level of reliability and stability, providing increased performance and availability. The five key functional areas of the network must be managed to ensure the highest levels of availability: fault, configuration, accounting, performance, and security management.

**Tip 8. Keep Your New Network Clean**
Most large enterprises have hundreds of lines and circuits that, through the years, have either been forgotten about or are simply unused. While this tip isn’t meant to cover all the technical considerations required to “clean out” your network, it’s an important reminder to view your IP telephony implementation as an opportunity to clean out your network to start anew, as well as clean, groom, and prepare the IP infrastructure. So, when the implementation team begins the conversion to IP telephony, remove as many unused lines off the PBX as possible, and only convert those lines that were proven as valid. Conduct a final cleanup at the end of the conversion to ensure that the implementation team has ample time to carefully review and trace all unidentified analog lines and circuits. Take steps to verify that business-critical lines aren’t removed, and make it a point to only migrate what you use, not what you have, so that you can help to keep the network clean.

**Tip 9. Plan for PBX Lease Returns**
At the time of implementation, you might have equipment that is leased, which meant that your IP telephony implementation schedule was largely dictated by the PBX lease return dates. To ensure that the massive effort of returning large quantities of leased equipment is organized and that items are returned on schedule, the team leader responsible for the retrofit cleanup should enter all PBX leases into a spreadsheet and develop a project plan to keep the returns on track. Carefully match the equipment list on the original lease agreement to the inventory being returned, create a box-level inventory list, and get a signed receiving list from the vendor.

In addition to managing the return of all leased equipment, there is also the process of removing all ancillary solutions and systems that are tied to the main PBX. The process of completely decommissioning your main PBX will take longer than you expect; therefore, assemble a project team to address the removal of all applications still running on it.

**Tip 10. Look Back, Move Forward, and Prepare for the Future**
Whether an IP telephony implementation involves 200 phones or 20,000 phones, careful and comprehensive planning, communication, teamwork, and knowing where the “gotchas” are hiding will divert problems before they even arise.

OK, you’ve almost arrived. You can see your destination and it is a fully converged voice and data network with all users migrated to IP telephony. Before celebrating, however, there are still a few important items that require your attention. You still need to be ready to address how to prepare your network for the future.
MIGRATING TO IP TELEPHONY?

Change management will be the toughest process to maintain once your new network is in place, but not because of routine changes or software upgrades. Maintaining a strict, yet manageable and scalable, process will be key to your success. Not only will your methods and procedures require a solid execution plan, but so will the standards by which you communicate the plan. Eliminate as many unknowns as possible by documenting your procedures, capture and incorporate lessons learned, and optimize your change management process. Make the commitment to continually support your new, dynamic network by reevaluating contingency plans often, conducting ongoing audits of network performance, incorporating new features through software upgrades, and reexamining the contract services that protect, monitor, and support your network.

To prepare for the future, you must embrace being prepared for new IP telephony applications. As applications become available, a system must be in place to analyze the technology for applicability, test it for feasibility, provide an adoption position, and ensure that all teams are involved, in agreement, and ready to reap the benefits that will come from rolling out another new IP communications application.

**IP Telephony Migration Questionnaire**

Use the questionnaire on the next page in your team planning workshop to jump start migration strategy discussions and identify key areas that need to be addressed in your converged network implementation. This abbreviated list is excerpted from the upcoming Cisco Press book, *The Road to IP Telephony: How Cisco Systems Migrated from PBX to IP Telephony.*
Planning
• How will you determine if your current network is ready for convergence?
• What specific hardware, software, and infrastructure changes are needed?
• What is your company’s security policy? Determine how the new network will adhere to this policy.
• What experience, tools, and methodologies are required to take advantage of converged technologies?
• How will IT staff learn to manage the converged IP network? Who will manage it?
• How will the new technology impact end users?
• Who are the stakeholders company-wide? Which groups absolutely require zero failure rate?
• Have you assembled a “Tiger Team” and outlined their core requirements for the design? Is there a chart of roles and responsibilities?
• Has an IP telephony assessment been conducted?
• Have all leased PBX equipment and lease expirations been identified?
• What are the risk factors? Is there a governance model to address and manage the risk factors?
• What is your content management plan? Are there naming convention standards?
• Are local site managers included in the planning discussions?
• Is there a plan in place to minimize customer impact?

Design
• What core functionality is required by key stakeholders/business units?
• Who are the high-risk users for whom failure is not an option? Have solutions or workarounds been established?
• Have you defined the “must-have” functionality for the network design? Are there any unusual considerations the design should address?
• Are the implementation and support teams part of the design strategy? (They should be.)
• Will the design requirements meet users’ expectations? Has a survey been conducted?
• Did you compare the PBX dump with your new design? Are there gaps?
• Have you identified all the existing applications that will integrate with the new IP telephony solution?

Implementation
• Who is the champion/sponsor of the migration? Are reasons for the conversion clearly articulated?
• Is your company’s culture factored into the migration plan?
• What are the users’ expectations? How will users be trained?
• Have you identified a migration plan for critical phone users?
• Is there a site escalation path if something goes wrong during cutover? Are there backout procedures?
• What is your selection process for the pilot site? Have acceptance criteria been identified?

Operation
• Have you created customer service standards for all deployment members?
• How will you capture lessons learned and ensure that other sites benefit?
• Will you require spares at each site? Is there a resource for allocating phones in a pinch?
• What monitoring and troubleshooting tools will you need to manage the new network?
• Has a PBX decommission plan been identified? Will the port reduction be monitored to ensure lower costs?
• Do you have a policy for managing analog line disconnects?
• Do you have a solid change management process in place?
• Do you have a system for capturing FAQs to be used for the support team?
Take a Page from this Book

*The Road to IP Telephony: How Cisco Systems Migrated from PBX to IP Telephony* (ISBN: 1-58720-088-0), from Cisco Press, provides a roadmap for your IP telephony migration that includes deployment, installation, management, and troubleshooting guidance from Cisco experts. Written by Stephanie Carhee, the book’s focus is not on technology but on the planning and business processes associated with a large IP telephony implementation. Included are more than 200 best practices and lessons learned from Cisco that every IP implementation team lead should know.

For more information, visit ciscopress.com/1587200880.

*Packet* magazine
2nd Quarter, 2004

www.cisco.com/packet
Companies across many industries and around the world realize the benefits of implementing IP Communications solutions.

The shimmering Mexican sun rises over thick adobe walls topped by clay roofs. Cool paved patios sparkle with fragrant flowering plants, while smoky wood fires roast newly harvested agave plants nearby. High-speed network cables carry digital voice and data traffic from office to factory.

The site is the Tequila Herradura distillery in Amatitán, Jalisco—a real-world implementation of IP Communications in an old-world setting.

Companies in every sector are employing IP Communications, that is, using intelligent data networks and Internet Protocol (IP) to handle telephone calls. IP Communications appeals to businesses for several reasons and adds features and applications beyond traditional telephone functions. First, they can save money by installing and maintaining a single network, and equipment, for both telephones and computers, rather than maintaining specialized networks for each. Second, IP Communications can reduce phone bills because calls that would ordinarily go over public telephone networks travel instead over the corporate network or even the open Internet. (Indeed, research firm Allied Business Intelligence estimates that “toll bypass” will represent more than 75% of IP telephony deployments in 2003.) And third, IP Communications improves productivity from the additional features and flexibility of IP telephones.

The market for telephone equipment has been generally soft for the past year. In the second quarter of 2002, traditional phone system sales fell 4%. But IP telephony system sales increased nominally in the same time frame, increasing to 16.9% of the market, according to management and IT consulting firm the Eastern Management Group.

“We’re seeing IP telephony installations where it makes good business sense to do it,” says Elizabeth Ussher, vice president of Global Networking Strategies at META Group. “Extending the enterprise, teleworkers, and things like that are being funded. The IP telephony decision is made on a case-by-case basis. Most of the time, it’s included as part of the larger business case (for an office or facility),” Ussher says.

Ussher finds the companies that can make that case and install the systems are glad they did. “Most of my clients that are going through the waves of putting in IP telephony are happy with it.”

TEQUILA HERRADURA: Enabling Growth

No history of tequila is complete without Tequila Herradura. Founded in 1870, the company continues to operate a traditional distillery at the Hacienda San José del Refugio, in Amatitán, 17 miles from Guadalajara. The Hacienda is both a busy factory and a renowned tourist attraction. Although its roots and traditions are in the 19th century, Tequila Herradura S.A. de C.V. is a true 21st-century corporation. In 2001, Herradura (the name means “horseshoe” in Spanish) had outgrown its legacy telephone system. “We had serious communication problems with our customers, distributors, and consumers,” says Irvin Valencia Rivera, Herradura’s director of information technology. “We didn’t have the equipment that we needed to support the growth of Tequila Herradura.”
The company wanted a converged IP network that could support data and IP Communications to link the 1,500 employees in its headquarters, offices, and warehouse in Guadalajara with its Mexico City facilities and the Amatitán production plant. “We looked into other options,” Valencia Rivera says. “We checked on traditional phone systems. The turning point that led us to choose IP telephony was that the traditional phone systems were a lot more expensive, and IP telephony offered other advantages with regard to flexibility, adaptability, and savings.”

