Microsoft Networking

Windows "Chicago": Adding Value to Connected Windows PC's

Overview

During the past decade, personal computers have become an indispensable productivity tool for individuals in their personal and business endeavors. But it is not until PC's are connected to each other and deliver new information resources and services that their true productivity potential can be unleashed. While connecting personal computers can boost productivity, it also creates challenges for users who must learn to use connected resources, and for administrators who must manage all the connected users and resources. Microsoft's next release of Windows, the "Chicago" project, aims to solve many of the challenges that users and administrators face when they connect their PC's, whether they are in small businesses with several PC's or large organizations with tens of thousands of PC's. The purpose of this paper is to provide an overview of the benefits that Chicago will bring to the user and administrator of the connected PC.

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The Chicago Project

Chicago is the code name for a development project that will produce the successor to Windows 3.x and Windows for Workgroups 3.x. The Chicago project encompasses a variety of important new technologies that will make mainstream desktop and portable computers running Windows easier to use, offer responsive multitasking performance, and provide a great platform for communications. Chicago will complement Windows NT, Microsoft's platform for "mission-critical" and technical workstation applications and Windows NT Advanced Server for production server use.

The mission for the Chicago project is to deliver compelling benefits for several different audiences. For all PC users, Chicago will make the PC easier to use, so both novice and experienced PC users can be immediately productive on a Chicago system. For Information Systems managers, Chicago will reduce the cost of deploying PC's through greater system reliability, interoperability and manageability, and lower employee training and support costs. For the PC industry, Chicago will provide a platform for innovative, compelling hardware and software solutions that provide new uses for the PC and appeal to new types of customers.

Chicago Benefits and Features

The Chicago project will advance the Windows platform on mainstream personal computers in many ways to make the possibilities of computing easier for everyone. Benefits that Chicago will provide include:

Ease of use

- On a system running Chicago, new Plug and Play devices will be automatically installed and configured -- just insert the device, turn on the system, and the new device is ready to use. The Plug and Play specification also enables new system designs which provide dynamic reconfiguration. For example, a Plug and Play docking station can be undocked while it is still running, and the system will adjust to a lower resolution display, absence of a network or sound card, and smaller hard disk -- without any intervention by the user.
- Chicago will include an improved, more intuitive user interface that is easier to learn and use. This interface will be provided across the entire Windows operating system product family.

Responsive multitasking performance

- Chicago utilizes a protect-mode, 32-bit pre-emptive multitasking operating system design to deliver smooth, responsive multitasking performance. Chicago is a complete operating sytem which does not require or use a separate version of MS-DOS, so it is not bound by the constraints of MS-DOS.
- Chicago will enable software developers to build a new generation of high-performance applications utilizing the services of the Win32™ Application Programming Interface (API).

A great platform for communications

- A rich set of services for connected PC's are built into Chicago, including file and printer sharing, electronic mail, fax, remote network access and file synchronization.
- Chicago's user interface provides an intuitive way to access different connected resources, including network servers and printers, host systems, electronic mail systems, fax systems, companion devices such as Winpad devices, and even other people.
- Chicago includes services to ease administrative tasks, including hardware installation and inventory management, operating system installation and configuration, access control, backup, and problem diagnosis and support.
- All of the services Chicago provides are built upon a high-performance, reliable and open architecture. This improves productivity by reducing costly downtime and improving response time. It also simplifies development for third parties who want to deliver solutions which plug into the client operating system, and simplifies administration for companies who want to mix and match computing products from different vendors.

Chicago Requirements

To be a compelling successor to Windows 3.x and Windows for Workgroups 3.x, Chicago must meet several rigourous requirements. Chicago must be a safe and hassle-free upgrade which protects the investment of Windows users in devices, applications and networking infrastructure. Chicago will be compatible with current applications and drivers for MS-DOS and Windows, and will provide an easy transition to the new user interface. When a customer installs Chicago, they won't need to add memory and will experience performance which equals or exceeds the performance of Windows 3.1 doing the same tasks on that system (provided they have at least 4MB's of RAM and an 80386 or higher microprocessor).

Chicago Networking

Today, many customers have realized only a small fraction of the productivity gains that are possible from connected PC's. There are a number of problems that stand in the way. Many of the basic services that are useful to most customers (file and printer sharing, electronic mail) have not been well integrated with the operating system until the introduction of Microsoft's Windows for Workgroups product. As a result, these services can be difficult and expensive to install, configure, use, and maintain. The services that administrators need to manage connected PC's are often unavailable or ineffective. Different connected resources (servers, printers, electronic mail systems, host systems) have different interfaces, so training users to access a variety of resources is expensive. And much of the networking software written to date is not based on a modern, open architecture and as a result is not very reliable and does not perform well on multitasking operating systems.

Chicago will take a major step forward toward solving these problems by integrating a rich set of services for end-users and administrators into the operating system and providing a user interface which will make all types of connected services and resources easier to use. In addition, these services are all built according to a high-performance, reliable and open architecture which provides simultaneous access to multiple connected resources.

