

Using Novell's DHCP Server Version 2.10



BY JOHN E. JOHNSTON

NOVELL'S implementation of the Dynamic Host Configuration Protocol (DHCP) allows you to automatically assign TCP/IP addresses to the workstations connected to your network. DHCP servers can also pass the following information to your workstations:

- ◆ Domain Name System (DNS) address(es)
- ◆ default gateway address
- ◆ Subnet mask
- ◆ NetBIOS name servers

This may not seem like a very important task until you dig a bit deeper. Let's look at what life would be like without a DHCP server. The Widget Company recently deployed TCP/IP on its 1,000 Windows 95 workstations. The network administrator now needs to add another DNS to the network. Since there is no DHCP in place, each of the 1,000 workstations must be modified manually in order to implement the new DNS.

This article will show you how to obtain, install and configure Novell's DHCP Server version 2.10. The samples shown in this article were generated from a NetWare 4.10 file server, but the installation and configuration steps are similar for all supported versions of NetWare.

For starters, Novell's DHCP Server version 2.10 can be found on Novell's web site and runs on the following versions of NetWare:

- ◆ NetWare 4.11
- ◆ NetWare 4.10
- ◆ NetWare 3.12

ADDING TCP/IP SUPPORT TO THE FILE SERVER

Before you implement the DHCP software on your NetWare server, you must have TCP/IP set up on the file server that is to host the DHCP server.

Setting up TCP/IP on a NetWare file server is rather simple to do. Three lines must be added to the AUTOEXEC.NCF file to load and bind the TCP/IP protocol. The partial AUTOEXEC.NCF file in Figure 1 shows the statements required to load and bind TCP/IP. The sample shown in Figure 1 was taken from a NetWare version 4.10 file server, but the statements and parameters are the same for NetWare 3.x and 4.11 servers.

The first pair of load and bind statements in Figure 1 load the LAN driver, then bind the IPX protocol to that LAN driver. The next statement loads tcpip.nlm.

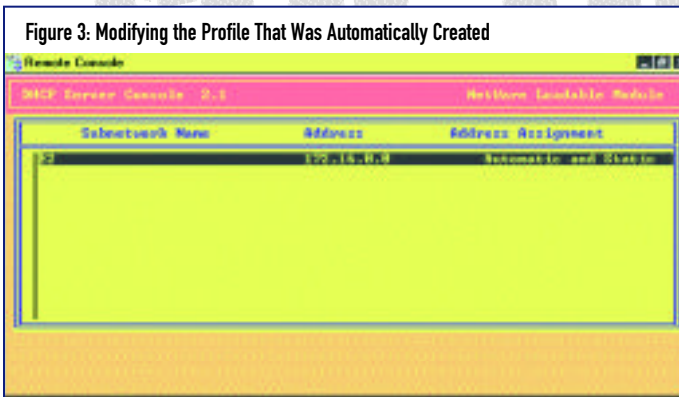
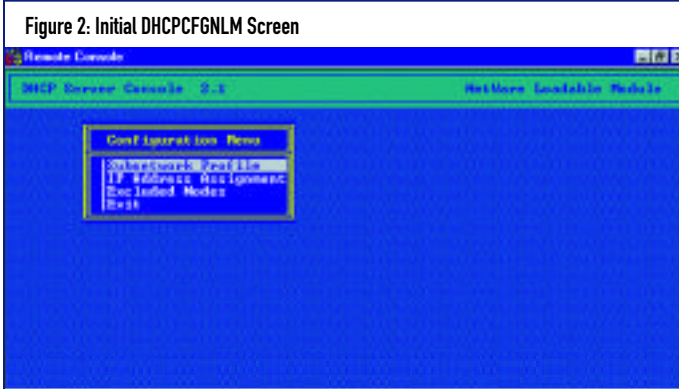
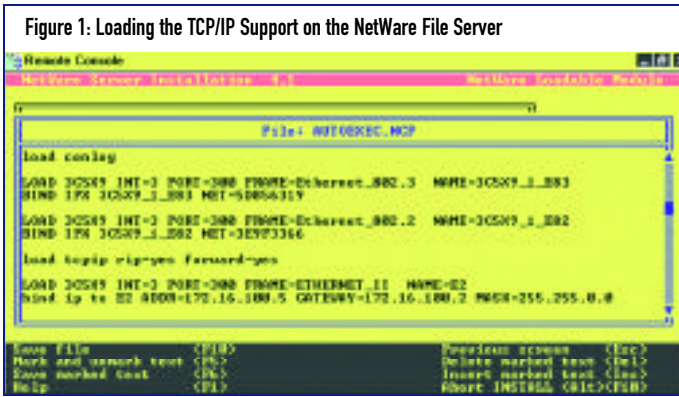
The last set of load/bind parameters is used for the TCP/IP protocol. The load command loads the LAN driver with the Ethernet_II frame type. This is required for TCP/IP. The bind statement binds the TCP/IP protocol. Notice the bind statement for the IP protocol. The following is an explanation of the parameters on this bind statement:

