On-Site Demo

Electronic Workforce

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Michael Clarke, the senior sales engineer of Edify, came to CTI Labs to demonstrate Electronic Workforce, a versatile product that facilitates application development, performs transaction processing, and delivers workflow functionality. Electronic Workforce is much more than a "glorified" application generator. As we learned in Mike's demonstration, the product has many features and functions that are at once powerful and are easy to use.

Electronic Workforce is an agent-based software that enables companies to deploy employee and customer self-service applications. For example, a company can give employees and customers direct access to its information systems. With Electronic Workforce, it is possible for employees to retrieve 401K or other benefit information via fax, pager, the Internet, and e-mail interfaces. Other interfaces can be added as needed.

A company can create applications that provides its employees and customers controlled, secure online access to the company's information systems through a simple, graphical user interface. The creation of this GUI does not require the development, distribution, or maintenance of any custom code on the PC used by the employee or customer. Also, the application developed is completely platform independent, meaning the application can be accessed from any Windows-, Macintosh-, UNIX-, or OS/2-based PC.

QUICK OVERVIEW

Edify summarizes the key attributes of its product with an acronym. This acronym — McFAST — is defined as follows:

M — Mixed Media

Edify's Electronic Agents (lines) support not only telephones for voice

response, they also proactively initiate services and transactions. They also support fax, e-mail, and World Wide Web/Internet access.

C — Client/Server

The Electronic Workforce was designed from the ground up to allow open access for all information in an organization. Employees and/or customers can easily retrieve information from legacy hosts, client servers, even PC applications. Edify can read screens and make direct SQL or ODBC calls to your database systems without specialized programming.

F — WorkFlow

Electronic Workforce can continue working before and after the call.

A — Agent Trainer

Applications are developed or modified using Agent Trainer, a graphical, intuitive methodology. *No* coding is required. The intent is to give you control of your systems and applications.

ST — STandard Architecture

Electronic Workforce, as a software product, will operate on any industry-standard PC platform. As platforms become larger, faster, and less expensive, you simply change your platform. Your applications are fully protected.

AGENT TECHNOLOGY

Edify's products are based on what it calls Agent Technology. An Agent is a software application that provides functionality for a user, rather than requiring user manipulation. Edify Agents support voice response, fax, e-mail integration, and Internet and workflow capabilities.

Mixed Media Support

With Electronic Workforce, customers can determine the means of information delivery. In addition, information content can drive the media used for delivery (for example, faxed statements).

An agent can start work based on the receipt of requests over various media, not just an incoming phone call. As new media devices become available, the Electronic Workforce integrates them into delivery applications

Figure 1. Viewing account statement via Web browser.

Figure 2. Sample connectivity.

Heterogeneous Information Environments.

The product supports access to information that is resident on hosts, client/server systems, specific application servers, or LANs. By supporting a wide variety of connectivity options, Electronic Workforce can either be used to integrate information from multiple sources into a unified information message or to mask the migration from legacy systems to client/server systems from users. Finally, Edify can automate entire processes that involve the movement and processing of information on multiple computing platforms.

Workflow Capabilities

Entire processes, not just transactions, can be automated. This capability allows you to fully utilize Electronic Workforce for process improvements.

By supporting multiple agent triggers (beyond an incoming call), Electronic Workforce goes beyond traditional IVR. Agent applications can be started by a date/time, a database event, a network event, an incoming fax, an electronic mail message, or another application. These triggers lets you build proactive applications that anticipate customer needs.

COMPLETE APPLICATION CONTROL

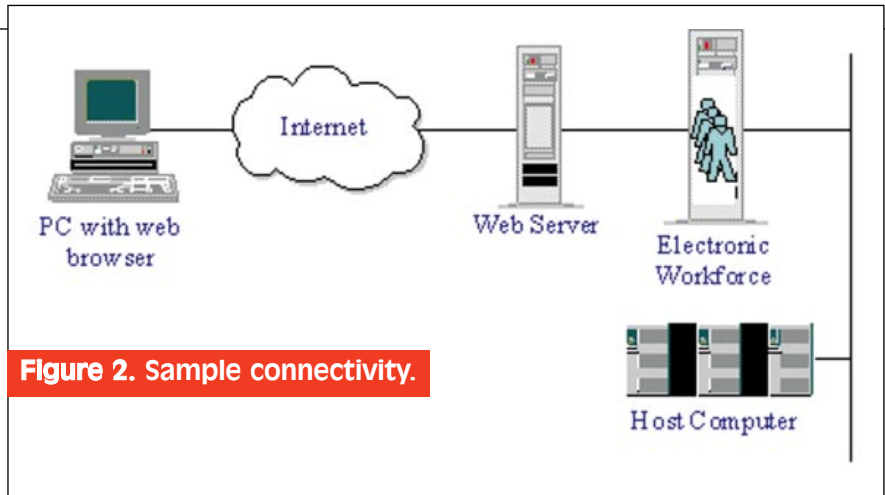You can utilize Edify's consulting organization to build entire applications or support your efforts in building them. Also, you can utilize Edify's network of application partners to assist you in the development of applications. Your other option is to take full responsibility for application development, independently from Edify.

Part of the standard Edify product offering is the ability to interface real-time with many popular SQL-based databases, including Oracle, Sybase, DB2/2, Microsoft SQL Server, BTRIEVE, Informix, and CA-Ingres. Electronic Workforce has been designed to perform real-time database retrievals while the caller is on the line, with no user-perceived delays. The database connections are supported by using Q+E. Each Electronic Workforce server can connect to 10 different databases concurrently, and every caller on the node can have access to these databases simultaneously.

Electronic Workforce also provides standard reports which may be run remotely or locally. These Windows-based graphical reports track statistics for applications, lines, trunks, and faxes. They can be run for an individual node, or for all nodes on the network. Call statistics may be stored either on a network database or on an Edify server.

FEATURES
Web Interface

Edify's Electronic Workforce can interface with Web servers, thus providing any PC with a standard Web browser an interactive, graphical interface to access information stored within the company. Now, instead of your traditional IVR answering a phone call, retrieving information from a host computer and speaking it back to the caller, the Electronic Workforce can receive an inbound request from a Web browser, retrieve information from a host computer, and dynamically create an HTML document for review. For example, a bank can do more than offer each customer the ability to call and have an account balance spoken back over the phone. The bank can also allow the customer to view an entire account online via the Web browser software and an Internet connection on a PC (Figure 1).

This interface to Web servers enables the Electronic Workforce to receive an inbound request via the Web server, assign a software agent (which will start a specific application), and maintain an online session with the remote user via the user's Web browser. Once the session has been established, the software agent can go through a process of receiving requests or information from the user and sending documents for display. These documents can be static documents, or the agent can create dynamic documents incorporating information or graphics it retrieves from any host computers or network databases. To illustrate this functionality, Figure 2 demonstrates how a home banking application might appear.

Figure 3.
Agent Trainer.
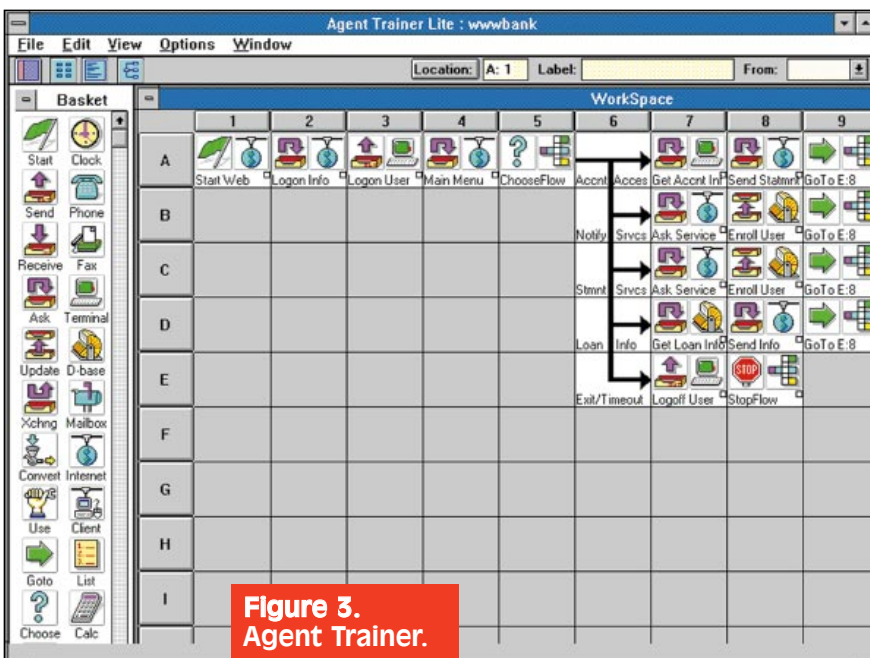
Applications created for Electronic Workforce are developed using Edify's Agent Trainer product. Agent Trainer is a 100% visual development environment that requires no scripting or coding. It enables a developer to graphically define the "overall flow" of an application as well as each of the individual steps that make up the application, such as retrieving information from a host computer or network database or sending or receiving phone calls, pages, faxes, or e-mail messages.

The Agent Trainer tool is what gives you the features necessary to develop Web-based PC self-service applications. Developers using Agent Trainer can create applications that are initiated on inbound requests to a Web server, which will trigger the particular application, and then the application will maintain an interactive session with the originator of the request (Figure 3).

One of the features of Agent Trainer is a WYSIWYG layout tool to design the HTML Web pages. (This is used by an Edify software agent to create the page and send it back to the user's Web browser.) The layout tool can incorporate dynamic information retrieved from a host computer or network database as well as input mechanisms such as option buttons and text input fields. The WYSIWYG HTML editor makes hand-coded HTML unnecessary, but you can still use your favorite HTML editor. However, Edify does need to know about fields that are dynamically updated from a database. In these instances, the best thing to do is use Edify's HTML editor (Figure 4) for database linking.

Security

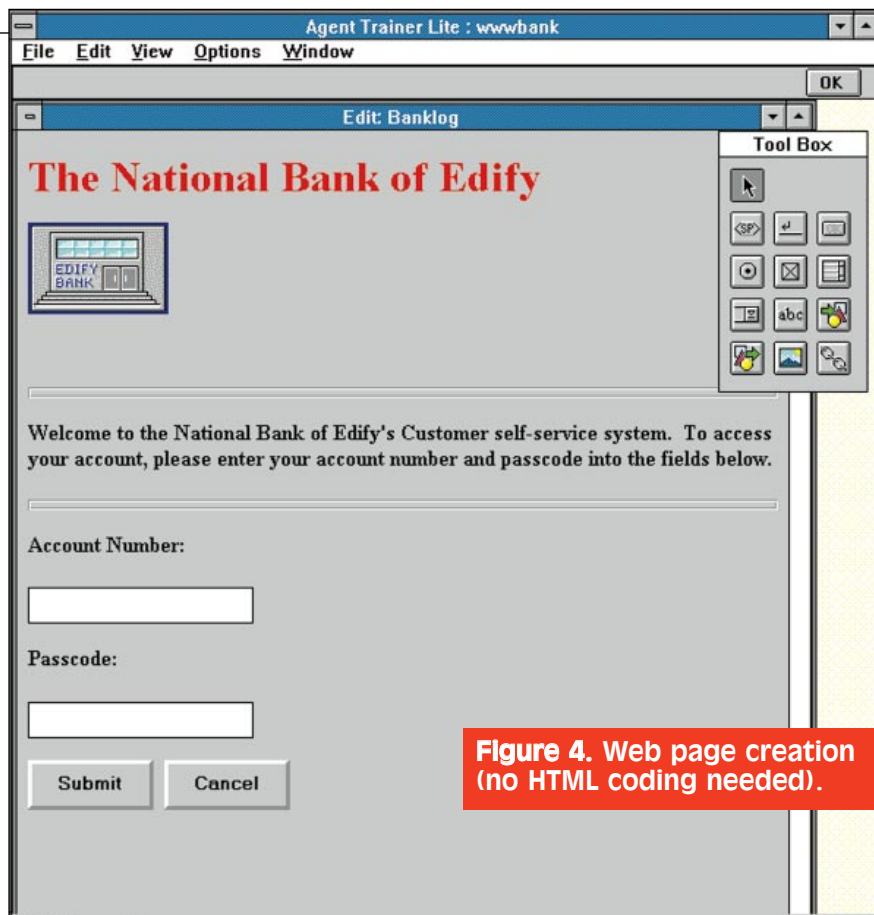Edify handles security through "standardized" security safeguards and customized solutions. Edify will integrate with existing backoffice safe-guards, such as log-on and password verification, in addition to structured query language (SQL) access security. With the Agent Trainer graphical development tool, such backoffice standards are seamlessly integrated into each application. Moreover, Edify provides application-level protection with user log-ons and authentication, allowing developers to specify the security requirements necessary to access applications.

