IPX-IP Gateways

Find Internet Solutions at a NetWare Conference and Exhibits

Laura Chappell

I was cruising the exhibit hall at the NetWare Conference and Exhibits in Cleveland, Ohio on May 7-8 when an attendee with a desperate look on his face approached me and introduced himself as Tom. Tom explained that his manager had told him to connect the company's 100 users to the Internet by July 1. Why the desperation? Tom's manager stipulated that Tom could not install a TCP/IP stack on every client workstation.

Sound impossible? Fortunately for Tom and for other network administrators who are facing this daunting task, it's not: In just one hour in the exhibit hall, I found a number of excellent products that allow you to connect to the Internet without installing TCP/IP on your NetWare clients. With an IPX-IP gateway, these clients can continue to run on IPX and use a single, shared IP address (or a set of IP addresses) to access the Internet. (See Figure 1.)

An IPX-IP gateway not only enables you to set up 100 users on the Internet quickly and easily, but it also provides several security features that may not be available with other TCP/IP connectivity products. For example, an IPX-IP gateway improves network security by ensuring that users generate only IPX (not IP) traffic across your NetWare network. As a result, NetWare clients are completely hidden from the Internet and are therefore protected from Internet surfers.

An IPX-IP gateway also allows you to filter the traffic between the Internet and your NetWare network, providing effective access control management. For example, you can manage Internet access based on individual users, groups, destination addresses, or even applications.

An IPX-IP gateway allows you to specify which areas of the Internet users can access and which areas of the Internet are restricted. As a result, you can prevent your users from abusing their access to the Internet by allowing them to access only a few vendors' Internet sites.

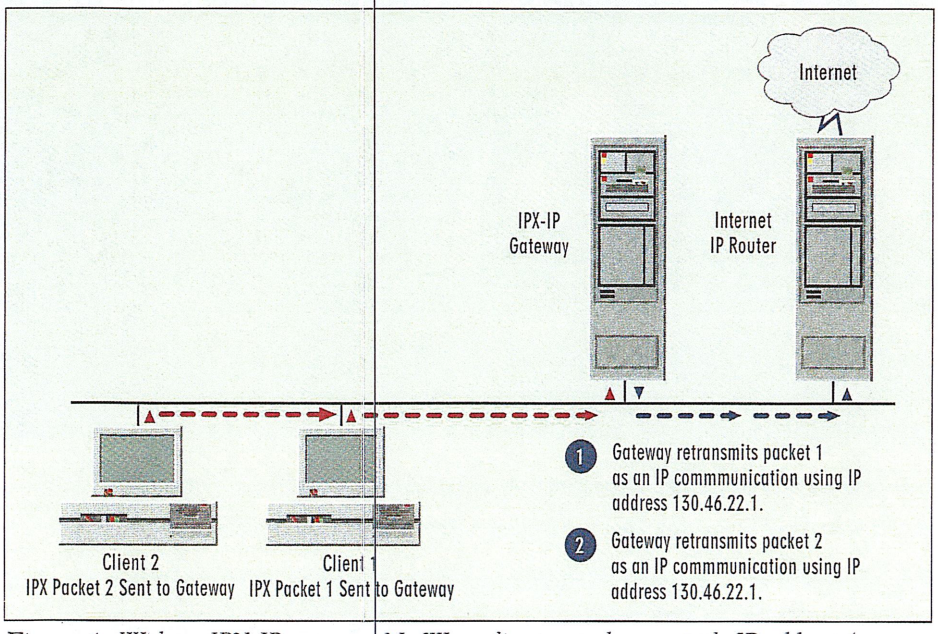


Figure 1. With an IPX-IP gateway, NetWare clients can share a single IP address (or a set of IP addresses) to access the Internet.

WHY SHOULD YOUR USERS SHARE AN IP ADDRESS?

Sharing an IP address is more practical than assigning each NetWare client a unique IP address. For example, sharing an IP address simplifies the following tasks in connecting your clients to the Internet:

- You do not need to load a TCP/IP stack on each client.
- You do not have to configure an IP address for each client.

gateway places your MAC address in a table and assigns it a unique port number. (See Figure 3.) When the gateway receives a response from the Internet, it will use this port number to route packets back to you. After the gateway adds your MAC address to its internal table, it discards the IPX header.

Next, the IPX-IP gateway reads the special gateway redirector header to identify the packet's destination port number. The gateway then places a TCP/IP header on the packet using the company's IP address and places the NetWare client's unique source port number in the source port field. (The destination application, such as the FTP daemon, will return the packet to this port number after the packet has been processed.)

The destination port field specifies which process is required to handle the packet at the destination device. For example, setting up an FTP connection requires TCP port 21, and exchanging data requires TCP port 20.

