Unified Messaging Systems: Technology Overview

Summary
Adoption of unified messaging solutions has been stagnant despite the convergence of computer, telephony, messaging and Web-based technologies and despite a growing mobile and remote workforce.

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Technology Basics

What Is Unified Messaging?

In its simplest form, unified messaging makes available voice mail, fax and e-mail messages through a single user interface. The goal is to simplify and speed message handling by improving how users receive, reply to and manage messages, regardless of delivery mode. Implementation can use a single server or multiple servers behind a single user interface. The user interface itself is typically a general-purpose desktop PC driven by an application software module or integrated software load. Additionally, the growth and ubiquity of Internet access are adding to the popularity of Web-based interfaces that use familiar browsers.

Enhanced unified messaging expands access to all messages at any time with whatever device is most convenient. This can include the following:

- Listening to e-mail over the telephone using text-to-speech (TTS) technology.
- Delivering faxes or e-mails to any fax machine.
- Web-based access to messages and mailbox options.
- Global or common directory.
- Single point of administration.
- Mixed-media functionality, such as the ability to attach fax messages to e-mail, annotate and electronically distribute e-mail, or fax messages, with voice mail.

Who Needs Unified Messaging?

People have a variety of communications needs and responsibilities at different times. Mobile and remote workers have a strong need to be aware of messages. However, being on the road or in a virtual office makes it difficult for them to check e-mail and faxes when they may only have a few minutes at a phone. They may also need to send e-mail or fax messages, but only have access to telephones. Additionally, organizations concerned about productivity believe employees will be more efficient and productive if they are able to check all messages from one interface. An important argument behind this is the value of work prioritization, which can enable users to structure their work more effectively with respect to time demands and the potential return to the organization.

User demand for unified messaging depends on an array of individual requirements. Examples include these:

- Being busy and unavailable to take phone calls.
- Receiving too many messages.
- Being on the go and unable to sit down at a PC for e-mail.
- Not having the correct terminal device for needed mode of communications (no screen device for e-mail).
- Having to be very responsive by taking calls immediately and by receiving and replying to messages promptly and selectively.

What Is Unified Communications?
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Communications systems have traditionally operated within discrete functional or technological “silos” without many interactions. Unified communications is a concept just beginning to evolve that is based on open architectures, employing established communications protocols that can break through the silo barriers.

As an architecture or a vision rather than a set of products, unified communications describes an environment that provides users with maximum flexibility across a range of contact possibilities. It makes use of openness to achieve integration at the technical level, bringing together varied communications technologies, including unified messaging, into a coherent architecture. At its broadest level, unified communications supports user interaction with any content transmitted through any network to any device, any place, any time, via any media. Capabilities include the following:

- Multimedia messaging
- Wireline and wireless real-time voice communications
- Paging
- Conferencing
- Information sharing
- Group applications
- Directory applications

Evolution of Voice Mail Functionality

**Voice Messaging**

A basic voice mail system records, stores and plays voice messages. The equipment can be either a stand-alone device or hardware that is integrated within a telephone system. Features available permit users to access, reply to and forward messages; schedule delivery of messages; and tag and edit messages. Integrated systems have message-waiting indication via a light on a telephone, an alphanumeric display or both. A ringing telephone can default to a mailbox that delivers an invitation to leave a message, then automatically records the results. Users (subscribers) are the owners of personal voice mailboxes in a voice mail system, and telephone callers can leave voice messages in a subscriber’s voice mailbox.

Advanced voice mail functions include fax tone detection for the automated recording, playback and retrieval of voice/fax messages; call coverage (telephone answering); voice message exchange; automated attendant (callers self-direct themselves to particular extension numbers); and audiotext (callers retrieve prerecorded information).

Users access messages in their mailbox from telephones or PCs by entering account numbers and personal passwords. With telephone access, information entry and all system commands are performed via the telephone touch-tone keypad or, with speech recognition technology, via simple voice commands. The Telephone User Interface (TUI) of a voice mail system provides the user with voice menu prompting for message management functions, including the following:

- Retrieval and playback of messages.
- Message disposition, such as deleting, saving, replying to or forwarding messages to other users.
- Sending new messages to one or more users.
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- Changing the setup of the mailbox facilities, such as greetings, passwords, distribution lists and access to live assistance.

In addition, the growth of e-mail usage is increasing the popularity of the PC screen as a voice mail user interface. Point-and-click techniques, together with labeled icons, make desktop message management functions easier and more efficient. An important benefit of desktop management of the voice mailbox is the ability for the user to access voice messages in random order. While the TUI forces users to access messages in sequential, first in, first out (FIFO) or last in, last out (LIFO) order with limited sorting, a graphical user interface (GUI) allows the user to choose which messages to play and in what order, since the user can see information such as the message sender, the message length and, possibly, the message topic.