Services for users of connected PC's

Chicago will include a rich set of services for end users, including file and printer sharing, network server access, electronic mail, fax and remote access. These services are well integrated with the Chicago user interface to make them easy to use, and extensible for developers to exploit within their applications.

Network server access

When a company grows to require a dedicated network server system, Chicago is ready to meet that need. Chicago includes the software required to connect to most popular network servers, including Netware 2.x, 3.x and 4.x, Windows NT Advanced Server, LAN Manager, LAN Manager for Unix, IBM LanServer, 3Com 3+ Open and 3+ Share. Additional networks are as easy to install as additional printers.

If you already have a network server, Chicago can continue to use your current networking software, or you can upgrade to the high-performance components included with Chicago. And if you have multiple network servers, Chicago provides simultaneous connections with a choice of popular protocols, including IPX/SPX, TCP/IP and NetBEUI.

File and printer sharing

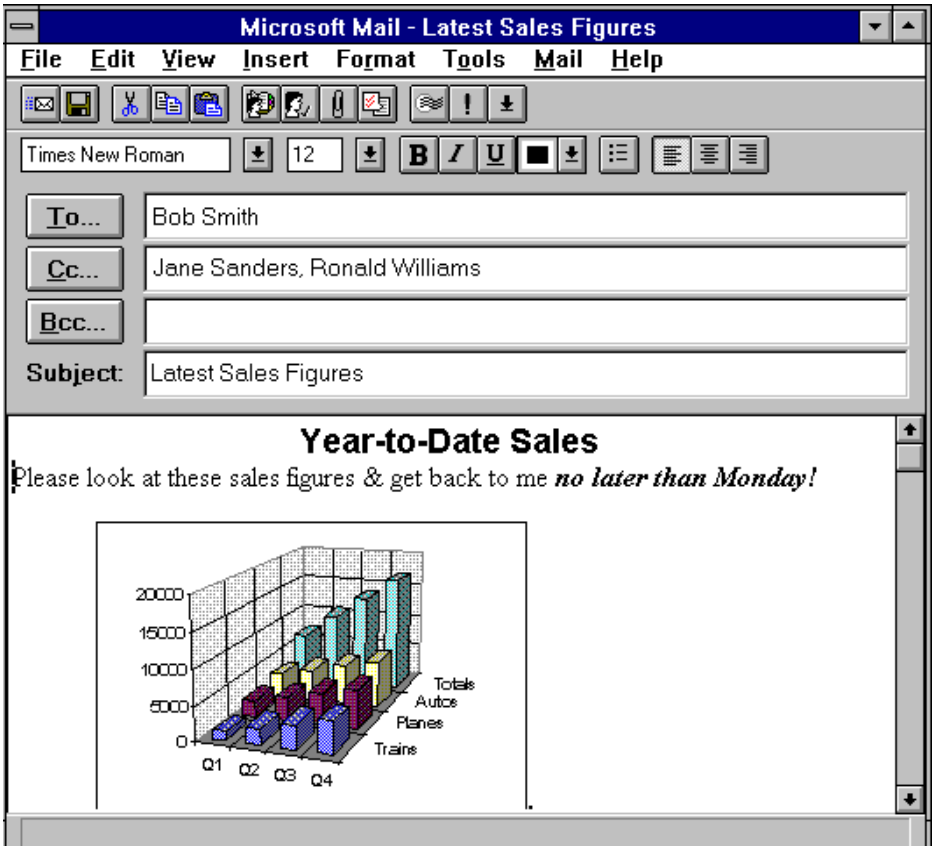
Chicago includes all the software you need to setup a cost-effective network and share files and printers among connected Chicago (and Windows for Workgroups and Windows NT) systems. Each system can function as both a client and a "peer" server, so no dedicated network server system is required. Chicago's networking software is

easy to setup, use, and maintain, with automatic detection of network hardware, built-in share-level security, and a complete set of administrative utilities for remote administration and auditing of server events.

Messaging

Chicago includes an “integrated messaging client” that provides individuals and businesses with a flexible tool for sending and receiving information, and provides developers with a platform for building custom business solutions.

As an application for sending and receiving information, the integrated messaging client contains a superset of the Microsoft Mail 3.2 graphical email client features and is well-integrated with the Chicago user interface. To the user of Chicago the message Inbox appears as just another folder, rather than a separate application. Messages that are received in the Inbox can be sorted, read, and saved in other folders or discarded quickly. Once read, messages can be moved or copied into subject folders by simply dragging and dropping.



