The 3Com® NBX® 100 Communications System: Providing High-Performance Telephony to the Small- and Medium-Size Enterprise

Abstract

The telephone is an essential tool for business communications even in this age of computer networking. To improve productivity and bolster their competitive positions in the marketplace, many larger firms have deployed recent advances in telephony ranging from automated attendants and voice conferencing to integrated voice/data capabilities. Traditionally, such capabilities require costly and complex solutions to implement, which place them out of the reach of small- and medium-size organizations. These businesses need to commit significant resources in hardware and software solutions, as well as IS staffs to maintain them, in order to achieve equal footing with larger competitors, or risk foregoing advanced voice communications entirely.

This paper discusses 3Com's NBX® 100 Communications System, an innovative solution that offers the advanced functionality of traditional telephone systems, but without the cost or complexity of old-fashioned voice solutions. This paper covers the following:

- how NBX technology converges voice and data traffic over Ethernet infrastructures
- how the NBX platform greatly reduces the cost of full-featured telephony
- how the NBX solution significantly increases productivity with easy-to-use telephone features
- how NBX solutions enable remote offices and telecommuters to access phone, email and Internet services, providing them with the same presence as if they were at the organization's headquarters
- how the NBX solution affordably provides advanced applications like Computer Telephony Integration (CTI)
- and examples of actual NBX deployments.

I Communications Remain the Key to Success

Although data networks are widely used to deliver information both within and between organizations, the ubiquitous telephone remains the cornerstone of business communications. No other form of communication, including email, provides the impact and immediacy of actually speaking with someone on the phone. No form of communication more effectively personalizes service to a customer or a partner than the voice of a real person. Even in today's networked workplace environment, the telephone is more critical than ever for success. It is easier to imagine a business surviving without a data network than without telephones.

To further empower businesses, vendors have greatly enhanced voice communications. Capabilities like the more efficient management of call traffic, multi-level auto attendant, and CTI have made telephony even more indispensable to business success. CTI, for example, enables an incoming caller's records to appear automatically on the desktop screen, which has proven to be a boon for expediting order taking and customer service.

Additionally, companies can tailor today's telephone systems to their specific requirements by implementing calling groups, call hunting schemes, and dial plans throughout the enterprise to optimize voice communications. Firms with such systems, particularly those operating in transaction-intensive, customer-driven markets, enjoy a distinct competitive advantage over companies without them. These sophisticated telephone systems provide a significant boost in productivity and can help deliver substantive improvements to an organization's bottom line.

Finding Affordable Solutions for Small and Medium Locations

Despite the power of today's telephone technologies, owners and decision makers of many companies cannot deploy these advances because of their high costs and complexity. Scaled for larger enterprises, which can afford substantial investments in sophisticated technologies and the IS staffs needed to maintain them, these new services are often beyond the reach of small- and mid-size organizations that lack such resources.

Traditional solutions, like PBXs and key systems, are expensive to install and administer, requiring dedicated wiring infrastructures and either service contracts or an internal staff experienced in telephone technologies. Linking telephones and desktop computers for

even basic CTI applications costs hundreds of dollars per phone. Additionally, these traditional telephone solutions are expensive to maintain. Moving, adding, and changing telephones requires skilled service technicians to perform the work. For rapidly growing small- and medium-size firms, which often have continually changing workforces, phone installations are a substantial drain on resources. These systems do not scale well and require firms to install entirely new technologies when growth outpaces their capacity and usefulness.

PC-server telephony solutions, another option, have not gained widespread acceptance because they are cumbersome, difficult, and not sufficiently reliable. They also demand separate wiring for telephones and the phones cease to work should the server fail. This approach also requires that users access their phone services via computer screens, which is for most customers a less convenient and intuitive alternative than simply picking up a handset and dialing a phone.

As a result, although the marketplace offers choices for obtaining voice communications, none are tailored to fully meet the budgets of small- and medium-size organizations. The irony is that while the reduced cost of computing power has leveled the playing field for data communications – so even the smallest firms can afford robust desktops – powerful telephony remains limited to larger, resource-rich organizations. Likewise, the Internet allows a smaller company to look as diverse and sophisticated as a larger one, but the traditional telephone paradigm restricts small organizations to a limited number of call-handling features.