ADDR=172.16.100.5: This is the TCP/IP address that is now assigned to the NetWare file server.

GATEWAY=172.16.100.2: This is the TCP/IP gateway address. If you do not have a TCP/IP gateway in place, omit this parameter.

MASK=255.255.0.0: This is the subnet mask for the IP network that the NetWare file server is connected to.

Novell's implementation of the Dynamic Host Configuration Protocol (DHCP) allows you to automatically assign TCP/IP addresses to the workstations connected to your network.



After modifying the AUTOEXEC.NCF file, you can either restart your file server or enter the load and bind statements from the system console to dynamically add the TCP/IP protocol to the server.

OBTAINING AND INSTALLING THE DHCP SOFTWARE

The Novell DHCP Server version 2.10 software can be obtained from the Novell web site at www.novell.com. You should download the file named dhcp210.exe. Expand the dhcp210.exe into a directory named DHCPSRVR on your NetWare file server.

Tip: The directory into which you expand the dhcp210.exe file must be named DHCPSRVR.

After you have downloaded and expanded the dhcp210.exe file and have the TCP/IP support loaded on your file server, you are ready to install the DHCP software. The following steps are required to install the DHCP software:

1. From the system console, enter **Load install**.

2. Select **Product Options**.
3. Select **Install a Product Not Listed**. You will need to enter a path to the DHCPSRVR directory.
4. Press F3 to change the path.
5. Enter the path to the DHCPSRVR directory as in the following example:

SYS:\DHCPSRVR

You will see the Product Installation screen.

6. Choose **Install Product**. You will see a list of the NetWare servers on your network.
7. Select the server to install to from the list. When the install process completes, you will get the following message:

Installation was successful. Bring down and restart each server on which you installed the software to ensure that it uses the newest NLM files. <Press ENTER to Continue>

8. Exit out of the installation program and restart your server.

CONFIGURING DHCP

Now that you have the DHCP software installed on your file server, it's time to perform the initial DHCP configuration. This is done using DHCPCFG.NLM. When DHCPCFG is initially started, it detects all subnetworks (in this example, only one) and creates a subnet profile.

Tip: Information in the initial subnetwork profile(s) is incomplete and must be edited before starting your DHCP server.

The following steps can be used to perform the initial DHCP configuration:

1. From the system console, enter **Load DHCPCFG**. The screen shown in Figure 2 will be displayed.
2. Select **Subnet Profiles**. The screen shown in Figure 3 will be displayed. Notice that the name of the profile matches the name specified on your AUTOEXEC.NCF load statement.

Tip: If you don't see any profiles listed on the screen shown in Figure 3, this means that the TCP/IP configuration on your file server is either missing or set up improperly. If this happens to you, you should exit out of the DHCPCFG utility, correct your TCP/IP server setup, and then restart the DHCPCFG utility. You should then see the initial profile.
3. Highlight the automatically created subnet profile (in this example E2) and press Enter. The panel shown in Figure 4 will be displayed.