An interesting feature is the availability of cross-media personal identification numbers (PINs). Should certain customers be uncomfortable entering secure information over the Internet, they have the option of entering their phone number and requesting that the system proactively call for touch-tone data entry. The Edify system will verify the data entered via DTMF and automatically change the "dynamic" Web session to the *next* HTML page. This is a powerful feature providing customers with the freedom to decide the procedure with which they are most comfortable.

One of the industry-standard security procedures which Edify supports is the Secure Sockets Layer (SSL). Access to the interactive session may be limited to those browsers that support SSL. Edify is attempting to address other security concerns by partnering with two of the leading firewall solutions providers, Secure Computing Corporation and Raptor Systems.

Connectivity

Terminal emulation is performed through IBM's Communications Manager/2 or SCA's TalkThru (Figure 5). Common terminal emulation types include IBM 3101, IBM 3X74, IBM 5250, DEC VT100, DEC VT220, HP 2397, TTY, WYSE, and ANSI. File sharing can be performed by using NFS or FTP protocols using TCP/IP, or by using a network operating system such as Novell Netware, Banyon Vines, Microsoft LAN Manager, or IBM LAN Server.

The Edify software may access files and applications available on networks running Windows for Workgroups
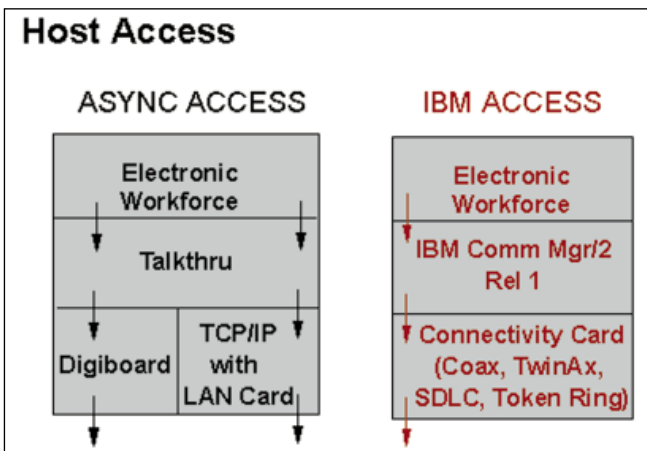

Figure 4. Web page creation (no HTML coding needed).

Figure 5. Asynchronous and synchronous connections.

3.11, Windows 95, Windows NT, Novell Netware, LAN Manager, LAN Server, Banyon Vines, and other network operating systems. TCP/IP, IPX, NetBIOS, and Named Pipes protocols are supported. Physical connections to the network may be through a Token Ring or Ethernet card.

The server may be connected to any PBX or CO that provides analog, T1, or ISDN connections. The telephone facilities connecting to a single server must be all analog or all digital, but it is possible to mix servers with analog trunks and servers with digital trunks on the same network. All incoming calls, regardless of facility type, have the ability to access all applications, hosts, electronic mail systems, and databases available to that server. Any application may be downloaded to any server, regardless of the type of PBX or CO to which the server is attached.

E-Mail Access

Edify software agents can generate, send, receive, forward or reply to e-mail messages. Automated applications may be triggered upon receipt of e-mail, and/or e-mail may be utilized to route information step-by-step in a workflow. E-mail forms make it possible for software agents to initiate applications based on incoming mail and interpret the data contained in the message. Outbound e-mail from the Edify system does not require a forms capability.

Generally, Edify uses "screen scraping" to send and receive e-mail messages. Thus, any character-based e-mail package (Microsoft Mail, cc:Mail, PROFS, etc.) is supported. In addition, any e-mail package that supports the Vendor Independent Messaging (VIM) protocol is supported (such as Lotus Notes). Finally, the SMTP protocol is supported via the SENDMAIL program. SENDMAIL is available on OS/2

and uses the TCP/IP protocol to directly send and receive Internet messages.

Development Environment

•*Drag-and-Drop Programming, Pre-Programmed Default Steps.* Applications are built using a graphical application generator called Agent Trainer. It uses visual programming. No coding is required by the user.

An application step consists of an icon that is created by "dragging and dropping" a selection from a basket of choices. The icons are dropped onto a grid with "cells" much like a Windows-based spreadsheet. Each icon comes with an associated default set of sub-flow icons that are used to program that step. This saves development time since there is no need to repeatedly re-enter similar subflow programming steps.

The sample demo in Figure 6 shows a copy of an application program as it appears in the Agent Trainer environment. This particular application notifies clients of their account status. It starts on a clock trigger, queries a database for a list of clients, grabs account status from a host application, then notifies the clients either by e-mail, fax, or telephone.

Developers can educate themselves about the Edify system by taking advantage of Edify's training opportunities. Edify also provides online help, which can be accessed at any step during application development by double-clicking on fields.

•*Shared Applications.* Applications may use the concept of a "mailbox" to pass tasks to separate modules (job descriptions). Information gathered such as DTMF digits entered during the call, data captured from an HTML document, data pulled from a database, or data "scraped" from a host screen may be passed using the mailbox function.

•*Pre-Built Applications.* Edify has application templates that can be used as the basis for order status, fax-on-demand, and other applications. These templates give you a good starting point in learning how to create applications. They can also save you the hassle of having to develop these applications from scratch yourself. In addition, you can reuse applications developed in another part of your graphical development.

•*Error Handling.* Each application has an extensive list of exception handlers that can be used within an application. These are essentially GOTO steps that can be reused throughout the appli-

Hardware Specifications For Typical Server

System:	EISA Bus, IBM certified for OS/2
Expansion slots:	6 minimum, 8 recommended
Processor:	Intel 486DX2 or Pentium
Hard drive:	500 MB minimum, 1 GB recommended, fast SCSI-2
Disk controller:	Fast SCSI-2, EISA bus
Memory:	32 MB for up to 8 voice lines; 64 MB for 9 to 16 voice lines; 96 MB for 17 to 24 voice lines; 128 MB for 48 voice lines; 32 MB + 1 MB/software agent for Web, mouse, keyboard, and 3.5" 1.44 MB floppy drive
CD ROM:	Quad speed, internal with tray
Service modem:	External 14.4 KB, CCITT V.32 bis, V.42, V42bis
Monitor:	17" minimum, SVGA 1024x768 (non-interlaced) color monitor
Video board:	SVGA 1024x768, IBM-certified chip set, 1 MB RAM (EISA or PCI bus)
Tape drive:	High-capacity (1 GB) tape back-up drive
Voice board:	A Natural MicroSystems voice board (1, 4, 8, or 24 analog ports per board, or 24 or 48 digital (T1) ports)
Fax board:	4-port GammaLink fax board (uses voice ports on the NMS board)

This system can be purchased from Edify, Vanstar, or other dealers. Edify has established a relationship with Vanstar where they provide Edify certified configurations (or upgrade kits, including voice board, fax board, and co-processor) at a package price.

cation in case an exception (error condition) occurs. There are 102 exception handlers which include hangup handling, invalid phone input, database error, and host application not responding.

•*Graphical Debugger.* Troubleshooting is facilitated by the graphical debugger, which allows the user to watch as the application graphically steps through each of its programmed icons. Break points may be used to stop the flow at any point, and the user may check and/or modify the value of any variable at any point.

Fax Capabilities

Edify's fax ports are not dedicated, but instead may share phone lines with voice-oriented applications. Any line in the system can be configured to support fax (on an inbound or outbound basis). Additionally, Agent Trainer gives the application designer WYSIWYG ("what-you-see-is-what-you-get") fax capabilities.

Edify's proactive capabilities allow you to have event-driven faxes. For example, as soon as a new product brief is available within the application, a system can automatically fax it to a list of key distributors and customers.

Voice Capabilities

Prompts can be edited either within applications during development or at any time after deployment using the integrated voice editor (integrated within the Electronic Workforce but separate from the Agent Trainer development tool).

The Edify Voice Editor supports editing of voice files through a GUI, which allows voice waveforms to be viewed. Portions of the waveform can be selected, played, deleted, copied, or pasted within any phrase in the system.

Voice files can be edited while the system is up. Changes will take effect when the installed job description is replaced or a new copy of the job description is installed. The number of people that may record prompts at the same time is limited only by the number of available voice lines. The only demand voice editing places on the system is that one telephone line must be available to create and/or update the recordings.

The Voice Editor automatically trims leading and trailing silence. If desired, a user may also perform this function on silence gaps in the middle of a recording. The user simply highlights the waveform in front and back of the voice
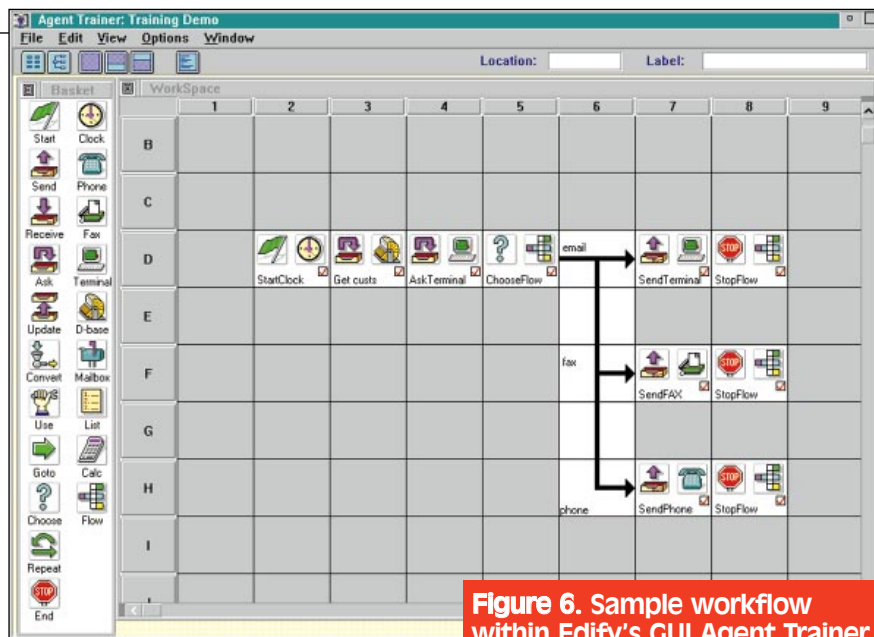
Figure 6. Sample workflow within Edify's GUI Agent Trainer.

waveform, and clicks on the "cut" icon.

All voice phrases are checked during compilation to ensure that the phrases have been recorded. Any step that has an unrecorded phrase is flagged and referred to by location to make it easy to find and record. In addition, the voice editing tool may be used, which points out all unrecorded voice phrases.

Edify uses Natural MicroSystems' industry-standard VOX voice file storage algorithm. This is a compressed Adaptive Pulse Code Modulation (ADPCM) format with a 32-KB sampling rate. The resulting storage size is 4KB per second of recorded voice. A standard system will support an average of 15 hours of voice storage. If additional voice storage is required, larger hard disk drives can be installed. In a multinode environment, voice can be stored out on a network drive. The maximum storage per node is 117 hours, and storage is unlimited if a network drive is used.

Electronic Workforce can provide broadcast capabilities that allow delivery at pre-scheduled hours (including off-hours) as well as after a change in a host application. The output can be sent via a voice, fax, or e-mail — or a combination of the three.

The software includes support for voice recognition technology. Through speaker-independent continuous voice, the digits 0 – 9 and "zero," "oh," "yes," and "no" are supported. Moreover, voice recognition hardware may be dynamically allocated over all available voice ports, eliminating the need for dedicated voice recognition boards that may use vital ports during DTMF-

intensive call periods. The developer may also designate acceptable confidence levels, and what action (such as repeating the recognized data) should be taken if levels fall below those standards (for example, <90%, repeat messaging). American English, Spanish, Italian and Canadian French are the available languages. Edify has chosen Voice Processing Corporation as its hardware vendor for voice recognition.

The text-to-speech capability supported by the Electronic Workforce converts text-based information into speech in real-time. This allows software agents to automate tasks requiring the communication of stored, random text such as e-mail messages or service notes. Text-to-speech provides greater application flexibility since spoken information does not have to be based on a library of pre-recorded prompts. Edify has chosen to incorporate First Byte's text-to-speech software.