When the IPX-IP gateway receives a packet from the Internet, the gateway reads the TCP/IP header to locate the packet's destination socket. The gateway finds the socket number in the table shown in Figure 3, places an IPX and MAC header with the proper address on the packet, and then transmits the packet to the appropriate NetWare client using IPX.

EXHIBIT HALL HIGHLIGHTS

I found four vendors that exhibited IPX-IP gateway products at the Cleveland NetWare Conference and Exhibits. These products are briefly described below.

Firefox's NOV*IX for Internet

Firefox was the first vendor to release an IPX-IP gateway. NOV*IX for Internet 3.0 is a software-based product that allows clients to communicate with the IPX-IP gateway using SPX. NOV*IX for Internet runs on NetWare 3.1x, NetWare 4.x, NetWare Runtime, and NetWare MultiProtocol Router (MPR). NOV*IX for Internet also supports Windows 3.1, Windows for Workgroups, and Windows 95.

Firefox offers an entire family of products called NOV*IX for NetWare that provide TCP/IP support for NetWare networks. All of these products offer automatic address allocation, including shared IP addressing, IP address pooling, and dynamic IP address allocation.

Automatic address allocation allows IPX-IP software to assign clients IP addresses as needed, thereby eliminating the need to manually configure IP addresses for each client.

Shared IP addressing, one method of automatic address allocation, enables multiple clients to connect to the Internet using a single IP address. IPX-IP software that uses shared IP addressing assigns each client a unique source port number to differentiate its communications from other clients' communications.

With IP address pooling (another method of automatic address allocation), the IPX-IP gateway uses a set of IP addresses to enable multiple users to connect to the Internet. IP address pooling is useful if you have more users than you have available IP addresses.

Dynamic IP address allocation, which is the third method of automatic address allocation, enables an IPX-IP gateway to assign a client a unique IP address from a designated set of addresses. When the client is finished using the Internet, the gateway software deallocates the address, returning it to the set of available IP addresses.

For more information about NOV*IX for Internet or NOV*IX for NetWare, call 1-800-230-6090 or 1-408-654-9933. You can also visit Firefox's WWW site (http://www.firefox.com).

Cisco Systems' Internet Junction

Although Cisco Systems is best known for its hardware products, it is now offering Internet Junction, which is a software-based IPX-IP gateway that runs on NetWare 3.1x, NetWare 4.x, NetWare Runtime, NetWare MPR, and Windows NT. Internet Junction comes in two versions: one that supports NetWare as the gateway platform and one that supports Windows NT. Internet Junction also supports Windows 3.1, Windows for Workgroups, and Windows 95.

Internet Junction supports dial-up modems, Integrated Services Digital Network (ISDN) ports, switched 56 kbit/s connections, and T1 and T3 lines. As a firewall solution, Internet Junction effectively isolates NetWare servers and clients from the Internet.

You can purchase 5-, 10-, 25-, 50-, or 100-user licenses of Internet Junction. Each copy of Internet Junction includes a site license for Netscape Navigator.

For more information about Internet Junction, call 1-800-GO-CISCO or 1-408-526-7209. You can also visit Cisco Systems' WWW site (http://www.cisco.com).

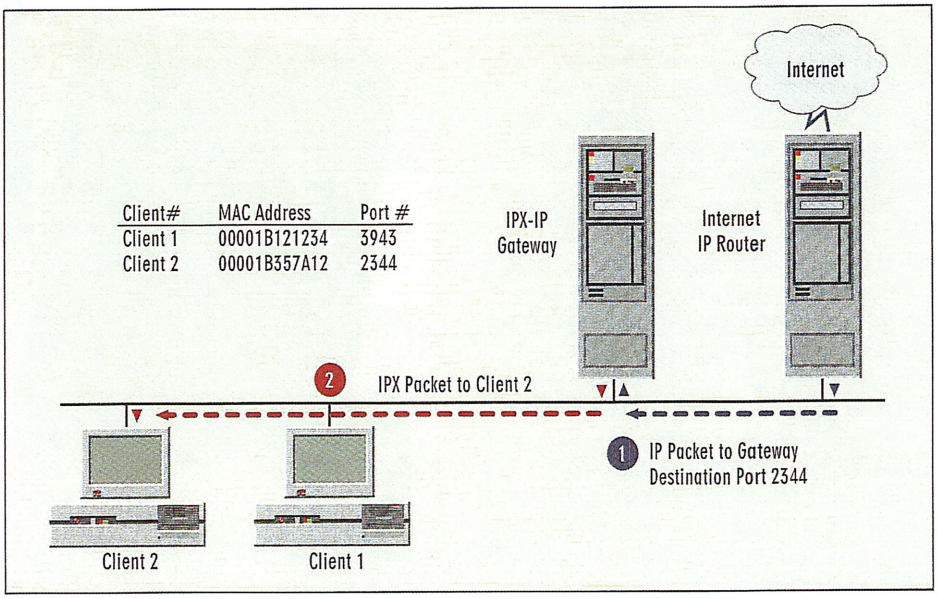


Figure 3. The IPX-IP gateway uses a table to route data from the Internet to the correct NetWare client.