After installing the system, Herradura realized bottom-line improvements. “The benefits are mainly reflected in the savings in long-distance service,” Valencia Rivera says. “We are able to communicate with the Mexico City offices and the production plant at local rates, which has created tremendous savings.”

Savings were only the start. The new phones also helped Tequila Herradura grow its business. “We started receiving calls from our customers and clients, thanking us for improving our communications system,” Valencia Rivera says. “They told us it had been almost impossible to contact us, because the lines were always busy. The new telephone system changed the way we work; we definitely had been losing sales because of communication problems. But after we changed, we experienced an increase in business—growth in our company.”

The productivity improvements allowed Tequila Herradura to better serve its customers—and more of them. Valencia Rivera reports that other, softer benefits are harder to measure, but it’s easy to see the enthusiasm for the new phone system.

“We gathered and trained a pilot group to test the new phones,” Valencia Rivera says. “When they saw all the features, other people started asking to join the pilot group, including our group director [CEO]. He likes technology and was very interested in getting it in his office.” Tequila Herradura has completed the necessary security steps to allow for virtual private network access, so employees on the road can now access e-mail and voice mail.

The system has also set the stage for Tequila Herradura’s move into new offices in Guadalajara. “We’ll just install network wiring at the facility, move the equipment, and connect the telephones to it,” Valencia Rivera says. “Compare that to the massive wiring and setup that traditional telephony would require.”

**NFL FILMS: Saving Money, Gaining Flexibility**

The 290 employees of NFL Films produced more than 400 hours of American football-related programming for broadcast, cable, home video, and the Web in the past football season alone. The company creates programming in 26 languages for shows broadcast in nearly 200 countries. It has won 82 Emmy awards. It stores more than 100 million feet of National Football League archival film in its vault. It’s a business like no other. But when it broke ground for its new 200,000-square-foot headquarters in Mount Laurel, New Jersey, in 1999, NFL Films faced the same challenge every business faces: how to save money while improving the way work gets done.

Implementing an IP Communications system from Cisco Systems was part of its game
By converging its phone and data networks, the company dodged the expense of installing telephone cabling and a PBX phone system, saving $400,000 from the start. NFL Films also avoided hiring a telephone specialist, instead handing phone management to the IT team.

“We could run the applications on a Windows 2000 server, and we already had people on staff who could support those servers,” says Steve Eager, director of network systems administration at NFL Films. “We were already running Cisco routers and Cisco Catalyst switches, and we had people on staff who were trained to support them. IP Communications fit right in line with what we were already doing. If we had installed a new phone system, we would have needed to retrain our people or potentially hire a new person to support the phone system. “That alone, Eager says, could cost $100,000 a year.

Cost savings provided the early wins, but the system’s flexibility and features are paying off in the end. IP Communications is a big hit in the audio and video departments, where 20 audio editors share 6 sound studios, and 30 video editors share 14 video-editing suites. During football season, these facilities are in use around the clock.

“Cisco CallManager’s Extension Mobility feature lets editors walk into a studio, log into the phone, and immediately have their extension, their fast dials, and their special configurations,” Eager explains. “When you need to find someone, you dial a number rather than look all over for the person.”

Moves, adds, and changes—time-consuming and costly chores with traditional PBX phone systems—are simple with IP Communications. Cisco Unity unified-messaging software is also winning fans. “Users love to get voice-mail messages in their e-mail inbox,” Eager says. A voice mail shows up as an e-mail attachment, which users can play through computer speakers or send back to the phone handset. “IP phones are just a lot more feature-rich and user-friendly than standard phones,” Eager says.

The flexibility of IP Communications extends literally across the United States. Case in point: Qualcomm Stadium in San Diego, venue for the 2003 Super Bowl. Every year, NFL Films moves much of its staff to a temporary trailer compound at the host stadium to cover the game’s every angle. This year, rather than arranging with the local telephone company for short-term land lines and temporary phone numbers, NFL Films brought in a high-speed Internet connection and used IP Communications. This designated the communications chore to IT, allowing the creative team to “concentrate on the game, which is where they really belong,” says Eager.

ERNST & YOUNG: Future-Proofing Communications

When global professional-services firm Ernst & Young built its new headquarters at 5 Times Square in New York in 2002, it intended the 37-story, 1 million-square-foot building to be an example of the company’s efficiency, intelligence, and technical prowess.

“The facility itself is a technology showcase,” says Juan Torres, Ernst & Young’s associate director of technology architecture. “So we wanted to make sure that we invested in [a telephone system] that was future-proof, that showed that we use state-of-the-art technology, and that we had teamed strategically to get us there. “To meet these goals, Ernst
& Young chose IP Communications from Cisco. The system now handles a massive volume of 90,000 to 100,000 calls per day through roughly 4,000 phones.

The installation at Ernst & Young posed specific technical challenges. For starters, the phones needed to integrate with the company’s existing global voice-mail system from Lyrix. Second, the phone system needed to support Ernst & Young’s hotelling application at the new headquarters.

“We’re big on hotelling,” Torres says. “Some employees—especially those who are constantly at client sites—don’t have assigned offices. They call a concierge and tell them how long they need a room, and the concierge tells them what office or cubicle to use.” The hotelling application from AgilQuest Corp. tracks who is in each spot and automatically sets up the telephone for that person. It performs hundreds of such setups every evening.

“From a maturity-of-technology perspective, we were right on that verge of IP Communications starting to gain acceptance,” Torres says. “The decision to proceed was helped by Cisco’s commitment to work with us and our vendors and stand behind the product.” Ernst & Young is now rolling out IP Communications to new offices as it adds them, including Houston, Minneapolis, and other cities, with four or five more installations planned in 2003.

“We definitely see cost benefits for the greenfield locations,” Torres says. “In New York, we saved substantially on wiring because we didn’t need as many cable installations per location. However, we have made a conscious decision not to replace our infrastructure in existing offices yet. As we enhance the [IP Communications] environment and add features to increase productivity, we expect that day to come. There are obvious advantages to having a firmwide homogeneous telephony environment.”

In New York, the first criterion for choosing and implementing IP Communications was making the system equivalent to what Ernst & Young employees had before they moved to the new headquarters. “Now we’re going to put on our features hat and make sure that the road map ahead solidifies the fact that this was a strategic decision and not a tactical one,” Torres says. “We feel that we’ve laid a foundation for future functionality and capabilities that we would not have if we had proceeded with legacy systems.”

SHERATON PETALUMA: Customizing the Travel Experience

Building a brand-new hotel entails thousands of discrete decisions. Along with location, architecture, color palettes, lighting, furnishings, staffing, food service, and countless other details, a 21st-century hotel needs to decide what technology services it wants to offer its guests. At the Sheraton Petaluma Hotel, an elegant 180-room facility on a scenic marina 32 miles north of San Francisco, that decision was easy.

“We had already decided to provide our guests with high-speed Internet access,” says Clyde Pearce, general manager of the hotel and chief operating officer of LOK Group of Companies, which opened the Sheraton Petaluma in June 2002. “So the installation and maintenance costs of a single network, instead of separate Internet and telephone networks, were very appealing.” The hotel chose a Cisco AVVID (Architecture for Voice, Video and Integrated Data) solution and in every room placed IP phones with LCD display screens that act as mini-Web browsers. But that decision was just the beginning. The
Sheraton Petaluma is using the phones’ display screens to deliver needed information to guests. The hotel hosts group events, business travelers, and leisure travelers visiting nearby wineries and outdoor recreation areas, so a one-size-fits-all solution just wouldn’t do.

“Members of groups often want to speak to one another, so we create a group directory on the screen or send meeting agendas to specific phones,” Pearce says. He also wants to provide information about services in the area. “A business traveler might want to know where to find the closest 24-hour copy center or place to mail packages. But a leisure traveler with children may want to know what nearby restaurants feature children’s menus. “The Sheraton has even begun displaying guests’ company logos on the screen. “That’s a real ‘wow’ factor,” says Pearce.

Any hotelier will tell you that these services, though well received by guests, are hard to translate into dollar signs on the bottom line. “These are warm fuzzies,” Pearce says. “I saw my logo on the phone. Am I willing to pay more for the room? The answer is no. But the flexibility of our system has helped us book groups and bring in revenue.”

In one recent example, a conference group asked for six phones, five high-speed Internet connections, and a fax machine in a small break-out room—all with just one day’s notice. “No one else in this marketplace could honor that request, especially in 24 hours,” Pearce says. “It took us 45 minutes. Our guests respond to this kind of service. They say it has value, and they’re willing to pay more for it.”

Indeed, Pearce says that IP Communications is a key to the high-touch experience his guests want—and will pay for—now and in the future. “We have guests in our presence for longer periods of time than other service industries,” Pearce says. “They literally live with us. Some hotels pride themselves on calling a guest by name, but that just doesn’t cut it anymore. You need to know a lot more than a person’s name—you have to make sure that the experience is really tailored to the purpose of their visit. We believe that IP telephony will help us get there better than any other technology.”

