



Workstation
Server
Enterprise

CHAPTER

Accessing Resources on the Network

13

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About Chapter 13

Chapter 13 focuses on how to find and access available network resources.

First, this chapter takes an in-depth look at browsing. The various browser roles played by different computers on the network are explained, including domain master browser, master browser, backup browser, potential browser, and non-browser. Then the browsing process is outlined, including browser elections.

Next, Chapter 13 explains how to configure the Computer Browser service, the Windows NT service that manages browsing. Then, the chapter examines how browsing functions on various transport protocols, including NetBEUI, NWLink IPX/SPX Compatible Transport, and TCP/IP.

Finally, this chapter details how to connect to shared network resources using Windows NT Explorer, and how to connect from the command line. Using UNC and FQDN naming conventions is explained.

This chapter includes two hands-on labs. In the first lab, you configure the Windows NT Computer Browser service. In the second, you create and connect to shared network resources.

Chapter 13 is a “must read,” no matter which of the three Windows NT 4.0 Microsoft Certified Professional exams you’re preparing for. This chapter maps to the “Use various methods to access network resources” objective for the Workstation exam, and maps to the “configure Windows NT Server core services” objective for the Server and Enterprise exams.

Browsing

Browsing enables users to find out what shared resources are available on the network (including resources in other workgroups and other domains), and facilitates connecting to those resources.

Browsing is managed by the Computer Browser service. The Computer Browser service is installed automatically during the installation of Windows NT (both Workstation and Server). The service is configured, by default, to start every time Windows NT is booted.

The Computer Browser service is responsible for the process of building a list of available network servers—a *browse list*—and for sharing that list with other computers. (Throughout this chapter, the term *network servers* includes all computers that either have shared resources or are capable of sharing their resources.) The Computer Browser service is designed so that not all computers on the network have to maintain a browse list. Certain computers are designated to maintain a browse list, and to provide that list to other computers on the network when they request it. A browse list is displayed when a user attempts to connect a network drive, or views the Network Neighborhood in Windows NT Explorer.

The following sections discuss the roles that various computers play in the browsing process, the actual process of browsing for available network servers, configuring the Computer Browser service, and how browsing works on different transport protocols.

Browser Roles

To avoid overloading any one computer on the network, the task of maintaining a browse list is distributed among many computers. A hierarchy of browser computers has been established, and each computer plays a different role in this process. The *browser roles* that computers can perform are: domain master browser, master browser, backup browser, potential browser, and non-browser.

Each Windows computer on the network can be designated to perform any of these roles, with the exception of the domain master browser, which is always a function of the *primary domain controller* (PDC) for a domain.

Because each computer on the network does not have to maintain a browse list, processor overhead and network traffic are reduced.

The role each computer performs in the browsing process is determined, in part, by how the computer is configured and, in part, by an election process. (Both configuring computers for browsing and the election process are covered later in this chapter.)

Here's a more in-depth look at the various browser roles.

Domain master browser

The *domain master browser* performs different functions, depending on whether the network consists of a single subnet or multiple subnets.

If the network has only one subnet, the domain master browser and master browser functions are combined and are performed by a single computer — the PDC. The PDC compiles the browse list of available network servers and makes this list available to the backup browsers.

If the network consists of multiple subnets, the domain master browser maintains a list of available network servers located on *all* subnets in the domain. The domain master browser acquires this information from the master browser on each subnet. The domain master browser makes this list available to the master browser on each subnet, which, in turn, makes the list available to the backup browsers.

There can be only *one* domain master browser in a domain, and it is always the PDC. If the PDC is down, no other computer can assume the role of the domain master browser. If there is no domain master browser, users are only able to browse network resources located on their local subnet.

Master browser

The *master browser* builds the browse list — the list of available network servers — on its own subnet. Then the master browser passes this list on to the domain master browser, and to the backup browsers on its own subnet.

If a domain spans several subnets, there is a master browser for each subnet.

If multiple workgroups or domains exist on the same subnet, each workgroup or domain has its own master browser for that subnet. (Workgroup browsing is limited to browsing on a single subnet — the master browser for a workgroup can't pass browse list information across a router.) Each workgroup or domain is limited to having only *one* master browser on a subnet.

Any Windows NT Server, Windows NT Workstation, Windows 95, or Windows for Workgroups computer can perform the role of the master browser. However, because the role of master browser requires additional overhead (including CPU

time and memory usage), you might consider configuring a more powerful computer to serve as a master browser.

Backup browser

The *backup browser* receives the browse list from the master browser, and then makes the browse list available to any computer that requests it.

All computers on the network, when they request a copy of the browse list, do so from a backup browser. There can be more than one backup browser on each subnet.

Any Windows NT Server, Windows NT Workstation, Windows 95, or Windows for Workgroups computer can perform the role of the backup browser.