If you have a default router for this subnetwork, insert its TCP/IP address in the Default Router field. If you have an established DNS server running, perform the following:

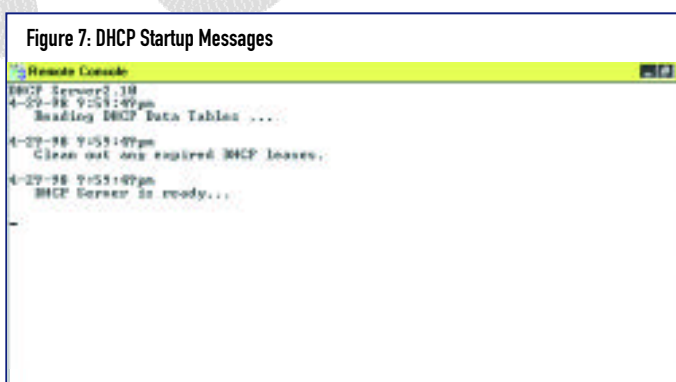
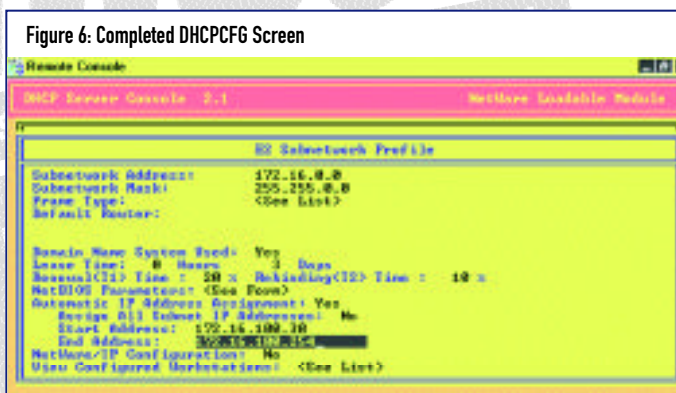
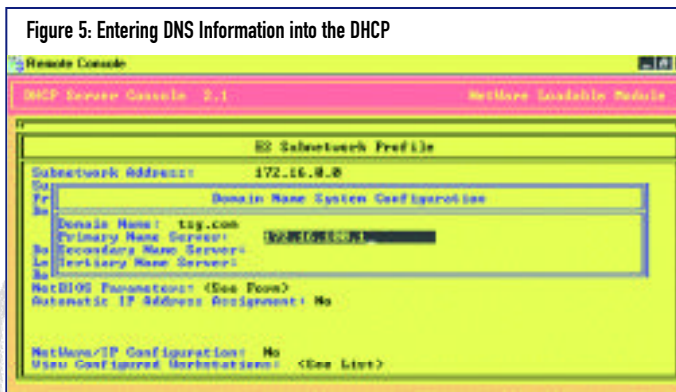
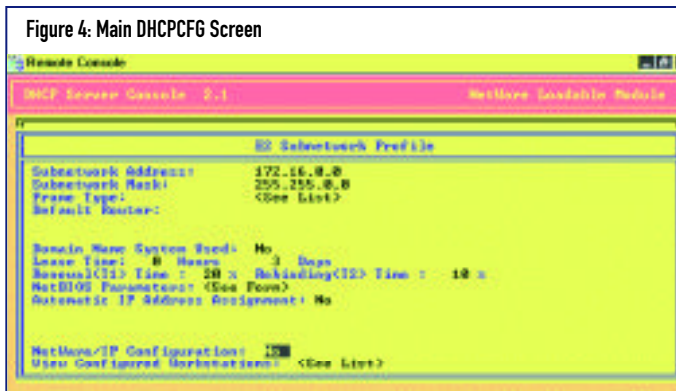
1. Enter **Yes** in the Domain Name System Used field. You will be prompted for the following:
 - ◆ Domain Name
 - ◆ Primary Name Server
 - ◆ Secondary Name Server
 - ◆ Tertiary Name Server
2. Fill in the information as shown in Figure 5. In this example, 172.16.100.1 is a Windows NT 4.0 Server running the DNS service.
3. In the Lease time entry, shown in Figure 4, specify the number of hours or days that the IP address lease is valid. In this example, three days was chosen.
4. In the Renewal (T1) Time field enter the percentage of the lease time remaining when the client should attempt to contact the originating DHCP server that issued its IP address. In this example, 20 percent was chosen.
5. In the Rebinding (T2) Time field, enter the percentage of time remaining in the lease when the client should attempt to contact ANY DHCP server. In this example, 10 percent was chosen.