Call and Message Management

Call and message management functions of voice mail systems include the following:

- Outdialing to a pager or an external telephone number to notify the user of a newly received message.
- Desktop call screening of inbound calls using recorded caller identification input, contact data screen pops or both.
- Find me, Follow me and Connect me call screening that puts the caller on hold while the user is contacted and makes the decision to be connected immediately or to request a voice message from the caller.
- Networking of voice-messaging systems that are in separate locations.
- Dynamic message delivery checks and returns a receipt for confirmation of message delivery.
- Outbound call initiation (call return) from the voice mail server during message retrieval.
- Personal mailbox administration, including prioritization of inbound messages.
- Sender cancellation or modification of undelivered messages.
- Fax applications, including the routing of a fax transmission that has been answered by the voice mail system to a direct inward dialing (DID) telephone number; treating it as a voice message, with or without an attached voice message (compound message); and fax overflow for busy fax machines. Many voice mail providers have integrated third-party fax servers to accommodate inbound and outbound fax traffic with voice mailboxes.

Voice Mail Networking

Voice mail networking allows users of geographically distributed voice mail systems to send/receive/forward voice messages. This can involve multiple mailbox addresses and distribution list codes for several remote sites. Although initial voice mail networking was limited to proprietary access between voice mail systems from the same manufacturer, industry standards, like Audio Messaging Interchange System (AMIS), expanded such access to networking between different systems. With the growth of the Internet and unified messaging, digital voice mail networking has been deployed over the Internet, using the Voice Profile for Internet Messaging (VPIM) standard, rather than requiring private dial-up or private-line connections between voice mail sites.

Facsimile Integration
Information dissemination services via fax broadcast and fax response have been incorporated into commercial stand-alone fax server systems. However, as indicated earlier, most voice mail systems also accommodate incoming fax-messaging activities as part of their telephone answering and message management capabilities. Fax mail/messaging captures incoming fax documents in a voice mailbox, with or without an attached caller voice message, and provides standard message management functions (forwarding, notification) to the recipient. The user can then direct the fax to any fax machine telephone number/extension or a network printer for hard copy printout. With the unified messaging desktop GUI, the fax can also be displayed directly on the PC screen. The fax overflow application accepts faxes that are sent to a fax machine that is busy or out of paper and stores the faxes until a fax machine becomes available.

**Impact of the Internet and World Wide Web on Voice Mail Systems**

The rapid growth of e-mail on the Internet has made Internet-based e-mail a popular target for integration and consolidation with voice mail systems and services. These services are particularly well suited for people with small businesses and for users of small home offices who do not have an internal enterprise e-mail server. In addition, the Internet offers a cost-effective means of voice mail networking between diverse voice mail systems using VPIM. Popular Web browsers are also being employed by users for PC access to voice mail servers over the Internet and can be used by messaging system administrators to remotely manage user activities via the Web. Finally, there is a trend toward using Internet telephony gateway services for Voice over IP (VoIP) applications that will extend enterprise features and functionality to even a remote office with just one telephone.

**Unifying Message Management Functions of E-Mail and Voice Mail**

E-mail systems and voice mail systems have been evolving toward unified user interfaces both at the desktop GUI and the telephone interface. The integration strategies have varied depending primarily on the e-mail server capability involved, which means a given unified messaging product may not be capable to support integration with all e-mail products.

Although voice mail system providers made early attempts at unified messaging for legacy mainframe e-mail systems, the results were extremely limited. Until LAN-based, client/server e-mail had established itself, no unified message product development had been successful. However, some of the early client/server e-mail products did not provide for voice server access needs in their implementations. Accordingly, three approaches for unified message management have been implemented by the voice mail industry. These are as follows:

- **Integrated Servers, Single Message Store**—This approach is based on the integration of the e-mail server and the voice mail server and sharing a common multimedia message store (universal mailboxes) and directory. This avoids administration of two message databases and address directories and facilitates forwarding multimedia messages (attachments). Most of the voice mail systems adopting this approach rely on the multimedia storage, directory and user client software of those e-mail servers that provide storage and directory functions for voice mail extensions.

- **Integrated Servers, Dual Message Store**—This is an alternative approach that uses separate multimedia messaging stores and directories for the e-mail and voice mail systems. The e-mail and voice mail servers, however, have to synchronize message and user status information to keep message status up to date and consistent between the two servers and between desktop and telephone modes of retrieval. This synchronization is inherently problematic.