The messaging client has a rich set of features that make it a very flexible tool for creating and managing messages. These features include:

- rich text formatting, with a built-in Spell Checker and customizable toolbars
- the ability to attach files from any application to messages
- the ability to view FAX's
- support for Object Linking and Embedding 2.0
- extensive options for sending messages, such as priority levels and return receipt
- a built-in Address Book that enables users to easily and quickly send information to the right person, group, or location -- inside or outside their organization
- the flexibility to supplement the Address Book with address books for multiple messaging systems

- delegation of mailbox access so an assistant can help manage messages
- Views, Rules, and Searching. *Views* enable users to create as many folders as they like to store and organize important messages, and sort or filter those messages in different ways. *Rules* enable users to automatically sort and process incoming messages. *Searching* is done through Message Finders, which allow the user to quickly search through existing messages

Remote Access

Chicago's Remote Access service makes it easy for customers to access the information and resources they need when they're away from their office -- all they need is a phone line. They will be able to browse for and retrieve files, send and receive electronic mail, print, and access a database just as if they on their office system. Remote Access will be useful for individuals who just want to connect two Windows systems and exchange information between them, and for businesses of any size that want to provide employees access to resources on the corporate network when they're away from corporate facilities.

Chicago's remote access service works with existing solutions such as Windows NT Advanced Server and NetWare Connect and provides support for industry-standard protocols such as PPP. By providing a flexible and open infrastructure for remote connections, Chicago makes it possible for customers to use a single phone connection to use multiple remote applications.

Remote Messaging

Chicago's integrated messaging client is designed work well over both LAN and remote communication systems. The messaging system uses a client/server design which minimizes network traffic by limiting transmissions to short requests and responses -- an efficient design whether you're communicating at Ethernet (10 Mbps) or modem (9600 bps) speeds. The integrated messaging client is flexible enough to work over connections ranging from 2400 bps modems to Public X.25 data networks and high-speed ISDN systems, as well as cellular or other wireless communications.

An important feature for remote use is the ability to store the Inbox and Outbox on a portable system. This feature makes it easy to read and send messages while away from the office. Remote Headers is another useful feature which allows the user to download and examine only the headings of new messages. The user can then select the messages they want based on information about the content, size and estimated download time for each message. This allows the remote user to stay in touch with important information, but not waste time or money downloading low priority messages that can be handled once they're back in the office. Mail downloads can also be automatically scheduled for times when lower phone rates apply.

Deferred Printing

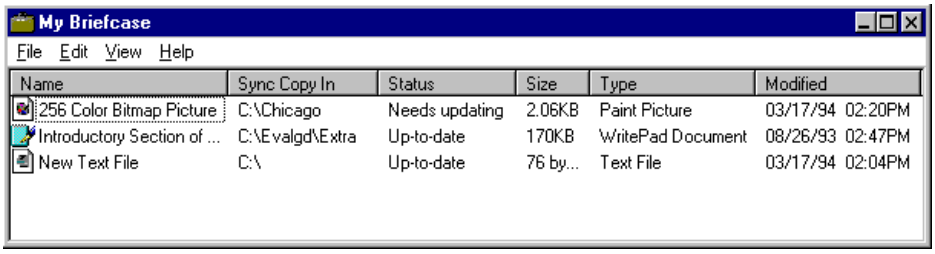
Another feature that will make working away from the corporate network more convenient is deferred printing. When the user is not connected he can still print just as if he had access to the network printer in his office. Chicago's print spooler will

place the print job into the queue, and automatically send the print job to the printer when the user reconnects to the corporate network.

File Synchronization

Chicago's file synchronization services are optimized for the needs of the mobile computer user who wants to take copies of documents to a remote location and have them be automatically synchronized with the source documents. It features a very intuitive user interface using a briefcase icon as the metaphor for performing file synchronization operations.

Using the briefcase, users can identify files that they want to stay up to date, take those files home or on a business trip, make changes, and have the files automatically updated when the source file is available to the system. The update is performed by replacing the source file with the modified copy at the discretion of the user. Developers can extend file synchronization by providing a merge-handler, which will merge changes in modified and source copies of a file to create a new updated copy.



Services for administrators of connected PC's

A variety of studies have shown that up to 80% of the costs of owning a PC are the costs of managing the PC, including installation, configuration and maintenance of hardware and software and support of users. Chicago will provide a number of services that will make it easier for system administrators to install, configure, monitor, maintain and troubleshoot their Windows desktops.

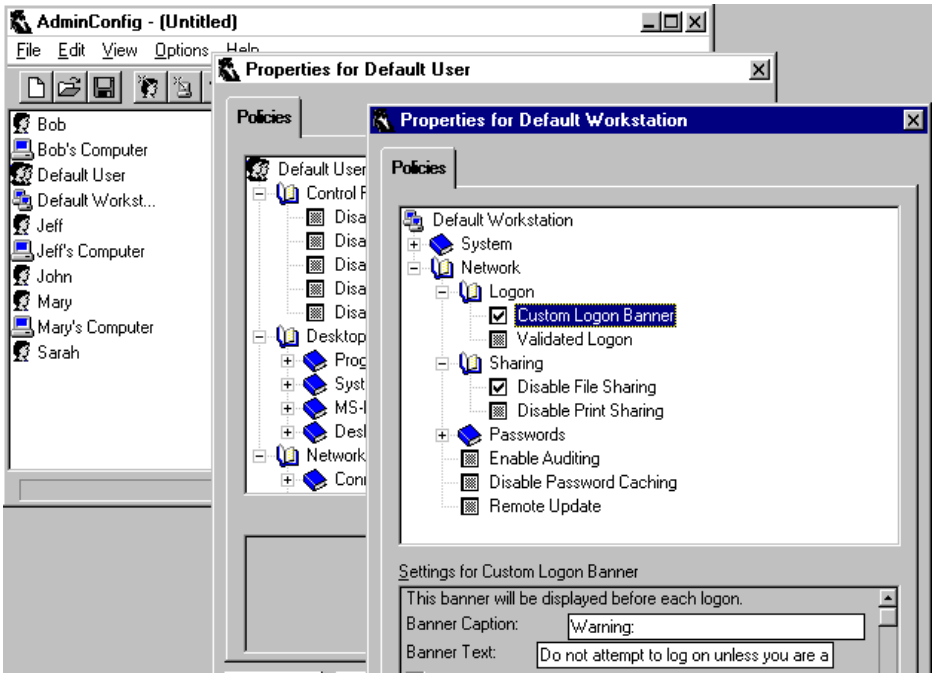
Hardware installation and inventory management

