



BY JOHN E. JOHNSTON

# Integrating Windows NT Into an Existing NetWare Network: Part III

Choosing a protocol for the Windows NT environment is an important decision for network administrators, one that unfortunately is often not thought through carefully, resulting in an unresponsive network.

**THIS** concluding article examines how to choose a protocol for the Windows NT environment. This is a major decision that many network administrators do not think through carefully, thus, they end up with an unresponsive network. Additionally, this article looks at the Microsoft WINS server and discusses why it is a necessity in larger environments.

## CHOOSING A PROTOCOL

Computers that are part of Windows NT networks make extensive use of the NetBIOS API to communicate with each other. To support the NetBIOS API calls, Microsoft implemented the NetBIOS API on the following protocols:

- ◆ NetBEUI
- ◆ IPX/SPX
- ◆ TCP/IP

Since there are three protocols that support the NetBIOS API available, you have to decide which protocol is best for your environment. Most network administrators choose to implement the TCP/IP protocol with Windows NT networks. However, before you decide, let's take a look at the strengths and weaknesses of each protocol:

**NetBEUI** – The NetBEUI protocol is very simple to implement and is automatically installed in Windows 95 workstations when networking is enabled. NetBEUI requires no address administration, making it a simple protocol to maintain. It installs automatically and requires no administration. However, NetBEUI is a very chatty protocol. Implementing NetBEUI on a large network will wreak havoc on your bandwidth.

NetBEUI is also non-routable, so if you have or plan to have WAN links connecting to your network you should avoid this protocol.

**IPX/SPX** – The IPX/SPX protocol supplied by Microsoft is quite robust. IPX/SPX is fast and routable. If you are integrating a Windows NT network into an existing NetWare network you may think that IPX/SPX is the logical protocol choice. After all, NetWare uses IPX/SPX, why introduce another protocol? First of all, you must use the IPX/SPX protocol stack distributed by Microsoft to access Windows NT resources. This is because Microsoft's version of IPX/SPX supports the NetBIOS Application Programming Interface (API). To access NetWare resources, you must implement the IPX/SPX protocol stack supplied by Novell. While the two protocols are very similar, you still must implement two separate IPX/SPX protocol stacks on each workstation. While implementing the two versions of the IPX/SPX protocol stacks is easy, you should ask yourself, "Since I have to implement another protocol stack to support Windows NT, why not go with TCP/IP?" Also, one major problem with the IPX/SPX protocol stack is that it is not supported by many firewall vendors. If a firewall is already installed on your network, or if you plan to implement a firewall, you should definitely choose to implement the TCP/IP protocol.

**TCP/IP** – TCP/IP is the logical protocol choice for Windows NT networks. TCP/IP is routable and is supported by all firewall vendors. TCP/IP is not chatty like NetBEUI. Establishing a rock solid TCP/IP network does require more work

Figure 1: NetBIOS Names Attached to a Windows 95 Workstation



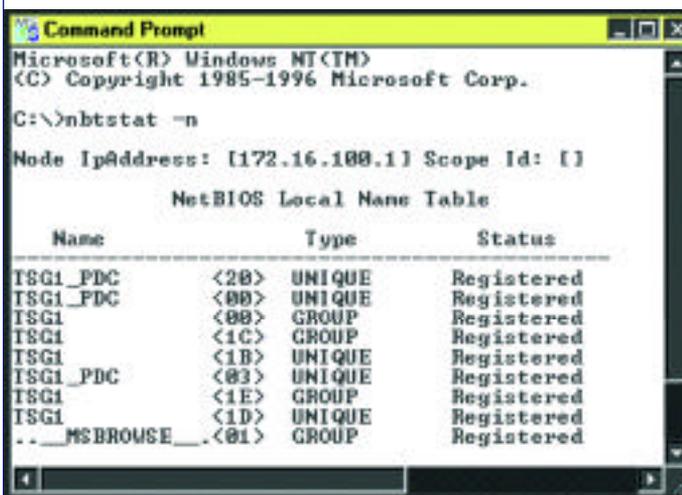
The following names are in use by the Windows 95 workstation illustrated in Figure 1:

- JOHNJ95WS- The Computer Name
- TSG1 - The Windows NT Domain name that this computer attaches to
- JOHNJ - My Name

Figure 2 shows the output of the NBTSTAT -N command run on the Windows NT 4.0 domain controller to which the computer JOHNJ95WS is connected.