Today's small- and medium-sized organizations demand telephone solutions that are affordable and easy to maintain, yet deliver the features of powerful telephone systems, including sophisticated call handling and even call-center capabilities. Telephony systems suited for this marketplace must be flexible, easy to scale, and inexpensive to own, allowing for simple and cost-effective administration of moves, adds, and changes to manage growth. Such solutions would ensure even the smallest enterprises of highly effective and efficient voice communications and provide parity with larger competitors.

The 3Com® NBX 100 Communications System is designed to meet these needs.

II The 3Com® NBX® 100 Communications System

3Com's NBX 100 Communications System, now in its second generation, delivers toll-quality voice communications and the advanced telephony services demanded by businesses today. The NBX system features the sophisticated capabilities of traditional solutions, such as PBXs, but without their costs and complexity. The platform also sets a new standard for lower cost of ownership for enterprise phone systems, permitting users to quickly move, change, and add telephones without any expertise in telephony technologies or reliance on service providers.

The key to these and other functionalities of the NBX system is its innovative approach to telephony, which delivers on the promise of converged voice and data communications. The solution fully integrates telephony with standards-based Ethernet technology to provide a powerful telephone system that addresses the needs of small- to medium-size businesses and the remote offices of larger enterprises.

The NBX system underscores 3Com's strategy to provide organizations with high-function, high-value communications solutions. The technology is designed to be a scalable, future-proof investment, and 3Com is continually enhancing and expanding its feature set. Future development of the NBX platform will continue to be backward compatible through software upgrades, ensuring today's NBX telephones will not become obsolete as an organization grows. 3Com already has extended the scalability of each NBX system to up to 200 devices and bolstered built-in, advanced call management features. To further safeguard the NBX solution as an investment, the technology will continue to be standards-based and open, providing interoperability with future voice and data products and innovations.

Converging Phones with Standards-Based Ethernet Networks

The NBX 100 Communications System is installed as an integral part of a customer's Ethernet-based local area network (LAN). Each NBX telephone is a network device, like any desktop, server, or printer. For organizations without data networks, the NBX system provides a standards-based 10 megabits per second (Mbps) LAN to which additional devices like PCs, servers, and printers can be attached.

The NBX solution unifies voice and data communications, eliminating the need for separate wiring infrastructures for telephones and data LANs and greatly reducing deployment costs. NBX architecture enables established organizations to leverage their existing Ethernet networks, dispense with the intricacies of traditional telephony technologies and reduce the cost of ownership by facilitating moves, adds, and changes to the system. Furthermore, the merging of telephone and data systems permits users to truly integrate voice and data communications for features like unified voice and email messaging and TAPI (Microsoft Telephony Applications Programming Interface)-enabled CTI. These and other e-business application capabilities are standard on every NBX system.

The 3Com voice solution is based on Ethernet, the protocol that has emerged as the worldwide standard for LAN infrastructures due to its simplicity, ease of use, low costs, and scalability. 3Com NBX technology formats audio signals into digital Ethernet packets and forwards them to their destination, where they are formatted back to audio signals. Even over wireless connections, the NBX platform eliminates latency and jitter that compromised the voice quality of early Ethernet telephony. Consequently, users rely on their NBX phones to enjoy reliable, crystal-clear voice communications throughout the enterprise.

Each NBX system links to outside phone lines (loop-start analog lines or digital T1), allowing users to call any other phone in the world, exactly like traditional telephony. The NBX telephony solution also provides quality phone services over the wide area network (WAN) for toll-bypass communications with other networked sites. Moreover, NBX technology supports H.323 services, enabling economical Voice-over-IP communications. This functionality allows users to make toll-free, long-distance calls over the Internet to branch offices or corporate headquarters.

NBX phone systems have a proven record for reliability. They run independently of both network and PC operating systems and do not require servers or desktop clients. For this reason, even if every PC on the network crashes, the NBX platform will continue to provide fully functional telephony, ensuring the flow of mission-critical voice communications. In fact, the highly-respected CT Labs, as reported in the April, 2000, issue of Computer Telephony Magazine (p. 179), gave the NBX 100 system a 99.999% accuracy rating in trunk to station switching.