Products designed according to the Plug and Play specification will be easier and less costly to install and configure. Simply insert a Plug and Play network adapter into a system and Chicago automatically determines what resources that adapter requires and configures the system without asking the user for information about memory address, drivers, card type, etc. The Plug and Play architecture also records all system devices and stores this information in the Windows Registry database. This database can be queried to determine system status and perform real-time configuration.

Operating system installation and configuration

The Chicago operating system itself can be set up from a network server and can be configured at the desktop to run locally or across the network. In each case, the administrator can establish a specific configuration for the installation, controlling which features are installed and which features can be accessed or altered by the end-user. Chicago will require only a floppy drive to start up, and paging of components to a swapfile on the network can be disabled to minimize network traffic. Chicago will run on diskless workstations which boot from a Windows NT or Netware server.

Once Chicago is installed, administrators will be able to centrally configure desktop settings such as file and printer sharing, network access, and passwords. They can remotely monitor Chicago desktops to determine what resources are shared, what connections have been made, and what files are being used. These capabilities are very scalable so they can be used to manage individual systems or large groups of systems, and they use the existing network services to limit access to individuals who have been designated as administrators.



In many companies employees share multiple PC's. Chicago will support "user profiles" to enable people to access their personal groups, applications, and data from any system on the network. This "multiple user mode" can also be provided on a stand-alone system. This capability is provided through the Windows Registry, which stores per-user configuration information separately from system information so that each of these can be managed separately. Per-user configuration information can include preference data such as favorite screen colors, mouse click speed, program groups, etc. These preferences will be centrally stored, accessed when the user logs into a Chicago system, and used to install the appropriate configuration so that user will be immediately productive working on a familiar environment tailored to whatever hardware they are using.

Security

Administrators need security at the desktop to control access to the system configuration and network resources. But system administrators don't want to administer a separate security database of users and groups on system. Ultimately, a system should utilize the user and group database that already exists on the network server, and provide desktop security by using that database. This approach is called "pass-through" security.

Pass-through security makes "user-level" security available to individuals that share resources attached to a desktop system, such as a printer or specific directories on the hard disk. So when a user shares a directory on their hard disk, the user can specify which other individuals are allowed to access that directory.

Chicago supports pass-through security to both Windows NT Advanced Server systems and Novell NetWare systems. This means that an administrator can just point at users from a Windows NT security database, or a NetWare bindery or NetWare Directory Services, and give these users rights to read designated files on a Chicago system. This approach simplifies administration, because a change to a password can be made in one place, the network server, and affect access to the desktop. Similarly, if a user shares their C drive and defines a group of people that can access it, the administrator on a Windows NT or Novell NetWare server can change the membership of that group at the server, and it applies to all the desktop workstations.

Pass-through security also allows administrators to centrally control what functionality users can access at desktop systems. Administrators can set a global policy such as restricting users from sharing printers or hard disks. Or, administrators can define which specific users are allowed to share resources on their desktop system. User-level security also applies to dial-up access, backup agents, Remote Procedure Call services, the Windows Registry, as well as file and printer sharing.

Desktop Backup

Chicago will include client backup agents that will also take advantage of pass through security. These agents will enable administrators to backup Chicago systems with existing server backup products, such as Cheyenne Arcserve and Arcada Backup Exec. The administrator need not worry that the presence of these agents will compromise the security of the desktop system because access to the desktop can be controlled by the central security database.