Potential browser

A computer that does not currently maintain or distribute a browse list, but is capable of doing so, is called a *potential browser*. By default, all Windows NT Server, Windows NT Workstation, Windows 95, and Windows for Workgroups computers are potential browsers.

It is the job of the master browser on a subnet to promote a potential browser to a backup browser should the need arise. Additionally, if the master browser becomes unavailable, a potential browser can be elected to fill the role of the master browser.

Non-browser

A *non-browser* is a computer that is not capable of maintaining and distributing a browse list. This is either because the computer has been configured to not function as a browser, or the computer's network software does not provide the capability to maintain a browse list.

All MS-DOS and Windows 3.1 client computers are non-browsers. These computers can request a browse list, but can't maintain or distribute such a list.

Any Windows NT Server, Windows NT Workstation, Windows 95, or Windows for Workgroups computer can be configured to be a non-browser. (Configuring Windows NT computers for browsing is discussed later in this chapter.)

The Browsing Process

The Computer Browser service is responsible for managing the browsing process. Browsing can be thought of as two distinct activities: building and maintaining

the browse list, and distributing the browse list to computers that request it. This section discusses what happens during each of these functions.

How a browse list is built and maintained

1. When a master browser first comes on line, its browse list is empty. To initially build its browse list, the master browser sends a broadcast to all computers on the subnet requesting that all network servers announce their presence. (Remember, for the purpose of discussing browsing in this chapter, network servers include all computers that either have shared resources, or are capable of sharing their resources.)
2. All available network servers respond to this request by announcing their presence within thirty seconds. The master browser incorporates this information into its initial browse list. The master browser then distributes this browse list to the domain master browser and to the backup browsers.
3. After initial creation of the browse list, when a Windows computer that functions as a network server is first booted, it broadcasts its presence to the network. The master browser receives this announcement and places the information in its browse list.
4. During normal operations, a Windows computer that functions as a network server continues to announce its presence to the network every twelve minutes. If the master browser does *not* receive a broadcast from a network server after three consecutive twelve-minute time periods, it removes the computer from its browse list.

(This is how the master browser maintains its browse list—it assumes that all network servers in its initial browse list are available until it fails to receive a broadcast announcement from a computer for three consecutive twelve-minute periods, at which time it updates its browse list by removing this computer from its list. Therefore, it is possible for a network server to remain on the browse list for some time after it is no longer available to network users.)

5. During normal operations, backup browsers request an updated browse list from the master browser every twelve minutes. If the master browser does not respond to an update request from the backup browser, the backup browser initiates the master browser election process (covered in more detail later in this chapter).

6. During normal operations, the master browser sends an updated browse list to the domain master browser every twelve minutes. The domain master browser, in response, sends an updated domain browse list to the master browser. Additionally, every fifteen minutes, the master browser announces its presence to master browsers of other workgroups and domains located on the same subnet.

What happens when a user browses the network

1. When a user of a Windows NT computer attempts to access browse information by double-clicking Network Neighborhood or by selecting Tools> Map Network Drive in Windows NT Explorer, the user's computer contacts the master browser and retrieves a list of available backup browsers.

(This step occurs only the first time a user accesses browse information—the Computer Browser service on the local computer then retains the list of available backup browsers until the computer is rebooted or until the backup browsers on the list are no longer available.)
2. The user's computer then contacts a backup browser to request a list of available network servers. The backup browser processes this request and returns a list of available network servers in the requesting computer's workgroup or domain, plus a list of available workgroups and domains. The user's computer then displays this information for the user.
3. If the user selects an available network server, the user's computer contacts the selected server and requests a list of shared network resources. The selected server then sends a list of shared resources to the requesting computer, which is then displayed for the user.

If the user selects an available workgroup or domain, the user's computer contacts the master browser in the selected workgroup or domain and requests a browse list. The master browser sends a list of backup browsers for the workgroup or domain to the requesting computer. Then the user's computer contacts a backup browser in the selected workgroup or domain for a list of available network servers, which is then sent by the backup browser to the requesting computer and displayed for the user. The user then selects an available network server, and the user's computer contacts the selected server and requests a list of shared network resources. The

selected server then sends a list of shared resources to the requesting computer, which is displayed for the user.

4. The user selects the specific shared resource he or she wants to access from the list that is displayed.

Browser elections are an integral part of building and maintaining browse lists. The browser election process is discussed in the next section.

Browser elections

A *browser election*, which determines which computer will function as the master browser, takes place when:

- The PDC is booted
- A backup browser is unable to obtain an updated browse list from the master browser
- A computer is unable to obtain a list of backup browsers from the master browser

When one of these events occurs, the computer experiencing the event initiates the browser election process by broadcasting an election packet.