- **Client Integration**—A simpler, but less effective, approach to unified desktop message management is based on a software client that separately, but concurrently, accesses individual e-mail and voice
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mail servers and their separate message stores whenever the user checks for messages. This approach does not permit the voice mail system to provide immediate telephone-based notification and delivery of important e-mail messages, as it would for voice mail messages. However, it does allow legacy client/server e-mail systems to interoperate with voice mail systems. **Note:** The voice mail server can still function as a client of the e-mail server for telephone retrieval of e-mail messages.

There are other considerations and implications for the implementation approaches mentioned above, including these:

- Message traffic between servers.
- Reliability of e-mail server and LAN for voice mail service.
- Total cost of ownership (TCO) for each approach.
- Ease of cross-media messaging.
- Cost of upgrading/replacing legacy e-mail and voice mail systems, which includes purchase, installation, training and business disruption.

**IP-Based Telephony Servers and Unified Call Management**

The convergence of voice and data networking is also pushing the role of telephony servers into the data networking camp, as evidenced by Cisco’s aggressive acquisitions and expansion into telephony functions and applications. However, the leading traditional telephony providers, such as Avaya, NEC, Nortel Networks and Siemens, are not standing still and are moving in the same direction as IP-based switches. The difference in approaches is that the incumbent circuit-switch vendors are building systems that can also support analog networks as well as packet-switched traffic.

Perhaps the most important benefit to be realized by the convergence of voice and data within traditional telephony networks will be the ease of integration between the real-time calling functions and messaging. This will not only support unified messaging facilities, but also the capability to easily switch from messaging to calling modes and vice versa during a single call/connection. Both messaging and calling functions will take place from the desktops and wireless telephones interchangeably.

Standardized directory services will not only be essential for universal, cross-media addressing, but also will play an important role in the personalization of individual user call and message management capabilities. In particular, the notion of intelligent personal assistants will be realized through personalized rules for call screening and message filtering that will be referenced in directories for efficient call and message routing.

**Barriers to Implementation of Unified Messaging**

Barriers to market acceptance include these:

- Lack of perceived soft-dollar benefits to offset hard-dollar cost or return on investment in a unified messaging system.
- Struggle between traditional IT and telecom departments over responsibilities for implementation and administration of unified messaging system activities.
- Costs associated with upgrading and integration of legacy communications systems.
Technology Analysis

Business Use

Enterprise Customer Premises Equipment (CPE) and Network Services

Unified messaging and call management technology have applications within the enterprise, both in the form of CPE systems, as well as through the use of network services. One of the important integration issues for unified messaging is the interaction between modes of implementation for individual enterprise users who, increasingly, are not working in an office all the time. Whether they are mobile workers, traveling executives or among the growing number of telecommuting knowledge workers, the need to unify communications access and management for the individual user is becoming critical to employee and enterprise productivity and flexibility.

Communication service providers, however, are not only interested in business users, but they are also aiming to exploit the benefits of the technologies for the mass consumer and residence markets.

Cross-Media Messaging

Another level of unified messaging includes cross-media messaging, which covers the retrieval of e-mail and fax text messages by telephone, as well as the ability to exchange voice messages and multimedia information as e-mail attachments. Voice e-mail enables traditional telephone voice mail messages and desktop e-mail-based voice messages to be sent to unified mailboxes for retrieval, either by wireline or wireless telephone or by multimedia screen devices (PC, laptop or personal Internet appliance). The two primary interfaces involved with cross-media messaging are the screen-based GUI and the voice-based TUI, which can employ TTS and Automatic Speech Recognition (ASR) technologies. TTS is very important and necessary for retrieving e-mail in voice, while ASR is primarily needed for hands-free, eyes-free situations.

Messaging Needs

From a users’ perspective, a sender should be able to send any kind of message to an addressable recipient and not be concerned with how the recipient will actually get message delivery. That should be left up to the recipient, based on messaging facilities and individual circumstances. Ideally, the sender should be able to monitor message delivery status at any time and retain ownership control of the message until actual delivery.

With multimedia messaging activity, recipients can receive a mix of voice, e-mail and fax messages. However, recipients might not have multimedia communications devices at their disposal. This means that messages may have to be converted for immediate user retrieval, deferred for retrieval at a later time or forwarded immediately to a compatible output device/destination (printers, fax machines, other mailboxes). Comprehensive multimedia-related facilities for recipients would, therefore, include the following:

- Text-to-speech conversion of e-mail and fax messages for retrieval by telephone, or at least fax message header or sending fax number.
- Cross-system message notification/delivery options, e-mail notice/message transfer, voice mail notice/message transfer, message waiting indication, numeric and alphanumeric paging, and telephone notification/delivery.