Problem diagnosis and support

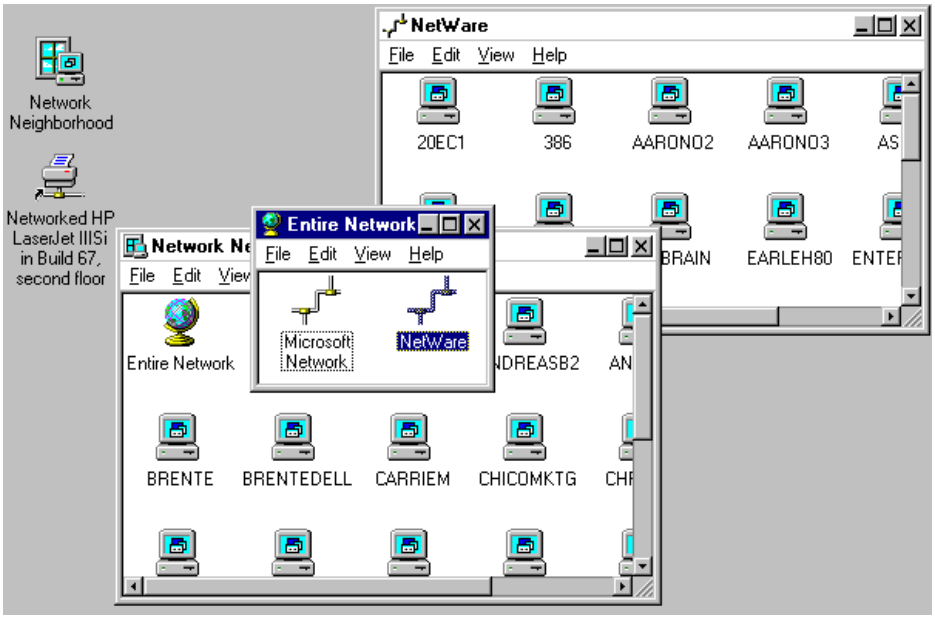
Chicago will include a diagnostic utility that graphically displays information about network traffic and system performance on specific Chicago systems. The information generated by this utility can also be exported to other products which provide additional analysis. A utility for remotely viewing the system registry will enable the administrator to identify hardware and software configuration settings on other systems. This tool will be very useful for support technicians, and will be extensible so it can be used by third-party management applications. Chicago also provides a “clean-boot” capability which will get a minimal system configuration up and running after a crash so a support professional can use the tools described above to troubleshoot the system.

Chicago will integrate well with existing system management solutions by providing SNMP and DMI support.

Easy to use interface for multiple connected resources

Chicago's user interface provides a simple, consistent way to use multiple connected resources. For example, when the user first logs on to a Chicago system that is connected to multiple network servers, he will need to provide only one password, even if each network server utilizes a different security scheme. If the user wants to change his password he can also do that by making a single change. Chicago will also provide the flexibility to allow multiple passwords for multiple resources.

Chicago also makes life easier for end users by presenting a common interface for finding and making connections to network resources of any type. To find and access a file on a server, the user just browses the network, clicks on the server, clicks on the file, and drags and drops the file onto his desktop. No cumbersome dialogues are encountered, no complicated commands are needed. It doesn't matter whether the server is running Netware or Windows NT or Pathworks, the procedure for finding and connecting to each server is identical. The same principle applies to printers as well -- the user can connect to the printer in the same way whether the printer is attached to a UNIX host, a Windows NT server, or another Chicago system. Support for long file names on all network resources will make browsing the network much simpler.



Most users need regular access to only a small number of network resources. Chicago provides a shortcut to help them quickly access the resources they use most often. When the user opens a view of the network Chicago displays the resources he uses most often -- his “network neighborhood”. If the user needs to access a resource which is not in his neighborhood, he simply selects an icon which opens a view of the entire network hierarchy.

Chicago does more than improve existing interface implementation -- in many cases Chicago eliminates the need for any interface at all. Chicago will detect most existing network devices and suggest the appropriate configuration. When new Plug and Play network or PCMCIA adapters are inserted, Chicago will load the correct drivers and configure the adapter automatically. Administrators will be able to remotely configure program groups and specify network protocols, so the end user need not be exposed to network infrastructure. Whenever a node is connected to the network, Chicago will automatically assign IP addresses using a server which suppors IP address allocation.

Chicago simplifies network printing with “point and print” access to networked printers. To print to a networked printer, all the user needs to do is drop a document on the desired printer -- Chicago determines the printer configuration (type of printer, device driver, number of paper trays, amount of memory, font information, etc.) and automatically loads the driver and configures the printer on the users system.

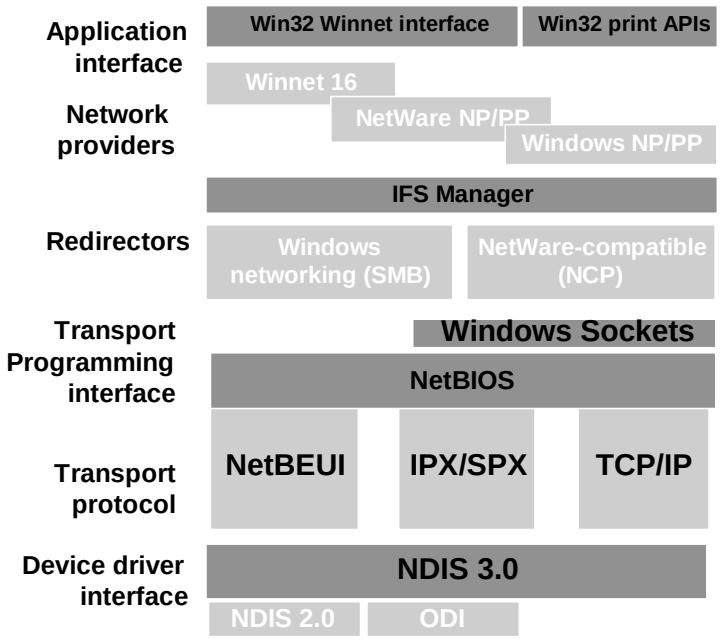
High-performance, reliable and open architecture