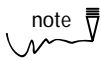
An election packet contains the computer's election criteria value. A computer's election criteria value is based on the computer's operating system, version, and on the computer's current browser role (for example, master browser or backup browser). The more powerful the operating system, the higher its election criteria value. The election criteria value ranking of operating systems, from highest to lowest, is: Windows NT Server, Windows NT Workstation, Windows 95, and Windows for Workgroups. Additionally, newer versions of an operating system have a higher election criteria value than older versions.

For example, Windows NT Server has a higher election criteria value than Windows NT Workstation, which has a higher election criteria value than Windows 95, which has a higher election criteria value than Windows for Workgroups.

Also, Windows NT Server version 4.0 has a higher election criteria value than Windows NT Server version 3.51, which has a higher election criteria value than Windows NT Server version 3.5.

The result of the browser election process is that the computer with the *highest* election criteria value "wins" the election and becomes the master browser.

When a computer initiates the election process by broadcasting an election packet, each browser computer on the subnet (that is, every computer except non-browsers) examines the packet and compares the election criteria value contained in the packet to its own election criteria value. If the computer that receives the packet has an *equal or lower* criteria value than the packet it receives, it takes no action. If the computer that receives the packet has a *higher* criteria value than the packet it receives, it broadcasts its own election packet. This process continues until no further election packets are broadcast. The last computer to send an election packet (the computer with the highest election criteria value) then declares itself as the new master browser.



note Only the master browser is elected. The domain master browser is always the PDC. If the PDC is unavailable, there is *no* domain master browser.

Configuring the Computer Browser Service

By default, all Windows 95 and Windows for Workgroups computers are configured as potential browsers. All Windows NT Server and Windows NT Workstation computers that are *not* domain controllers are also configured as potential browsers by default. Additionally, by default, all Windows NT Server domain controllers are configured to maintain a browse list, and to function as a backup or master browser. You can change the default setting for the Computer Browser service on a Windows NT computer, and thereby change the computer's default browser role.

The Computer Browser service on a Windows NT computer is controlled by the following Registry entries in `\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Browser\Parameters`:

`\MaintainServerList`

`\IsDomainMaster`

The `MaintainServerList` Registry entry, which specifies whether a computer will maintain a browse list, can be configured with one of the following values:

- No — When this configuration is used, the computer functions as a non-browser.

- Yes—When this configuration is used, the computer maintains a browse list, and will function either as a backup browser or a master browser. This is the default setting for all Windows NT Server domain controllers.
- Auto—When this configuration is used, the computer functions as a potential browser, a backup browser, or a master browser (depending on the outcome of a browser election). This is the default setting for all Windows NT computers that are nondomain controllers.

The IsDomainMaster Registry entry, which specifies whether a computer will initiate an election at startup and gives a computer a higher election criteria value than other computers of equivalent configuration, can be configured with one of the following values:

- True—When this configuration is used, the computer, at startup, initiates a browser election. In addition, the computer is assigned a higher election criteria value than it would normally be assigned, given its operating system, version, and current server role. This higher election criteria value gives the computer an advantage in a browser election, and causes it to become the master browser if all other factors are equal. For example, when this configuration is assigned to a *backup domain controller* (BDC), this BDC will have a higher election criteria value than all other BDCs (assuming that all BDCs use the same versions of Windows NT Server); only the PDC would have a higher election criteria value. Either *True* or *Yes* can be used for this setting.
- False—When this configuration is used, the computer does *not* initiate a browser election at startup, and is *not* assigned a higher election criteria value than other computers with equivalent configurations. Either *False* or *No* can be used for this setting. This is the default setting for all Windows NT computers.

TO CONFIGURE THE COMPUTER BROWSER SERVICE'S REGISTRY SETTINGS, FOLLOW THESE STEPS:

1. Select Start ➤ Run.
2. In the Run dialog box, type **Regedt32** in the Open drop-down list box. Click OK.

3. In the Registry Editor dialog box, select Window>HKEY_LOCAL_MACHINE on Local Machine.
4. Maximize the HKEY_LOCAL_MACHINE on Local Machine window.
5. Double-click the SYSTEM folder. Under the SYSTEM folder, double-click the CurrentControlSet folder. Double-click the Services folder. Scroll down and double-click the Browser folder. Click the Parameters folder. Figure 13-1 shows the contents of the Parameters folder in the Registry Editor dialog box. Notice the default settings for MaintainServerList and IsDomainMaster on a PDC.