Tip: *There are several schools of thought about DHCP lease durations. Some say a short lease is preferable, while other say a long lease is better. The choice between a long or short lease depends upon the conditions in your particular environment. If you are in a classroom environment where machines are used for a week to teach a class and are then re-deployed, a short lease would be preferable. If you work in an environment where the network rarely changes, then a longer lease is preferable.*

If you are running NetBIOS on your network, you can specify the NetBIOS Primary, Secondary and Tertiary Name Servers in this field:

1. In the Automatic IP Address Assignment field, change the value to **Yes**.
2. After entering “Yes” to the above, you will be prompted with the “Assign All Subnet IP addresses” field. Enter **No** in this field and press Enter. This will allow you to define an IP address pool from which this DHCP can pull from to assign IP addresses to the clients. This also allows you to exclude ranges.
3. After entering “No” to the above, you will be prompted for the Starting and Ending addresses of the IP address pool. In this example, we chose a starting address of 172.16.100.30 and an ending address of 172.16.100.254. When finished, the screen should look similar to Figure 6.
4. Press **ESC** to save the changes you made to the subnetwork profile.
5. You are now ready to start the DHCP service. From the system console start the DHCP by entering the following command:

```
LOAD DHCP SRVR
```



You should see a screen similar to Figure 7 if the configuration is without errors.

MODIFYING YOUR WORKSTATIONS TO USE THE DHCP

Once you have your NetWare/IP DHCP server up and configured, you are ready to configure your workstations to use the DHCP. In this section, I will show you how to configure a Windows NT 4.0

Figure 8: Checking the Windows NT Workstation IP Settings Using the ipconfig /all Command

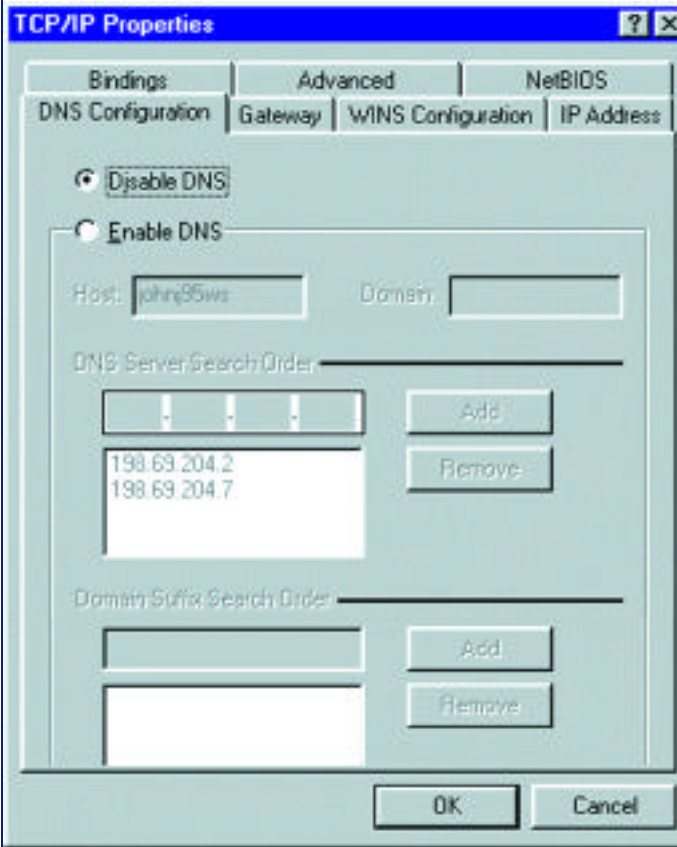
```
Windows NT IP Configuration

Host Name . . . . . : john95ws.wg.com
DNS Servers . . . . . : 172.16.100.1
NetBIOS Scope ID . . . . . :
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
NetBIOS Substitution User ID: No

Obtained ipconfig IP-104

Device Name . . . . . : KLSX00 Ethernet Adapter
Physical Address. . . . . : 00-60-97-87-86-17
DHCP Enabled. . . . . : Yes
IP Address . . . . . : 172.16.100.30
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . : 172.16.100.1
DHCP Server . . . . . : 172.16.100.1
Lease Obtained. . . . . : Saturday, February 16, 1996 6:31:06 PM
Lease Expires . . . . . : Tuesday, February 17, 1996 6:31:06 PM
```