The computer illustrated in Figure 2 utilizes several more names than the Windows 95 workstation. This is because this computer is a Primary Domain Controller (PDC) and a Master Browser for the Windows NT network.

Figure 2: NetBIOS Names Attached to a Windows NT 4.0 Domain Controller



**Implementing NT without a solid TCP/IP environment is guaranteed to cause problems on your network. These problems can include high network utilization, WAN connectivity problems, and firewall exposures.**

Microsoft networks make use of the NetBIOS name. If the computer named JOHNJ95WS needs to access a file on the computer named JOHNJNTWS, how would the two computers find each other? The first and most important step to finding each other is to discover each other's TCP/IP address. NetBIOS name resolution over TCP/IP was addressed by two Internet Requests For Comment (RFCs). These RFCs offered the following solutions to resolving NetBIOS names over the TCP/IP protocol:

**B Nodes** – The B Node, or Broadcast Node, uses broadcast messages to find computers. For example, using the B Node method, JOHNJ95WS could do a broadcast over the network asking if anyone on the network is named JOHNJNTWS. If JOHNJNTWS was active on the network, the computer would respond, passing its TCP/IP address to JOHNJ95WS. Note, however, that the B Node method is fatally flawed; broadcast messages do not pass through routers. Because of this, the B Node method is a viable solution on single subnet networks only. Multi-segmented LANs and WANs cannot utilize the B Node method.

**P Node** – The P Node, or Point-to-Point Node, method utilizes a name server to resolve the NetBIOS names. The WINS server is one of these name servers. If the two computers in this example were using the P Node method, JOHNJ95WS would issue a point-to-point message to the name server asking for the TCP/IP address of JOHNJNTWS. If JOHNJNTWS was registered with the name server, its TCP/IP address would be passed on to JOHNJ95WS, again with a point-to-point message. Since point-to-point messages pass through routers, P Node can be used in multi-segmented LANs and WANs.

**M Node** – The M Node, or Mixed node, method uses a combination of the B Node and P Node methods.

than the other protocols, but your efforts will be worthwhile. NetWare version 5 utilizes TCP/IP as its native transport. If you already have a solid TCP/IP infrastructure, you will be one step ahead of the game when migrating to NetWare 5. Note that the components required to establish a reliable TCP/IP network include a DNS server and a DHCP server. For more information on these components, see Parts I and II of this series (*Technical Support*, March and April 1998).

**NAME RESOLUTION**

Now that we've agreed to utilize the TCP/IP protocol to access the Windows NT network (we did agree on that, didn't we?), I must discuss NetBIOS name resolution under the TCP/IP protocol. Windows NT networks make extensive use of NetBIOS names. In Part I, I discussed the DNS server that resolves computer names with their TCP/IP address. For example, the DNS server can tell us that the computer named johnj@tsg.com is at TCP/IP address 172.16.100.2. The computer also has a NetBIOS name. This name is specified in the "Computer Name" field of the network settings. In this example, the computer johnj@tsg.com also has a NetBIOS name of JOHNJ95WS.

To help you visualize the use of NetBIOS names in your environment, enter the command NBTSTAT -N from a Windows 95, Windows NT, or Windows for Workgroups computer. The output of the NBTSTAT -N command shown in Figure 1 was taken from a Windows 95 machine attached to a Windows NT Domain.