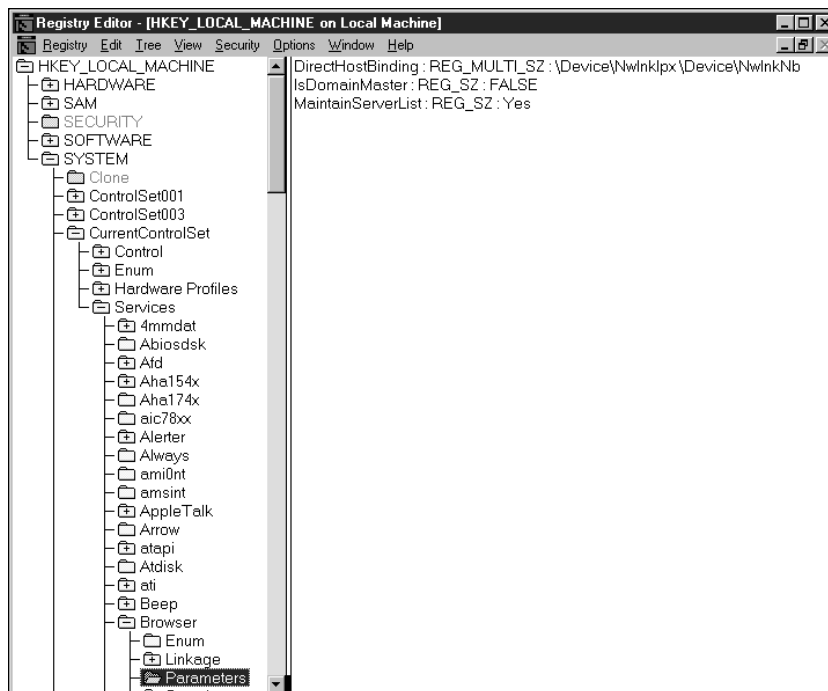


FIGURE 13-1 Registry settings for the Computer Browser service

6. In the right-hand window, double-click either the MaintainServerList or the IsDomainMaster value (depending on the value you want to modify).
7. Edit the String Editor dialog box so that it contains the desired value. Click OK.
8. Exit Registry Editor. The changes will be effective the next time the computer is booted.



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For information on configuring the Computer Browser service on Windows 95 or Windows for Workgroups computers, consult the *Microsoft Windows 95 Resource Kit* (Microsoft Press, 1995) or the *Microsoft Windows for Workgroups Resource Kit* (Microsoft Press, 1992).

Browsing on Transport Protocols

Browsing functions differently based on the transport protocol in use on the network. The following sections discuss how browsing is implemented on NetBEUI, NWLink IPX/SPX Compatible Transport, and TCP/IP.

Browsing on NetBEUI

NetBEUI is a nonroutable protocol. Because of the nonroutable nature of this protocol, browsing is always limited to a single subnet. Browsing traffic, and in fact, all network traffic in a NetBEUI environment, cannot be forwarded across a router.

Browsing on NWLink IPX/SPX Compatible Transport

NWLink IPX/SPX Compatible Transport (commonly associated with NetWare networks) is a routable protocol. All browsing communications on networks that use this protocol consist of NetBIOS broadcasts.

By default, NetWare routers are configured to forward NetBIOS broadcast traffic across up to eight routers. This means that browsing information is automatically forwarded to other subnets.

Third-party routers are usually configured, by default, to *not* forward NetBIOS broadcast traffic (type 20 packets). You must manually configure third-party routers to support the forwarding of NetBIOS broadcast traffic if you want browsing information to be forwarded to other subnets.

If you use Windows NT with routing enabled, *and* use the NWLink IPX/SPX Compatible Transport protocol, you must enable NetBIOS Broadcast Propagation (broadcast of type 20 packets) in order for browsing information to be forwarded across routers to other subnets.

Forwarding NetBIOS broadcasts across routers to other subnets can enable up to eight subnets to function as a single subnet for the purposes of browsing. Forwarding NetBIOS broadcasts can also create a serious increase in the amount of network traffic on all subnets, and should be carefully considered before being implemented.

Browsing on TCP/IP

TCP/IP is a routable protocol. By default, browsing communications on networks that use TCP/IP consist of NetBIOS broadcasts. Because TCP/IP is not normally configured to forward NetBIOS broadcasts, browsing information on networks that use TCP/IP is *not* typically forwarded to other subnets.

However, there are two methods you can use on TCP/IP networks to overcome this limitation and enable browsing information to be forwarded to other subnets. You can use LMHOSTS files, or you can use a WINS server to enable network-wide browsing on TCP/IP networks. Using LMHOSTS files or a WINS server enables the master browser to send and receive browsing information *directly* to and from the domain master browser (on another subnet) — but it does *not* enable forwarding of NetBIOS broadcasts across routers.

Because browsing on a TCP/IP network that uses LMHOSTS files or a WINS server does *not* involve forwarding broadcast traffic, browsing on TCP/IP networks is much more efficient than browsing on networks that use the NWLink IPX/SPX Compatible Transport protocol.



concept link

For more information on NWLink IPX/SPX Compatible Transport, see Chapter 17. For more information on TCP/IP, see Chapter 16.