What Is LAN Telephony? What Is IP Telephony?

LAN telephony, sometimes called Ethernet or network-based telephony, extends the usefulness of the LAN beyond the sharing of computers, printers and Internet access to include telephone services. With LAN telephony, voice and data traffic traverses the same network or infrastructure, using the same cabling, switches, and hubs. Every telephone is another device on the network, relying on the same Ethernet standards (802.3) that have been in place for years for data communications. Audio traffic is converted into digital packets and forwarded via the network to the public telephone network. At the receiving end, the packets are converted back to audio.

IP protocols are used for telephone services across the WAN or the Internet. Like LAN telephony solutions, IP telephony, known as voice over IP or VoIP, packetizes audio information and sends it over the network. LAN telephony generates digital packets. IP telephony generates true IP packets.

Decision-makers considering Ethernet-based telephones for their organizations have these choices. Smaller, single-site firms can deploy LAN telephony that operates at Layer 2, the MAC address or Ethernet layer. Larger firms that want voice communications across the WAN or Internet use the IP standard at Layer 3, the IP address layer. MAC addresses are easier to use, a benefit for smaller organizations lacking substantial IS/IT resources, whereas IP addressing offers long-haul, toll-bypass telephony. To assist organizations with limited IS/IT resources that nevertheless would benefit from occasional IP access, 3Com offers "IP-on-the-Fly." See page XXXX.

As part of 3Com's enterprise voice strategy, the 3Com NBX 100 Communications System enables both approaches, providing small to mid-size customers with the ability to harness the power, efficiencies, and cost-savings of network-based voice communications for today's e-business. The system's support of standards-based QoS (Quality of Services), including IEEE 802.1p/Q, IP Type of Service (IP TOS) and IP DiffServ, allows organizations to prioritize and expedite both voice and data traffic on the LAN/WAN. Regardless of which cost-effective protocol is deployed for a particular call, the NBX 100 system is transparent to the user. People talk over LAN telephones in the same familiar way that they speak over a traditional PBX, key or hybrid system.

Innovative Architecture Delivers Functionality, Simplicity, and Economy

An NBX system uses two prime hardware components – a rack-mounted chassis and multi-line telephone sets.

Figure 1: Image of an NBC chassis
Caption:
The fully expandable NBX chassis provides reliable, peer-to-peer call handling options.

The chassis connects via standard interfaces to the LAN infrastructure and provides the processing for all call traffic. It supports multiple processing and interface modules, enabling customers to scale their phone systems as their needs grow. Each four-port analog line interface card, for example, connects up to four public switched telephone network (PSTN) lines with built-in Caller ID support. An NBX Digital Line card permits customers to take advantage of T1 services for high volume, low-cost connectivity to local and long-distance telephone service providers. The system's scalable call processing engine doubles as an innovative voice application server, delivering advanced features like multiple, multi-level auto attendants and CTI.

Figure 2: Image of an NBX telephone
Caption:
The easy-to-use, customizable NBX multi-line telephone.

An essential feature distinguishing the NBX system from traditional phone solutions is the simplicity with which the sets connect to the system. Unlike the master/slave paradigm of the PBX, NBX phones, as Ethernet devices, connect directly to any Ethernet port in the LAN. Users simply plug their phones into the network as they would a printer or laptop computer. To relocate phones, they merely unplug them from one location jack and connect them to another. The distributed architecture of the NBX system enables each telephone to retain its identity (i.e., its customized speed dials, usage authorization and extension number). Consequently, NBX solutions enable organizations to arrange and re-arrange their phone system according to prevailing needs with unprecedented ease. This simplicity dramatically reduces the NBX system’s cost of ownership over conventional telephone systems, which are difficult and expensive to modify.

Figure 3: Image of an enterprise-wide NBX architecture
Caption:
The 3Com NBX system connects to both circuit-switched public networks and Ethernet networks.