- You need just one IP address from your Internet service provider (ISP).
- You can centrally manage Internet access and set up filters at the gateway device.

In Tom's case, configuring an IP address and installing a TCP/IP stack on 100 clients would be time consuming. And because available IP addresses are in short supply, Tom's ISP may not be willing to give him 100 IP addresses. Tom needs a simple solution that is both cost-effective and easy to configure and manage. He needs an IPX-IP gateway.

HOW DOES AN IPX-IP GATEWAY WORK?

An IPX-IP gateway is typically a client-server application that consists of two parts: the client redirector software and the gateway software. An IPX-IP gateway can be a software-based product (such as Firefox's NOV*IX for Internet, Cisco Systems' Internet Junction, and Quarterdeck Corporation's IWare Connect) or a hardware-software product (such as Performance Technology's Instant Internet).

To use an IPX-IP gateway on your network, you must first install the IPX-IP gateway's redirector software, a special WINSOCK.DLL file, on your NetWare clients. This file allows you to run WinSock 1.1-compliant TCP/IP applications (such as Netscape Navigator, NCSA Mosaic, Telnet, and FTP) over IPX. Some gateways automatically install the server's WINSOCK.DLL file on each client as users log in, whereas other gateways allow clients to run WINSOCK.DLL directly from the NetWare server that is running the IPX-IP gateway software.

After installing the WINSOCK.DLL file, you can run any WinSock 1.1-compliant TCP/IP application just as if you were communicating directly with an IP host. Then you input a destination address, such as http://www.novell.com, which is the address of Novell's home page on the World-Wide Web (WWW).

The IPX-IP gateway's redirector software (the WINSOCK.DLL file) intercepts your request at the client, places a special gateway redirector header on it, and sends this packet to the IPX-IP gateway using IPX. (See Figure 2.) Some gateways, such as Firefox's NOV*IX for Internet, use SPX instead of IPX. IPX-based gateways are generally faster and require less overhead than SPX-based gateways, but SPX-based communications are connection oriented and are therefore more reliable.

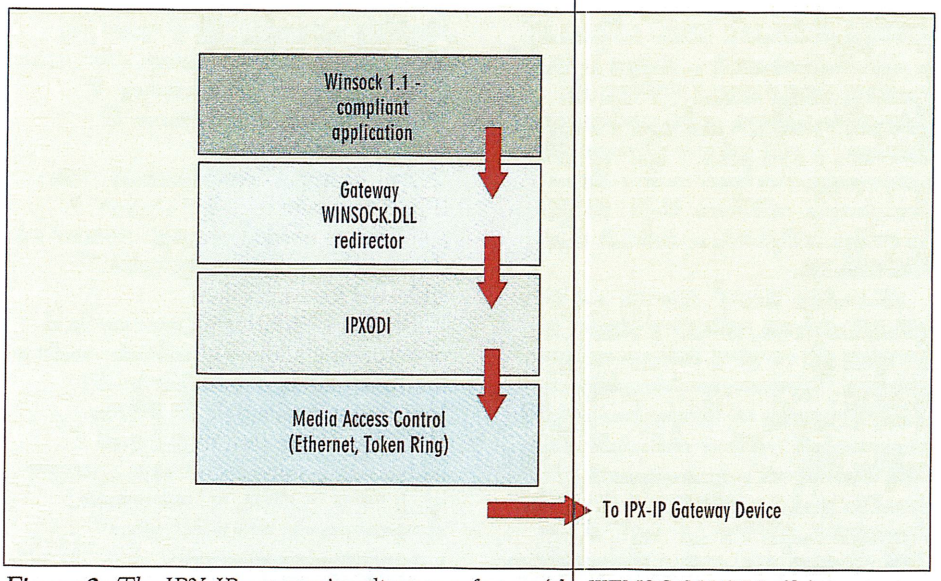


Figure 2. The IPX-IP gateway's redirector software (the WINSOCK.DLL file) intercepts your request and sends it to the gateway as an IPX packet.

After the IPX-IP gateway receives the packet, the gateway reads the packet's IPX header to locate your media access control (MAC) address (also called a node address). The

Circle 631 on the reader service card.

Where Will NUI Be Next? Read All About the NetWare Conferences Online

NetWare Conferences and Exhibits are sponsored by NetWare Users International (NUI), an independent, nonprofit organization that supports NetWare user groups worldwide. If you want to know more about these conferences, visit the Conference Information page on NUI's World-Wide Web (WWW) site. To get to this page, go to http://www.nuinet.com and click NetWare Conferences and Exhibits.