Browsing provides the user with a list of available shared network resources. Once the user knows what resources are available, the user can select a resource, and then connect to the shared folder in order to access the resource.

Connecting to Shared Folders

Users must connect to shared folders before they can access the resources they contain.

The following sections discuss how to connect to shared folders, including how to use common naming conventions, Windows NT Explorer, and the command line to connect to shared network resources.

Naming Conventions

A *naming convention* is an accepted method of identifying individual computers and their resources on the network.

The two common naming conventions used in Windows NT are: *universal naming convention* (UNC), and *fully qualified domain name* (FQDN).

A UNC name consists of a server name and a shared resource name in the following format: `\\Server_name\Share_name`. *Server_name* represents the name of the server that the shared folder is located on. *Share_name* represents the name of the shared folder. A UNC name in this format can be used to connect to a network share. For example, a shared folder named `Public` located on a server named `Server1` would have the following UNC name: `\\Server1\Public`.

A UNC name can also specify the name of a subfolder and/or file within the share, using the following format: `\\Server_name\Share_name\Subfolder_name\File_name`. A UNC name in this format can be used to access a specific folder or file, such as a data file on a remote server. For example, a data file named `Salaries.doc` in the `Payroll` folder located in a share named `HR` on a server named `CORP` would have the following UNC name: `\\Corp\HR\Payroll\Salaries.doc`.

An FQDN is a fancy term for the way computers are named and referenced on the Internet. FQDNs are often used on networks that use TCP/IP and DNS servers. The format for an FQDN is `Server_name.Domain_name.Root_domain_name`. For example, the FQDN of a server named `Wolf` in a domain named `AlanCarter` in the `com` root domain would be: `wolf.alancarter.com`.

If your network uses TCP/IP and DNS servers, you can replace the Server_name in a UNC with an FQDN. For example, to specify a share named `Books` on a server with an FQDN of `wolf.alancarter.com`, you could use: `\\wolf.alancarter.com\Books`.

Both UNC names and FQDNs can be used to connect to shared network resources in Windows NT Explorer and from the command line.

Using Windows NT Explorer

Assuming that you have the appropriate permissions, you can connect to any shared network resource by using Windows NT Explorer.

TO CONNECT TO A SHARED NETWORK RESOURCE BY USING WINDOWS NT EXPLORER, FOLLOW THESE STEPS:

1. Select Start ► Programs ► Windows NT Explorer.
2. In the Exploring dialog box, right-click Network Neighborhood. Select Map Network Drive from the menu that appears.
3. The Map Network Drive dialog box appears, as shown in Figure 13-2.
Notice the browsing information available in the Shared Directories list box. In this dialog box, you can use one of two methods to select the network resource to which you want to connect:
 - You can type in the UNC name of the resource you want to connect to in the Path text box.
 - You can double-click any domain or server shown in the Shared Directories list box to browse the network. If you double-click a domain, a browse list of available network servers in that domain is displayed. If you double-click a server, a browse list of shared folders on that server is displayed. Highlight the shared folder you want to connect to. The UNC name of the shared resource then appears in the Path text box. Click OK.

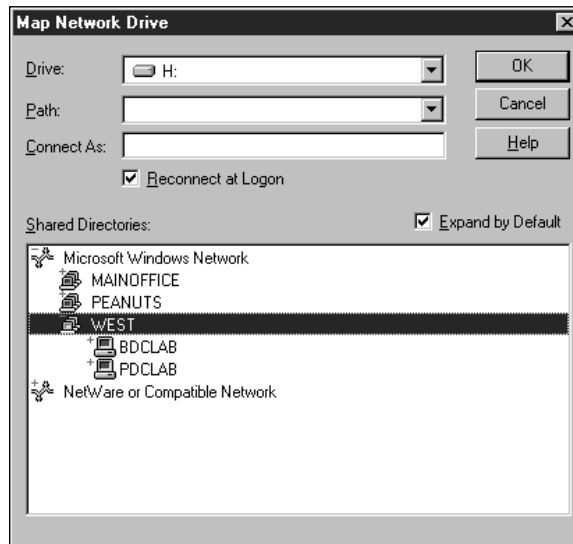


FIGURE 13-2 Using Windows NT Explorer to browse the network

4. The resource you select should appear with a drive letter under My Computer in the All Folders section of the Exploring dialog box, indicating that you have successfully connected a network drive to the resource.
 5. Exit Windows NT Explorer.
-

Once you have connected a drive letter to a shared network resource, the new drive letter appears in Windows NT Explorer, My Computer, and the Open dialog box in standard Windows applications. You can then access the files and folders within the share in the same manner that you access files and folders on your local computer.