NBX 100 architecture is distributed for increased control and flexibility throughout the network. Each NBX telephone contains a digital signal processor (DSP) to handle all incoming and outgoing voice traffic, providing sound quality or QoS at each intelligent end point. The telephone set provides the full range of features, such as speakerphone, conferencing, transfer, redial, caller ID and speed dialing, that users have come to expect from premium phone systems. With one touch, users can instantly access voice messaging services, speed dial, and voice mail. Moreover, achieving truly converged voice and data communications, each phone also features a built-in mini-hub or data jack, allowing users to plug their computers into the network via the telephone set.

Management of the entire NBX phone system is simplified by the Web browser-based NBX NetSet™ administration utility. This user-friendly GUI (graphical-user interface) program enables employees to readily customize their phones' feature set, ensuring each is configured for optimum productivity. The intuitive, pictorial NBX NetSet works with any familiar Web browser, such as Netscape Navigator or Microsoft Internet Explorer. Every NBX system includes the NBX NetSet administration utility for both users and administrators.

Figure 4: Image of the NetSet user interface
Caption:
The NBX NetSet administration utility

III Benefits & Features

From manufacturers and technology dot.coms to schools and research labs, the NBX system makes advanced telephone solutions affordable and practical. 3Com's LAN-based telephone system delivers superb quality, function-rich business telephony and advanced CTI functionality at significantly competitive costs. It enables organizations to operate more productively, reliably, and cost-effectively. Moreover, the solution delivers exceptional value by providing a wealth of features that otherwise would cost extra and

require hardware upgrades and service calls. Adding new functionality to an NBX system usually requires merely downloading software.

Convergence of Voice & Data Communications

The NBX system integrates voice communications with data traffic on a single networking infrastructure, eliminating the separate phone wiring infrastructure required for traditional telephone solutions and significantly reducing the expertise and resources needed to maintain these systems.

Reduced Cost of Deployment

Customers leverage their existing Ethernet network cabling to fulfill all their communication needs. By delivering both voice and data communications over a single wire, the NBX solution greatly reduces deployment costs and resource-draining complexity.

Lowered Total Cost of Ownership

By allowing for easy moves, adds, and changes of phones, the innovative NBX architecture substantially reduces the cost of ownership. Organizations can deploy powerful, full-functioned telephone services without incurring the maintenance and administrative expenses demanded by conventional phone technologies. By greatly reducing the need for costly service contracts and on-site service technicians, even small locations can benefit from the sophisticated telephony features once limited to large corporations.

Buckeye Elementary School, a K-8 school district in Buckeye, AZ, with 1,300 students, sought an easy-to-use, cost-effective telephone solution to replace its aging key system. The district wanted to ensure that teachers could speak conveniently with parents and administrators had reliable voice communications for its business operations. Additionally, the district needed to tightly monitor phone usage to avoid abuses as well as quickly deploy phones on its 14-building campus for volunteers and visiting parents. For its solution, Buckeye Elementary deployed a 3Com voice solution on campus. Users now plug their phones in minutes into any of its campus Ethernet network ports, ensuring voice communications are available wherever and whenever required. Moreover, the district eliminates paying phone installers $150 per hour every time a telephone needs to be moved. Using the NBX NetSet administration utility, the district easily regulates its phones, tracking usage of each and restricting long-distance access on some. In addition to its 60 NBX telephones, the district will enable staff to deploy multimedia PCs

as phone sets, providing teachers with voice communications to parents directly from their desktops. Provisioned with NBX technologies, Buckeye Elementary has reduced costs while enhancing safety and communications among administrators, teachers and parents.

Flexibility

The NBX platform operates in shared and switched 10Base-T Ethernet environments most commonly used by small and mid-size sites. The system functions in virtually any networking architecture and any WAN technology, including ISDN, ATM, T1, Frame Relay, xDSL, cable modems, and wireless Ethernet links. Optional analog terminal adapter cards support tip/ring or analog devices, permitting devices like fax machines, cordless phones and single line (2500) sets to operate seamlessly on the system. Users who rely heavily on telephones, like call-center agents, can use a headset and the NBX pcXset PC telephone client for hands-free voice communications. Schools with an occasional but vital need for telephone and voice mail access in PC-deployed classrooms find pcXset to be a cost-effective voice solution.