**CALIMAX: Cutting Costs Nearly in Half**

Countless phone calls go out every day in the course of operating a busy supermarket chain. Store managers call headquarters. Buyers call suppliers. Distribution centers call stores. For Calimax, a 45-store, $350 million regional grocery chain headquartered in Tijuana, Mexico, the cost for those calls added up to $60,000 a month.

“We relied on [regional telephone company] Telnor to connect our headquarters and distribution centers to our stores,” explains Roger Zapata Buenfil, CIO for Central Detallista S.A. de C.V., Calimax’s parent company.

Calimax was understandably eager to cut those costs. It offers its customers a low-price guarantee in a competitive, low-margin business, so it looks for every opportunity to reduce costs without compromising service. You could say that IP Communications offered Calimax a chance to get a cartload of telephony for the price of a basket. Calimax connected half its facilities with a frame-relay IP network and built wireless radio-frequency network bridges to the rest of its facilities. For example, Calimax’s headquarters connects wirelessly to 15 nearby stores.
Calimax is a Mexican leader in employing technology to provide the best service and products at the lowest price to its customers. It built the network not only to support its IT operations but also to connect its 350 administrative employees and potentially its 3,500 total employees if they use one of the internal phones at a store or the distribution center that is connected directly to headquarters.

Phone bills plummeted to as low as $25,000 per month and settled at around $35,000 per month, even as Calimax expanded from 35 to 45 stores. The system paid for its entire $500,000 cost in 18 months. The savings were so dramatic because all calls within Calimax—from stores to headquarters, for example—are now internal calls rather than toll calls. The new system has eliminated the cost of maintaining a separate phone network. And many calls outside the system—from a distribution center in Tijuana to a supplier in Ensenada, for example—are also local calls because the system uses the IP network to route the calls to the store or facility nearest the call’s ultimate recipient before connecting to the outside telephone network.

That tactic even works for international calls. Calimax runs an importation transfer warehouse in the United States to support its own operations as well as those of Smart & Final of Mexico, which is a joint venture between Central Detallista and Smart & Final of the United States. (About one-fourth of the products in Calimax stores come from the United States.) Calls from Mexico to the United States route through the IP network to the distribution center near San Diego, California, and then connect to the public telephone network there.

Calimax’s converged voice and data network immediately saved money on phone bills, but it also offered other advantages. For example, Calimax’s five-story headquarters building is piloting a wireless-network project; some on-site employees now carry wireless IP telephones. “I can get my calls, my voice mail, and even my e-mail on my wireless IP phone, wherever I am in the building,” says Zapata Buenfil. The company is also engaged in a pilot project to connect security cameras in ten of its stores to the IP network for remote surveillance.

These additional benefits are the dessert; the meat-and-potatoes benefits of IP Communications show up on Calimax’s bottom line. Asked to share an anecdote about how IP Communications has improved the way Calimax does business, Zapata Buenfil chuckles politely. “That’s a question for the people in finance,” he says. “Or our CEO—he frequently tells me that this system is the best investment we have made in technology. That is true not only because of the savings in cost of operation but also because it provides the infrastructure of all the systems at Calimax.”

As these real-world examples illustrate, IP Communications has matured from an experimental technology with questionable return on investment to one that serves real businesses and their goals. As the technology continues to improve, IP Communications implementations will grow. Telecommunications-strategy firm Atlantic-ACM projects that IP telephony calls in North America will reach almost 100 billion minutes by 2007. Savings on infrastructure and operations will entice companies to move to IP Communications, but they’ll stick with the technology because of the features and productivity benefits it provides.
From Cisco: The IP Communications Experience
Cisco Systems has the world's largest IP Communications system, with nearly 20,000 phone devices in 55 buildings at its San Jose, California, campus alone. Worldwide, 40,000 Cisco employees use the technology. Stephanie Carhee was the team lead for the conversion in San Jose.

iQ: What steps did Cisco take to make the implementation successful?
Carhee: First, we treated IP telephony not as a phone replacement but as another vertical application in our overall IT strategy. Second, we created a crossfunctional team of key stakeholders that the migration would affect. Third, and most important, we focused on how IP telephony would affect our users. Communication, clear expectations, and various training options were critical. We also led by example: John Chambers was the senior champion of the project.

iQ: How did the phased migration work?
Carhee: We decided early on to use a crawl, walk, run approach. Our migration allowed for a learning curve, then scaled to migrate 600 employees in a single weekend. The IP telephony development and marketing teams went first. Next were new employees, new campuses, and then buildings that had expiring PBX leases.

iQ: What benefits have you seen?
Carhee: It’s all about productivity. If employees want to work in multiple offices, multiple areas within the building, or from home, IP telephony supports that. You can unplug your phone, move anywhere on campus, and plug it in to any available port. The system automatically configures the phone based on your profile, with settings and voice mail ready within seconds. Cisco encourages virtual office space in satellite offices. Our adds, moves, and changes are much more streamlined: Where we previously needed separate move teams for computers and phones, we now have one efficient team.

iQ: What features excite employees?
Carhee: Enabling employees to work smarter, not harder, is a great crowd pleaser. Self-service is just one example. Employees can move their own phones, program speed dials, set up call-forwarding remotely, and use an employee directory on the phone. Cisco has new functionality, such as SoftPhone, that lets you duplicate your phone on your laptop, plug in a USB headset, and answer your phone wherever there’s a data network connection, whether you’re in a hotel, at a client site, or at home. Personal Assistant specifies how you want to be reached, which calls go to voice mail, and how to locate you. This is great for our mobile sales force. The applications are exciting because employees can be more productive, efficient, and accessible.

iQ: What advice can you give companies considering IP Communications?
Carhee: You need a champion for the cause, who understands its features and benefits, and how it fits into the company’s overall strategy. Look at the migration strategy: A phased migration worked very well for Cisco. Then there’s architecture. Long-term, how do you want to manage your network? Does the functionality of your network grow as you grow? Bring your support team in early to ensure that your user, design, and support requirements are in sync. Last, utilize a partner to offset your resources. Know your areas of expertise and get help to fill in the gaps. – F.S.
Arizona State Savings & Credit Union wanted to remake its aging and fragmented IT infrastructure into a dynamic, cost-effective force for serving members better, raising employee productivity, reducing and restraining costs, and increasing revenues.

Not so long ago, Arizona State Savings & Credit Union (AZSTCU) reached a crossroads that would define its future. On one side sat an IT infrastructure that no longer could support the organization’s business goals. On the other stood a new vice president for IT, Peter Simonsen.

One false start and several good decisions later, Simonsen and his new employer would find something extraordinary: the future of banking. This is the story of how they got there.

With 102,000 members, 270 employees, 21 branches, and $540 million in assets in 2000, AZSTCU was growing rapidly. Its legacy systems were an aging collection of disparate elements.

Layered some 15 years deep, the systems worked, but they pinned the company to the past. They created more work instead of less. They eroded the bottom line instead of contributing to it. And they didn’t help member care—a live-or-die issue in banking.

The phone system was a patchwork of 11 different setups with an expensive reliance on long-distance calls. There was no desktop equipment standard. Nor were there any internal or external networks. Some employees lacked voice mail and relied on hand-scribbled messages.

Employees interrupted their dealings with branch visitors to answer phone calls. Members who called waited on hold, but no one knew for how long. A service bureau handled the company’s core business application, so every time AZSTCU added a new member, it had to pay for the added service. Internet banking also created additional fees.

“The business problem was this: Every time a new member walked in the door, we incurred an extra cost,” Simonsen says. “So the more successful we became, the only thing our costs could do was to increase.”

From Challenge to Opportunity

Some of AZSTCU’s challenges were obvious. The executive team identified others around a core goal of gaining a sustainable competitive advantage through technology. Still others arose from the institution’s strategic planning process.

What Simonsen identified was opportunity.

“I envisioned an employee toolbox based on standards, one that everybody could access right from their desktops,” says Simonsen. “Everyone would have the same advantages. I saw this as a huge opportunity to integrate this whole organization so everyone could be more productive.”

Consultants made recommendations. Companies came to talk. AZSTCU signed a contract for a PBX voice system to go with a Cisco Systems data network. Then Cisco invited Simonsen to see the 18-wheeled Cisco AVVID Express truck, which travels to demon-
strate converged technology, including Internet Protocol (IP) telephony, based on Cisco AVVID (Architecture for Integrated Voice, Video and Data).

“Up to that point, my concern had been quality of service, which was a key business driver for us,” says Simonsen. “When the president of our organization picks up the phone to call one of the members, I want good voice quality, and when one of our members calls us, I want good voice quality. When I went to check out the truck, I liked what I saw.”

He liked what he heard too. So with his fears about the voice quality of IP telephony quashed, Simonsen asked Cisco to design a complete end-to-end IP solution, a true converged network for both voice and data. In three weeks, he had a price. Then came the hard part: Explaining why the PBX system the organization had just approved wasn’t the right solution.