Figure 3: WINS Manager screen

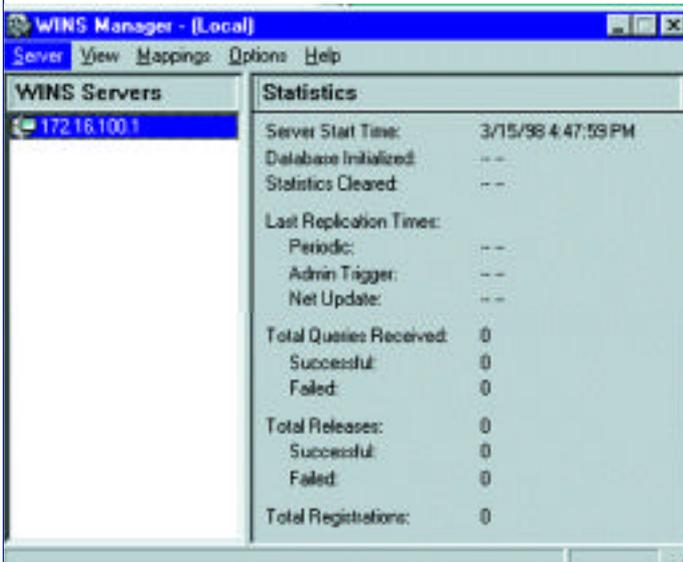
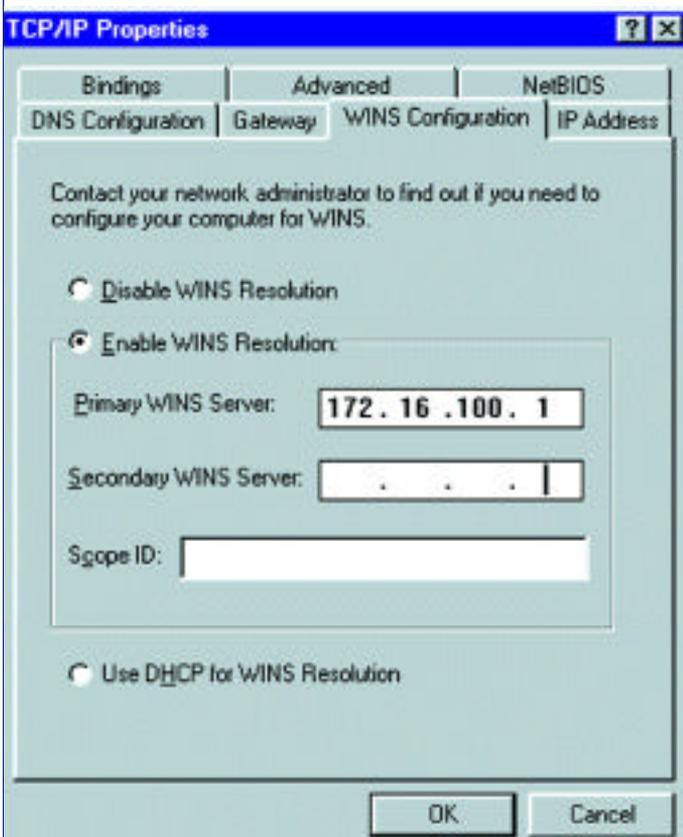


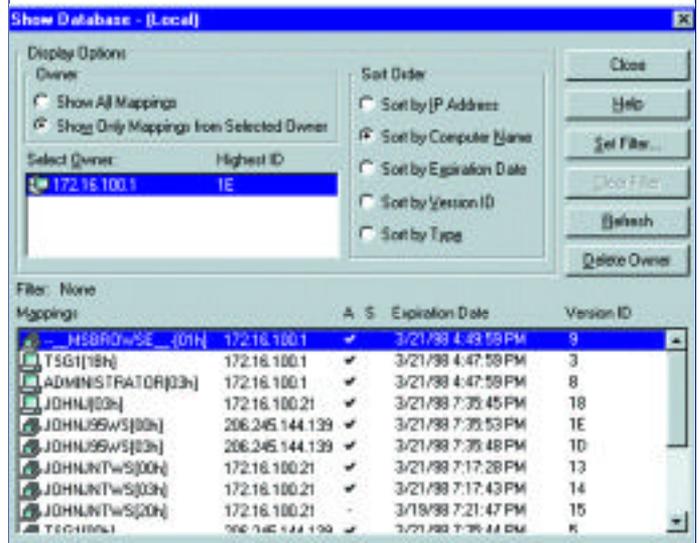
Figure 4: Enabling WINS on a Windows 95 workstation



**H Node** – The H Node, or Hybrid Node, method is what Microsoft clients use with WINS. In Part II of this series, when configuring the DHCP to assign the WINS address for the client, I modified the WINS/NBT Node Type to 0x8. The 0x8 specifies that the H Node method will be used for NetBIOS name resolution.

**Note:** M Node and H Node are very similar. M Node will attempt to perform name resolution using a broadcast first (B Node), then if unsuccessful, will attempt the P Node method. The H Node method will perform the P Node method first, then if unsuccessful, will issue a broadcast (B Node).