Reliability

For outstanding availability of mission-critical voice communications, the NBX telephony solution delivers 99.99% reliability, which translates to only one minute of scheduled downtime occurring for every 1,000 operating hours. The NBX system works independently of any operating systems on the network and will continue to perform even if any or all other network devices cease to function. This essential design characteristic means that users and callers will have telephone capability whenever they need it.

A Free LAN

For new, moving, or smaller sites without a data network, installing an NBX system also provides a built-in LAN, ready to be leveraged for data transmissions. Users can plug in PCs, printers, servers, and other devices into the network for fully functional connectivity. The NBX architecture delivers the opportunity and simplicity of convergence.

Standards-based

The NBX platform offers open, standards-based architecture that works with any existing desktop computers, servers and Ethernet switches, routers and hubs. As a result, customers avoid the costs, hassles, and compatibility issues raised by proprietary technologies.

Plug'n Play Deployment

3Com NBX systems deliver the industry's simplest phone system implementation. This is key for small locations, which generally lack the internal resources for extensive technical support. Installing NBX telephones is literally plug'n play. Rather than wait days, if not weeks, for costly, on-site service technicians to add or move phones, employees can move their own phones by merely unplugging their handsets from one network jack and connecting them to another. The NBX system automatically retains each user's phone number and settings. For groups that are rapidly growing or relying on on-site consultants or temporary workers, this ease of installation permits an NBX phone system to pay for itself in no time.

Premium Quality Business Telephone Services

The NBX system delivers full-featured, premium-grade voice communications to ensure the timely and efficient management of inbound calls.

Call Management Features

To power businesses, every NBX phone system provides a host of productivity features. Each NBX telephone, for example, offers speakerphone, conferencing, caller ID, speed dialing, and call pick-up from any other phone. NBX systems deliver call forwarding, built-in system-wide paging, call detail reporting, and user-programmable keys with LCD displays for greater ease-of-use and efficiency.

Multiple and Multi-Level Auto Attendants

Automated attendant allows users to support or replace receptionists and improve the flow of communications even during non-business hours. New enhancements enable NBX users to customize inbound routing by creating up to 99 different automated attendant greetings, each tailored for a division, workgroup, or individual. Using the NBX NetSet administration utility, organizations can provide up to 20 levels of main menus and sub menus that enable callers to route themselves quickly and accurately to desired individuals or workgroups. Every inbound line or DID (Direct Inward Dialing) number can have its own custom greeting (including time-dependent greetings), main menu, and submenu selection choices. As a result, firms can organize call patterns according to their exact needs, ensuring customers, clients, and vendors to access their parties around the clock.

Time-of-Day Service Modes

Firms can further customize NBX systems to meet their needs by programming different automated attendant greetings and call routing paths for various times of day, such as Business hours, Non-business hours, and Lunch. A receptionist, for example, can press a button to put the system in Lunch mode at any time, thereby routing callers to a secondary receptionist position.

Voice Messaging Features

Powerful voice messaging features are standard with every NBX solution. Users can easily access their voice mail and deploy personalized greetings, password security, and group messaging. The system even offers phantom mailboxes so workers without phones can receive and manage messages.

Programmable Call Center Hunt Groups

The NBX platform can route incoming calls to the next available person within a group, such as customer service, technical support, or order entry. For greater flexibility, the technology allows both linear and circular hunt groups -- up to 48 groups per system. With linear hunting, users organized into groups share a common extension. Inbound calls are routed in a sequential, predefined order. In circular hunt groups, calls are routed automatically to the next available member of the group. Calls, for example, might go to the next free salesperson within a sales group. If no one in the group is available, the system can stack the callers in a queue or provide alternative coverage. Either way, the hunt group feature of the NBX platform ensures that users share the call load and business opportunities are never lost.

Calling Groups

Calling groups provide coverage for important calls by routing them to a predefined group of extensions until an available person picks up. The NBX platform supports up to 48 calling groups to manage call flow, even if an automated attendant answers the phone. If callers, for example, want to speak directly to a person instead of leaving voice mail, they can press “0” on the automated attendant menu, triggering an alert to multiple individuals in a calling group to answer the call promptly.