For efficient two-way communication, message reply and forwarding functions must allow message recipients to:
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- Respond to an e-mail message with a voice mail message, along with message attachments.
- Respond to a voice/fax mail message with an e-mail message, along with message attachments.

Benefits and Risks

Benefits

Effective unified messaging and call management must result in productivity enhancements and improved message management that will generate a return to the enterprise. In general, the greatest benefits have been realized by mobile users, such as salespeople and executives who travel frequently, and must be able to communicate with others in dynamically changing circumstances. However, organizations can find it difficult to forecast how much financial gain will result from the implementation of unified messaging. Certain vertical markets, such as financial and legal firms, may also benefit from long-term archiving and retrieval of multiple types of messages from a single data store.

Risks

The risks associated with today’s available technologies are still evolving. Not only is the underlying technology changing, but also practical usage needs are evolving and shifting. Increased traffic loads on enterprise LANs can result from voice messages being recorded and retrieved for playback at the desktop. This can be a problem for IT management in network environments that might already be under-configured, since additional voice traffic can complicate the situation.

Perhaps the greatest risks to unified messaging implementations are system reliability and scalability. Telephony applications, including voice and unified messaging, typically requires 99.999 percent system availability. This level of reliability is new for the data-networking world. Reliability and scalability concerns apply equally to standard operating systems being used for all areas of telephony applications and server software that support unified messaging functions. Even where the source of the problem has nothing to do with particular server platforms, users are not generally willing to give up reliability in exchange for enhanced features or system efficiencies. Enterprisewide scalability is further complicated by synchronization issues and the existence of multiple databases.

Standards

A number of industry standards have evolved around the convergence of voice and data communications. The growth of Internet telephony is adding to these. Noted below are some of the more relevant and evolving standards that relate to messaging and convergence:

- **AMIS**—Audio Messaging Interchange Specification is typically used to support analog networking between dissimilar voice mail systems. Dual-tone multifrequency (DTMF) tones convey control information and transmission of a voice message in analog form.
- **H.323**—International Telecommunication Union (ITU) standards specifications are for real-time multimedia communications over packet-based networks.
- **IMAP**—Internet Messaging Access Protocol is for user access over the WAN to Internet mail servers for managing mail folders, scanning message headers and downloading messages.
- **MAPI**—This is a messaging application programming interface (API) for messaging clients to interact with messaging servers.
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• **MIME**—Multipurpose Internet Mail Extension protocol enables the transmission of mixed-media data files across TCP/IP networks and is an extension of Simple Mail Transfer Protocol (SMTP). MIME provides the power for document exchange as well as for cross-media messaging.

• **POP3**—This is the Post Office Protocol for e-mail servers on the Internet and is used to access e-mail for downloading. This protocol is key to basic text e-mail exchange.

• **SMTP**—Simple Mail Transfer Protocol is an application-level protocol that operates over TCP/IP for exchanging e-mail text messages between devices supporting Message Handling Service (MHS).

• **SNMP**—Simple Network Management Protocol is the common method by which network management applications can query a management agent using a supported Management Information Base (MIB).

• **TAPI 3.0**—Developed by Microsoft for its Windows PC environment, the Telephony Application Programming Interface enables Windows applications to control key telephony functions common to most telephone systems. Such control, originally provided for direct first-party call control for individual desktop PCs, has been expanded to allow server-oriented, third-party call control for call-routing applications. TAPI is important to the industry acceptance of Windows NT as a platform for the convergence of public switched telephone network (PSTN) telephony and Internet Protocol (IP) telephony.

• **TCP/IP**—This is the Transmission Control/Internet Protocol used for communications across interconnected networks and is being increasingly deployed to connect diverse computer architectures and platforms, both between enterprises and within enterprises.

• **VPIM**—Voice Profile for Internet Messaging is a protocol that is being proposed to allow different voice mail systems to automatically exchange voice messages over the Internet.

**Price vs. Performance**

The average cost per user for unified e-mail, voice mail and telephone activities ranges from US$150 to $300 per individual. This excludes basic e-mail or telephone system costs and basic desktop PC hardware and software, which could add another $200 per. Essentially, it includes licensing costs for the voice mail server software that will integrate with e-mail and the telephone system. For example, Microsoft Client Access Licenses (CALs) might be required for subscribers who access messages through the Outlook desktop interface. Subscribers who access messages only over the telephone do not require a CAL if they have purchased the Microsoft Exchange Voicemail Runtime Edition. If the site has an established Exchange Server, they should already have CALs for their e-mail users. In addition, maintenance costs can be estimated at 15 to 20 percent of the purchase price per year. Operational costs would be enterprise-specific and very dependent on the number of changes. One developing trend is that more and more vendors are packaging a limited number of unified messaging seats in the basic offer as a way of lowering right-to-use fees and increasing market adoption.