“I had to go back to the president and say, ‘I think I made a mistake,’” Simonsen says. “For about three days he grilled me. He asked all the right questions—technical questions, business questions, and support questions.” Simonsen had the answers. AZSTCU cancelled plans for the PBX voice system.

After reviewing Simonsen’s proposal for the converged network, AZSTCU’s management was convinced that it was the only solution able to fully support the organization’s business goals, which include the following:

- **Simplified Network Management:** The IT staff consisted of Simonsen and two other people, and he didn’t want a system that required him to hire many more people.
- **Scalability:** The organization needed the ability to quickly expand or contract bandwidth. It wanted to add phone workers to its new call center during times of peak demand and return them to other jobs as demand decreased.
- **Lower Total Cost of Ownership and Capital Expenditures:** The organization wanted a system that didn’t increase in expenses as new members joined.
- **Improved Phone System:** AZSTCU wanted to use a seamless wide-area network to keep most calls on its network and off the public telephone system, thereby reducing long-distance tolls. It also wanted four-digit dialing for internal calls and direct lines for every employee.
- **Unified Messaging:** The credit union wanted to take advantage of the converged network to provide access to voice mail, email, and fax on all desktop computers.

**Quick Moves**

Once a company decides to implement a new system, it’s always nice to take advantage of it as soon as possible. For AZSTCU, it was imperative. The organization was bringing a new core business application online in 13 months. Any new network Simonsen envisioned had to be in place to welcome it. He taped the deadline date to his bathroom mirror at home, where it glared at him every morning as he prepared for work.

High on the priority list was identifying a desktop standard. Simonsen says Dell Computer was an easy decision. “Dell stepped up big-time in the initial phase,” he says. Microsoft was also a quick decision. Simonsen wanted to keep the IT department small by leaning

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### A Calendar for Change

#### 2000
- **August:** Peter Simonsen joins AZSTCU. Consultants brought in to assess overall technical infrastructure, with an emphasis on voice.
- **November:** Decision made to go with PBX voice system.
- **December:** Simonsen visits Cisco AVVID Express truck and concludes that a converged network is a better solution.

#### 2001
- **January:** Simonsen persuades AZSTCU president that PBX is the wrong way to go for voice. The credit union instead chooses a Cisco converged network solution. Simonsen orders the T-1 lines.
- **April:** Senior Network Engineer Kim O’Connor attends classes for Cisco CallManager. The following Monday she and others begin converged network implementation.
- **May–June:** Branches begin conversion one at a time, with each conversion taking place overnight.
- **August:** Installation complete.
- **December:** Converged network fully operational in 23 AZSTCU locations within Arizona.

#### 2002
- **April:** IP network is fully integrated with new core business applications. Work begins on disaster-recovery plan.

#### 2003
- **March:** Disaster-recovery plan complete.
- **April:** Cisco IDS Security appliances installed and operational.
heavily on trusted business partners to handle large portions of the job. After one integrator failed to finish the job, AZSTCU brought in NEC. The strategy: The more work that the partners could handle, the more streamlined Simonsen could keep his internal operation. “We aligned ourselves with business partners that have comprehensive and deep solutions,” says Simonsen. “That way we only need a handful of partners. You really don’t know with whom you are doing business until you have problems. Everyone stepped up. We had some pain, but there wasn’t any finger-pointing. All they said was, ‘What can we do to help?’”

Progress was swift. AZSTCU converted each of its branch offices overnight, including installing new PCs and monitors, Cisco IP phones, Internet service, and new T-1 lines. Two workers would arrive at an office in the early afternoon to remove all the new equipment from the packaging. When the office closed at 5:30 p.m., the workers would start replacing all the old equipment with the new. When associates arrived the next morning, they would find a complete, new system. The technical staff would stay on-site for a couple hours to answer questions, and the conversion would be complete.

“You would never have been able to do this with a traditional PBX system,” Simonsen says. “Branches migrated overnight? No way. This is a very important point with IP technology. It can be deployed very quickly with minimal training.”

**Support for Change**

Change is jarring. Change is necessary. And at AZSTCU, change is quick. “We probably could have done more training, but in hindsight the benefit of not giving too much training was that our associates didn’t have time to be scared,” says Simonsen. “It was fast and furious, and the good thing about the system is that it’s very intuitive.”

“With the user-friendliness of the phone system, training is a nonfactor,” says Lisa Hord. Formerly the call-center manager, Hord has been promoted and now manages two branches. “The average time an agent spends training on the phone system is anywhere from five to ten minutes. This leaves me more time to train them on the work.”

Hord says the initial call-center transition went smoothly and that the new system also simplified office moves. “We physically had to move the department twice,” she says. “The phone system’s plug-and-play feature made it easy.” Employees who move to a different desk, or even a different building, simply bring their phones, plug them in at the new location, and all their features follow. Before, it would take days, and considerably more money, to move the phone and set up the voice mail.

**Proof of Payback**

The impact of the new converged network was immediate and lasting. The monthly long-distance phone bill for the entire credit union is now less than $3,500. Before IP telephony, the monthly bill for a single branch approached $11,000. In addition, AZSTCU does all its own telephone moves, adds, and changes, saving the time and money associated with bringing in a thirdparty to do the work. The banking organization will realize return on investment in 16 to 18 months, with savings then accruing directly to its bottom line.
Recently, a power outage in Phoenix cut power at AZSTCU’s call center. Within ten minutes, the branch offices had taken over the full call volume, leaving members with minimal disruption. “There is no way, period, you could do that without a converged network and voice over IP,” says Simonsen.

Simonsen has also calculated that the organization can add 25% more members without adding any incremental costs. That's fortunate, because AZSTCU is still growing. Today it has 117,000 members, 330 employees, 23 branches, and $880 million in assets.

Productivity at the call center is up tenfold, by Simonsen's estimate. The length of the average member call has dropped from about four minutes to about a minute and a half or less. There's less staff turnover now as well.

Particularly helpful is the ability to add call-center agents to handle surges in calls at busy times, such as the day after a three-day holiday. Because the IP phones and call-center system are so easy to use—and because the converged network and the desktop standard brings the same tools to everyone—managers can divert employees in any branch to take calls as needed.

“Other call centers will typically say that wait times go up during busy periods,” Simonsen says. “We didn’t want that.” Reduced wait times is one benefit of Cisco CallManager, though certainly not the only one. CallManager is a software-based call-processing component that extends enterprise telephony features and functions to IP phones and other devices. CallManager is part of the solution that allows unified messaging, multimedia conferencing, collaborative contact centers, and interactive multimedia response systems.

Agents went from handling 30 to 50 calls daily to handling 100, sometimes twice that. At the same time, call-abandonment rates sank, although they’re impossible to compare because the old system wasn’t capable of measuring them.

The then-and-now differences are striking. Under the old PBX phone system, 23 people in branches wound up taking phone calls, says Bryan G. Nielsen, a regional vice president who oversees call-center operations. The new call center needs only 18, except during peak periods, and it still takes more than 30,000 calls per month with less than a 4% abandon rate. How can fewer people provide better service? It’s the combined power of the entire converged network with IP telephony and CallManager. Now call-center agents can handle 80% of calls immediately because agents have direct access to member information. This makes them more productive, allowing them to handle more calls a day while still resolving member requests more quickly and more effectively. Agents also have to transfer or put on hold far fewer calls than before.

“The ability to have our Virtual Agents—who are employees located in branches throughout the state of Arizona—logged on at any time very clearly gives us a sustainable competitive advantage,” says Nielsen. “We do not need all call-center associates physically located in the same location, but we can have one from this branch, three from that branch, and seven from another.”
Most calls are basic: “What’s my balance?” or “Has this check cleared?” Often, though, such calls lead to other questions. That’s another area where the converged network helps. Members may want to know if they really have overdraft protection or ask about home-equity loan rates. The network immediately brings the agent everything she or he needs—all the member account information, all the information on the credit union’s products, and all the tools required to calculate answers. By the time a phone customer gets to a loan officer, much of the work is already complete. Screening by the call-center agent ensures that members get to the right person on the first try. Agents can even provide quotes on disability and life insurance or rates on loans, resulting in many more cross-sell and up-sell opportunities.

“This new phone system has improved our service level tremendously,” says Nielsen. He especially likes the ability to get customized call-center reports. He can quickly view how many calls are being abandoned, for example, or manage staffing by analyzing call-volume trends.

To Hord, one of the most important features is the ability for supervisors to do instant-message chats with call-center workers while the workers are on the phone with members. She feels that the feature is good for training and helps ensure members get what they need immediately. “The agent is less frustrated and the caller is more satisfied,” says Hord. “The new systems have changed the way the employees think about their jobs.”

**Behind-the-Scenes Benefits**

Overall, the new phone system has boosted employee productivity, says Nielsen. “Before, if I wanted to call somebody, I had to dial the full seven-digit number,” he says. “Now I can just pick up the phone, dial a four-digit extension, and I can reach any of our staff, anywhere in the state, without a toll charge. Moreover, we offer much better service now. Compared with the systems we had, this is heaven.”