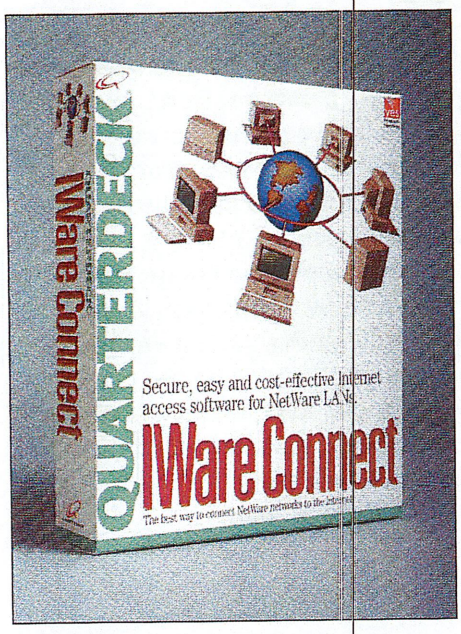
You can view a list of upcoming NetWare Conferences and Exhibits by clicking Where are the conferences?, and you can get various information about these conferences by clicking a particular conference. For example, if you click Dallas: July 30-31, 1996, you can find out which tutorials and seminars will be offered at the NetWare Conference and Exhibits in Dallas, Texas. You can also view a list of regular conference exhibitors and get other conference information such as who to contact about hotel reservations and transportation in Dallas.

Finally, you can register for any NetWare Conference and Exhibits using the online conference registration form. To register for the Dallas conference, for example, you must click Registration on the Dallas NetWare Conference and Exhibits page, and then click Register On-Line Now! The online conference registration form will appear.

In addition to entering information such as your name, address, and telephone number, you must select a registration option. You can register for the full conference, for the tutorials only, for the seminars only, or for the exhibits only. (An Exhibits Only conference pass is free.) The registration form allows you to select the tutorials and seminars you want to attend.

After you have completed the online conference registration form, you must click Submit Form. Because NUI does not currently accept payment over the Internet, you must then complete a separate online payment form, which will appear on your screen when you click Submit Form.

After you have completed the online payment form, you must fax or mail it to the NUI registration office. NUI will then send you a confirmation letter, a payment receipt, a course schedule, a name badge, and a voucher that you can exchange at the conference for a notebook containing course materials. (If you choose the Exhibits Only registration option, NUI will simply send you a confirmation notice and instructions for entering the exhibit hall.)



Quarterdeck Corporation's IWare Connect

IWare Connect is a software-based product that runs on NetWare 3.x and 4.x and supports Windows 3.x, Windows for Workgroups, Windows 95, and Windows NT. IWare Connect requires only 2 MB of RAM and 3 MB of disk space for 100 concurrent users.

IWare Connect uses Novell's TCP/IP stack at the server and includes a Windows-based configuration tool for setting up incoming and outgoing IP filters. With IWare Connect, you can get printed reports based on denied sites, bytes sent, and bytes received by individual users.

You can purchase 5-, 10-, 25-, 50-, or 100-concurrent user licenses of IWare Connect. For more information about IWare Connect, call 1-310-309-3700. You can also visit Quarterdeck Corporation's WWW site (http://www.quarterdeck.com).

Performance Technology's Instant Internet

Instant Internet is a hardware-software product that looks like a router with one network port, a built-in 28.8 kbit/s modem, and a 64 KB ISDN port. If you want to access the Internet using a frame relay line, a T1 line, or a leased line, you simply attach an external router to Instant Internet.

Instant Internet runs on NetWare 2.x, 3.x, and 4.x and supports Windows 3.1, Windows for Workgroups, Windows 95, and Windows NT. Instant Internet comes with a network license for the WINWEB browser, a news reader; FTP; and point of presence (POP) e-mail client software.

Up to 50 users can simultaneously access the Internet using Instant Internet. (This number may vary, depending on socket usage. However, because Tom needed to provide Internet access for 100 users, he may have wanted to purchase more than one Instant Internet.)

For more information about Instant Internet, call 1-800-PT-IINET or 1-210-979-2000. You can also send an e-mail message to Performance Technology at info@instant.net, or you can visit Performance Technology's WWW site (http://www.perftech.com).

CONCLUSION

If you want to connect your NetWare network to the Internet without the hassle of installing TCP/IP stacks and assigning IP addresses for every client, then an IPX-IP gateway is the product for you. Check out these and other connectivity products at the next NetWare Conference and Exhibits near you.

For a list of upcoming NetWare Conferences, see p. 65. For information about getting conference information over the Internet, see "Where Will NUI Be Next? Read All About the NetWare Conferences Online."

Laura Chappell researches, writes, and lectures on NetWare protocol performance, troubleshooting, and optimization. Her partner, Roger Spicer, focuses on NetWare/Internet integration. They can be reached at info@imagitech.com or on CompuServe at 72000,3333.

Special thanks to Michael Swarm at Firefox, who explained the technical aspects of IPX-IP gateways.