**Selection Guidelines**

Potential users should consider the following attributes as they relate to their specific environments:

• **Scalability**

• **Ease of system management and administration**

• **Availability of personal mailbox administration at the desktop**
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- Message notification methods
- Message-handling options, including cross-media capabilities
- Web-based and browser-based message access and management options
- Multiple language capabilities
- Text-to-Speech capabilities
- Availability of backup and restore procedures

Technology Leaders

Industry providers with large numbers of installed voice mail systems are strategically positioned to provide the necessary e-mail integration upgrades for unified messaging. These include the following companies.

*Active Voice, LLC*

Since October 2001, Active Voice, LLC, has been wholly owned by NEC America and NEC Infrontia. Active Voice continues to sell its platforms through its own dealer channel and strategic partners while a significant portion of its business comes from NEC. Active Voice’s immediate priorities are centered on adding new features and integrations to its Microsoft Exchange-based Kinesis product; enhancing its Repartee for Windows 2000 product line; delivering a new Repartee product on the Linux platform; and further developing its in-switch products:

- Active Voice released its Kinesis product in January 2003. Targeting the large enterprise market, Kinesis uses Microsoft Exchange 5.5 and 2000, along with Windows 2000, to deliver voice mail and unified messaging into a Microsoft BackOffice environment. Kinesis allows users to access their voice, fax and e-mail messages from the Microsoft Outlook Inbox, where the information can be managed via the telephone, desktop computer or Web browser. Active Voice recently added clustering (up to five servers), which allows it to scale from four to several hundred ports. During the next year, Active Voice is planning to enhance its Kinesis product with various IP integrations and networking capability. Kinesis will integrate with both traditional and IP telephone systems and in combined IP/private branch exchange (PBX) environments. Virtually the same product, NEC’s NEAXMail AD-120 unified messaging system, which Active Voice developed for NEC, is sold through NEC’s distribution network.

- Version 2.1 of Active Voice’s Repartee for Windows 2000 products was released in February 2003. The product line comes in two flavors—Repartee UC (Unified Communications) and Repartee VM (Voice Messaging). The products are based on the Windows 2000 Server and are highlighted by a variety of unified messaging applications called TeLANophy. For example, the ViewMail module combines voice and fax messages into one window, while ViewMail for Microsoft Messaging supports voice mail and fax unified messaging with Microsoft Exchange, Microsoft Outlook and Windows Messaging Inbox. Repartee’s ViewCall Plus application adds desktop call management functionality that works with Microsoft Outlook, Excel and Word. Its GUI enables users to dial, answer, transfer, hold, screen and create conference calls by pressing a single button on the desktop screen. Telephone calls can also be linked to personal information management (PIM) software for the purpose of updating client contact information. The latest version supports Active Voice’s ActiveFax and ViewFax modules, which allow users to retrieve and send faxes from their desktop or from a remote location. New Repartee for Windows 2000 features will include TTS capability for Microsoft Exchange, ASR, 96-port capacity and integration with Lotus Notes. Features such as networking, a
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Web-based GUI and wireless mobile integration are planned for future product releases. NEC sells its own version of the Repartee for Windows 2000 products, the NEAXMail AD-64.

- Active Voice began shipping its new Repartee LX product in May 2003. Repartee LX is based on Active Voice’s Repartee OS/2 software code, and it operates on the Linux platform. Repartee LX will target small- to midsize businesses with 25 to 400 users who experience heavy telephone traffic. Customers are categorized by a wide range of businesses, including hotel/lodging, education and healthcare. Repartee LX will offer the TeLANophy applications, e-mail integration with Microsoft Exchange and Novell GroupWise, networking and multilingual prompts. Future product enhancements will include an HTML console and various analog and digital integrations.

- Active Voice continues to develop in-switch voice mail and unified messaging products for its strategic partners, namely NEC. For example, the EliteMail digital voice mail product line has been built exclusively for NEC’s Electra Elite IPK, 192, 48 key and hybrid systems. The ElectraMail CTI product represents a fully functional unified messaging solution. Features include fax integration, automated attendant, caller ID and live record. The company plans to enhance its in-switch products later this year with TTS, an HTML console and Linux integration.