Connecting from the Command Line

You can use the `Net.exe` utility to browse the network and, assuming that you have the appropriate permissions, to connect to a shared network resource from the command line.

TO BROWSE THE NETWORK FROM THE COMMAND LINE,
FOLLOW THESE STEPS:

1. Select Start ➤ Programs ➤ Command Prompt.
 2. To obtain a list of available servers in your domain or workgroup, at the `C:\>` command prompt, type **net view** and press Enter.
 3. To obtain a list of all domains on the network, type **net view /domain** and press Enter.
 4. To obtain a list of available servers in another domain, type **net view /domain:Domain_name** and press Enter. (For example, to obtain a list of available servers in the LAB domain, type **net view /domain:lab** and press Enter.)
 5. To obtain a list of available shares on a network server, type **net view \\Server_name** and press Enter. (For example, to obtain a list of available shares on a server named PDCLAB, type **net view \\pdclab** and press Enter.) To exit the Command Prompt dialog box at any time, type **exit** at the command prompt and press Enter.
-

TO CONNECT TO A SHARED NETWORK RESOURCE
FROM THE COMMAND LINE, FOLLOW THESE STEPS:

1. Select Start ➤ Programs ➤ Command Prompt.
2. In the Command Prompt dialog box at the C:\> command prompt, type **net use *Drive_letter*: \\Server_name\Share_name** and press Enter. For example, to connect a drive letter, such as X:, to a share named Data on a server named Pdclab, type **net use x: \\pdclab\data** and press Enter.
3. A message appears indicating that the command completed successfully.
4. Exit the Command Prompt dialog box by typing **exit** at the command prompt and pressing Enter.

Once you have connected a drive letter to a shared network resource, the new drive letter appears in Windows NT Explorer, My Computer, and the Open dialog box in standard Windows applications. You can then access the files and folders within the share in the same manner that you access files and folders on your local computer.

Key Point Summary

Chapter 13 covered browsing, which permits users to find out what shared resources are available on the network, and facilitates connecting to those resources. Browsing is managed by the Computer Browser service, which is responsible for the process of building a list of available network servers (a browse list), and for sharing that list with other computers. (For the purposes of this chapter, network servers include all computers that either have shared resources or are capable of sharing their resources.) Not every computer on the network has to maintain a browse list, and because of this fact, processor overhead and network traffic are reduced.

- The task of maintaining a browse list is distributed among many computers. *The browser roles* that computers can perform are: domain master browser, master browser, backup browser, potential browser, and non-browser.

- If a network has a single subnet, the *domain master browser* and master browser functions are combined, and are performed by a single computer — the PDC. The PDC compiles the browse list and makes this list available to the backup browsers.
- If a network has multiple subnets, the domain master browser maintains a list of available network servers located on all subnets in the domain, and makes this information available to the master browser on each subnet, which, in turn, makes the information available to the backup browsers.
- The *master browser* builds the browse list for its own subnet, and distributes this list to the domain master browser and to the backup browsers on its own subnet. Each workgroup or domain is limited to having only *one* master browser on a subnet.
- The *backup browser* receives the browse list from the master browser, and then distributes the information to any computer that requests it.
- A computer that does not currently maintain or distribute a browse list, but is capable of doing so, is called a *potential browser*. By default, all Windows NT Server, Windows NT Workstation, Windows 95, and Windows for Workgroups computers are potential browsers.
- A *non-browser* is a computer that is not capable of maintaining and distributing a browse list, either because it has been configured to not function as a browser, or because the computer's network software does not provide the capability to maintain a browse list.
- The browsing process consists of two distinct activities: building and maintaining the browse list, and distributing the browse list to computers that request it. There are several steps involved in both of these activities.
- Because the master browser does not remove a network server from its browse list until *after* it has failed to receive a broadcast announcement from the network server for three consecutive twelve-minute periods, it is possible for a network server to remain on the browse list for some time after it is no longer actually available to network users.
- A *browser election*, which determines which computer will function as the master browser, takes place when the PDC is booted, when a backup browser is unable to obtain an updated browse list from the master browser, and when a computer is unable to obtain a list of backup browsers from the master browser.