IPX-IP Gateways

Find Internet Solutions at a NetWare Conference and Exhibits

Laura Chappell

I was cruising the exhibit hall at the NetWare Conference and Exhibits in Cleveland, Ohio on May 7-8 when an attendee with a desperate look on his face approached me and introduced himself as Tom. Tom explained that his manager had told him to connect the company's 100 users to the Internet by July 1. Why the desperation? Tom's manager stipulated that Tom could not install a TCP/IP stack on every client workstation.

Sound impossible? Fortunately for Tom and for other network administrators who are facing this daunting task, it's not: In just one hour in the exhibit hall, I found a number of excellent products that allow you to connect to the Internet without installing TCP/IP on your NetWare clients. With an IPX-IP gateway, these clients can continue to run on IPX and use a single, shared IP address (or a set of IP addresses) to access the Internet. (See Figure 1.)

An IPX-IP gateway not only enables you to set up 100 users on the Internet quickly and easily, but it also provides several security features that may not be available with other TCP/IP connectivity products. For example, an IPX-IP gateway improves network security by ensuring that users generate only IPX (not IP) traffic across your NetWare network. As a result, NetWare clients are completely hidden from the Internet and are therefore protected from Internet surfers.

An IPX-IP gateway also allows you to filter the traffic between the Internet and your NetWare network, providing effective access control management. For example, you can manage Internet access based on individual users, groups, destination addresses, or even applications.

An IPX-IP gateway allows you to specify which areas of the Internet users can access and which areas of the Internet are restricted. As a result, you can prevent your users from abusing their access to the Internet by allowing them to access only a few vendors' Internet sites.

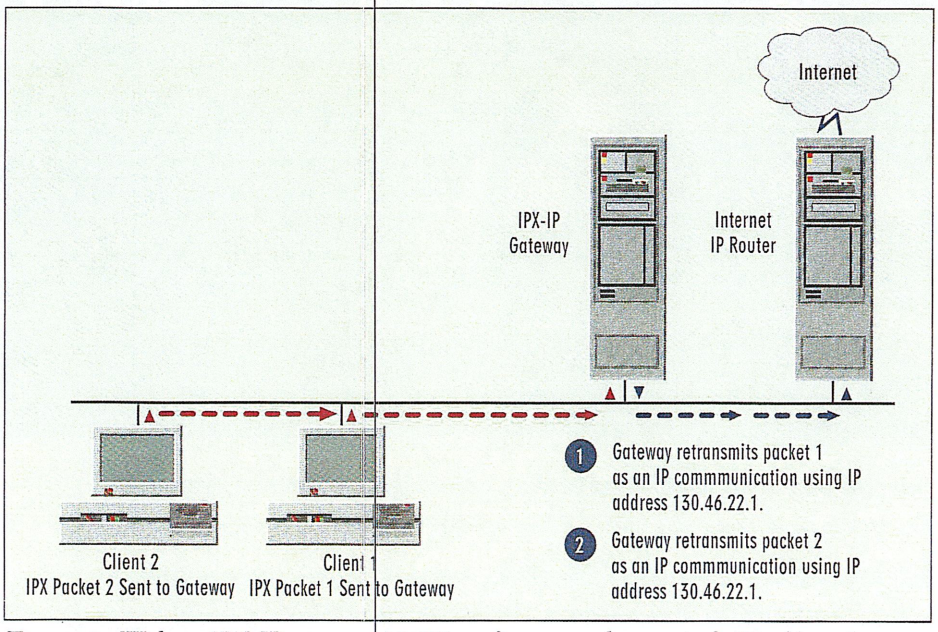


Figure 1. With an IPX-IP gateway, NetWare clients can share a single IP address (or a set of IP addresses) to access the Internet.

WHY SHOULD YOUR USERS SHARE AN IP ADDRESS?

Sharing an IP address is more practical than assigning each NetWare client a unique IP address. For example, sharing an IP address simplifies the following tasks in connecting your clients to the Internet:

- You do not need to load a TCP/IP stack on each client.
- You do not have to configure an IP address for each client.

gateway places your MAC address in a table and assigns it a unique port number. (See Figure 3.) When the gateway receives a response from the Internet, it will use this port number to route packets back to you. After the gateway adds your MAC address to its internal table, it discards the IPX header.

Next, the IPX-IP gateway reads the special gateway redirector header to identify the packet's destination port number. The gateway then places a TCP/IP header on the packet using the company's IP address and places the NetWare client's unique source port number in the source port field. (The destination application, such as the FTP daemon, will return the packet to this port number after the packet has been processed.)

The destination port field specifies which process is required to handle the packet at the destination device. For example, setting up an FTP connection requires TCP port 21, and exchanging data requires TCP port 20.