OPERATIONAL TESTING

Electronic Workforce's user-friendly GUI was particularly impressive. We also liked the product's monitoring utility. Every application (or, specifically, every agent) has one and only one start icon placed on the development screen or grid. This start button is what initiates or "wakes up" the agent to perform a task, whether it's started by a clock trigger, a fax, an incoming call, etc. The Electronic Workforce monitor includes the ability to graphically view the run-time status of each software agent, including resources pending, resources in-use, the status of hosts, image processing, logical phone resources and

physical phone resources (Figure 7).

The system can notify the administrator of system errors in two ways. First, the Edify desktop screen has a blinking icon which displays green, yellow, or red. This corresponds to error severity in the system log. Second, an application may be created that polls the system log and looks for specific error conditions. The application can then fax the log to a pre-defined number, call a telephone number and speak pre-recorded prompts, or call a pager number, or any combination of these actions.

System logs may be configured to be automatically sent out as fax reports once a week to the Edify technical support group. The reports contain the status of every application on the node, call detail reports for each application, and a listing of the event log. This information is analyzed by Edify support personnel.

To transfer a call and the call's context-sensitive information from a software agent to a live agent requires two elements:
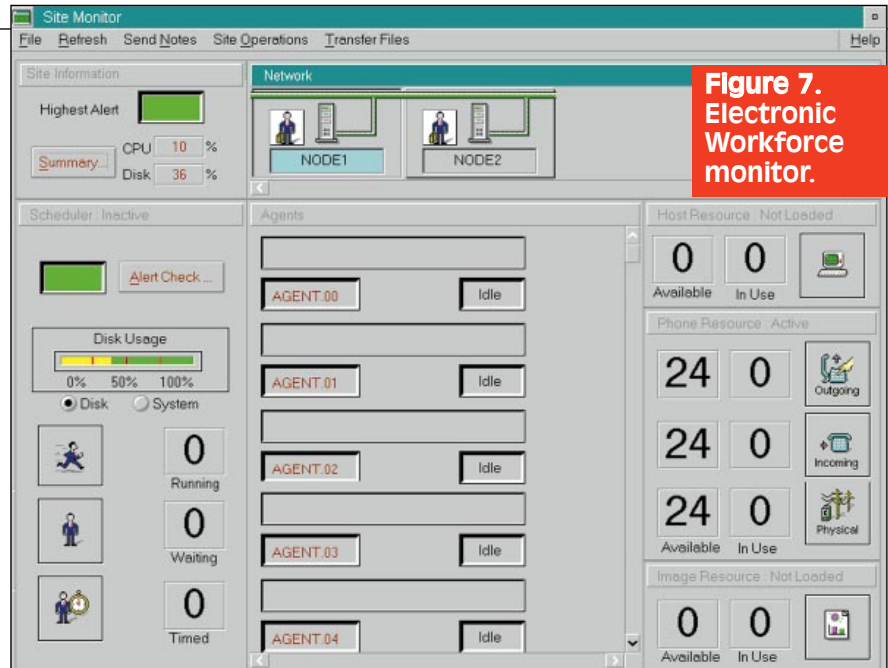
Connectivity Specifications

PC- and LAN-based data can be accessed by terminal emulation or file sharing. The Edify system can also access data via APIs and DLLs to DOS, Windows, OS/2 and UNIX applications, and through DDE and OLE interfaces to Windows applications. The following networking, file sharing, and terminal emulation types are supported:
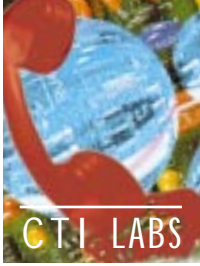
Terminal Emulation
IBM SNA — IBM
Communications Manager/2
SCA TalkThru
TCP/IP Telnet

File Sharing
FTP
NFS

Network Operating Systems
Novell Netware
IBM LAN Server
Microsoft LAN Manager
Banyon Vines

Figure 7. Electronic Workforce monitor.

1. The telephone that received the call transfer must be determined. There are two ways to determine where the call has been transferred. In the first, Edify does a supervised transfer, waits for the agent to answer, and listens for live-agent-initiated DTMF key presses (can be done with a speed-dial button). This is a very cost-effective method if you have relatively few agents (no more than 50 to 100) and if you can count on small queuing delays in the ACD. In the second, Edify interacts with a PBX's computer-telephony integration (CTI) link. CTI links provide a wide range of call control functions, including identification of the live agent who received a call. Edify supports CTI integration via DLL.

2. Context-sensitive call information must be presented to that live agent (via a "screen pop"). The screen pop is handled in a unique fashion that requires less development than traditional methods. In order to deliver context-sensitive call information to the appropriate live agent's intelligent workstation, an Edify software agent initiates a remote Windows session on that workstation via the LAN. The software agent then accomplishes the screen pop. The screen pop can be done via terminal emulation (done by the software agent but on the live agent's workstation) or via DDE with an application on the workstation.

Information collected from a call, host, database, or Web page can be transferred to a live agent in one of two ways. First, an Electronic Agent can speak the information to the live agent as part of a super-

vised or announced transfer. This does not require CTI support. Information includes items such as account numbers, dates and times, and any pre-recorded or caller-recorded phrases. Second, the Electronic Workforce presently supports the Aspect (CTI) Bridge, in addition to PBXs supported by IBM's CallPath Switch Server/2 product, the Genesys T-Server, and Novell's TSAPI. For other PBX support, VARs can use Edify's open Dynamic Link Library (DLL) interface to establish a CTI connection between the VAR's or client's PBX and other vendor PBXs, as well as IBM or Hewlett-Packard hosts.

CONCLUSION

We were very impressed with Electronic Workforce for many reasons. It was more than your typical computer-telephony application generator. It provides a very user-friendly GUI, with icon-oriented "building block" applications that can be reused. That, along with Electronic Workforce's strong feature set, great connectivity, and its "proactive" and "workflow" type approach, help make Electronic Workforce one of the more innovative CTI products. This product is definitely worth a look if you are thinking of implementing CTI within your corporation.

Test Drive

Figure 1. CoolTalk's main screen.

CoolTalk, an Internet telephone tool included with Netscape Navigator 3.0, provides high-quality audio conferencing, a full-featured whiteboard, and text-based communications using the chat tool (Figure 1). With CoolTalk, you can now talk and work collaboratively with friends and colleagues anywhere in the world via the Internet. And because CoolTalk works seamlessly with Navigator 3.0, you can send and receive calls directly from any Web page. You can download CoolTalk now.

FEATURES

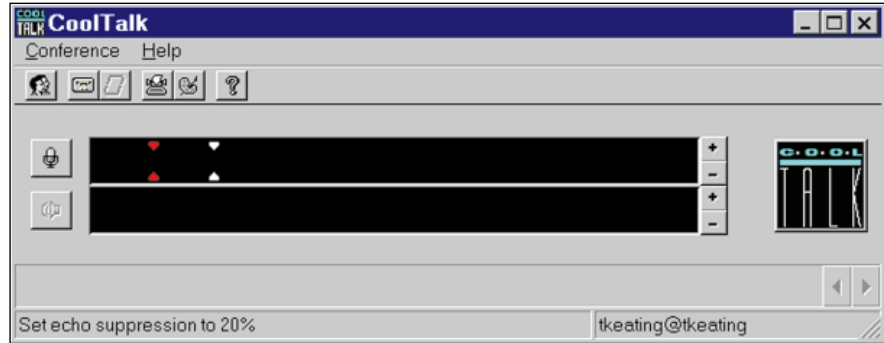CoolTalk includes such features as a speed dialer, caller ID functionality, call screening, and mute buttons. CoolTalk comes with a voice mail capability that acts like an answering machine to record messages and caller information while you're away.

CoolTalk's directory is Web based (that is HTML Web page). From a specified Web page you should be able to determine who is online or not. We did have problems with this online directory, however. Several times we found that the server was unavailable, or that we couldn't find the user we were looking for.

CoolTalk's chat tool lets you send and receive typed messages, as well as entire text files. It provides full support for both dynamic and static IP connections through dial-up PPP and SLIP connections.

Another feature of CoolTalk is its shared whiteboard (Figure 2). While you are connected to another user using CoolTalk, you can both view the same graphic image and edit it in real-time with drawing, zoom, and markup tools. Within the whiteboard, you have the capability to import, save, and print TIFF, GIF, JPEG, BMP, EPS, TARGA, RASTER, and SGI files.

CoolTalk is available with Navigator 3.0 for Windows NT, Windows 95, Windows 3.1, Macintosh, Sun OS, Solaris, HP-UNIX, Digital UNIX, and IRIX. Versions for additional UNIX platforms will be available soon. CoolTalk's technology will serve as the basis for upcoming LiveMedia applications that will be based on the recently introduced H.323 standard. For videoconferencing, Apple offers videoconferencing products that interoperate with Netscape's CoolTalk.

OPERATIONAL TESTING

Our tests with CoolTalk were similar to those we ran on NetMeeting and NetSpeak (reviewed below). That is, tests were conducted externally (over the Internet using 28.8 Kps modems to people around the world) as well internally (over the Internet and our LAN to one of our test machines).

Both machines in our tests ran using a CPU of at least 120 MHz, used Windows 95, and had 16-bit sound cards. We used cards (including sound
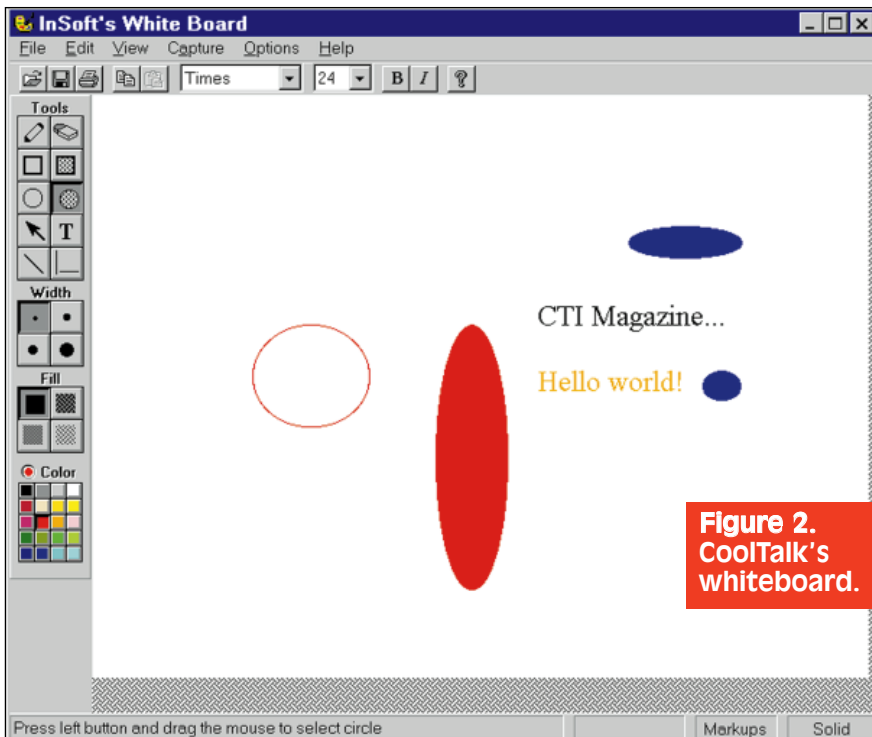

Figure 2. CoolTalk's whiteboard.

cards) that supported full-duplex communications. The sound quality during full-duplex communication was good. However, just as with other Web telephony packages, there were occasional breaks in the voice.

We used the same procedure for CoolTalk and all the other Internet Web phone products we have tested. Each party on either end counts to 15, and determines whether the counting by the other party can be heard. CoolTalk fared well in this test. Both parties could hear each other and talk simultaneously.

The text chat tool is adequate. Like several other packages, the text chat feature does not do "real-time" transmission of characters that are typed. Instead, it waits until the Enter key is pressed before sending the characters/sentence over the Internet.

The graphical user interface of CoolTalk was fair — nothing fancy, but it gets the job done. The icons are a bit small and not descriptive at all. There is, however, "bubble" help to help you determine the function of each of the icons. The online directory was fair. You can search by name, or view all the entries. However, similar to NetSpeak,

SPECOM'S INTERNET VIDEOPHONE

Minimum System Requirements

- 386-33 PC/Notebook with 4 MB RAM (Pentium recommended for voice)
- 8 MB hard disk space
- VGA card with 256 colors (64K colors preferred)
- Windows 3.1 or later (we tested on Windows 95)
- 9600 baud modem (28.8 Kbps modem preferred)
- Video capture card with MPEG1 CD movie playback or video capture card with Video for Windows driver
- Camera

Note: Specom can provide or recommend cameras, modems, and video capture cards at your request. Alternatively, these items can be purchased separately from a third-party vendor. ■

there were no forums or chat rooms corresponding to special interests.