“It’s definitely a cost-effective system,” says Jayson Carr, a network engineer who administers the credit union’s help desk. He especially likes being able to look up employees through the global corporate directory on the phone’s LCD display. The IP phones also have integrated unified messaging, enabling employees to listen to e-mail over the phone, and call-routing features, enabling them to direct incoming calls by time of day, day of the week, or caller identification. Employees can select which calls are vital enough to answer in real time. The phones also display real-time interest-rate sheets, which means associates don’t have to look them up on a desktop computer.

The phone experience is just as seamless now for members. Associates are more readily able to help them. Voice mail works. Transfers occur without delay. No toll-free or long-distance numbers complicate communication.

“Our members now can pick up the phone and speak to someone right away,” says Hord. “They no longer have to call different numbers or wait for associates to return voice-mail messages. They get real-time assistance and complete follow-up.”
AZSTCU added all this functionality while keeping IT staffing levels low: seven people.

“When I compare our IT team to [those of] other businesses, that’s absolutely unheard of,” Simonsen says. “The yardstick tells me we should have at least three times that number.”

The small size of the team hasn’t hindered AZSTCU’s ability to bolster network security. Simonsen says the organization has already deployed security hardware, and soon will deploy software to “harden” the servers, further protecting them from viruses. Intrusion tests are complete, and a disaster-recovery plan is in place. All data circuits can route to different locations, so that if any building is damaged or destroyed, data integrity and connectivity are preserved.

**More Opportunities**

AZSTCU is looking for more ways to take advantage of its new network. It’s testing an employee portal that will enable online expense reporting and human-resources interactions. Moving in a new direction to utilize the network’s video capabilities, AZSTCU will offer virtual classroom training, online seminars, and testing for employees. It also plans to introduce Internet bill payment and online statements for members. Another planned new service is check imaging, which will enable members to view the front and back of a check.

The goal of all these varied efforts is to give members complete self-service, dramatically increasing member satisfaction while simultaneously reducing the cost of contacts.

With a converged network empowering its employees, AZSTCU is distinguishing itself as an organization that gets things done faster and better. Costs are under control. Productivity is up. Members are happier. And it all happened because the institution made a right turn—a correct turn, that is—at a very important crossroad.

*iQ Magazine*

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www.cisco.com/go/iqmagazine
From Cisco: The Bank of the Future
Suddenly the bank of the future is here now. To learn more, iQ Magazine spoke with Rod Scott, director of solutions marketing for Cisco Systems and a former senior vice president with Bank of America. Scott has more than 20 years of experience in banking and brokerage management and 10 years in technology consulting and marketing in the finance industry.

**iQ:** How is technology helping banking?

**Scott:** The anytime-anywhere aspects are increasing and will become more intuitive and easier, both for the customer and the institution. As technology integrates better, inefficiencies will start to disappear because information will be available throughout the organization instantly. This will hold down costs, drive up productivity, and increase sales.

**iQ:** What barriers are banks seeing now?

**Scott:** There are a lot of inconsistencies in customer-service levels, which leads to missed sales opportunities and a drop in customer loyalty. What needs to happen is a lot more integration between telephone, Web, e-mail, traditional mail, print products, and all the other things banks do, such as sales, service and support, business-unit activities, and marketing.

**iQ:** How does a network contribute?

**Scott:** When the communications infrastructure is set up properly, you get a rapid and consistent response to customer needs. This arises from a unified customer view and unified customer messaging, which leads to enhanced cross-sell and up-sell opportunities. It all adds up to a cohesive business framework for managing customer relationships.

A Cisco converged network supporting the bank’s customer-care database applications, along with Cisco call routing, enables the entire bank to be an active part of the call center, intelligently routing customer calls to the most appropriate employee. Now you have the right person, fully empowered with all relevant information, quickly handling the customer’s inquiry. If that’s happening, the bank is much more likely to reach its strategic business goals.

**iQ:** What about cost savings?

**Scott:** The same network that provides improved customer service through the phone system also provides inexpensive videoconferencing, allowing for employee training right in the branch without travel costs or time away from the job. IP telephony drastically reduces the monthly service charges and management costs. And when the bank’s kiosks and ATMs are integrated into the IP network, the bank eliminates the cost of separate networks. This also allows personalizing the bank/customer interchange with, for example, cross-selling and wealth-management messages. These are the kinds of improvements happening now with Cisco Branch of the Future solutions. – G.P.P.
IP COMMUNICATIONS MADE EASY

BY JANET KREILING

With IP telephony and a converged network, midsized retailer Edwards Fine Foods finds its communications as sweet as its desserts.

If you’re a baker like Edwards Fine Foods, you want desserts—eight-layer chocolate cake, key lime pie, carrot cake—to die for, but your network alive and leavening your business. With five locations in California, Utah, and their home state of Georgia, many of Edwards’ 1000 employees are frequently on the road, creating and nurturing high-quality products that consistently win national awards and doing top-notch marketing to food service companies, restaurants, and retail supermarkets. The Cisco IP communications solution that Edwards installed last September provides dynamic communications—IP telephony, unified messaging, extension mobility, virtual private networks (VPNs) to the home, and more—that help energize its people’s work, making them more effective on the road and in their offices.

Good communications for mobile workers is especially important for Edwards, according to Steve Alsop, infrastructure manager for Edwards Fine Foods, because its employees travel more than those of most midsize companies. Because it makes products that have to be fresh and distributes them all over the US, Edwards’ manufacturing plants are located where distribution, raw materials, and workforce conditions dictate. The network must reliably and flexibly tie distant locations together and also support mobile workers—the company keeps lean in part by sharing staff members and expertise across locations, and its sales staff traverses the country.

Edwards’ parent firm, The Schwan Food Company, recently bought Mrs. Smith’s Bakeries and combined the two subsidiaries. This created an opportunity to build out the IP network to include a total of nine locations. “The executive staff saw the value in IP telephony, unified messaging, portability, the ease of moves, adds, and changes, and a quick return on investment,” Alsop notes.

The ROI for the initial Edwards converged network will be 18 months, he adds; the estimate for the buildout, which includes some new fiber and other infrastructure and will be completed this year, is 26 months. Just the savings in toll bypass charges from IP telephony in the Edwards network adds up to some US$1600 a month. Moreover, Alsop’s staff of three put in the Edwards network itself and is now doing the buildout and all maintenance as well.

The initial network, pulled from Cisco’s line of IP communications solutions for midsized businesses, is enabled by Cisco AVVID (Architecture for Voice, Video and Integrated Data). The network centers on an integrated communications system installed in Norcross, Georgia—the Cisco ICS 7750—which is equipped with Cisco CallManager call-processing software and Cisco Unity™ unified communications software. From this hub, T1 and Frame Relay links run out as spokes to Cisco 3725 multiservice access routers, which act as voice gateways, at the five locations. To segment bandwidth within the locations and deliver power to each phone, Alsop’s team installed 26 Cisco Catalyst® 3524 PWR switches throughout the network.

“Every port can provide power over Ethernet so we can plug in a phone anywhere,” Alsop says. On the desks are Cisco 7940G IP phones, and Cisco Aironet® 1200 Series wireless access points are being distributed throughout the manufacturing plants.
The buildout will be more of the same, with the exception of the core switch. Alsop will install a Cisco Catalyst 6513 switch in what will be the new data center for both companies in the former Mrs. Smith’s headquarters in Suwanee, Georgia. Cisco Unity and Cisco CallManager are now connected by this switch, which is the new network aggregation point.

Alsop is placing Cisco 3725 routers at the new locations in Suwanee; Pottstown, Pennsylvania; Spartansburg, South Carolina; and Stilwell, Oklahoma, and adding 20 more Cisco Catalyst 3524 PWR switches. With 250 new IP phones in Suwanee alone, the network is virtually doubling in size.

Any Communication, Anywhere, Any Time

“There’s not a single piece of our infrastructure that is not Cisco,” Alsop says. “We have virtual private network solutions, mobile solutions, remote access solutions—there are all kinds of ways people can get the information they need quickly on the road. Our people can communicate just about anything from anywhere at any time.”

Key to this flexibility is Cisco Unity unified messaging, Alsop says. “Our managers have the ability to send voice communications through the e-mail system to everybody on a distribution list—for example, updates on products to their sales staff. They can copy multiple people at multiple locations with just a couple of clicks. If employees are away from their desks, they can get voice and e-mail delivered by voice on IP phones, cell phones, or laptops; if at their desks, in their native form or as voice or e-mail.”

Moreover, all voice mail is enabled by the same Cisco Unity system, so employees temporarily at other locations can access their address books, speed dials, or old messages. And any employee, at home or away, can forward voice mails to any other employee. Easy-to-use teleconferencing through Cisco CallManager also brings employees together.