When the IPX-IP gateway receives a packet from the Internet, the gateway reads the TCP/IP header to locate the packet's destination socket. The gateway finds the socket number in the table shown in Figure 3, places an IPX and MAC header with the proper address on the packet, and then transmits the packet to the appropriate NetWare client using IPX.

EXHIBIT HALL HIGHLIGHTS

I found four vendors that exhibited IPX-IP gateway products at the Cleveland NetWare Conference and Exhibits. These products are briefly described below.

Firefox's NOV*IX for Internet

Firefox was the first vendor to release an IPX-IP gateway. NOV*IX for Internet 3.0 is a software-based product that allows clients to communicate with the IPX-IP gateway using SPX. NOV*IX for Internet runs on NetWare 3.1x, NetWare 4.x, NetWare Runtime, and NetWare MultiProtocol Router (MPR). NOV*IX for Internet also supports Windows 3.1, Windows for Workgroups, and Windows 95.

Firefox offers an entire family of products called NOV*IX for NetWare that provide TCP/IP support for NetWare networks. All of these products offer automatic address allocation, including shared IP addressing, IP address pooling, and dynamic IP address allocation.

Automatic address allocation allows IPX-IP software to assign clients IP addresses as needed, thereby eliminating the need to manually configure IP addresses for each client.

Shared IP addressing, one method of automatic address allocation, enables multiple clients to connect to the Internet using a single IP address. IPX-IP software that uses shared IP addressing assigns each client a unique source port number to differentiate its communications from other clients' communications.

With IP address pooling (another method of automatic address allocation), the IPX-IP gateway uses a set of IP addresses to enable multiple users to connect to the Internet. IP address pooling is useful if you have more users than you have available IP addresses.

Dynamic IP address allocation, which is the third method of automatic address allocation, enables an IPX-IP gateway to assign a client a unique IP address from a designated set of addresses. When the client is finished using the Internet, the gateway software deallocates the address, returning it to the set of available IP addresses.

For more information about NOV*IX for Internet or NOV*IX for NetWare, call 1-800-230-6090 or 1-408-654-9933. You can also visit Firefox's WWW site (http://www.firefox.com).

Cisco Systems' Internet Junction

Although Cisco Systems is best known for its hardware products, it is now offering Internet Junction, which is a software-based IPX-IP gateway that runs on NetWare 3.1x, NetWare 4.x, NetWare Runtime, NetWare MPR, and Windows NT. Internet Junction comes in two versions: one that supports NetWare as the gateway platform and one that supports Windows NT. Internet Junction also supports Windows 3.1, Windows for Workgroups, and Windows 95.

Internet Junction supports dial-up modems, Integrated Services Digital Network (ISDN) ports, switched 56 kbit/s connections, and T1 and T3 lines. As a firewall solution, Internet Junction effectively isolates NetWare servers and clients from the Internet.

You can purchase 5-, 10-, 25-, 50-, or 100-user licenses of Internet Junction. Each copy of Internet Junction includes a site license for Netscape Navigator.

For more information about Internet Junction, call 1-800-GO-CISCO or 1-408-526-7209. You can also visit Cisco Systems' WWW site (http://www.cisco.com).

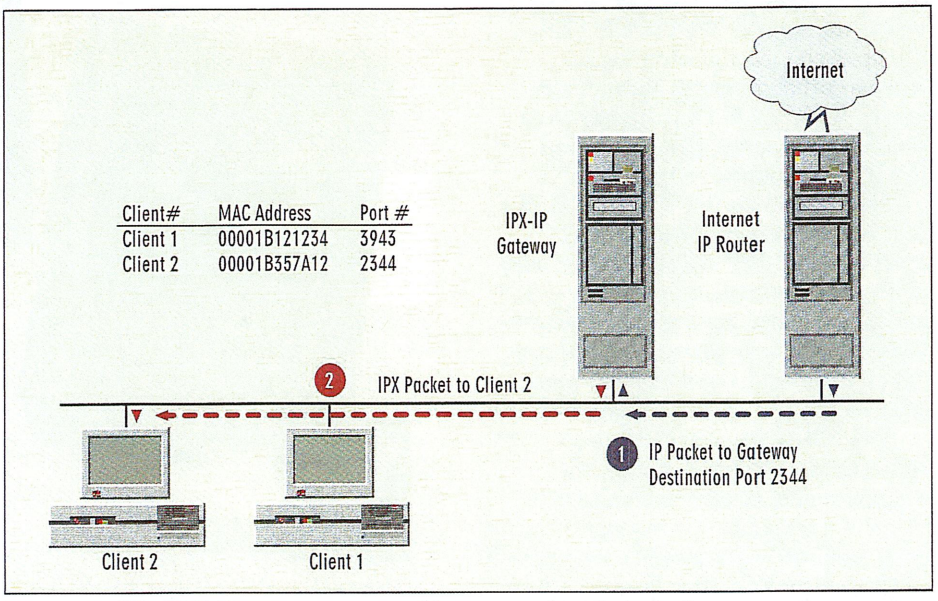


Figure 3. The IPX-IP gateway uses a table to route data from the Internet to the correct NetWare client.