CONCLUSION

The user interface did facilitate ease of use, although the icons were small and nondescriptive. We found overall usability to be fair. The online Web directory server was down quite a bit, dampening our enthusiasm for the product. It remains to be seen whether CoolTalk will stay in the "hobby" arena or make a foray into business applications as well.
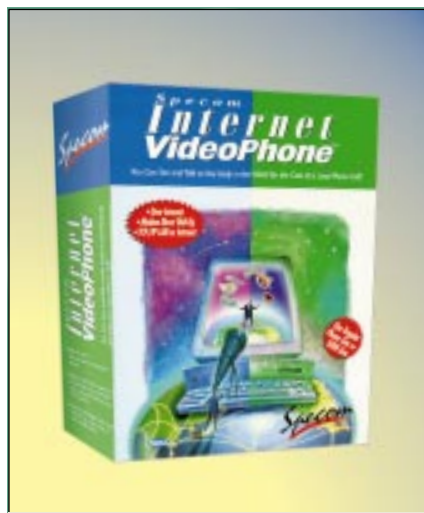
Internet VideoPhone

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E-mail: sales@specom.com
Web site: www.specom.com

Specom's Internet VideoPhone is a videoconferencing software program for your home or office. It features full voice and data communications. The videoconferencing feature can be performed over a network LAN, the Internet, and a direct modem dial-up as well. It also features a whiteboard for interactive data communications, that is, sending part of an existing document from another application such as Word or Excel.

INSTALLATION

We found that Internet VideoPhone was pretty easy to install. The main software installation was flawless. The gold version of the product (which we

used) includes a camera and a video capture board, the latter of which requires a separate installation program. This also went without a hitch.

FEATURES

Internet VideoPhone supports:
- TelePro and a variety of voice-on-data modems, data-only modems, and video capture boards.
- Two-way transfer of files using YMODEM/ZMODEM formats.
- Simultaneous transmission of video, voice, and data.
- Capture of both local and remote video screens to a file for printing, future retrieval, etc.

In addition, Internet VideoPhone's data conferencing capabilities allow the exchange of drawings, text, and images via an electronic whiteboard. Imported images, including those acquired from a TWAIN source, can be placed on the whiteboard. The contents of the whiteboard can be saved and archived, and later retrieved for viewing and editing.

You can opt for one- or two-way videoconferencing. In addition, you can select one of three video formats: 80X60, 160X120, or 320X240 pixels. It is possible to use either gray scale or color. If you have an Intel Smart Video capture card, YUV-to-RGB conversion is supported. A phone directory for storage of commonly used phone numbers (direct modem dial-up) is available.

OPERATIONAL TESTING

Internet VideoPhone was fairly easy to use. When we performed direct dial-ups from a standard analog phone to another machine, we had only a little difficulty manipulating the dialing interface and turning on auto-answer. We were also able to connect through our LAN and perform videoconferencing and instigate voice transmissions (Figure 3).

We found, as expected, that setting image quality directly affected the compression rate. The higher the image quality, the longer the transfer of images between two Internet VideoPhone connections. The default is 40%, which Specom states is a reasonable balance between quality and performance.

For Internet videoconferencing, there are two ways you can connect to your partner's machine. With the first, you enter your partner's IP address and port number. Since these values are often

Figure 3. Internet VideoPhone in action.

dynamically allocated each time someone logs onto the Internet, he or she could send you an e-mail with these values, or call you on a separate line.

The second option, which is a bit easier, requires that you register with Specom's server. If you go this route, the user's name and IP assignments will appear in the list of users displayed in the Internet Conference dialog box within Internet VideoPhone.

When we used Internet VideoPhone over the Internet, there was a noticeable lag in video transmission, especially when we opted to use color and the highest resolution available (320X240). We even left the voice capability disabled to increase the bandwidth available, but video frame transmission rate remained quite slow. However, Specom's frame rate was no better or worse than our "first look" at CuSeeMe, another videoconferencing product.

With faster compression rates and better codecs coming out all the time, video quality and throughput are bound to improve. In the meantime, you will get much better results if you opt to use low resolution. We found 160X120 or 80X60 tolerable, but 80X60 was much too coarse for our tastes. Using black and white instead of color will also improve the frame rate, and was actually our preferred mode when we had voice go through the sound card.

ROOM FOR IMPROVEMENT

Other than a faster frame rate (an obvious preference), we would also like to see an open architecture so Internet VideoPhone users can call and videoconference with other videoconferencing software such as PictureTel or CuSeeMe. We would like to be able to transfer files without having to make sure both machines are preset to the same protocol (ZMODEM or YMODEM). That is, we would like the software to hot-swap between the two protocols when receiving ZMODEM or YMODEM packets without requiring user intervention.

CONCLUSION

Overall, Specom's Internet VideoPhone is a good videoconferencing product. Like many other videoconferencing products, it suffers from poor video frame rates. If you are serious about using videoconferencing as a business tool, we recommend having (at the least) an ISDN or 10BaseT connection. However, for personal, hobby, family, or general home use, a 28.8 Kbps modem will suffice.

NetMeeting

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052
Web site: www.microsoft.com/netmeeting/

Microsoft has hit a home run with NetMeeting, the first real-time Internet phone-voice communications client that includes support for international conferencing standards (T.120, H.323, and others) and provides true multiuser application sharing and data conferencing capabilities. This software tool allows the live sharing, by multiple parties, of programs, pictures, screens, and files across the Internet or LAN. Said parties can even see and continue to work on Windows programs such as Word, Excel, and PowerPoint. NetMeeting utilizes the global reach of the Internet to transform the everyday telephone call into a richer and more effective multimedia communications and collaboration experience (Figure 4).
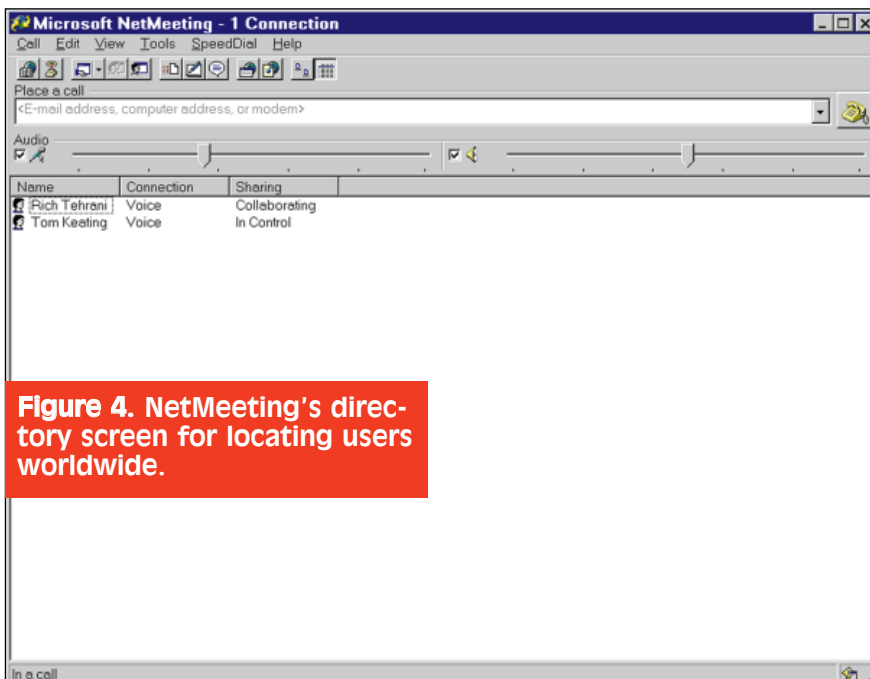
INSTALLATION

Microsoft ships NetMeeting bundled with Internet Explorer 3.0, so if you've installed Microsoft Explorer 3.0 (MSE30) you probably have NetMeeting already. If you've installed Internet Explorer 3.0, you were given the option of installing NetMeeting. If you chose "No," you can probably reinstall MSE30 and say "yes" this time, or you can go to Microsoft's home page

Figure 4. NetMeeting's directory screen for locating users worldwide.

and download NetMeeting by itself (www.microsoft.com/netmeeting/).

In the event you did install NetMeeting with Internet Explorer 3.0, *and* you have Microsoft Office installed, we recommend you check out the Microsoft toolbar, which is usually attached to the right side of the screen. If the toolbar is displaying Programs, you will probably see the icon for NetMeeting somewhere toward the bottom — unless you have so many program groups that the icon for NetMeeting has scrolled off the end of the toolbar. To fix this, either "customize" the toolbar (right-click on it) and remove any program groups you don't use very often, or just move the icon for NetMeeting up a few notches.

We suggest you remove the link to extraneous program groups by "unchecking" them. Don't worry: the program group doesn't get removed, just the link, and you still have access

to these program groups through Start, Programs, and the appropriate program group. You will also probably find Internet Mail and Internet News hiding down there at the bottom of the Programs toolbar.

DOCUMENTATION

Currently, there is no written documentation for NetMeeting. However, there is online help; a menu option that allows you to jump to Microsoft's NetMeeting Web site for help; as well as a newsgroup on Microsoft's news server for informal support.

You can find the newsgroup at news://msnews.microsoft.com/microsoft.public.internet.netmeeting. MSE30 users who want to access this newsgroup should carry out the following procedure:

1. Find the News menu and click Options.

2. Find the Server tab and click Add.

3. Type msnews.microsoft.com as the name of the server.

OPERATIONAL TESTING

In order to test NetMeeting, we deployed a Pentium 120 and a Pentium 133, both with full-duplex sound cards in them. Both machines had 32 MB of RAM.

We completed NetMeeting's setup Wizard, told the Wizard that we wished to register with Microsoft's user locator service, and tried to call each other. However, when one party entered the other party's e-mail address in the address box, and hit Enter, an error message came back. The first party was informed that the e-mail address of the second party (rtehrani@tmcnet.com, the address of our publisher, Rich Tehrani) could not be found on its server.

Our first thought was, "If Microsoft were using UNIX instead of Windows NT for its Web server, we wouldn't

Remote Access — Secure And Otherwise

We thought of some neat ways you could use NetMeeting in your own corporation. For example, let's say you've brought a portable along on a business trip and you want to check your e-mail and retrieve an important document that should have been copied to the portable earlier. Assuming your modem has been set to auto-answer, you can dial into your office computer and use your e-mail package to read the e-mail.

You can probably even check your voice mail if you are using unified messaging. Then, you can use the e-mail package to send the file over the Internet to your portable, assuming that your computer doesn't try to send the e-mail right away on the same modem to which you are currently connected. There is no "file receive" capability, only "file send" from your own location, so you can't use the file transferring capabilities on the road. You can always have a fellow employee sit at your desk and send the file, though.

To realize these possibilities, you must first be connected, and then

you must share the application from the remote site. That is, someone has to "share" the application from the remote end. However, if you were to set NetMeeting to leave the remote computer in auto-answer mode with auto-sharing, this problem would be solved. You would create another problem, however. Setting your modem to auto-answer and auto-share (collaborate) with no security could leave you vulnerable to external hacking.

This is an area we would like to see improved with NetMeeting. For "true" telecommuting support, security in the dial-up and connect procedure is essential. Also, NetMeeting will only share applications that are currently open, so if a telecommuter did call into her computer, she would only be able to access programs already running, unless she called into the office and had a fellow employee open up a particular program.

As previously stated, you can't setup NetMeeting beforehand to "automatically" go into collaborate (sharing) mode. However, we did

find a workaround for not being able to open any more applications that are *not* currently open or running. If you open up Explorer and share that application, you can explore the entire hard disk and run *any* application you desire by double-clicking on the appropriate executable (EXE) file from within Explorer, including WINWORD.EXE, EXCEL.EXE, or even COMMAND.COM or FORMAT.COM.