Avaya

Avaya supports several alternatives that integrate voice mail with e-mail for users: Avaya Modular Messaging, Avaya Intuity AUDIX Multimedia Messaging System, Avaya Unified Messenger for Microsoft Exchange and Avaya Unified Messenger for IBM Lotus Domino. Avaya provides both Web-based and “thick” desktop clients for managing voice mail and e-mail messages:

- Modular Messaging is a new, standards-based IP messaging solution that supports enterprise voice messaging in an IP environment. Through the use of IMAP4, standard desktop clients, such as Microsoft Outlook and Lotus Notes, can present both voice mail messages from Modular Messaging and e-mail messages to the user. As a standards-based solution, Modular Messaging leverages common IP standards, such as SMTP/MIME, for networking; IMAP4 and POP3 for message presentation; and ultimately H.323 and SIP for telephony integration.

- Intuity AUDIX Multimedia Messaging System is Unix-based with its own multimedia message storage capability that allows data attachments to be added to voice mail messages, as well as e-mail attachments generated by e-mail servers. Optional Intuity Message Manager (a desktop client) and Internet Messaging allow screen-based voice mail management and dual-store integration with a variety of e-mail systems.

- Unified Messenger is a Microsoft Windows 2000-based platform that depends on Microsoft Exchange or IBM Lotus Domino for its universal mailbox storage, directory service and Outlook/Notes client software. Unified Messenger works with third-party fax servers for accessing fax messages at the desktop. All messages can be reviewed, replied to, forwarded and deleted using either a personal computer or a telephone. From a telephone, voice mail is heard in the original voice of the sender, while e-mail is read to the user via text-to-speech conversion by the computer. Fax and e-mail messages can be sent to any fax machine. From a PC, voice messages are played using the sound capabilities of the PC or over the telephone. Additionally, e-mails are displayed as text, and fax images can be viewed on the PC’s screen. Avaya Unified Communication Center (UCC) Speech Access is a voice-enabled technology that provides mobile and remote workers with access to important communications tools and information, including access to messages, contact lists, calendars, calling and conferencing by simply speaking commands into any phone.
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- Intuity Message Manager software is compatible with both Intuity AUDIX and DEFINITY AUDIX systems and supports Internet Messaging. Message Manager integrates voice, fax and e-mail messages so users can view and manage messages from their PCs. Message access is available from the office or via dial-up connections from remote locations.

- UCC Web Messaging is Web-based software that uses Internet Explorer or Netscape Navigator to support voice and fax management tools for Octel 200/300 and Octel 250/350 message servers. When used with Intuity AUDIX, it is a voice, fax, e-mail and text graphical user interface.

Captaris (Formerly AVT)

CallXpress delivers unified messaging to users of Microsoft Exchange and Lotus Notes, providing access to all messages (voice, fax and e-mail) in one Inbox, from any device—telephone, mobile phone, computer, Internet browser or mobile wireless device. CallXpress offers real-time call management features, such as Live Reply (to internal and external callers), and outbound calling from Microsoft Outlook’s Contacts folder. The Captaris fax server, RightFax, is integrated with the CallXpress unified messaging server. Infinite Mobile delivery provides mobile and Internet solutions for e-mail, groupware and enterprise information with voice and data features that are accessible from Web-enabled devices. Captaris Speech provides mobile and remote speech access to messages, contact lists, calendars, calling and conferencing by simply speaking commands into any phone. CallXpress supports integration to over 150 PBX products, centralized and decentralized implementations, and networking with legacy voice mail systems. CallXpress also supports up to 10,000 users per server.

Cisco

Cisco Unity 4.0 unified messaging supports the Microsoft Exchange or Lotus Domino environments for enterprise-scale organizations. The platform uses a single message store and combines voice mail, fax and e-mail into one inbox, accessible through an intuitive desktop client interface, any telephone or cell phone. A multilingual Text-to-Speech engine is available to read e-mail messages to users over the telephone. In addition, individuals can use the notification service to receive alerts for high-priority messages. Cisco Unity’s modularity allows it to be configured initially just for traditional voice mail use, then upgraded to support unified messaging functions. Cisco Unity’s software-only integration with the Cisco CallManager IP PBX is intended to save hardware expense, while a built-in wizard expedites installation. The system also supports dual-switch integration for traditional PBXs and Cisco CallManager. Cisco Unity supports Session Initiation Protocol (SIP) proxy servers, AMIS and VPIM networking, and offers the Cisco Unity Bridge for OctelNet compatibility.