- You need just one IP address from your Internet service provider (ISP).
- You can centrally manage Internet access and set up filters at the gateway device.

In Tom's case, configuring an IP address and installing a TCP/IP stack on 100 clients would be time consuming. And because available IP addresses are in short supply, Tom's ISP may not be willing to give him 100 IP addresses. Tom needs a simple solution that is both cost-effective and easy to configure and manage. He needs an IPX-IP gateway.

HOW DOES AN IPX-IP GATEWAY WORK?

An IPX-IP gateway is typically a client-server application that consists of two parts: the client redirector software and the gateway software. An IPX-IP gateway can be a software-based product (such as Firefox's NOV*IX for Internet, Cisco Systems' Internet Junction, and Quarterdeck Corporation's IWare Connect) or a hardware-software product (such as Performance Technology's Instant Internet).

To use an IPX-IP gateway on your network, you must first install the IPX-IP gateway's redirector software, a special WINSOCK.DLL file, on your NetWare clients. This file allows you to run WinSock 1.1-compliant TCP/IP applications (such as Netscape Navigator, NCSA Mosaic, Telnet, and FTP) over IPX. Some gateways automatically install the server's WINSOCK.DLL file on each client as users log in, whereas other gateways allow clients to run WINSOCK.DLL directly from the NetWare server that is running the IPX-IP gateway software.

After installing the WINSOCK.DLL file, you can run any WinSock 1.1-compliant TCP/IP application just as if you were communicating directly with an IP host. Then you input a destination address, such as http://www.novell.com, which is the address of Novell's home page on the World-Wide Web (WWW).

The IPX-IP gateway's redirector software (the WINSOCK.DLL file) intercepts your request at the client, places a special gateway redirector header on it, and sends this packet to the IPX-IP gateway using IPX. (See Figure 2.) Some gateways, such as Firefox's NOV*IX for Internet, use SPX instead of IPX. IPX-based gateways are generally faster and require less overhead than SPX-based gateways, but SPX-based communications are connection oriented and are therefore more reliable.

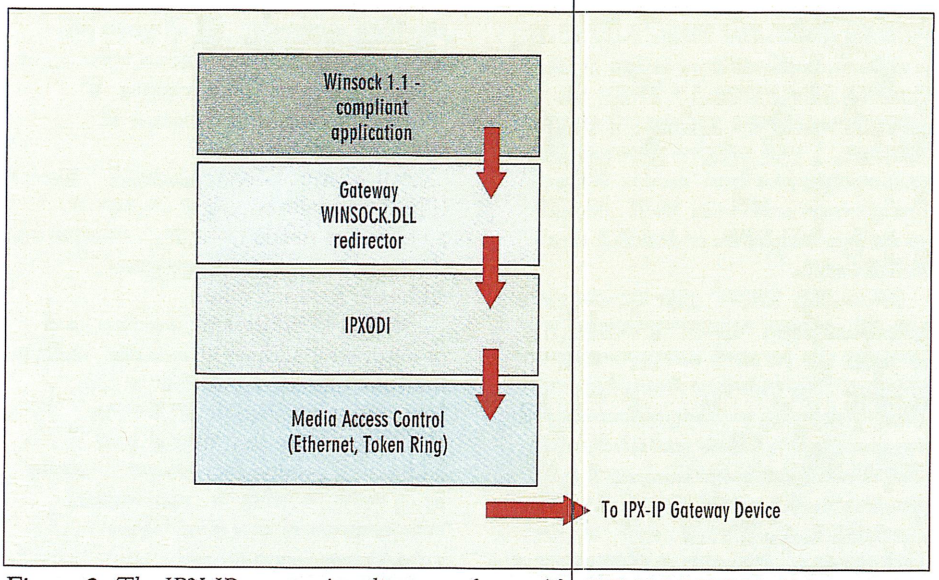


Figure 2. The IPX-IP gateway's redirector software (the WINSOCK.DLL file) intercepts your request and sends it to the gateway as an IPX packet.

After the IPX-IP gateway receives the packet, the gateway reads the packet's IPX header to locate your media access control (MAC) address (also called a node address). The

Circle 631 on the reader service card.

Where Will NUI Be Next? Read All About the NetWare Conferences Online

NetWare Conferences and Exhibits are sponsored by NetWare Users International (NUI), an independent, nonprofit organization that supports NetWare user groups worldwide. If you want to know more about these conferences, visit the Conference Information page on NUI's World-Wide Web (WWW) site. To get to this page, go to http://www.nuinet.com and click NetWare Conferences and Exhibits.