- The computer that initiates the browser election process broadcasts an election packet, which contains the computer's election criteria value. A computer's election criteria value is based on the computer's operating system, version, and on the computer's current browser role. The election criteria value ranking of operating systems, from highest to lowest, is: Windows NT Server, Windows NT Workstation, Windows 95, and Windows for Workgroups. Newer versions of an operating system have a higher election criteria value than older versions. The computer with the *highest* election criteria value, in a browser election, "wins" the election and becomes the master browser. Only the master browser is elected. The domain master browser is always the PDC. If the PDC is unavailable, there is no domain master browser.
- The Computer Browser service on a Windows NT computer is controlled by the MaintainServerList and IsDomainMaster Registry entries that are located in `\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Browser\Parameters`. The default settings for these entries can be changed by editing the Registry if you want to change a Windows NT computer's default browser role.
- The MaintainServerList entry, which specifies whether a computer will maintain a browse list, can be configured with a value of No, Yes, or Auto. *Yes* is the default setting for all Windows NT Server domain controllers. *Auto* is the default setting for all Windows NT computers that are non-domain controllers.
- The IsDomainMaster entry, which specifies whether a computer will initiate an election at startup, and also gives a computer a higher election criteria value than other computers of equivalent configuration, can be configured with a value of True or False. *False* is the default setting for all Windows NT computers.
- Because of the nonroutable nature of NetBEUI, browsing on a network that uses NetBEUI is limited to a single subnet.
- On networks that use the NWLink IPX/SPX Compatible Transport protocol (a routable protocol), all browsing communications consist of NetBIOS broadcasts. By default, NetWare routers are configured to forward NetBIOS broadcast traffic across up to eight routers, which can enable up to eight subnets to function as a single subnet for the purposes of

browsing. However, this can create a serious increase in the amount of network traffic on all subnets.

- o On networks that use TCP/IP (a routable protocol), browsing communication, by default, consists of NetBIOS broadcasts. However, because TCP/IP is not normally configured to forward NetBIOS broadcasts, browsing information is typically *not* forwarded to other subnets. This limitation can be overcome by using LMHOSTS files or a WINS server, which enables the master browser to send and receive browsing information *directly* to and from the domain master browser (on another subnet), but this is *not* accomplished in the form of a NetBIOS broadcast. When LMHOSTS files or a WINS server is used, browsing on a TCP/IP network is much more efficient than browsing on a NWLink IPX/SPX Compatible Transport network, because there is no forwarding of browsing broadcast traffic on the TCP/IP network.
- o A naming convention is an accepted method of identifying computers and their resources on the network. The two common naming conventions used in Windows NT are: the *universal naming convention* (UNC), and *fully qualified domain name* (FQDN).

 - o A UNC name consists of a server name and a shared resource name in the following format: `\\Server_name\Share_name`. A UNC name can also specify the name of a subfolder and/or file within the share, using the following format: `\\Server_name\Share_name\Subfolder_name\File_name`.
 - o An FQDN is a fancy term for the way computers are named and referenced on the Internet. The format for an FQDN is `Server_name.Domain_name.Root_domain_name`. If your network uses TCP/IP and DNS servers, you can replace the `Server_name` in a UNC with an FQDN. Both UNC names and FQDNs can be used to connect to shared network resources in Windows NT Explorer and from the command line.

Applying What You've Learned

Now it's time to regroup, review, and apply what you've learned in this chapter.

The following Instant Assessment questions bring to mind key facts and concepts.

The hands-on lab exercises will really reinforce what you've learned, and allow you to practice some of the tasks tested by the Microsoft Certified Professional exams.

Instant Assessment

1. What service manages browsing on Windows NT computers?
2. What is a list of available network servers called?
3. List the five different roles that computers can play in the browsing process.
4. Which computer is always the domain master browser?
5. How many master browsers can each domain have on a subnet?
6. Why are some computers non-browsers?
7. Briefly describe how a browse list is built and maintained.
8. Describe the process that takes place when a user browses the network.
9. You browse the network and are unable to connect to a server that is listed as available on your browse list. What timing issue inherent to the browsing process could account for this problem?
10. Which kind of browser is determined by a browser election?
11. What is contained in an election packet?
12. Which Registry entry specifies whether a given NT computer will be a browser?
13. Which Registry entry specifies whether a given NT computer will initiate a browser election at startup?
14. What type of network traffic does browsing communications consist of on an NWLink IPX/SPX Compatible Transport network?
15. What can you use on a TCP/IP network to enable the master browser to send browsing information *directly* to and from the domain master browser (on another subnet)?
16. Specify the format of a UNC name.
17. Specify the format of an FQDN.
18. If your network uses TCP/IP and DNS servers, what can you replace in a UNC name with an FQDN?

T/F

19. Because NetBEUI is a nonroutable protocol, browsing on a NetBEUI network is limited to a single subnet.



concept link

For answers to the Instant Assessment questions see Appendix D.

Hands-on Lab Exercises

The following hands-on lab exercises provide you with two different opportunities to apply the knowledge you've gained in this chapter about accessing network resources.

Lab 13.21 *Configuring the Computer Browser service*



Workstation
Server
Enterprise

The purpose of this lab is to give you hands-on experience in configuring the Windows NT Computer Browser service. You will edit the Registry to configure your Windows NT Computer to force an election when it is booted, in an attempt to become the master browser for its subnet.