ChannelWave Software, Inc., of Cambridge, MA, is a leading provider of partner relationship management applications. Fueled by its impressive growth, the firm’s staff expanded from 13 employees to 70 in less than two years. ChannelWave’s legacy PBX phone system, however, scaled only to 30 users. The software developer turned to NBX

technology for a scalable phone solution. As new hires come onboard, feature-rich phones are installed quickly, easily and inexpensively. Today, the firm deploys 115 NBX phones to meet its 24/7 voice communications needs.

Powerful communications applications

Due to its innovative architecture, the NBX platform offers powerful communication applications for productivity-enhancing services.

Unified Messaging

Every NBX solution includes the APX (Advanced PowerMail eXchange) messaging system, a set of powerful software tools for call answering, routing, and messaging. These tools allow users to seamlessly integrate email and voice mail messaging into a universal in-box for unparalleled ease and efficiencies. Employees can view and access their voice mail in the same visual, non-linear way they are used to viewing their email, using any IMAP4-compliant contact management application such as Microsoft Outlook Express or Eudora. They can save their voice mail as sound files for replay later, just as they might save any .wav audio file, and even forward them to anyone in the world with an email address and a multimedia PC. 3Com's Unified Messaging capability takes business communications to a new level so users can better manage their work, prioritize tasks, and respond rapidly to customer needs. The NBX system ships with 30 minutes of voice mail storage and scales up to 80 hours through software upgrades.

Local and Off-Site Message Notification and Retrieval

To expedite communications, NBX telephones promptly notify users of new messages via an LED light. Moreover, if users are off-site, the APX messaging system in every NBX platform can notify them of new messages via pagers, telephones, or cellular phones. They then can easily retrieve their messages via any touch-tone phone. The NBX solution makes such sophisticated voice communications affordable and practical for even small organizations.

Call Center Applications

All organizations can benefit from increased contact with their customers. Efficient, productive contact with customers is a hallmark of professional service. Yet the sophisticated communication capabilities that make large call centers so productive have been far beyond the reach of smaller locations. Due to its innovative approach to telephony, the NBX platform delivers advanced call center solutions at no additional cost.

Thanks to TAPI-enabled Computer Telephony Integration, the system can recognize each caller and display the appropriate records, such as purchase history and charge card data, on the screen of the next available call center agent. These time-saving applications, once limited to large, expensive call center operations, are now available to even modest-size firms. With 3Com technology, information in your PC is now accessible to your phone.

Wyoming.com LLC is a rapidly growing ISP with an increasing residential and business customer base. To provide superior customer service, the firm deployed an NBX system, converging its voice and data in one infrastructure. The firm uses auto attendant with multiple greetings, eliminating the expense of a receptionist, and unified messaging to ensure the reliable forwarding of business-critical communications. With these capabilities, Wyoming.com LLC is "always open." It also is using the CTI features of the NBX platform to operate a small call center, providing attendants with near-instant, easy record retrieval for every customer who calls, delivering accurate customer service.

Simplified Administration

Despite its robust capabilities and sophisticated features, the NBX system is extraordinarily easy to manage. Organizations no longer have to forego the features and functionality of expensive telephone solutions to control costs and simplify administration.

Ease of Use

No matter how fully featured a phone system may be, its capabilities are wasted if workers find them difficult to access or use. 3Com voice solutions offer users simplicity, flexibility, and convenience unequalled by old-fashioned telephone systems. With NBX technology, even the newest users control their phones, not the other way around. The intuitive NBX NetSet administration utility allows employees to easily program their own phones, thereby ensuring that voice communications are optimized for each user's needs.

Enterprise-wide Management

With the NBX NetSet administration utility, the NBX platform provides administrators and small-business owners with unprecedented control of their phones that is simple and system-wide. From anywhere on the LAN or WAN, they can use the browser-based

utility to quickly make changes throughout the enterprise so that NBX phone systems are always up-to-date and ideally configured for maximum productivity.