Figure 9: Disabling the Windows 95 DNS Parameters to Allow DHCP to Supply Same



Work-station and a Windows 95 workstation to use the Novell DHCP Server.

Modifying a Windows NT Workstation to Use the Novell DHCP Server

The following steps can be used to configure a Windows NT 4.0 Workstation to use the Novell DHCP service created and configured previously:

1. Click on **Start > Settings > Control Panel > Network**.
2. Click on the **Protocols** tab.
3. Double-click on the **TCP/IP Protocol**.

4. Click on the radio button **Obtain an IP address from a DHCP Server**.

Tip: Check your DNS network settings. If you configured your DHCP to provide these addresses, you should remove any information in these fields.

5. Restart your Windows NT Workstation to pick up the changes just made.
6. After your workstation re-boots, you should check the TCP/IP settings to make sure that the DHCP process is correctly assigning your IP address, DNS settings and Default Gateway address. To check your settings on a Windows NT 4.0 Workstation, perform the following:

- ◆ Open the Command Prompt application by clicking on **Start > Programs > Command Prompt**.
- ◆ Type **ipconfig /all** and press **Enter**. A screen similar to the one shown in Figure 8 will be displayed. Notice in Figure 8 that the DNS, IP address, Subnet Mask, and Default Gateway are all configured for us. Also notice that you are also given the IP address of the DHCP server that provided these addresses. The Lease Obtained and Lease Expires fields are also displayed for your information.

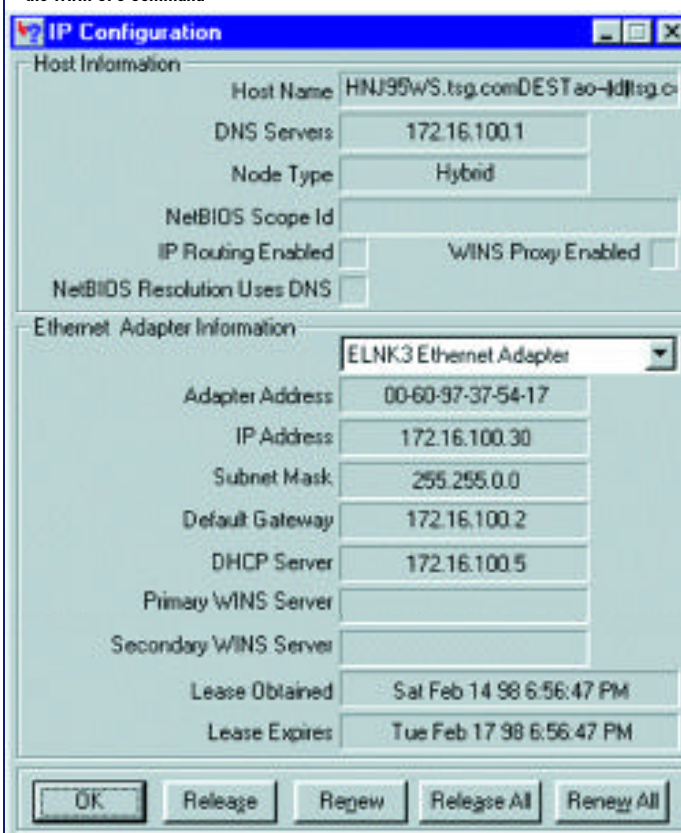
Modifying a Windows 95 Workstation to Use the NetWare/IP DHCP

We are now ready to modify the setting of a Windows 95 workstation(s) to utilize the Novell DHCP Server that we set up.