Chicago provides multiple, simultaneous connections to different types of resources (files, programs, printers, host systems, mail systems), over most popular media (Ethernet, Token Ring, X.25, ISDN), from most any location (office, home, hotel). These capabilities are implemented using a high-performance, reliable, flexible and open architecture based on the Windows Open Services Architecture (WOSA) specification. This approach provides users with a consistent interface to different services on the front end, while giving system administrators the flexibility to mix and match multiple services on the back-end.

Networking Architecture

Chicago's networking components are designed to provide the fastest, smoothest multitasking performance and highest system reliability, while using no conventional memory. All of the network components in Chicago are designed according to Chicago's Installable File System architecture with integrated caching, and implemented using 32-bit protect mode virtual device drivers (VxD's). Chicago's networking components support the Plug and Play specification, which enables the operating system to manage the addition or removal of the network transparently to the end user. For example, if the user inserts a portable unit into a networked docking station, the operating system will be able to detect the presence of the network and load the appropriate networking components without requiring any intervention by the user.

This architecture still supports existing real mode components for the highest possible compatibility with existing network products, including Windows 3.1 Winnet drivers, protocal stacks like FTP and Novell LWP, and any redirector that works with MS-DOS version 5.0.



Windows "Chicago" Networking Architecture

Chicago provides an ***application programming interface*** that enables developers to create a single version of their application which runs unmodified on different networks. The Multiple Provider Interface in Chicago is the successor to the WinNet interface in Windows 3.x. The Windows 3.1 interface was limited to simple functionality such as connecting to a drive letter or redirecting a printing port to a networked printer. The Chicago Multiple Provider Interface abstracts a high level of functionality across many different types of networks, including NetWare, Windows NT, Windows for Workgroups and other servers. The functions provided include authenticating the user when he accesses a network server, managing multiple passwords, listing servers, adding or removing connections to a server, and browsing network servers. The multiple provider software routes incoming network requests to the appropriate network provider, using the same interface whether one or multiple network providers is installed. For example, when a user wants to enumerate the servers on the network, that request gets routed across all of the different network drivers installed, a master list is created, and presented though the Chicago user interface .

Chicago will provide ***network redirectors*** to support all Microsoft networking products (LAN Manager, Windows NT and Windows NT Advanced Server, Windows for Workgroups, and other Chicago systems), and third party products such as IBM LanServer, 3Com 3+ Open, Netware 2.x, Netware 3.x and Netware 4.x. The NetWare Redirector will support logging into Netware 4.x Directory Services and browsing of Netware 4.x servers as well as Netware 2.x and 3.x servers. Support is provided for login scripts and all the NetWare client-side utilities. Chicago provides this broad range of support by including two Microsoft-authored network file systems: a Server Message Block (SMB) compatible file system, and a NetWare Core Protocol (NCP) compatible file system. Additional network redirectors can be added to Chicago using a very straightforward installation program.

Chicago makes it easier than ever before for users to connect to multiple network environments by providing ***multiple protocol support.*** Chicago provides a 32-bit protect mode implementation of the NetBEUI and IPX/SPX (first shipped in Windows for Workgroups 3.11) and TCP/IP protocols. Chicago's TCP/IP stack comes with most of the standard utilities, such as FTP, TELNET, PING, ARP, ROUTE, NETSTAT, NBSTAT, IPCONFIG, REXEC, RCP, RSH, and TRACEROUTE. In addition, the Dynamic Host Configuration Protocol (DHCP) is supported, so Chicago clients running TCP/IP will be automatically assigned an IP address based on a pre-defined range of addresses and leases when they log onto the network. This IP address database will be complemented by support for the Windows Internet Naming Service (WINS) which matches the IP address with a database of name and address information (eg, xxxx@microsoft.com) residing on a domain controller. The Chicago TCP/IP stack will use names provided by Directory Network Services (DNS) as well.

Chicago provides ***standard network programming interfaces*** for all of the popular protocols. The protocols listed above support both NetBIOS and Windows Sockets programming interfaces. Chicago enhances NetBIOS support by providing a 32-bit implementation. The Windows Sockets programming interface, which is also present on Windows NT, is the best interface for developers who need to write client/server or distributed applications that communicate at a low level with the network operating system software. Industry-standard DCE-compliant Remote Procedure Call (RPC), client-side Named Pipes and Mailslots interfaces will also be supported in Chicago.