Of course, this workaround brings up security issues as well. Sharing Explorer leaves your computer completely vulnerable. Again, some sort of "logon" screen and password would make this product "the" choice for telecommuting employees. Also, you could set up a password list to designate "allowable" applications for sharing over the connection. These applications would run "automatically" upon entry of a valid password. This would eliminate the need for a fellow employee to run applications for you or perform other setup duties when you dial in from a remote site to a computer. ■
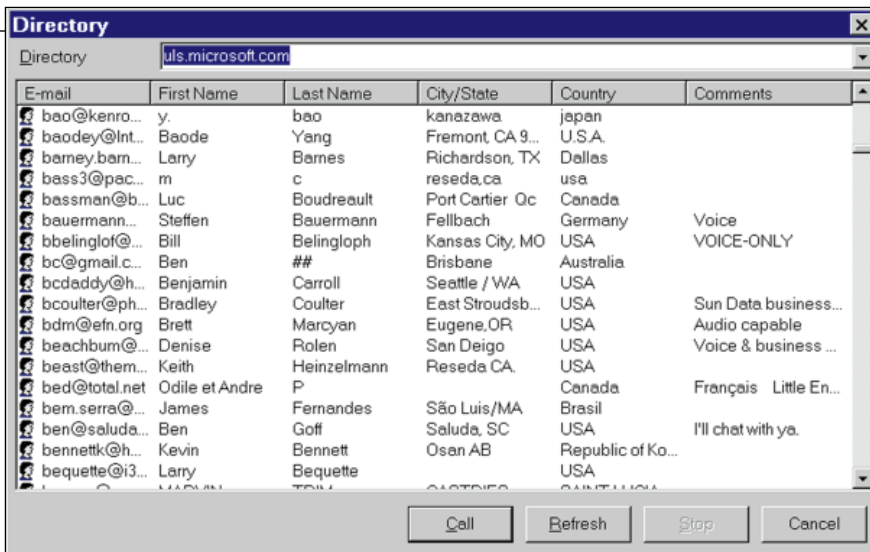
have this problem!" We were joking, of course! Anyway, we fiddled with trying each other's e-mail address for a little while, figuring maybe the server was being overloaded or something. Then we gave up and tried using the NetMeeting Web site instead. When we browsed the directory, both our names showed up. After we clicked on the hypertext link and said "Open" in MSE30, NetMeeting opened up, and the computer that we were calling began to ring.

Now we were getting somewhere. We learned you have the option of automatically accepting all incoming calls, or manually accepting them. After accepting the call, you can begin talking (if you are using a sound card with a microphone), or you can begin your "collaborative computing!" If more people want to join, all they have to do is call one of the participants. It is then up to that person to accept the call. We had a connection of three people all in one conference, but it is possible to connect many more than three with NetMeeting.

NetMeeting has a directory option that allows you to retrieve the names of people who are online and who are there by virtue of the NetMeeting software (Figure 5). We did notice, however, a minor problem with the design of NetMeeting's online directory, which adds names by loading the corresponding e-mail addresses in alphabetical order. This in itself is not a problem. However, when there are over 1000 people logged onto the server, loading

all the e-mail addresses can take anywhere from five to ten minutes. And, if you or the person you are calling happens to have an e-mail address that begins with a letter far down on the alphabet, you will wait a long time before you can find their name. This is what happened to us when we tried to call rtehrani@tmcnet.com. Since "r" is pretty far down in the alphabet, it took a while (five minutes) before "Rich Tehrani" loaded into NetMeeting.

To get around this problem, savvy NetMeeting users use bogus e-mail addresses that begin with letters at the beginning of the alphabet or (even worse) with characters low on the ASCII chart, such as an exclamation point. We suppose it won't be uncommon to see the first 50 or so e-mail addresses begin with an exclamation point or a strange ASCII character.

Also, with the online directory, you can't sort the entries until it has finished downloading. It would have been helpful if we could have chosen the sort order or which field we wanted sorted before the entries started loading. We would have been able to find certain names more quickly. A "search" option within NetMeeting's online directory would be another welcome addition.

We never did figure out how to call by e-mail address, which would have been the easiest way to call someone whose e-mail address we knew. NetMeeting is supposed to let you call someone by e-mail address, but we couldn't get this feature to work. You can also call someone on your corporate LAN using the TCP/IP address of that person.

After we connected to our publisher's machine, we were able to open, and share, Word, Excel, and an MS-DOS box. Thus, whenever one party

moved his or her mouse, the other party could see the corresponding movement of the first party's cursor. If one party moved or resized a window, the other party could see the outline of the window of the program change as the first party moved or resized it. When one person chooses a menu option, the other person sees the corresponding display in real-time, although there is a small lag if the users have a poor or low-bandwidth connection. When we first saw how application sharing worked, we were amazed. Imagine being able to use software programs not even located on your machine! We immediately saw many possibilities for this product.

As if collaborative computing wasn't enough, Microsoft added Internet phone capabilities, allowing for real-time voice communications on top of application sharing. NetMeeting has built-in Internet phone support similar to VocalTec's Internet Phone, NetSpeak's WebPhone, and Netscape's CoolTalk, which makes it easy for you to call business associates, family, and friends around the world over the Internet.

Multiuser data conferencing support

MICROSOFT'S NETMEETING

Hardware And Software Specifications

Microsoft NetMeeting requires the following configuration:
- 486/66 with 8 MB RAM (Pentium with at least 16 MB RAM recommended)
- Windows 95
- 14,400 bps modem or LAN (works best with a fast Internet connection)
- Sound card, speakers, and microphone (required for real-time voice)

Note: Currently, Microsoft NetMeeting is available for Windows 95 only. Future releases from Microsoft will be available on Windows NT and the Macintosh. Interoperable products will be available from a variety of partners. ■

allows two or more users to work together and collaborate in real-time over the Internet or corporate Intranet using application sharing, whiteboarding, and chat functionality. Unlike Netscape's new CoolTalk, which is limited to two users at a time, NetMeeting lets groups of people work together. Also, there are sliding level controls for both microphone sensitivity and speaker volume, which you can also quickly mute with a single click on a check-box. For other audio settings, see Figure 6.

In what circumstances might NetMeeting improve the effectiveness of people collaborating over the Internet? Possible scenarios include virtual meetings, document collaboration, customer service and help desk call centers, telecommuting, technical support, and training. MIS personnel will be particularly interested.

MIS and other computer support personnel spend a lot of time moving from place to place. They'll travel from one end of an office to another, from floor to floor, or from building to building to help people with their computer problems. With NetMeeting, computer problems, or at least software problems, could be handled from across the office or from even more distant locations via the Internet or LAN.

A typical example: a user doesn't know why her computer keeps hanging. MIS support could use NetMeeting and watch the user reenact the problem. The reenactment could reveal to MIS what the user might be doing wrong.

Another common software problem — letting TMP files accumulate in the TEMP directory — could be managed remotely with NetMeeting. Why worry about such files? If your computer crashes and these files remain, GPFs might occur more frequently. But, with NetMeeting, you can access someone's computer anywhere in the world, run Explorer, and remove the errant TEMP files. Of course, you could probably accomplish the same thing by accessing the network drive from your own Explorer and deleting the files.

Perhaps a better example would be adding fonts to computers around the office. If an MIS staffer could do it from the luxury of her desk, it would save her the time and effort it would take to move from computer to computer throughout the building. Another common (and repetitive) task is teaching users to do mail merges. Such a procedure could be taught from NetMeeting.

As you load a picture file, draw, or type on the whiteboard, the others in the conference see your efforts on their screen almost the same time you do (depending, of course, on the speed of the Internet link). Those on the other side can see exactly what you're doing, including your mouse movements.

Regardless of whether or not you are using the whiteboard, you can always see the mouse pointer moving. It should also be noted that the mouse pointer shows the initials of the person who is currently in control of the application. To take control away is as simple as clicking on your mouse button. Of course, you don't want to interrupt a person unless it's your turn.

You can still talk to one another while the picture or application process is happening, although voice transmission quality is degraded and slowed down somewhat to make way for sending the visual data. You also have the option of turning off voice communications to increase the data throughput. You can use the chat program for sending messages.

NetMeeting is based on international standards and will interoperate with other standards-based conferencing products. Videoconferencing vendors like PictureTel, OnLive Technologies, White Pine Software, and Databeam have all announced that their products will work with NetMeeting. MCI will also make NetMeeting a part of networkMCI conferencing service.

Microsoft NetMeeting lets you communicate with more than one person at a time and includes application sharing, which enables you to share a program running on your computer

NetMeeting: What's New In Version 2.0 Beta

STANDARDS-BASED AUDIO
•NetMeeting 2.0 Beta 1 supports the International Telecommunications Union (ITU) H.323 standard for audio conferencing. This enables you to call and talk to people running other H.323 Internet phone products, such as the Intel Internet Phone.
•NetMeeting 2.0 audio continues to interoperate with NetMeeting 1.0 audio as well. NetMeeting 2.0 can thus call NetMeeting 1.0 users, NetMeeting 2.0 users, and users running other H.323 Internet phones.
•Improved audio quality on PCs with a Pentium processor between NetMeeting 2.0 users.

WINDOWS NT SUPPORT
•NetMeeting 2.0 Beta 1 runs on Windows NT 4.0!
•Supports Internet telephony for voice, as well as multiuser data conferencing for application sharing, electronic whiteboard, chat, and binary file transfer. (Note: In this beta release, users of Windows NT 4.0 can use applications that have been shared by Windows 95 users of NetMeeting, but can't share an application running on their computer.)

NEW USER INTERFACE
•New integrated directory makes it easier to place calls.
•New Microsoft Internet Explorer 3.0 style toolbar ("Coolbar").
•New feature to eject individuals from a conference (works for conference initiator only).

NetMeeting 2.0 is fully compatible with NetMeeting 1.0 for audio and data conferencing, the Microsoft User Location Server for finding and connecting to people on the Internet, and with applications and solutions built using the NetMeeting SDK for Windows 95. ∎
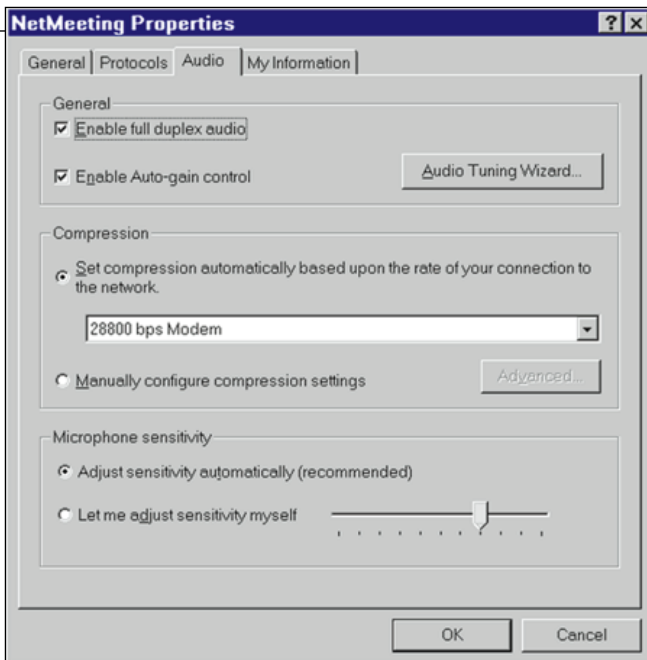
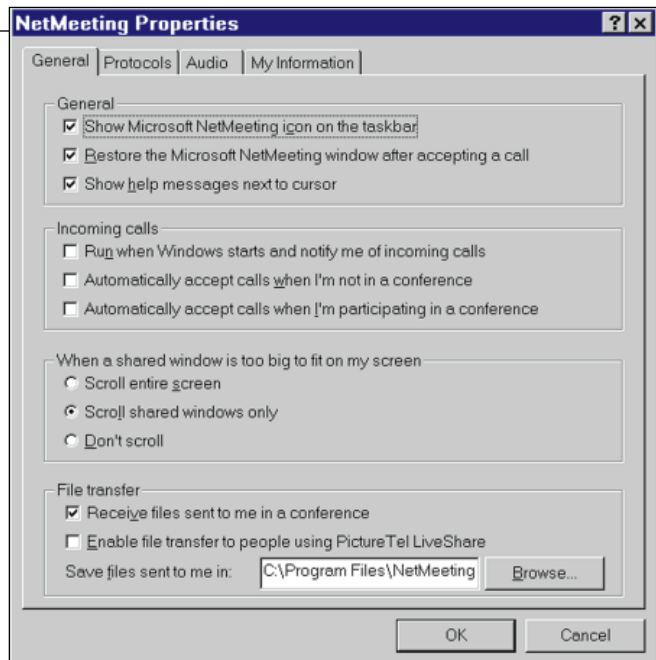**Figure 6.** NetMeeting's autoconfiguration features.

Figure 7. NetMeeting's user-configurable options.

with other people in your conference. This allows others to take control of your program and make changes, in real-time, to the document you are all sharing.

FEATURES

Some of the default settings can be changed via a user-friendly interface (Figure 7).

Application Sharing

Application sharing enables you to share a program running on one computer with other people in a conference (Figure 8). For example, you could run

Figure 8. NetMeeting's sharing feature.

Microsoft Word, open a document, and share it with several co-workers. Each person would see an image of your program on his or her computer. You could then review the document together and take turns editing. Your colleagues do not need a copy of the program or the file.