Interactive Intelligence

Interactive Intelligence Inc. develops software for IP telephony, contact center automation and unified communications. Since 1997, Interactive Intelligence has offered unified messaging as part of its all-in-one communications platform, called the Interaction Center Platform. Based on this platform, the company’s contact center software, called Customer Interaction Center (CIC), and enterprise software, called Enterprise Interaction Center (EIC), provide unified messaging in addition to interaction management features. The Interaction Center Platform also powers the company’s Service Interaction Center (SIC), which enables service providers to offer enhanced communications and messaging services to large subscriber bases. In order to leverage this same platform as a stand-alone replacement for legacy voice mail and fax servers, Interactive Intelligence introduced in January 2002 a large-scale unified communications and messaging solution for the enterprise called Communité:

- CIC unified messaging features can operate either as a component of the product’s entire interaction management feature set or as a stand-alone unified messaging system that is integrated with an
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established PBX or VoIP platform. CIC provides unified messaging with local and remote access to voice mail, faxes, e-mail and Web interactions. Messages can be retrieved and processed using an e-mail client (MS Exchange/Outlook), telephone (optical code reader [OCR], TTS and fax) or a Web browser. CIC’s unified messaging supports Microsoft Exchange, Lotus Notes, Novell Groupwise, Sun One Messaging Server and other SMTP/IMAP-compliant products. Functionality includes central management and administration of all messages regardless of type.

- EIC unified messaging features operate as a component of the IP-PBX product only. Unified messaging capabilities are similar to those found in CIC.

- SIC is a turnkey unified communications and messaging product for service providers, such as VoIP vendors, e-mail outsourcers, competitive local exchange carriers, and Internet and application service providers. SIC’s unified messaging capabilities include a universal in-box for managing voice mail, faxes and e-mail. SIC also supports user-defined or system-defined greetings; enables callers to record messages; and provides special options, such as listen to the recording, start over and more.

- Communité was designed to work with established PBXs and IP-based communications systems. It offers unified messaging and unified communications features, such as one-number follow me, call screening, presence management and other messaging functions. Communité supports central administration of unified messaging (UM) users in Active Directory, which allows for load-balancing across multiple servers and locations for distributed enterprises with hundreds of thousands of users. System administrators also have a graphical design environment to create extensions to the voice mail features, such as customer relationship management (CRM) integration as well as wireless and self-service applications. Users can access messages and configuration settings from the desktop, telephone or Web browser, or on a wireless device, such as a PDA, with integration to voice-enabled technology also available. Although Communité can be integrated with many different PBX systems, when used to communicate with Cisco CallManager, voice-processing boards can be replaced with a TCP/IP connection if desired. A new telephony interface that supports SIP was released in May 2002. An Exchange 2000 version of Communité is currently offered, with Lotus Notes and SunOne Messaging Server versions planned for release in 2Q03.

Nortel Networks

CallPilot is Nortel Network’s unified messaging solution that expands on the core functionality of Meridian Mail by delivering voice, fax and e-mail messages to a single multimedia inbox at the user desktop via TCP/IP connectivity to an enterprise LAN or WAN. Optionally, CallPilot can be implemented as a voice messaging system and then enhanced to support multimedia messages. CallPilot uses a multiple message store architecture that stores voice and fax messages separate from e-mail and supports a range of e-mail servers and clients, including Microsoft Exchange/Outlook, Novell GroupWise, Lotus Notes, Qualcomm Eudora Pro, Microsoft Outlook Express and Netscape Messenger. CallPilot also allows end-user interaction via Web browsers, such as Microsoft Internet Explorer, Netscape Communicator and Netscape Navigator. The system is built on Intel Pentium-class processors and Intel/Dialogic voice boards, and operates on a Microsoft Windows NT-based server. It supports integration primarily with Nortel Networks PBX systems, including Norstar, Meridian 1, Succession CSE 1000, DMS 100/500 and MSL 100. CallPilot Release 2.0 features include as e-mail by Phone (Text to Speech), Web Messaging and integration with Nortel Networks Symposium Call Center Server Integration. Multisite networking via AMIS or VPIM is also supported.