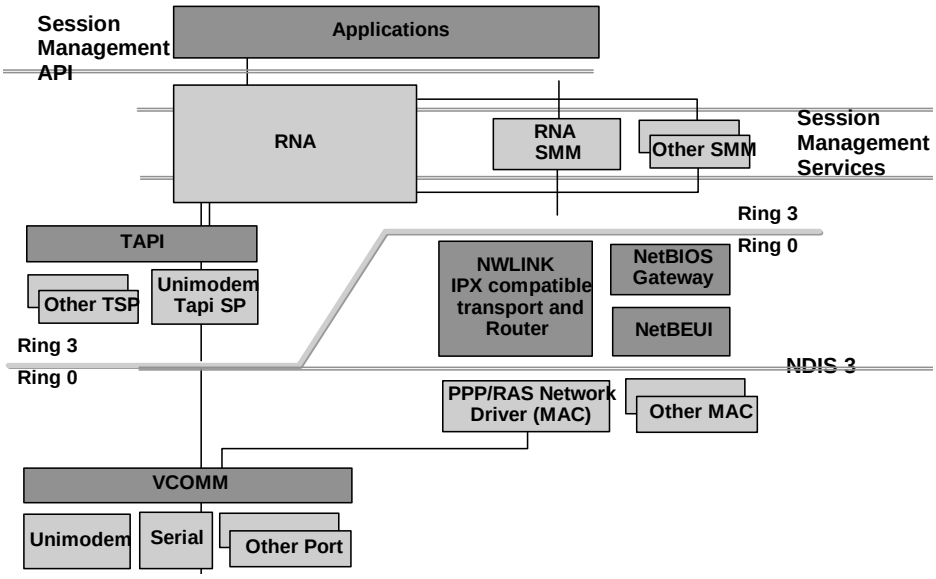
These protocols need ***device support*** to work on a large variety of network hardware which scales from 9,600 baud phone lines or lower up to 100 megabytes per second media. The recommended device driver model for vendors who want to provide protect mode drivers for specific network hardware is the Network Device Interface Specification (NDIS) version 3.0. The NDIS 3.0 drivers included in Chicago will provide support for Plug and Play and offer dramatic performance improvements over today's real mode drivers. Chicago also includes "mappers" for people who want to continue to use real mode NDIS 2.x or ODI drivers. And if you have one ODI driver and one NDIS 3.0 driver, both will run concurrently.

Chicago supports a wide range of ***network media*** including Ethernet, Token Ring, ArcNet and FDDI. Support for popular existing media is provided through ODI, NDIS 2.x and NDIS 3.0 drivers. Support for WAN media is also supported through the Point-to-Point Protocol (PPP) and Microsft Remote Access Services protocol (RAS) for making dialup connections.

Chicago's ***peer server*** is interoperable with Windows for Workgroups, Windows NT and NT Advanced Server, LAN Manager, LAN Manager for UNIX, AT&T Starlan, IBM Lan Server, 3Com 3+ Open and 3+ Share, and DEC Pathworks. Chicago enhances the features of Windows for Workgroups peer services to provide administrative control over whether peer services are enabled, what specific resources can be shared with which users, and remote auditing of peer server events.

Remote Access Architecture

Chicago Remote Access implements a modular, open architecture to project the remote system as a node on a network which can be scaled from two to many systems. At the application level, Remote Access provides services to applications (including the Chicago user interface, the Remote Access connection application, or other "remote-enabled" applications) through the ***Remote Application Programming Interface***, part of the Win32 API. Developers can take advantage of services to initiate, abort or resume a connection, gather data about the type and status of the connection; and present this information to the user through common dialogues. Remote Access connections can be made explicitly (the user initiates the connection), implicitly (the system automatically connects when a remote resource such as a printer is accessed), or through an application.



Windows "Chicago" Remote Access Architecture

The ***Remote Access subsystem*** implements these application services and in turn calls on "service providers" through a defined interface to perform management of physical connections, authentication of the user when an attempt is made to connect to a remote server, and management of network traffic over the remote media.

The ***connection service provider*** in the Chicago Remote Access architecture is the Windows Telephony API (TAPI) which itself is implemented according to the WOSA framework. Chicago Remote Access uses TAPI to dial out via any TAPI-compatible device (including modems, fax modems, ISDN adapters, telephony PC adapter cards, or PBX digital modem pools). This provides device independence for Chicago Remote Access, because a new device can be incorporated by adding a TAPI service provider.