Figure 5: Viewing the WINS Database



**WINS SERVER**

The WINS server is Microsoft's implementation of the NetBIOS name resolution server for the TCP/IP protocol. The WINS server maintains a database of NetBIOS names and their corresponding TCP/IP addresses. While WINS performs the same type of function as the DNS server (see Part I for more information on DNS), WINS has an added feature that makes administration much easier; WINS updates its database dynamically. The network administrator is not required to update the WINS database each time a new computer is added to the network.

**IMPLEMENTING WINS UNDER WINDOWS NT SERVER 4.0**

WINS must run on an NT server machine. The logical place to install WINS is on your PDC. WINS does not consume much of the CPU resource, so a dedicated server for WINS is not necessary, except for very large sites with thousands of workstations. **Note:** The server onto which you install WINS should have a static TCP/IP address. Do not allow the WINS server to obtain an IP address from a DHCP server.

To install WINS, perform the following from the NT Server on which you wish to install WINS:

1. Log into the NT Server as Administrator.
2. Click on Start > Control Panel > Network.
3. Click on the Services tab.
4. Click on Add.
5. Click on the Windows Internet Name Service, then click on OK. You will then be prompted to insert your Windows NT CD-ROM. Several files will be copied from the CD-ROM.
6. Click on Close when the copies are completed.
7. You will then be prompted to re-boot the server.

After your server re-boots, you will see a new WINS Manager entry in the Administrative Tools. To start the WINS Manager, perform the following:

1. Click on Start > Programs > Administrative Tools (Common) > WINS Manager. You will see a panel

similar to the one shown in Figure 3.

### ENABLING A WINDOWS 95 CLIENT TO UTILIZE THE WINS SERVER

We are now ready to modify our workstations to utilize the WINS server. To configure a Windows 95 workstation to utilize a WINS server, perform the following from the Windows 95 machine:

1. Click on Start > Settings > Control Panel.
2. Double click on the Network icon.
3. Click on the TCP/IP protocol entry, then click on Properties.
4. Click on the WINS Configuration tab.
5. Click on Enable WINS Resolution, then enter the TCP/IP address of your WINS server in the Primary WINS Server field, as shown in Figure 4.
6. Click on OK.
7. You will be prompted to restart the workstation.

### ENABLING A WINDOWS NT 4.0 WORKSTATION CLIENT TO UTILIZE THE WINS SERVER

To configure a Windows NT 4.0 Workstation to utilize a WINS server, perform the following from the Windows NT Workstation:

1. Click on Start > Settings > Control Panel.
2. Double click on Network icon.
3. Click on the Protocols tab.
4. Click on the TCP/IP protocol; then click on Properties.
5. Click on the WINS Address tab.
6. Enter the TCP/IP address of the WINS server in the Primary WINS Server field.

7. Click on OK; then click on Close.
8. You will be prompted to restart the workstation

**Note:** If you utilize the Microsoft DHCP server, you can direct DHCP to automatically assign the WINS addresses to your Windows workstations. For more information on performing this function, please refer to Part II of this series under the heading "Configuring DHCP to Assign a WINS Address."

### MONITORING THE WINS SERVER

You can monitor the workstations that are registered with your WINS server using the WINS Manager applet. To view the workstations that have registered with your WINS server, perform the following from the WINS server machine:

1. Click on Start > Programs > Administrative Tools (Common) > WINS Manager.
2. Click on Mappings > Show Database. A screen similar to the one shown in Figure 5 will be displayed. From this panel, you can view all of the NetBIOS names in use on each workstation that is utilizing your WINS server. You can sort the database entries in several ways, including by Computer Name and by TCP/IP address.

### AHEAD OF THE GAME

Most NetWare administrators are not familiar with TCP/IP. When it comes time to implement their first Windows NT Server,

many of these administrators will not take the time to build a stable TCP/IP environment before forging ahead with the implementation of NT. Implementing NT without a solid TCP/IP environment is guaranteed to cause problems on your network. These problems can include high network utilization, WAN connectivity problems, and firewall exposures.

This series has concentrated on showing you how to implement a TCP/IP environment using the tools available with Windows NT Server 4.0, including the DHCP server, DNS server and the WINS server. NetWare 5 will fully utilize the TCP/IP protocol. NetWare shops that already have the components listed in this article implemented will be one step ahead of the game when converting to NetWare 5. 



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