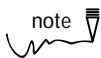
Begin this lab by booting your computer to Windows NT Server. Log on as Administrator.

FOLLOW THESE STEPS CAREFULLY:

1. Select Start ➤ Run.
2. In the Run dialog box, type **Regedt32** in the Open drop-down list box. Click OK.
3. In the Registry Editor dialog box, select Window ➤ HKEY_LOCAL_MACHINE on Local Machine.
4. Maximize the HKEY_LOCAL_MACHINE on Local Machine window.
5. Double-click the SYSTEM folder. Under the SYSTEM folder, double-click the CurrentControlSet folder. Double-click the Services folder. Scroll down and double-click the Browser folder. Click the Parameters folder.
6. In the right-hand window, double-click the IsDomainMaster value.
7. Edit the String Editor dialog box to read **TRUE**. Click OK. (This step configures the computer to force an election on startup, and to attempt to become the master browser for its subnet.)
8. Notice in the right-hand window that the IsDomainMaster value is changed to TRUE.

9. The MaintainServerList value should be Yes. (If it isn't, double-click MaintainServerList and change the value to **Yes** in the String Editor dialog box.)
10. Exit Registry Editor. These changes will become effective the next time you boot the computer.

Lab 13.22 *Accessing network resources*



This lab is optional, because it requires an additional networked computer. Additionally, Lab 10.15 must be completed prior to performing this lab. (See Lab 10.15 for specific computer hardware requirements.)



Workstation
Enterprise

The purpose of this lab is to give you hands-on experience in accessing shared network resources. You will create and then access shared folders by using Windows NT Explorer, and also connect to shared folders from the command line.

This lab consists of three parts:

- Part 1: Configuring shares on the second computer (PDCMAINOFFICE)
- Part 2: Connecting to shared folders by using Windows NT Explorer
- Part 3: Connecting to a shared folder from the command line

Follow the steps in each part carefully.

Part 1: Configuring shares on the second computer (PDCMAINOFFICE)

Perform these steps on your second computer (PDCMAINOFFICE) after you have booted the computer to Windows NT Server and logged on as Administrator.

1. Select Start ➤ Programs ➤ Windows NT Explorer.
2. In the Exploring dialog box, highlight the Program Files folder. Select File ➤ Properties.
3. In the Program Files Properties dialog box, click the Sharing tab.
4. On the Sharing tab, select the radio button next to Shared As. Edit the Share Name text box so that it appears as **Programs**. Click OK.
5. Highlight the C: drive under My Computer. Select File ➤ New ➤ Folder.
6. Rename the new folder as **Projects**. Press Enter.
7. Select File ➤ Properties.
8. In the Projects Properties dialog box, click the Sharing tab.

9. On the Sharing tab, select the radio button next to Shared As. Accept the default share name of Projects. Click OK.
10. Highlight the C: drive under My Computer. Select File > New > Folder.
11. Rename the new folder as **Public**. Press Enter.
12. Select File > Properties.
13. In the Public Properties dialog box, click the Sharing tab.
14. On the Sharing tab, select the radio button next to Shared As. Accept the default share name of Public. Click OK.
15. Exit Windows NT Explorer. Continue on to Part 2.

Part 2: Connecting to shared folders by using Windows NT Explorer

Perform these steps on your main computer (NTW40) after booting it to Windows NT Workstation and logging on as Administrator.

1. Select Start > Programs > Windows NT Explorer.
2. In the Exploring dialog box, right-click Network Neighborhood. Select Map Network Drive from the menu that appears.
3. In the Map Network Drive dialog box, double-click MAINOFFICE in the Shared Directories list box. Double-click PDCMAINOFFICE. Double-click the Programs folder.
4. Notice that Programs on 'Pdcmainoffice' appears with a drive letter under My Computer in the All Folders section of the Exploring dialog box. You have successfully connected a network drive to the Programs share on PDCMAINOFFICE (the second computer).
5. Select Tools > Map Network Drive.
6. In the Map Network Drive dialog box, type **\\pdcmainoffice\public** in the Path drop-down list box. Click OK.
7. Notice that Public on 'Pdcmainoffice' appears with a drive letter under My Computer in the All Folders section of the Exploring dialog box. You have successfully connected a network drive to the Public share on PDCMAINOFFICE (the second computer.)
8. Exit Windows NT Explorer. Continue on to Part 3.

Part 3: Connecting to a shared folder from the command line

Perform these steps on your main computer (NTW40) that is running Windows NT Workstation.

1. Select Start > Programs > Command Prompt.

2. At the C:\> command prompt, type **net use p: \\pdcmainoffice\projects**
3. Press Enter. Windows NT should indicate that the command completed successfully. This means that you have successfully connected to the Projects share on PDCMAINOFFICE (the second computer).
4. At the C:\> command prompt, type **exit** and press Enter.