Whiteboard

Whiteboard is a multipage, multiuser drawing program that enables you to sketch an organization chart, draw a diagram, type action items, and perform similar tasks. You can point out your co-workers' errors by using a remote pointer or highlighting tool, or

take a "snapshot" of a window and paste the graphic on a page.

File Transfer

File Transfer enables you to send a file to all the participants in a conference by dragging it into the Microsoft NetMeeting window. The file transfer occurs in the background as everyone continues sharing the program, using the whiteboard, and chatting. This was a feature we liked a lot, particularly the background feature.

Multipoint Communication

Multipoint chat, whiteboard, and application sharing allow the user to hold meetings with three or more people, where everyone can receive the transferred files, draw on the whiteboard, and see and control the shared applications. This is a true collaborative experience, not just a simple point-to-point call.

Standards

NetMeeting adheres to T.120 protocols, the International Telecommunications Union standards for data conferencing used by telephone companies, PTTs, bridge manufacturers, video conferencing vendors, software vendors, and service providers worldwide.

With NetMeeting's support of open standards, over 120 companies, including Sprint, AT&T, and BT, have announced their support for Microsoft's H.323/T.120/RTP/RTCP/RSVP approach. Currently, 20 leading indus-
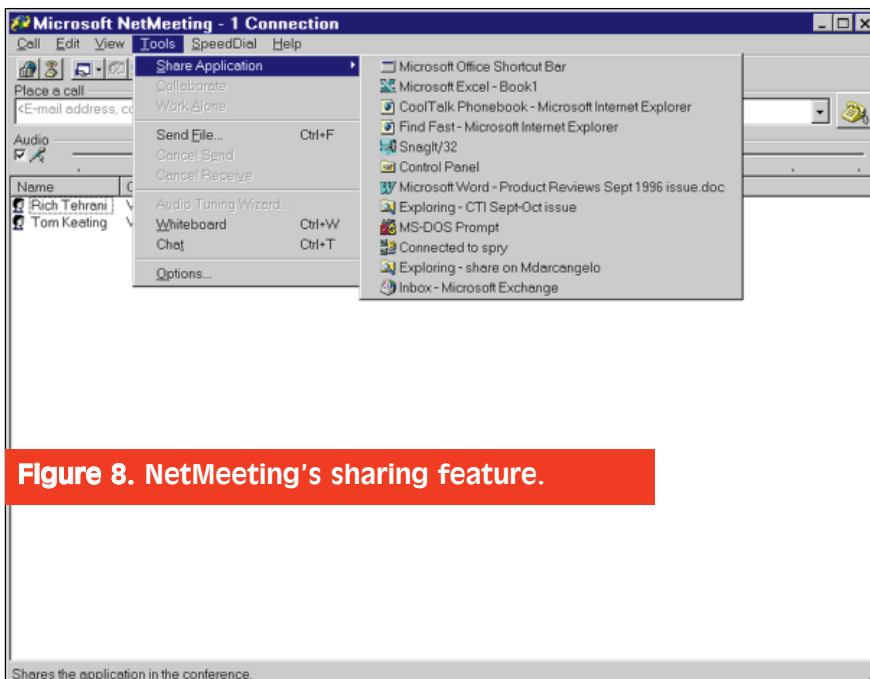
try companies have announced products and services that are or will be compatible with NetMeeting, including Intel, PictureTel, MCI, Creative Labs and others.

ROOM FOR IMPROVEMENT

The sound quality was pretty good, but there seemed to be some voice degradation on the computer that wasn't in control of the current application. The voice degradation seemed to switch between the two PCs. One minute one of the PCs had perfect sound, the next minute, the other PC had perfect sound.

The chat tool was good, and it did allow us to save our chat transcripts, but we would have liked an option for "real-time" chat. This kind of chat allows you to see keystrokes "real-time," which, to many of us, is better than seeing chunks of text appear at intervals (in response to another party pressing the Enter key).

In addition to the "Automatic answer incoming calls" option, we would like to see "Automatically enter 'collaborate' mode after answering call" and "Ask for logon ID and password." The latter suggestion would solve most, if not all of the security issues with NetMeeting. It would also make NetMeeting more attractive as a telecommuting application or as a remote access software program.

In testing NetMeeting with multiple users, we found that other users would often interrupt and take control of the mouse. Then, when we clicked on the mouse to get control back, they would often just click their mouse and "steal" control back. Often this was done unintentionally, and since some people may not have voice capability, we couldn't speak into the microphone to exert "mediation" control. Also, we couldn't use the chat tool to communicate our need to regain control. How could we, without control of the mouse?

Of course, we could have temporarily suspended the "collaborate" mode, but that seems a crude solution. It would be better if the application allowed us to institute some sort of hierarchy of control. For example, the owner of the application being shared should have special privileges. She should be able to keep control of the shared application without having to keep clicking on the mouse to gain control. It should be possible, for example, to assign a function key to serve as a toggle, enabling/preventing interruptions from other users interacting with the owner or "super user" of the shared application.

But what if two or more people are sharing applications? In this case, whatever shared application is the current window should give the owner of that application the ability to toggle on/off collaborate mode from within that application, without requiring the owner to go into NetMeeting and turn off collaborate mode completely.

One final note: There was some lag time when the Internet was busy. But we found that using NetMeeting across our LAN or over the Internet using ISDN worked quite well.

CONCLUSION

NetMeeting is going to revolutionize the way we do business. It's only a matter of time. Myriad uses — including technical support, help desks, customer service, training, telecommuting, and "collaborative computing" — can and will be done with NetMeeting. We see so much potential for this product that we must say we haven't been this impressed or excited about a software product since the release of Windows 95!

NetMeeting is more than just another Internet phone product. While NetMeeting encompasses Internet telephony in its function set, it has many additional features, including application sharing and collaborative computing. And since Microsoft is giving away this product for FREE, there is no reason not to try it.

There are other remote access programs out there, including Norton's pcAnywhere (which has better security than NetMeeting), but with Microsoft giving away NetMeeting for free, we tend to wonder how the remote access software vendors, as well as remote e-mail access vendors will do if NetMeeting takes hold in the industry — which we think it will. NetMeeting's potential is so great that you must check out this product. You won't be disappointed.
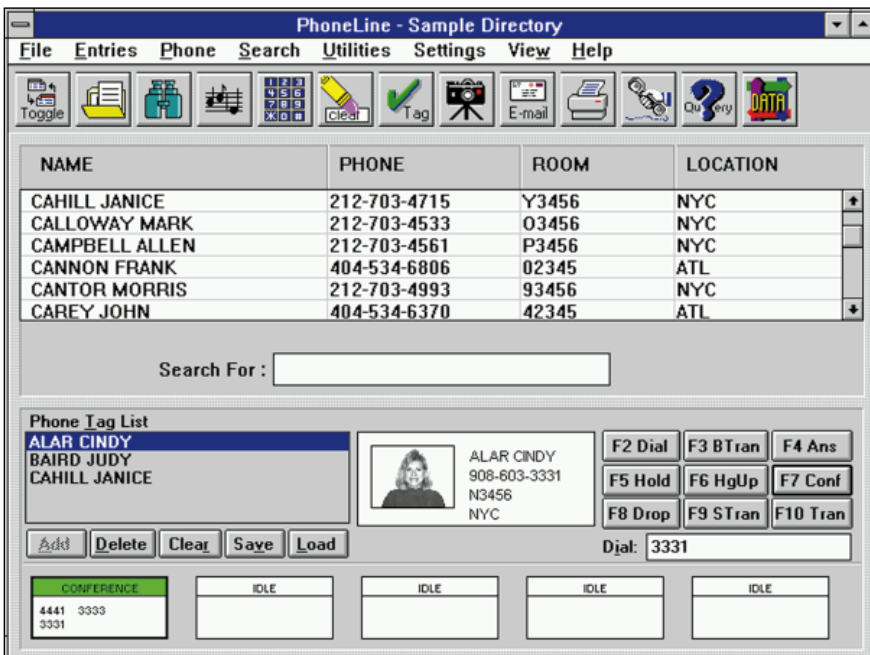

Figure 9. PhoneLine — shows main user screen — note the conferencing capabilities.

PhoneLine

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Iselin, NJ 08830
Ph: 908-603-7750; Fx: 908-603-7751
E-mail: ccom@attmail.comm

PhoneLine is a powerful software program that enables corporations to keep track of employee information (name, title, department, phone number). Such help can be valuable in companies where constant employee turnover complicates the task of creat-
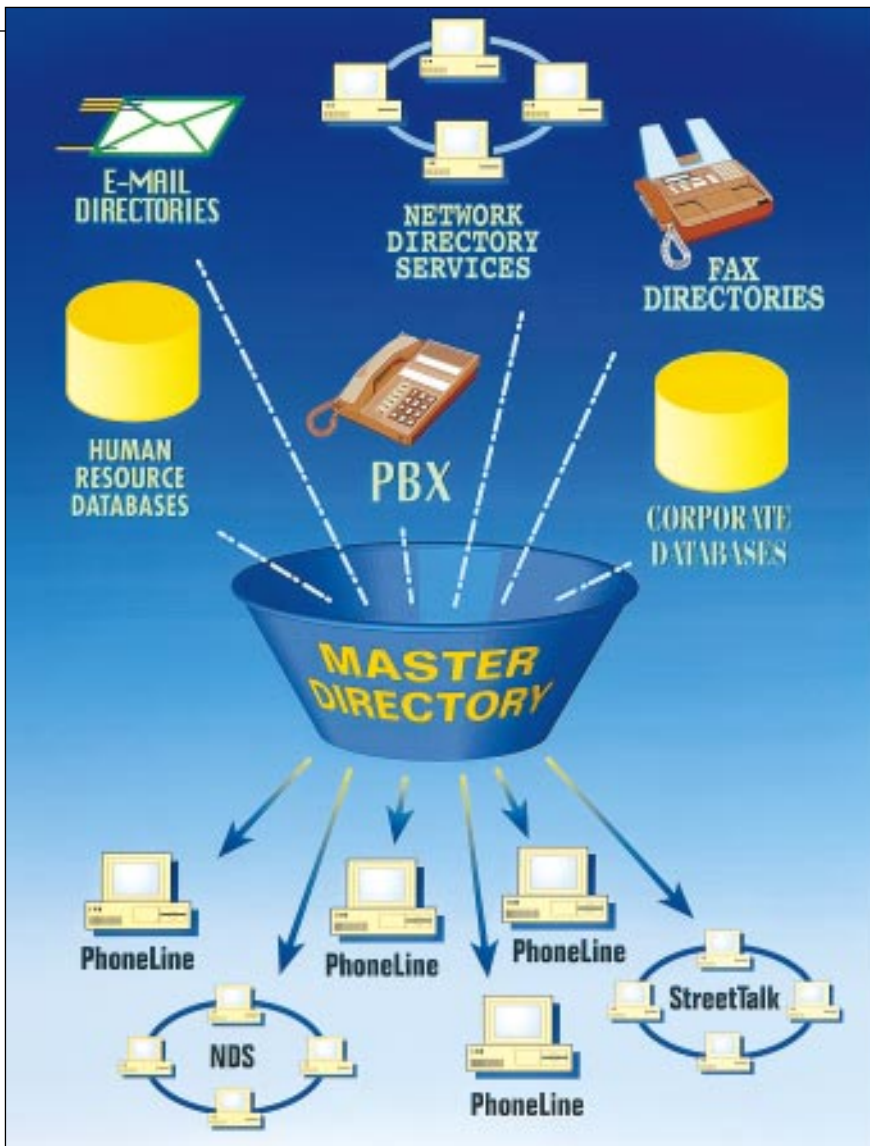
ing and maintaining current, accurate employee directories (Figure 9).

Many corporations, including our own, have used word processing or spreadsheet programs to put together and update employee directories. Many still do. Often the information isn't centralized, but is either transmitted through paperwork or through e-mail when an employee starts, transfers, leaves, or changes extensions. Regardless of how the information is distributed, gathering the information and entering it into a word processing file is an inefficient process.

With PhoneLine, a central database is used to store all the employee information. We should emphasize that this software product isn't limited to keeping track of employees, along with their basic contact information.

PhoneLine also has useful CTI features, such as being able to call an employee in the directory with a double-click, caller-ID with screen-pop, and being able to take advantage of the existing conferencing capabilities within your phone system in a more graphical and user-friendly manner.

The software consists of two programs, named MasterDirectory and PhoneLine, which work in conjunction with each other. PhoneLine is the main program for handling calls (call control, that is, dialing, transferring, conferencing) and looking up employee names. MasterDirectory handles the importing of records, maintenance, and the manipulation of employee records. Each of these software components will be explained in detail (Figure 10).