Account Codes

For professional organizations that bill clients by the hour, the use of the account code feature of the NBX platform could pay for the entire system. When on the phone with a client, a user enters that client's account code via the telephone set. The system keeps a log of every call by account code, its date and its duration, ensuring accurate accounting of calls and billing. While such a useful business feature might cost thousands of dollars in other phone systems, it comes standard with the NBX solution.

Dial Plans

The NBX system offers sophisticated dial plans to provide administrators and owners with effective, around-the-clock management of both incoming and outgoing calls. To avoid unauthorized long-distance phone calls that inflate operating costs, for example, dial plans can restrict calls and their routing based on parameters such as time of day, day of week, each user's class of service, and area and country codes.

LAN/WAN/Internet Connectivity

The NBX system delivers high-quality voice communications throughout the enterprise, over the public telephone system and across the Internet.

Enterprise-wide Communications

In addition to providing users with access to public telephone lines and other phones on the LAN, NBX solutions provide extraordinary connectivity over the WAN and the Internet for greater cost-savings and enterprise-wide communications. Full support for popular connectivity and Quality of Service standards, from PSTN and T1, to 802.1p/Q and IP TOS, provide users with comprehensive deployment options to meet any need.

Internet Telephony

With its support of the Voice-over-IP H.323 standards, the NBX system offers voice communications over the Internet. This means that distributed offices can use NBX ConneXtions gateways to place calls to each other over the Internet rather than the public telephone system. As a result, long-distance phone charges can be reduced for substantial cost-savings.

Figure 5: Image of distributed sites using the WAN and Internet for voice communications between NBX systems.

Caption:

3Com voice solutions can deliver voice and data communications between distributed sites over WANs and the Internet.

Supporting Telecommuters

Telecommuters and traveling employees can plug their NBX phones into standard routers at home or elsewhere and link via the WAN or the Internet to the central office LAN and its NBX system. With full access to all of the system's telephony features, such as transfer, messaging, and teleconferencing, workers will seem to be in the office, regardless of where they may be located. Businesses can use this cost-effective feature to attract and retain valued employees, offering location flexibility while maintaining seamless professional communications.

Oswald and Yap in Irvine, CA, is a 12-attorney law firm specializing in legal services for high technology firms. The firm relies heavily on voice communications to meet its clients' needs, so when it moved into its new office building in 1999, it replaced its legacy PBX with two NBX chassis and 50 NBX phones. By converging voice and data traffic over the same infrastructure, the firm economized on cabling and eliminated costly service fees every time it needed to install or move a phone. It enhanced communications with its clients by deploying such standard NBX features as voice mail, call forwarding, automated attendant, and conferencing. Users also will use the account code feature of the NBX platform to track all phone calls with clients for accurate billing. Moreover, the firm will support telecommuters by providing users with NBX telephones to connect to high-speed Internet connections, like cable modems, at their homes. They will make and receive phone calls and enjoy all the same NBX functionalities from their homes as if their sets were plugged directly into the firm's Ethernet network at the office. As a result, Oswald and Yap reduced its telephone costs while improving its responsiveness to its clients.

IV. Conclusion

Even as data networks support the worldwide proliferation of e-commerce, the telephone remains critical to organizations, large and small. Voice will continue to be a principal mode of communication in the workplace and elsewhere. Capitalizing on this fact, traditional telephony vendors have enhanced telephone capabilities, making phone service more crucial than ever to success in the marketplace. These solutions, however, are

proprietary, inflexible, expensive to buy and deploy, and not very expandable. While their functionalities provide the large organizations that can afford them with distinct competitive advantages, smaller locations have been left out in the cold.

3Com's NBX 100 Communications System is designed to provide all organizations with reliable, feature-rich telephone systems, but without the costs or complexity associated with traditional solutions. With its groundbreaking architecture, the NBX platform leverages and extends the functionality of scalable Ethernet networks, providing advanced voice communications and the convergence of voice and data for powerful business applications. The NBX system delivers solid benefits because of its many extraordinary capabilities and the unequalled ease-to-use of these features, thereby ensuring bottom-line cost savings and tangible productivity enhancements. The 3Com solution is the smart communications strategy.

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