Cisco CallManager helps employees on the move as well. Its extension mobility feature lets them log onto any Cisco IP Phone 7940G anywhere in the WAN and acquire their own extensions, user profiles, configurations, and privileges. “This makes it much easier for us to share people among locations,” Alsop says. “An engineer can go to Stilwell, log in to the phone, and get all his or her speed dials, e-mail, voice mail, everything, just as though they were in Atlanta,” he continues. Given how much Alsop himself is on the road lately with the installations, he appreciates the convenience.

Whether at home, on the road, or at the office, employees can call anywhere in the nationwide network simply by dialing the extension they want—no dialing of 10 tedious numbers. “We especially wanted dialing by extension among all our facilities,” Alsop says.

He benefits personally from another feature of Cisco AVVID: the ability to set up a secure IP VPN to his home. Several employees use VPNs at home, equipped with Cisco 3002 VPN client systems with embedded firewall protection. When working from home, these people have all the features available on the WAN such as extension dialing and teleconferencing.

Edwards’s new network delivers reliability as well with the Survivable Remote Site Telephony (SRST) feature of its routers’ Cisco IOS® Software.

Snapshot
Edwards Fine Foods installed IP telephony over a converged network serving five locations across the US last fall and doubled the network’s size this spring and early summer after acquiring Mrs. Smith’s Bakery. Benefits like unified messaging, extension dialing across the network, extension mobility, secure virtual private networks to the home, and Survivable Remote Site Telephony are enhancing the productivity of a work force that’s more mobile than most, as well as the folks back home. The return on investment is a short 18 months on the first phase; 26 on the second—and Edwards installed the network itself.
“We’ve had several storms this year in the Atlanta area, and the power grid goes down frequently,” Alsop says. “There have been several instances where SRST has kicked in. It keeps voice service up for the building via a PRI line to the PSTN.” SRST turns the router into a mini-CallManager so it recognizes when an employee wants dial tone and forwards incoming calls to the right extension. “Edwards alone processes about 8000 calls a day so a failure would be catastrophic.”

To make sure the benefits of the new network can reach the factory floor, Edwards is installing Cisco Aironet 1200 Series wireless access points that will enable employees to handle tasks such as updating inventory in real time for more efficient planning and supply-chain management.

### Easy IP Telephony for Data People

Alsop priced out several different solutions before deciding on Cisco IP telephony. “The traditional PBX solutions were vastly more expensive because of their proprietary nature and the cost of installation,” he says. “And we are not big enough to have someone on staff to work on and administer a traditional PBX.”

Then there are the savings in lines dedicated to voice, especially for extension dialing across the network. “Without Cisco IP telephony, we’d have to buy separate T1s and use them as tie lines. And then we wouldn’t be able to do anything else with those lines, just use them for extension dialing.”

With Cisco IP telephony, he points out, “You use the pipes you have anyway for e-mail, manufacturing systems applications, and other data. There are a mountain of reasons to have a data pipe, and only one to have a voice pipe. With IP telephony, you are using lines that are already there. That is really sweet.”

Edwards terminates all types of network connections on the Cisco Catalyst 6513—voice, data, fiber, copper.

And, he adds, “Cisco AVVID is so flexible that we can do so many things, like hanging home office phones off our corporate network.”

Alsop decided to install the network himself. “I’d had a lot of experience with Cisco equipment,” he says. “The Cisco manuals are complete and easy to use. We called the Technical Assistance Center [TAC] only six times in three months for install clarifications. Cisco CallManager, Cisco Unity, SRST—if the manual didn’t have something we needed to know, we consulted the Web site.” Alsop says he saved the US$80,000 budgeted for a consultant to install the initial network, and expects to save another US$180,000 budgeted for the buildout. Even given his own expertise, Cisco made the job easier, starting with the parts list, Alsop says. “The parts list was perfect, even though it had dozens of parts. The job only went off as well as it did because Cisco was so involved. The TAC was also an amazing resource.”

He adds that IP telephony was easy for his staff to learn. “It’s just another data stream. My staff picked it up in a week or two. IP telephony just makes sense to data people.”

BEND, OREGON CONVERGES WITH IP TELEPHONY

BY ERIC J. ADAMS

With the help of Cisco Systems and channel partner Obsidian Technologies, the city of Bend, Oregon has taken a telecommunications problem and turned it into a leading example of what’s possible by migrating its entire infrastructure system—including data, voice, and video traffic—to a state-of-the-art Internet Protocol (IP) communications solution.

Bend, Oregon, a city of 55,000 at the foothills of the Cascade Mountains, prides itself on its diversity. But when it comes to the municipal government’s communications system, the city’s IT department believes strongly that many are not better than one.

“We were setting up new fire and police substations and a new fire-administration building, and we were looking at yet another standard key-switch telephone system,” says Steve Meyers, Bend’s IT director. “With each new facility, we would have a new generation of products to learn and maintain, and it was becoming a maintenance nightmare.”

Meyers and Robert Bussabarger, Bend’s network administrator, saw an opportunity to reverse this trend and converge the city’s growing numbers of voice and data technologies into one Internet Protocol (IP) network, easing the delivery of communications services through a single common infrastructure.

“I went to the management team and said, ‘We’re getting too fragmented. We need to go in the other direction—converging our telephone technology with our network technology to save hard costs and maintenance costs,’” says Meyers, who is responsible for keeping the city’s 450 employees plugged in and active.

Today, the new converged network and IP Communications solution extends to virtually every city employee, providing traditional phone features such as caller ID, call forwarding, and voice mail, as well as advanced services such as weather forecasts, airport information, and advanced directory services.

Money alone didn’t drive Meyers’ vision of convergence. “Our patchwork phone systems were a mess,” he says. “Employees in one department couldn’t forward calls to employees in other departments. It was a major operation when someone wanted to move offices or work temporarily from somewhere else. We were spending too much time and money on maintenance, administrative, and infrastructure costs. And the phone-system confusion didn’t help with the public’s perception of us.”

Meyers and Bussabarger put together a request for quotes for a converged network, and Cisco Systems along with its local channel partner Obsidian Technologies presented the case for the Cisco® AVVID (Architecture for Voice, Video and Integrated Data) solution.

The city of Bend liked Obsidian Technologies’ proposal for two reasons. The first was Cisco AVVID’s intelligent call-management technology, which provides seamless call routing, network-to-desktop computer telephony integration (CTI), and advanced telephony features. The second attraction was Obsidian Technologies itself—Bend liked the fact that it would be working with a local company that had local ties and proven expertise.

“At the time that we started our project, our network was already built on a Cisco infrastructure, so we had a pretty high level of confidence in Cisco,” says Meyers, “but IP
telephony is new stuff, and we wanted a vendor that could deliver locally and be there locally when we had a problem.”

City workers benefit from the advanced capabilities of IP telephones, such as auto attendant, "follow me" messaging, message forwarding to off-system users, and centralized directory integration.

Because each Cisco IP Phone is a network device that plugs into the data network, it allows employees "to take their phones with them when they move offices or work elsewhere for the day," says Mike Elmore, the city’s public works director.

Channel Expertise
Obsidian Technologies was no stranger to converged networks, having worked with Selsius, a company Cisco acquired for its IP telephony networking technology.

“We’re a paradigm shift for Cisco,” says David Markey, president of Obsidian Technologies. “In the past, Cisco aligned with the big guys. But IP telephony is not a commodity; it’s a skill set that requires you to know telephone technology as well as high-contact, on-location, hands-on implementation. We’re small, but we excel in what we do.”

From Cisco’s perspective, a talented channel partner has no substitute.

“Our channel partners are absolutely critical to our success,” says Chuck Robbins, vice president of U.S. Channels at Cisco. “Obsidian Technologies played a pivotal role in helping the city of Bend identify the numerous competitive advantages of a converged IP telephony solution.”

Because of its analog telephony background, Obsidian Technologies had the experience necessary to overcome the project’s major challenge of gradually migrating the city’s legacy phone systems to the Cisco IP Communications solution.

“This was really important for us, because we knew we wouldn’t have the funds to make the transition all at once, which meant we had to deal with two systems for a while,” says Meyers.

Crucial Collaboration
Bend had no room for failure. The first installations, beginning in 2000, were at police and fire stations, so reliability and flawless performance were critical from the moment the city deployed the IP telephony solution.

Meyers secured a franchise agreement with the local cable company to get fiber access for a metropolitan-area network. The agreement gave the city instant access to both the bandwidth and the physical reach that was necessary to extend high-speed data and voice capabilities to remote office locations—all with the security and reliability required for city service.

Obsidian Technologies worked closely with Cisco to ensure the feasibility of the new network’s design and to ensure product availability at a time when new equipment was just coming off the assembly line.
“At the time, a new Cisco switch was just coming out, and we wanted to take advantage of the product’s capabilities. But the switch was so new it wasn’t available,” says Markey. “I have long-term relationships with the Cisco people here, and they literally dismantled portions of their lab to get me the equipment I needed for this deployment.”

**Converged City**

Enthusiasm for the IP solution from municipal workers further encouraged Bend’s city leaders to fully transition to a converged network. In March 2003, the city boxed up the last of its legacy phone system equipment. Bend now operates on a fully converged single data and voice network.