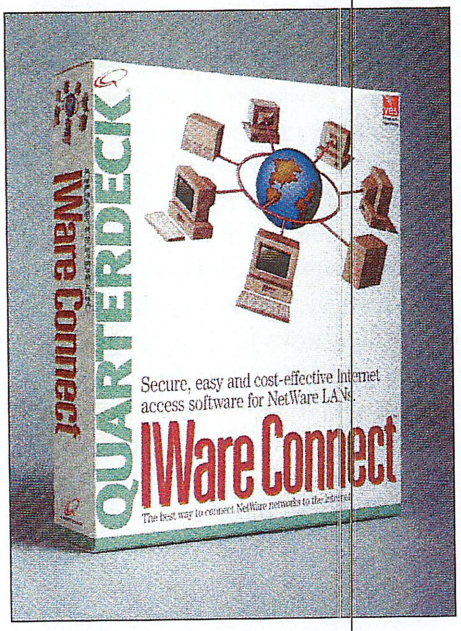
You can view a list of upcoming NetWare Conferences and Exhibits by clicking Where are the conferences?, and you can get various information about these conferences by clicking a particular conference. For example, if you click Dallas: July 30-31, 1996, you can find out which tutorials and seminars will be offered at the NetWare Conference and Exhibits in Dallas, Texas. You can also view a list of regular conference exhibitors and get other conference information such as who to contact about hotel reservations and transportation in Dallas.

Finally, you can register for any NetWare Conference and Exhibits using the online conference registration form. To register for the Dallas conference, for example, you must click Registration on the Dallas NetWare Conference and Exhibits page, and then click Register On-Line Now! The online conference registration form will appear.

In addition to entering information such as your name, address, and telephone number, you must select a registration option. You can register for the full conference, for the tutorials only, for the seminars only, or for the exhibits only. (An Exhibits Only conference pass is free.) The registration form allows you to select the tutorials and seminars you want to attend.

After you have completed the online conference registration form, you must click Submit Form. Because NUI does not currently accept payment over the Internet, you must then complete a separate online payment form, which will appear on your screen when you click Submit Form.

After you have completed the online payment form, you must fax or mail it to the NUI registration office. NUI will then send you a confirmation letter, a payment receipt, a course schedule, a name badge, and a voucher that you can exchange at the conference for a notebook containing course materials. (If you choose the Exhibits Only registration option, NUI will simply send you a confirmation notice and instructions for entering the exhibit hall.)



Quarterdeck Corporation's IWare Connect

IWare Connect is a software-based product that runs on NetWare 3.x and 4.x and supports Windows 3.x, Windows for Workgroups, Windows 95, and Windows NT. IWare Connect requires only 2 MB of RAM and 3 MB of disk space for 100 concurrent users.

IWare Connect uses Novell's TCP/IP stack at the server and includes a Windows-based configuration tool for setting up incoming and outgoing IP filters. With IWare Connect, you can get printed reports based on denied sites, bytes sent, and bytes received by individual users.

You can purchase 5-, 10-, 25-, 50-, or 100-concurrent user licenses of IWare Connect. For more information about IWare Connect, call 1-310-309-3700. You can also visit Quarterdeck Corporation's WWW site (http://www.quarterdeck.com).

Performance Technology's Instant Internet

Instant Internet is a hardware-software product that looks like a router with one network port, a built-in 28.8 kbit/s modem, and a 64 KB ISDN port. If you want to access the Internet using a frame relay line, a T1 line, or a leased line, you simply attach an external router to Instant Internet.

Instant Internet runs on NetWare 2.x, 3.x, and 4.x and supports Windows 3.1, Windows for Workgroups, Windows 95, and Windows NT. Instant Internet comes with a network license for the WINWEB browser, a news reader; FTP; and point of presence (POP) e-mail client software.

Up to 50 users can simultaneously access the Internet using Instant Internet. (This number may vary, depending on socket usage. However, because Tom needed to provide Internet access for 100 users, he may have wanted to purchase more than one Instant Internet.)

For more information about Instant Internet, call 1-800-PT-IINET or 1-210-979-2000. You can also send an e-mail message to Performance Technology at info@instant.net, or you can visit Performance Technology's WWW site (http://www.perftech.com).

CONCLUSION

If you want to connect your NetWare network to the Internet without the hassle of installing TCP/IP stacks and assigning IP addresses for every client, then an IPX-IP gateway is the product for you. Check out these and other connectivity products at the next NetWare Conference and Exhibits near you.

For a list of upcoming NetWare Conferences, see p. 65. For information about getting conference information over the Internet, see "Where Will NUI Be Next? Read All About the NetWare Conferences Online."

Laura Chappell researches, writes, and lectures on NetWare protocol performance, troubleshooting, and optimization. Her partner, Roger Spicer, focuses on NetWare/Internet integration. They can be reached at info@imagitech.com or on CompuServe at 72000,3333.

Special thanks to Michael Swarm at Firefox, who explained the technical aspects of IPX-IP gateways.