Siemens Enterprise Networks
Unified Messaging Systems: Technology Overview

HiPath Xpressions V3.0 can be installed for basic voice messaging capability, then upgraded to full unified messaging to include fax and e-mail integration. HiPath Xpressions uses the same LDAP directory and message store as Microsoft Exchange with the Microsoft Outlook e-mail client or Lotus Domino and the Lotus Notes client. The platform supports full cross-media messaging options, which Siemens calls “message morphing.” HiPath Xpressions is available with either a single message store, a dual message store or a combination of both within an organization, on a user-by-user basis, on the same server. Additionally, HiPath Xpressions can simultaneously integrate to both Microsoft Exchange and Lotus Domino Groupware servers, with the same HiPath Xpressions server. End users can manage messages and mailbox options from a standard multimedia PC, a telephone or a combination of a PC screen and any telephony connection. The use of TTS for reading e-mail messages is an option. Users also benefit from the TUI-accessible “myXpressions” message-filtering folder that leverages Microsoft Outlook rules and Lotus Notes rules. Also available is multilingual support for the TUI, Web-based mailbox administration, system administration and TTS. E-mail integration via dual message store with the IMAP4/POP3 protocols to Novell GroupWise and Qualcomm Eudora e-mail clients is also supported. Legacy Siemens PhoneMail systems can network with HiPath Xpressions using its companion gateway options. HiPath Xpressions is supported simultaneously on multiple Siemens HiPath 3000, 4000 and 5000 IP-based systems, as well as legacy Siemens Hicom 300 systems. Siemens continues to announce further enhancements. For example, in the summer of 2003, HiPath Xpressions will integrate to a wide variety of non-Siemens PBX and IP PBX platforms. Significantly, in April 2003 Siemens AG announced its intent to acquire Cycos AG, its co-development partner for HiPath Xpressions V3.0.

**TOPCALL**

TOPCALL’s Unified Messaging is a turnkey hardware and software solution that uses a single message store to support voice, fax, e-mail, Short Message Service (SMS), Web, and wireless communications. Through native integration with Microsoft Exchange, Lotus Notes and Novell GroupWise, as well as standard SMTP message transfer, TOPCALL offers functionality for all major environments. TOPCALL manufactures its own voice and fax boards, ensuring compatibility and reliability with TOPCALL solutions. Solutions are modular and are pre-configured and tested at TOPCALL technical offices located in 40 global locations, including many throughout North America. TOPCALL provides solutions for all sizes of organizations in all major industries while also offering a business and technology model that addresses the particular needs and requirements of service providers.

**Technology Alternatives**

**Web-Based Messaging Access**

With the cross-media facilities of unified messaging, voice mail messages can be attached as *.wav files to e-mail messages, then sent across the Internet. Using unified directory capabilities, such voice messages can be accessed either from a PC or telephone using e-mail or voice mail addresses.

**Unified Messaging Service Bureaus**

Message servers do not necessarily have to reside on the enterprise premise. For a monthly service charge, unified messaging service bureaus provide individuals and businesses with a single user interface for voice mail, e-mail and fax messages. While no investment in special software or hardware is required, service providers typically require subscribers to forward incoming telephone and fax calls to specific numbers on the service provider’s system. Message notification can be a brief message to a pager, a cellular phone or an e-mail address, while a subscriber can use a telephone or PC to retrieve messages. Many services include speech recognition and Web-based interfaces that use familiar browsers. Charges typically range from $10 to $50 per user per month. Examples of service providers include these:
Unified Messaging Systems: Technology Overview

- j.fax.com Unified Messaging provides toll or toll-free numbers for unlimited incoming messages, a toll-free number for retrieval and use of established e-mail accounts. Web-based message retrieval is not currently offered.

- Premiere Technologies’ Orchestrate provides a single number for incoming messages and message retrieval with an option for browser-based access.

- General Magic Portico subscribers get a PIM feature and can use voice commands to access messages. Web-based access is supported.

- Webley offers users voice recognition for managing voice mail and e-mail, but it also supports voice mail, e-mail and fax messaging using a Web-based interface. Capturing caller ID for incoming voice calls enables a user to just say “return the call,” and Webley dials the last caller.

Communications Service Providers

Companies like VoxSurf focus on the delivery of modular communications solutions to Communications Service Providers (CSPs), such as Mobile and Fixed Line Operators, Mobile Virtual Network Operators, Competitive Local Exchange Carriers and Business Internet Service Providers. VoxSurf’s Next Generation Voicemail product allows CSPs to address both consumer and enterprise markets with a range of targeted communications features from a common platform, thereby making UM features a subscriber choice. VoxSurf’s MobileOffice enables CSPs to deliver a service that consolidates voice mail and enables multichannel access to corporate mail stores, calendars, tasks and contact lists.

Recommended Gartner Research


Insight

The integration of IP connectivity between switching platforms and unified messaging systems has the potential to reduce costs and ease end-user migration to a converged voice and data environment. Nevertheless, while unified messaging developers continue to overcome technological and pricing barriers, unified messaging seems poised for an increase in market acceptance more so within the wider context of unified communications.