Meyers expects to recoup the entire cost of the IP solution in three and one-half years. “And that’s just the hard dollars,” he says.

Meyers expects to significantly save on reduced maintenance, administrative, and infrastructure costs, particularly as the city grows and adds new locations and employees.

“Now that we have the entire city on one communications system, training is far easier,” says Meyers. “And we can maintain the phones from a browser on the network rather than on site.”

Elmore is also exploring the solution’s videoconferencing capabilities for training and daily briefings, as are leaders in the police and fire departments.

“We’re not quite ready for implementation, but videoconferencing means we won’t have to bring in people from remote locations, and that will save us money,” says Andy Jordan, Bend’s chief of police.

Emergency response departments have begun to connect the phone systems to Cisco Emergency Responder, a solution that automatically identifies the location of emergency 911 calls from municipal employees using IP telephones. "It will save us a few critical moments when we get calls from employees," says Jordan.

“This is more than a phone system,” says Meyers. “It’s a technology foundation for the future of the city.”

*iQ* magazine

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www.cisco.com/go/iqmagazine
A bold move to IP communications from Cisco is helping Cap Gemini Ernst & Young (CGEY) satisfy important business needs and establish an open, scalable platform for delivering future voice and data applications and services. With plans to eventually provide all of its 10,000 employees worldwide with IP telephony, this article discusses a few of the key lessons learned and benefits gained by CGEY in deploying an enterprise-wide IP telephony hub-and-spoke architecture.

When Cap Gemini bought the consulting arm of Ernst & Young in early 2000, the new management consulting and IT services company had to bring both groups into a single enterprise communications network. Given this classic opportunity to upgrade (and a nudge from the US Securities and Exchange Commission, which required it to separate operations in the US from Ernst and Young by May 2003), Cap Gemini Ernst & Young (CGEY) made a far-from-classic move—to IP communications from Cisco.

The benefits were obvious. CGEY (cgey.com) could converge its voice and data networks and centralize management—monitoring, troubleshooting, and upgrades. The Cisco IP telephony systems cost less to install and operate than PBXs. And, very important, IP communications provides the foundation for a future that includes boons such as unified messaging and other voice and data applications and services.

The timetable was short. Six months had to suffice for the initial phase, which involved 700 users at six major sites in a large triangle reaching from Pittsburgh, Pennsylvania, to Minneapolis, Minnesota, to Houston, Texas. That timetable had to stretch around design, procurement, installation, and user training.

The project roadmaps were nonexistent. This was a pioneering installation for CGEY. Despite the abbreviated schedule, CGEY planned carefully, spending six weeks, for example, on a pilot between offices in Cleveland, Ohio, and Chicago, Illinois, to test possible network components and configurations, work out problems, and assess user reaction.

The results were excellent. According to Rob Filby, CGEY’s manager of voice operations in North America, users took readily to IP telephony, appreciating features such as call logs they didn’t have with PBX service. Users also rated the sound clarity as excellent.

The network, enabled by Cisco AVVID (Architecture for Voice, Video and Data), worked and integrated well with legacy systems, including third-party hoteling software, PBXs, and voice mail.

Equipment closets were less crowded, power requirements less, costs lower. CGEY’s return on investment (ROI) looked good. At the time this issue of Packet went to press, CGEY was finishing up the second phase, converting another 500 phones so one-third of the company’s US staff will be on IP telephony; future phases will convert the rest.

Planning is underway for outfitting CGEY’s operations outside of the US as well, so in time, all 10,000 employees will use IP telephony.
The Crucial Pilot

“The single most important thing we did right was the pilot,” Filby says. During these six weeks, Filby and his staff, with advice from Cisco Technical Assistance Center (TAC) engineers, mixed and matched various AVVID-enabled components—including Cisco CallManager software, voice gateways, and Cisco IOS® Software—to find the combination that accomplished what CGEY needed.

They created a hub-and-spoke architecture, with hubs in Chicago and Cleveland for voice and data and a data hub in Toronto, Ontario (see figure). When the team began rolling the technology out full scale, the fundamental decisions and fixes had been made, and the team could concentrate on network-level issues.

“One of the strengths of AVVID is that Cisco gives you lots of building blocks, and you can choose what works best for your environment and business goals,” says Mike Shintani, technical architect, CGEY. “There are lots of ways to skin the cat.”

After trying various combinations of CallManager, Cisco IOS Software, voice gateways, and other components, the team decided on a distributed network comprising a mix of Cisco CallManager clusters running on a Cisco Media Convergence Server 7835 (MCS-7835), Cisco VG248 analog phone gateways, Cisco VG200 H.323 voice gateways with an ISDN PRI interface, Cisco Catalyst® 4006 and 6500 switches, Cisco 3725 routers, Cisco IP phones, and ancillary systems.

Among the considerations that governed these choices was the need to separate local and longdistance calls, to separate voice and data at the main distributing frame, and to leverage the WAN that CGEY already had in place.

“We use different carriers for local and longdistance calls, so we wanted the granularity that H.323 provides via dial peers,” Shintani says. “We also wanted to separate voice and data traffic so we could do maintenance on voice without taking data down. Isolating the PSTN gateway, the VG200 gives us the flexibility to do that.”

One of the more important items the team worked through in the pilot, Filby points out, was integrating a third-party voice-mail system into Cisco AVVID. The solution rests on
Simple Message Desk Interface (SMDI) and VG248 analog gateways. Smaller issues included occasional crosstalk during conference calls—solved by changing the digital signal processor (DSP) farm supporting local conferencing; some echoing—solved by changing the router and gateway combination; and some glitches in software compatibility—solved by using a different release of Cisco IOS Software.

Tailoring the login/logout extension mobility features was key. CGEY employees “hotel” offices. Rather than having a designated office, they use any available one. So, when people come in to work each day, they must login to Cisco CallManager by entering their numeric employee IDs. With the modification, they tap each key once to enter the number instead of the four times required in the usual coding (for example, A-B-C-2), thus minimizing aggravation.

Extension mobility is, currently, mostly limited to hoteling within the employee’s home city, but Filby expects that in the future users will be able to move throughout the area served by their hub and perhaps across the entire company. “The capability is there. We are working through the design now.”

Although the installation was designed and carried out by Filby’s group, he points out that “the Cisco TAC was a key component of our success. They suggested different configurations and created software patches for us. A lot of what we were doing was brand new, so there was no documentation on how to do it. TAC engineers set up parallel configurations in their labs, and we both worked on solutions while learning together.”

It was especially important to nail down the core equipment lineup and resolve basic operating issues during the pilot rather than during the full-scale rollout because, says Shintani, “if we had tried to troubleshoot in a production environment, people might have received a bad impression of IP telephony.”

User satisfaction was crucial, of course, and the group also tested how to introduce the new technology during the pilot. They settled on providing each user with paper documentation and giving receptionists and administrative assistants, who are responsible for covering multiple lines, hands-on training.

**Hub-and-Spoke Design**

Another right move was the hub-and-spoke design, with hubs initially in Chicago and Cleveland; an additional hub is planned in Texas.

Approximately 70 percent of the first 1200 Cisco IP phones are served through Chicago, about 10 percent through Cleveland, and the remainder through the Texas hub. An ATM WAN carries voice traffic as well as signaling and device management. While PSTN voice gateways are located at each branch office to give users local numbers, call processing is performed by Cisco CallManager clusters running on MCS-7835 servers in the hubs.

This design allows CGEY to centrally manage call processing, perform moves, adds, and changes, and install software upgrades and patches centrally, saving staff time and resources.

The hubs, which also house switches, voice gateways, routers, and the voice-mail systems, enable CGEY to serve up voice mail, monitor and troubleshoot network performance, and
handle other administrative tasks centrally as well, adding to the savings. In addition, redundancy is built into the hub to improve network reliability and availability cost effectively.

The local sites contain routers employing Cisco IOS Survivable Remote Site Telephony (SRS Telephony) software that automatically reconfigures the router to handle call processing in the event of a failed link to the hub.

“Should the WAN link go down, users can still make and receive local calls,” Shintani says. Conference bridges, DSP farms, switches, voice gateways, and routers round out the local sites. The switches deliver inline power to all phone jacks. “We tried powering only the voice jacks to save flexibility and had to repatch to get inline power to the data jacks, so it was actually more labor intensive,” according to Filby.

Staging and Specializing
Another step the team did right was staging some offices in Vienna before installing the equipment on site, something CGEY plans to do with all future sites. “We had the equipment shipped to Vienna, where we configured the systems, loaded the selected release of IOS, configured the Cisco CallManager instances, and tested everything, and then shipped the complete office out to the site,” Filby says. “This saved time and travel, as all the necessary people could be in Vienna at the same time, rather than having to travel to the different locations.” Staging does require early ordering, though, to have time to relay the equipment through the staging area, he adds.
Team members specialized in certain aspects of the installation, such as the voice gateways, Cisco CallManager, and LAN switching—a much more efficient approach, Filby notes, “than everybody developing expertise on everything.”