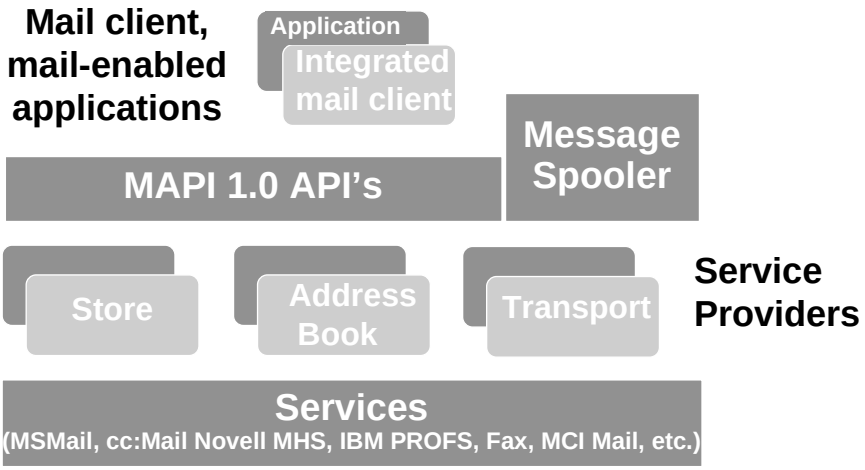
Validation of the end user when he attempts to access a remote server occurs through an ***authentication service provider***. Chicago will provide basic network logon validation through the authentication module, and more rigorous security schemes can be implemented by adding new authentication providers.

The “network provider” for Chicago Remote Access provides multiple, simultaneous connections to different servers by adapting the Chicago networking components for use over asynchronous communications lines. Chicago Remote Access includes support for TCP/IP, IPX and NetBEUI network transport protocols, and Point-to-Point (PPP) and Asynchronous MAC drivers to interface with the Windows Communications Driver that in turn sends data out over the communications port on the PC. A system running Chicago Remote Access services will be able to connect to Microsoft and other SMB-based network servers, as well as Novell Netware 2.x, 3.x and 4.x servers and 3rd party gateways/routers such as Shiva NetModems.

Messaging Architecture

Many organizations are looking to their electronic messaging system to take on the role of a central communications backbone for transmitting not just electronic mail, but all types of information. And as enterprise-wide “workgroup” applications (scheduling, forms routing, order processing, project management) become more functional, the need for this communications backbone becomes even greater. Today, however, messaging systems and workgroup applications from different vendors have different user interfaces, are often hard to use, and the systems and development tools are often incompatible with one another. This makes creating and deploying applications based on messaging systems difficult and costly.

To solve this problem, Microsoft has worked with Independent Software Vendors (ISV’s), corporate developers, messaging system developers, and consultants to create an open, extensible messaging infrastructure standard (MAPI) for the Windows operating system. The MAPI standard ensures complete independence for Windows applications from underlying messaging systems in much the same way that the Windows printing infrastructure has freed applications from the burden of supporting printing devices. MAPI solves a critical development problem: developers need to create only one version of their messaging-based application, rather than writing a different version for each messaging system, or writing their own messaging system to go with their application. Also, by including an integrated messaging client in the Windows operating system, MAPI provides end-users with a common interface for different messaging systems and messaging-based applications.



Windows "Chicago" Messaging Architecture

Both the ***integrated messaging client and other messaging-enabled applications*** will provide access to messaging functions by utilizing the ***Messaging Application Programming Interface (MAPI)*** function calls. MAPI supports both Simple MAPI and the X.400 API Association Common Messaging Call (CMC) API to enable applications to send, address and receive messages even across operating system platforms. MAPI also includes Extended MAPI, which provides a rich set of services for developing complex messaging-based applications.

The ***MAPI subsystem*** implements the MAPI function calls and acts as a central clearinghouse to route messages to different back-end messaging systems. The specific components of the subsystem include a dynamic link library (MAPI.dll) to implement the function calls and a spooler much like a print spooler except that it deals with the routing of messages instead of print jobs. The spooler operates in the background, and provides store and forward services in the event that the messaging system is unavailable at the time that the message is sent.

The ***Service Provider Interface*** enables different back-end services (including message stores, address books, and messaging transports) to be developed that will work with any MAPI-compliant application. The implementation of this interface takes of the form of service provider "drivers" that can be written by the service provider or a third-party. Because of these drivers, applications will work with multiple messaging systems such as Microsoft Mail, Novell MHS, IBM PROFS at the same time, without having to be customized for each system. And MAPI can support more than just LAN-based email systems -- services such as FAX, DEC All-In-1 voicemail, AT&T EasyLink, CopuServe, MCI Mail, and others can also be supported, all through a single, Windows interface. In this way a single application can receive messages from a fax system, bulletin board system, host-base email system, and LAN-based email system, all arriving in a single in-box.

Most messaging systems include a ***message store, address book or directory, and message transport***. MAPI supports each type of service independently, enabling a vendor to specialize in a specific service or a corporate customer to develop a custom service like a corporate phone book directory of employees. The MAPI address book user interface also provides access to user and group lists on Windows NT Advanced Server systems and the Netware Bindery. Chicago will include a message store, personal address book, and fax transport.

Summary

Windows “Chicago” will help users and administrators of networked PC’s realize greater productivity from their investment. Windows “Chicago” will accomplish this by integrating into the operating system a rich set of easy-to-user services for users, and by supplying administrators with the tools they need to cost-effectively manage their networked PC’s. All of these services are built on a high-performance, reliable and open architecture. In addition, Windows “Chicago” will protect the investment customers have made in their existing network infrastructure by providing the highest possible compatibility with current networking software.