INSTALLATION

Installation went pretty smoothly, but it wasn't perfect. Since the software consists of two different programs

(MasterDirectory and PhoneLine), there are actually two separate installations. We had to run two separate SETUP.EXE files (install programs) from the RUN command, Explorer, or File Manager program, which wasn't a big deal, but having one install program would have been nice. It's possible CCOM provided separate installs to accommodate users who might decide to upgrade MasterDirectory and not PhoneLine, or vice versa.

The installation process itself was pretty standard. For PhoneLine, there were no options to change or select, which made for a simple and straightforward installation. The only user input required was selecting the installation directory, which we installed to the default C:\PHNLINETP directory for PhoneLine, and C:\PHNLINEMD for MasterDirectory.

The PhoneLine installation directory varies depending on which version of their PhoneLine program you are running. There are four varieties: PhoneLine for Windows, PhoneLine DC (PassageWay Direct Connection), PhoneLine TS (TSAPI), and PhoneLine TP (TAPI). We tested the TAPI version, which explains the TP suffix at the end of the PHNLINE directory name. There are also some other varieties of PhoneLine in addition to these base products, including PhoneLine for StreetTalk III and PhoneLine with multilingual support.

There was one other minor issue with

the installation of the MasterDirectory program. It doesn't auto-detect where you installed the PhoneLine directory (Figure 11). Thus, the installation program requires you to manually input the directory where you installed PhoneLine. Now, if you forgot where you installed it, or just didn't pay attention to where the default directory was (we didn't), then you have to go into Explorer and browse the root directory and find something that begins with the word "Phone." When we ran Explorer, we found a name beginning with "PHN" which turned out to be the PhoneLine program.

Anyone who has installed a software program on Windows 95 is familiar with the recommendation that you "Close ALL programs before continuing the installation." The more adventurous computer users (we count ourselves in this group) sometimes ignore this warning. They have left programs running or have opened up other programs during an installation. However, not all users are so bold. It usually isn't a problem to leave a program open as long as the program being installed doesn't use a DLL or certain other files which are being used by a currently running program. But we digress. If CCOM doesn't provide an auto-detect of the PhoneLine software, they could add some sort of "Browse" capability built into the installation program so we weren't forced to open up Explorer and manually find it.

DOCUMENTATION

The documentation consists of two separate manuals, one for MasterDirectory and one for PhoneLine. The installation instructions were good overall, but the index could use some improvement. For example, we looked in vain for some keywords. TAPI and TSAPI weren't listed in the index even though they
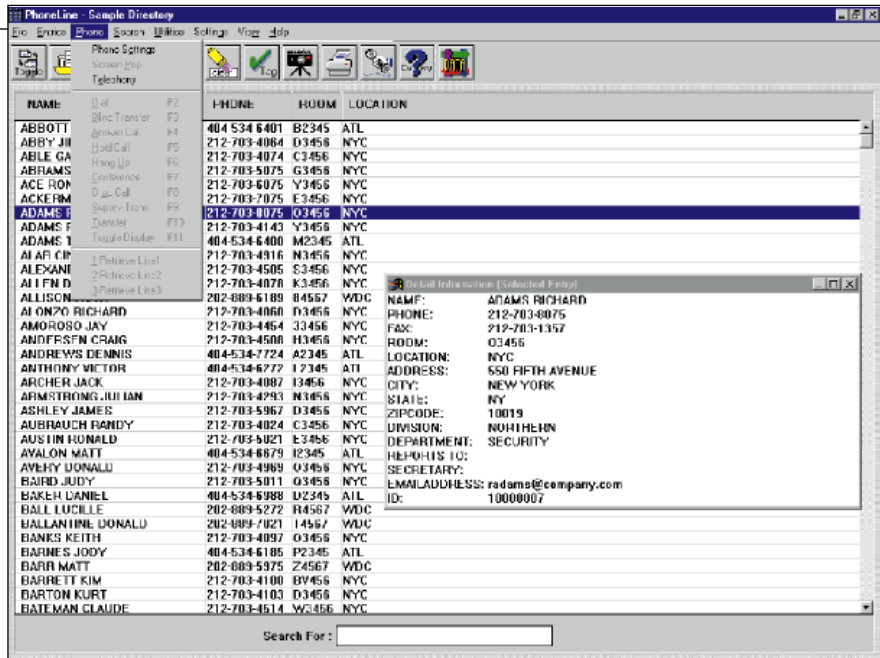

Figure 11. PhoneLine — a selection of telephony functions (grayed out here because we weren't running on a TAPI server).

must be defined/set in the Interface Type Settings area. Another keyword that was missing from the index was "un-install." However, in the version we tested, an un-install feature was unavailable anyway.

Despite these minor problems, the documentation is very good. The tutorials are excellent. They are well illustrated with screen shots, and provide step-by-step directions throughout. One of their tutorials is a whopping 69 pages! While that number of pages may seem intimidating, completing the tutorial didn't take long. (CCOM recommends one hour to perform the steps in this particular tutorial.)

Regardless, once you've completed the tutorial you know how to take advantage of many of the product's capabilities. We should also note there are several good examples for importing records, creating maps to map certain fields, and exporting records.

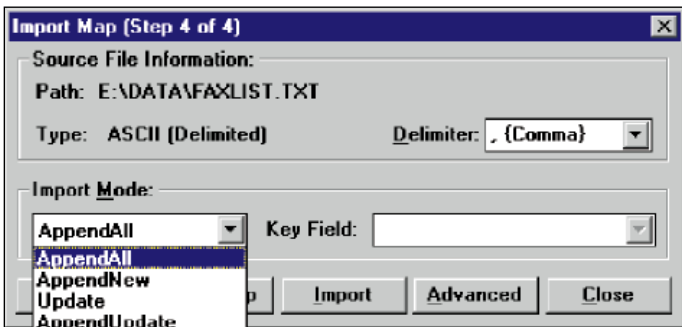Overall, we were so impressed with the organiza-

tion and content of the documentation that we gave it a 4.25 rating.

FEATURES

PhoneLine allows you to dial from a graphical user interface (GUI), transfer and receive calls, as well as initiate and participate in conference calls (Figure 11). Each user can maintain private electronic rolodexes for personal information, vendor directories, home phone number, etc. For call control, PhoneLine supports several telephony interfaces, including modems, TAPI, TSAPI, and PassageWay DirectConnection.

PhoneLine and MasterDirectory have more import and data manipulation functions than you will know what to do with. Several import modes are available, including append all, append new, append update, update, delete, and replace database. (See Figure 12) There are many import and data manipulation utilities. For example, changing or updating an area code is simple with MasterDirectory.

PhoneLine lets you instantly look up directory information, transfer calls, and dial phone numbers. With PhoneLine, operators and message centers can send electronic "While you were out" phone slips using standard e-mail packages, including Microsoft Mail, Lotus cc:Mail, GroupWise, and all MAPI- or VIM-compliant packages.

With PhoneLine, receptionists can look up and dial employees to notify them of visitor arrivals. They can also track down employees using PhoneLine's search and query capabilities. PhoneLine even has a

Figure 12. PhoneLine — multiple import capabilities.

feature to help find the appropriate administrative assistant or secretary (or other employee) to alert the person who has a visitor. These capabilities are further enhanced with PhoneLine's photo feature. Each employee can have his photo tagged to his name. This allows security desks to access online employee photos to perform visual identification.

Users of PhoneLine can configure and modify it to meet personal preferences or specific needs, such as changing the sort order, or showing/hiding specific data fields on-screen. The size of the font and type of font is also modifiable. Specific functions of PhoneLine's feature set can also be enabled/disabled as required for specific individuals or groups. For example, the administrator can configure the picture feature so that only the receptionists and security desks have access to employee ID images.

OPERATIONAL TESTING
MasterDirectory
We tried to perform a group select on the records, but this capability is not available at this time. Thus, you cannot use the Control key (and a mouse click) to select individual records, nor can you use the Shift key (and a mouse click) to select ranges of records (See Figure 13). We are told that CCOM is working on implementing this feature in an upcoming version. Being able to select specific records is important for group deleting, or group modifying. For example, if a specific department has changed names, you can select this group of records, click on a group modify button or menu option, and then indicate which field(s) you wish to change/modify.

Although a group modify of *specific* records is unavailable in this version, there is a group modify feature that allows you to change the entire group of records. This allows you to make global changes to "specified" fields for all the records. A GUI interface brings up a screen where you enter the new information into one or more fields. The group modify feature only changes fields into which you enter new information. Thus, if you leave a field blank, MasterDirectory leaves the original information intact.

MasterDirectory had some great "data massaging" tools. They allow you to create "maps" when importing records into a new or existing directory.

Figure 13. MasterDirectory — main screen for viewing records, searches, record manipulation, etc.

For existing directories, MasterDirectory gives you excellent "merging" capabilities. The import maps define the data import procedures from the source files into the directory. When creating import maps, you specify the source file that contains the data you want to import into the phone directory, the format of the source file (Dbase, ASCII delimited, etc.), the fields that contain the data you want to import, and the fields in the MasterDirectory file that will receive the data to be imported. You actually "map" the information from the fields in the source files to fields you specify in the directory. You also specify the import mode you want MasterDirectory to use when comparing records from the source files with existing records in the directory.

There is no need to "massage" the data before importing into MasterDirectory. Many other software programs require that you "strip" out any fields that are not going to be imported, and they require that the fields of the data file be in a certain order before importing. MasterDirectory does not present this problem.

Export maps are done in a similar fashion from MasterDirectory. Another nice feature is that you can import (or export) manually using the import/export maps, or schedule the data to be imported (or exported) automatically at a specified time, such as late at night

when you are not using your computer. MasterDirectory can also perform batch importing and exporting of data, which is particularly nice if you are constantly importing the same data files to update the records in MasterDirectory.

PhoneLine
PhoneLine, the software program that runs on each of the client PCs, is responsible for the nifty call appearances that are displayed on the bottom of the screen. Up to five call appearances can be displayed, but that doesn't mean you are limited to five calls. Regardless, most people only handle three or fewer phone calls, that is, call appearances at any one time (say, one line/phone call on hold, one line in use, and one incoming phone call.

Picking up a phone call is as simple as clicking on the call appearance box containing the incoming phone call. This can also be done from the keyboard, which is very important in call center environments, where call volumes are large, and where the keyboard is preferred because it is faster than using a mouse to answer calls. CCOM has gone to extremes to provide keyboard equivalent shortcuts in PhoneLine to allow access to just about every function that can be performed by the mouse.

The call control for PhoneLine was very impressive. We liked the screen-pops combined with caller-ID to pull up records in the directory. For those entries that had pictures associated with the records, the screen would pop-up a picture of the employee along with the

records. Pretty neat stuff! Other uses for pop-up pictures include attaching a map of the company to a generic department phone, which can be helpful when security personnel are asked to direct visitors. Popular graphic formats supported by PhoneLine include TIFF, JPEG, and GIF.

PhoneLine's searching capabilities are integral to the product. We were able to search entries on any field. PhoneLine also had an "on-the-fly" search routine. For instance, as a user types a letter, PhoneLine scrolls to the first entry that matches the first letter. As you enter successive letters, PhoneLine scrolls to the next entry that matches each of the successive letters. So if you type "S" it brings up all the records that begin with "S"; then, if you type "M," it matches all records that begin with "SM," such as "SMITH" or "SMIRNOV."

Other searching capabilities include phonetic searches, which are useful when you don't know the exact spelling of what you are looking for. (For example, last names are sometimes spelled differently from what is expected.) PhoneLine also enables phone extension searches, and you can do a location search to find an employee's supervisor or administrative assistant. Complex queries are also available with PhoneLine. With these queries you can

provide a subset of directory information that can be used for printing reports and labels, or exported for mail-merging. Besides being able to print the directory in a report, PhoneLine can also print Avery address labels.

ROOM FOR IMPROVEMENT

Implementing Control select and Shift select would be a welcome improvement. Nonetheless, there are workarounds you can use in the meantime. Another feature we would like to see is the ability to click on a column heading to change the sort order (assuming that particular column heading has been indexed). At present, you can only sort on fields you index first.

Although MasterDirectory has bubble help, PhoneLine lacks this convenience. This is a minor problem. The icons in PhoneLine are very large, and some have descriptive words contained within them. Still, we would like to see bubble help in the next version.

When you define which fields to display, you cannot double-click on the field to add or remove it from the display fields. You have to select it, and then press another button. One other minor nuisance: the Delete key doesn't work in MasterDirectory when you try to remove a record. Instead, you have to delete a record by going into the 'Entries' menu. This required two

clicks plus a confirmation click, for a total of three clicks to delete an entry.