Having successfully deployed IP telephony for internal use, CGEY is showcasing the network to demonstrate the technology to its consulting clients. But that’s far from CGEY’s main goal.

As Filby points out, “IP telephony satisfies extremely important business needs for us. The facilities people love IP telephony because it requires less floor space than a PBX—sometimes just one-fifth of a rack, rather than a big floor unit—and consumes less power. It’s more flexible to manage. It delivers at least the functionality of a PBX, and it gives us an open, scalable platform for delivering future voice applications.”

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Managing large-scale IP telephony deployments calls for new tools that follow the traditional operations, administration, maintenance, and provisioning (OAM&P) model.

The primary differences between managing a traditional private-branch exchange (PBX) telephony system and an IP telephony network is that the IP solution “is not its own separate system that can be managed independently,” says Brian Promes, product line manager for IP telephony management in the Enterprise Management Business Unit at Cisco. “IP telephony resides atop a Cisco AVVID (Architecture for Voice, Video and Integrated Data) infrastructure, and it has to be managed within that context.”

The data network management staff supported the earliest implementations of Cisco IP telephony. With enterprise-scale IP telephony deployments, today’s management approaches are moving more toward the traditional operations, administration, maintenance, and provisioning (OAM&P) model long familiar to telephony managers. In many cases, telephony and data operations personnel work together to ensure a smooth IP telephony implementation and successful day-to-day operations. Fortunately, Cisco offers new management tools and enhancements to existing solutions to support both the data and telephony infrastructures.

The OAM&P Model
Telephony operations functions include monitoring and discovery of problems before they negatively impact service. Administration deals with billing, department cross-charges, accounting, and capacity management. The telephony maintenance function is quite similar to the data networking processes of fault isolation and correction. The final element, provisioning, is used to define services for individual subscribers.

Applications such as Cisco CallManager and the Cisco Unity™ unified communications solution handle provisioning of services to subscribers. CallManager also includes configuration tools and basic monitoring capabilities, while telephony gateways, switches, IP telephony-enabling router blades, quality of service (QoS), and monitoring are configured and managed through CiscoWorks. Most CiscoWorks tools such as Device Fault Manager (DFM), Voice Health Monitor (VHM), Resource Manager Essentials (RME), and QoS Policy Manager (QPM)—have been and continue to be enhanced to better enable IP telephony management.

In addition, instrumentation such as the Network Analysis module (NAM) for the Cisco Catalyst® 6500 Series provides intelligence within the network infrastructure, to analyze IP telephone traffic in real time along with the data traffic and troubleshoot network problems.

Old Model, New Tools
The DFM ensures a sound management foundation by providing continuous analysis of the general health and well being of the underlying data network upon which the IP telephony traffic flows. The data network, sometimes called the IP fabric, usually contains many devices and components, creating a complex environment that becomes difficult for
enterprises to monitor effectively. DFM simplifies management by providing around-the-clock vigilance with out-of-the-box correlation functionality that offers insight and understanding of over 100 conditions and environments known to create service-impacting problems.

“In Voice Health Monitor has helped us substantially. It keeps us proactive, finding problems before they become major... The Web-based interface is less complicated than command-line interface management.”

– Maurice Ficklin, Director of Technical Services, University of Arkansas

In a PBX network, pathways were strictly defined, whereas call pathways in a Cisco AVVID network can change constantly. In the IP telephony network, “you need advance warning that a problem will happen,” says William Gaskill, VHM product manager in Cisco’s Enterprise Management Business Unit. The new CiscoWorks VHM tool is designed specifically for operational monitoring and troubleshooting of IP telephony implementations and applications.

Coupled with DFM, VHM brings critical visibility into the telephony environment. VHM monitors the Cisco CallManagers, router gateways and switches that enable IP telephony through dashboard views that demonstrate real-time fault analysis. VHM uses synthetic traffic to replicate network activities to enable continuous monitoring of key voice components. It alerts operations staff to situations known to affect IP telephony before they become significant problems. VHM automatically looks for a range of predefined network- and device-level problems without requiring administrators to write rules or set polling or threshold values.

VHM has proven its usefulness to Maurice Ficklin, director of technical services at the University of Arkansas, Pine Bluff. Ficklin oversees a fully converged Cisco AVVID network, a Cisco CallManager cluster in each of four cores, 258 wiring closet switches, and over 2000 Cisco IP phones. “Voice Health Monitor has helped us substantially,” says Ficklin. “It keeps us proactive, finding problems before they become major. It caught a problem with VLAN (virtual LAN) duplication, found an overheating switch, and identified a memory failure in a switch. The Web-based interface is less complicated than command-line interface management. It helps us with training administrators.”

CiscoWorks Resource Manager Essentials (RME) is another popular Cisco management application that has been enhanced to support IP Telephony. RME has been enhanced to detect and report on the switch ports that can provide power to the Cisco IP phones and
to detect and document the various IP telephony applications and application platforms in the network. Proper QoS configuration is essential for good voice quality. Jack Hipp, director of computer information services at the Bonita Unified School District in San Dimas, California, tried manual QoS configuration for his converged Cisco AVVID network with 180 Cisco IP phones in 12 sites. “It’s crucial for us to prioritize packets because of the sensitivity of voice,” says Hipp. “Cisco understands quality of service.”

Bonita’s first QoS deployment was timeconsuming and resulted in suboptimal performance. Upon Cisco’s recommendation, Hipp tried QPM, which uses templates based on best practices developed and tested by Cisco. “QPM was kind of like magic. It was amazing,” says Hipp. “I have little experience with QoS, but all I did was identify the type of equipment and what I wanted. It took 15 minutes to set up configurations and push them to devices. It was very easy.”

To ensure high availability of the IP fabric being used for IP telephony, the NAM in the Catalyst 6500 Series monitors IP telephony traffic in conjunction with the data traffic for bandwidth utilization, quality issues, and QoS parameters.

This information is critical for isolating network problems affecting IP telephony in converged networks. Cisco continues to invest in developing robust, integrated IP telephony management solutions, and is committed to giving telephony managers the OAM&P tools they need to effectively install and administer a Cisco IP telephony environment.

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Want to Outsource to a Managed Service Provider?

You’ve installed the Cisco IP telephony solution on your Cisco AVVID network, but you have concerns about managing the converged network. What to do? You can choose to outsource day-to-day operations to a Cisco-qualified IP telephony managed service provider (MSP). Before you do, Mike Irving, services product manager in Cisco’s Services Marketing Group, encourages enterprise information technology (IT) teams to develop a converged network support plan that addresses the combined needs of the network, server, and telephony groups. “The plan should identify who is responsible for which support tasks, so nothing gets left out,” he says.

To assure successful handoff from deployment to “day-two” operations management, Cisco offers a new MSP specialization called the IP Telephony Remote Network Operations-Advanced Technology Provider (RNO-ATP) Program. This program helps enterprises and small and midsized businesses identify MSPs that apply Cisco-defined best practices to successfully monitor and manage end-to-end Cisco IP telephony and voice solutions in complex enterprise environments.

“The NRO-ATP program is a critical component of our support offerings,” says Irving. “MSPs that we certify under this program have a broad skill set in both data and telephony management.” Certified RNO-ATP providers have demonstrated expertise in a range of network operations center (NOC) and services for complete fault, configuration, accounting, performance, and security (FCAPS) management of Cisco CallManager, Cisco Unity software, Cisco VoIP routers, and digital and analog gateways. These skills complement Cisco SMARTnet Onsite and Software Application Support+Upgrades (SASU) services to enable 24-by-7 operations coverage.

NetSolve, based in Austin, Texas, is an MSP that specializes in remote network management services and currently manages sites in more than 40 countries. The RNO-ATP certification helps NetSolve differentiate its services and find new clients through closer collaboration with the Cisco sales force.

“NetSolve’s proven day-two operations ensure successful IP telephony migration. With over seven years of network management expertise, our customers can offload their day-to-day network operations with confidence and focus on initiatives strategic to their core business,” says Scott Olson, director of product marketing at NetSolve. “Our economies of scale reduce our customers’ total cost of ownership. We can cover 500 IP phones and the networks they reside on in five cities for about [US]$5000 per month with around-the-clock coverage.”

“My biggest fear was, ‘The minute I install this (IP telephony), how am I going to support it?’, ” recalls John Ahlberg, chief information officer at Cohen Financial, who chose NetSolve to manage his recently-completed company-wide IP telephony installation. “NetSolve is actually an augment to my IT team... I’m a pretty smart guy, and the guys on my staff are pretty smart. But there’s no way we could have kept up with all the issues [of a new IP telephony system]. Even now, there are times when we get voice mails and e-mails from NetSolve telling us something happened, they fixed it, and everything is OK. More bonus for us—we don’t have to worry about it.”

To locate an RNO-ATP provider, go to:
tools.cisco.com/WWChannels/LOCATR/jsp/partner_locator.jsp?page=partner_within_country_content