One final note, we couldn't find a way of modifying records from within PhoneLine, although we saw three grayed-out menu items, one of which said "Edit entry." We suspect CCOM may already be at work on adding this feature to the next version.

CONCLUSION

For directory assistance and maintenance of the directory database within your corporation, PhoneLine is one of the best products on the market. Its database functionality, particularly its great "data massaging" techniques, make this software product very powerful and easy to use.

We were particularly impressed with CCOM's attempt to make PhoneLine self-sufficient. What we mean by this is that we didn't have to use Borland's Paradox, Microsoft Access, or some other database tool to "massage" the data and then import into CCOM's product. All the data manipulation can be done from CCOM's program. In fact, in many ways we found that using CCOM's product to manipulate data was easier than using Microsoft Access or Borland's Paradox.

Conferencing with PhoneLine is a powerful and easy-to-use feature which is accessed via the graphical user interface or a function key. People who have problems setting up conference calls with their current phone system might be interested in this product for its conferencing feature alone. (But we'd recommend you investigate the product's wealth of functionality beyond that.) Many current phone systems make it very difficult to set up conference calls. We've seen phone systems where conferencing is performed by pressing convoluted sequences of digits, such as *55, or pressing a Transfer button. Still others require you to put the call on hold, and then press the Transfer button. This leads to great confusion, inadvertent caller hang-ups, and frustration among employees who may have used another legacy phone system with different conferencing methods. With PhoneLine, there is no confusion. It's very easy and user-friendly. We would definitely recommend this product for corporations with 100+ employees or multiple sites, but smaller companies will see benefits as well.
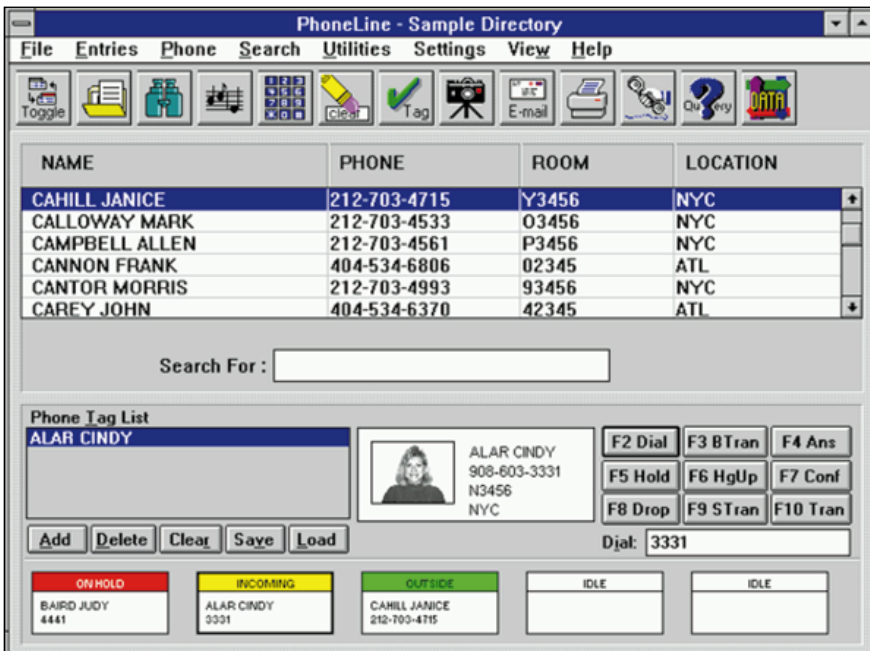

Figure 14. MasterDirectory — shows the multiple call-handling capabilities, including on-hold, and whether they are internal or external calls.

WebPhone

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NetSpeak's WebPhone is a Web telephony software product that allows you to talk to anyone in the world for no more than the cost of your Internet connection. Since most Internet Service Providers (ISPs) currently charge a flat rate per month while allowing you unlimited connection time to the Internet, making calls over the Internet can be very economical. ISP monthly rates are usually around $19.95, but we've seen them as low as $7.95 — which is pretty cheap in comparison to a hundred-dollar or even thousand-dollar phone bill. With WebPhone, you can make free long-distance phone calls to anyone in the world who is also running this software product (and who has the appropriate hardware).

NetSpeak has taken Internet telephony a step further by joining with Rockwell to provide Internet-originated calls directly to call center agents, who are able to use the call center's existing equipment. This feature will also allow customers and agents to talk over the Internet while simultaneously viewing World Wide Web pages.

A call center using Rockwell's automatic call distributor (ACD) would not require any additional equipment. (NetSpeak also plans to support other ACDs.) Customer calls, which are made via the Internet from customer PCs, appear the same as any other inbound call to the ACD, but can be identified as an Internet call (as opposed to a standard phone call) on the agent's computer screen. This feature will be especially useful in those instances where there is only one phone line connection (over 80% of homes). Conversing over the Internet is much easier than using a "call me back" solution.

Personal Directory

WebPhone's Personal Directory has powerful yet easy-to-use features that allow for fast updates and entry queries. For example, while you are speaking with someone on the WebPhone, you can simply drag the appropriate line to the WebPhone Personal Directory. Personal Directory features include adding new members to your directory, delete, sort, and search. You can also place a call from the Personal Directory by simply double-clicking on the party you wish to call.

Searching Capabilities

When you click on the Information button on the phone, enter your search criteria, and press the Search button, the NetSpeak Information Assistance Server will return the parties who match your search criteria, and WebPhone will display them in the search results window. You can then drag the desired party to the WebPhone Personal Directory, thus adding them to your personal directory, or double-click to place the call right away.

The information dialog box connects you directly to NetSpeak World Wide Information Assistance to obtain the WebPhone number of the party or parties you wish to call (Figure 15). If you know the party's e-mail address, you can simply type it in to place the call. If the party does not have WebPhone installed, your WebPhone will display, "NO WEBPHONE" and send the party an e-mail message informing them of your attempted call.

Voice Mail Capabilities

If you have WebPhone, other WebPhone users can send you voice mail. It doesn't matter whether you are online or off-line. See Figure 16 to see the voice mail message screen.

Operational Testing

We tested WebPhone externally over the Internet using 28.8 Kps modems to people around the world. We also used the Internet and our own LAN to connect to a second test machine. Both

Figure 15. WebPhone's information dialog box to obtain the WebPhone number of the party you wish to call.

Figure 16. WebPhone's voice mail interface.

machines had Pentium 120 Mhz CPUs, used Windows 95, and had 16-bit sound cards. These cards, from Creative Labs (SoundBlaster 16 Value PnP), supported full-duplex communications, so we were able to test this capability.

The sound quality during full-duplex communications was surprisingly good. There were a few breaks in the voice here and there, but these were less obvious than those we've seen in similar products. It could be the compression algorithm (NetSpeak's TrueSpeech), or maybe the Internet traffic happened to be light the day we tested. One of the tests we performed was to see whether the parties on either end of the connection could hear each other while they carried out a counting exercise. Both parties counted to 15 simultaneously, and each could hear the other without difficulty.

The text chat feature is adequate. Like several other packages, the text chat feature does not do "real-time" transmission of characters that are typed. Similar to IRC, it waits until the Enter key is pressed before sending the message over the Internet. This hampers communications somewhat. Often you will be typing something, not realizing that the other user is also typing something. When initiating a text chat, the other person's computer automatically "pops up" their chat window if it isn't open already.
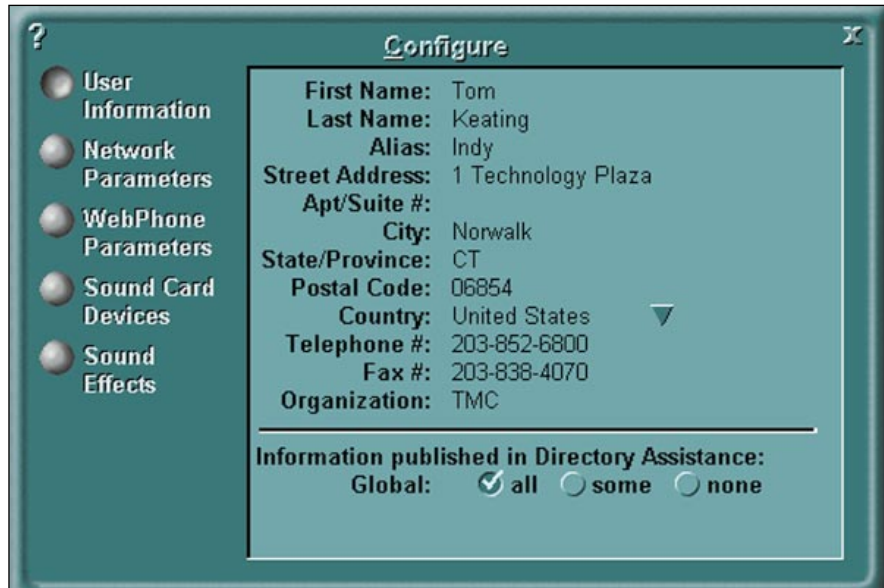

Figure 17. WebPhone's main GUI interface for making calls.

The graphical user interface was fair (Figure 17). Although NetSpeak was creative in duplicating the "look" of a cellular phone, the design did introduce some limitations. For example, the buttons are very small, and the functions, denoted with three-letter labels, are not always obvious. This made for a longer learning curve.

The main window located on top of the phone interface included several pieces of useful information. It shows the name of who is calling, the status of each call (busy, no answer, talking, calling), as well as the status of each line. The display also shows connect time, which has potential for business applications, especially if WebPhone is eventually integrated with a contact management software program. Then, connect times could be recorded in a database for call center manager monitoring, statistics, and performance ratings for improvement or appraisal.

The online directory was fair. You can search by name or by country. However, there were no forums or chat rooms that we could find for special interest areas. This was a surprising omission. Most competing Internet telephony products already have this feature. We suppose the WebPhone Forum Server (WFS) will soon solve this problem.

ROOM FOR IMPROVEMENT

We didn't like the default color scheme. (It's hard to read black on dark green.) A user-configurable color scheme would be helpful (Figure 18). The text chat was fair, but could use real-time keystroke transmission support. There also was no built-in whiteboarding, and the online help consisted of a WordPad file instead of the standard structure Windows 95 online help program.

The next thing we would like to see isn't really a proper Room For Improvement issue. It's more of a

WebPhone's Features

Much of what you would expect to see on a fully featured phone is included with this software. Advanced features on WebPhone include:
- Midi-music on hold
- Point-to-point calling via e-mail address
- On/off-line integrated voice mail system
- Four lines with call holding, muting, and do not disturb
- Call blocking plus complete caller ID
- Noteboard for interactive party specific text chat
- Call conferencing
- Call transferring
- Full duplex voice communications
- Personal WebPhone Directory for storing your favorite numbers
- Improved audio quality with TrueSpeech
- Last party redial
- Speed dialing
- Conversation encryption for secure phone calls
- Integrated real-time information assistance
- Party-specific, user-definable, custom outgoing messages
- User-configurable sound effects
- Operation over the Internet over any TCP/IP-based LAN or WAN

Figure 18. WebPhone's configuration screen showing some of the available options.

and we liked the multiple OGMs. The simple, no-frills graphical user interface was adequate. Sound quality was very good, as was the usability.

How does WebPhone stand up to the many Web telephony products appearing in the market? It can be hard differentiating between them. For example, most support industry codecs such as H.323 (or soon will). We suggest focusing on two areas. First, consider the GUI. Are you comfortable with it? Is there another product out there with a GUI interface you prefer? In WebPhone's case, the GUI was unique and creative, but also a bit hard to read, which made learning to use the product a little more difficult.

Second, look at connectivity. In this area, WebPhone not only provides a means of connecting people who are online, it also (in partnership with Rockwell) allows Internet-based users to call directly into call centers (technical support, help desk, whatever). Once connected, the call center agent and the caller can converse over the Internet.

NetSpeak worked in conjunction with Federal Express to provide a demonstration of this capability. We clicked on a FEDEX icon, and a call center representative from FEDEX picked up immediately. (We gave the FEDEX representative a tracking number, which allowed us to trace a package which our CTI Labs hadn't received).

This application represents an innovation other Web telephony products have yet to implement. (Imagine: a real business application of Web telephony!) It also demonstrates that NetSpeak is serious about making its WebPhone a business tool instead of a technical curiosity. Indeed, this approach might help NetSpeak's product pull ahead of its competition.

"wish list" topic. Anyway, we'd like to see WebPhone increase its strength as a business application by providing integration with contact management software such as ACT! and Goldmine, or by providing "hooks" into databases such as SQL Server, Sybase, and Oracle.

CONCLUSION

Overall, WebPhone is a good product. The online or off-line voice mail capabilities were impressive,

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