1. Click on **Start > Settings > Control Panel > Network**.
2. Click on the **Protocols** tab.
3. Double-click on the **TCP/IP Protocol**.
4. From the IP Address tab, click on the radio button **Obtain an IP address from a DHCP Server**.
5. Check your DNS settings by clicking on the **DNS Configuration** tab. If you configured your DHCP to provide your DNS address(es), you should click on the Disable DNS radio button, as shown in Figure 9. This may seem contradictory, but here is how it works: If you have the Enable DNS option specified in the Windows 95 DNS Configuration tab, your workstation will use the settings supplied on this panel. If you have the Disable DNS radio button on and your DHCP server is configured to hand out the DNS addresses, your DNS settings will be supplied from the DHCP server.
6. Restart your Windows 95 workstation to pick up the changes just made.

7. After your workstation re-boots, you should check the TCP/IP settings to make sure that the DHCP process is correctly assigning your IP address, DNS settings and Default Gateway address. To check your settings on a Windows 95 workstation, perform the following:

Figure 10: Checking the Windows 95 Workstation IP Settings Using the WINIPCFG Command



- ◆ Click on **Start > Run** and enter **WINIPCFG**.
- ◆ When the WINIPCFG program starts, click on the **More Info** button. A panel similar to the one shown in Figure 10 will be displayed. Notice in Figure 10 that the DNS Server, IP address, Subnet Mask and Default Gateway are all configured for us. Also notice that you are given the IP address of the DHCP server that provided these addresses. The Lease Obtained and Lease Expires fields are also displayed for your information.

MONITORING THE DHCP ADDRESS ASSIGNMENTS

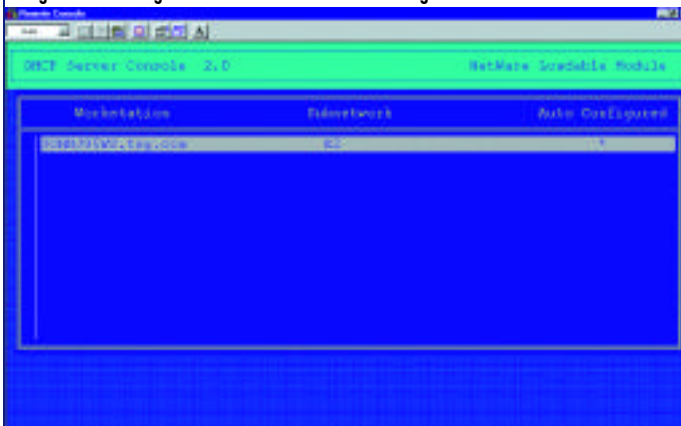
You can use one of the services of DHCPCFG.NLM to monitor the TCP/IP addresses that were assigned by the DHCP server. You can view the following information about each DHCP assigned TCP/IP address:

- ◆ workstation name
- ◆ TCP/IP address assigned
- ◆ MAC address of the node
- ◆ lease duration
- ◆ lease begin date and time

To view this information, load DHCPCFG.NLM and then select IP Address Assignment. You will see a screen resembling Figure 11, showing all of the workstations that have been assigned TCP/IP addresses.

Next, select one of the entries, then press enter to see the detailed information about the workstation. Figure 12 illustrates this extended information.

Figure 11: Viewing Workstations That Have Been Assigned TCP/IP Addresses



ADVANCED DHCP CONFIGURATION TECHNIQUES

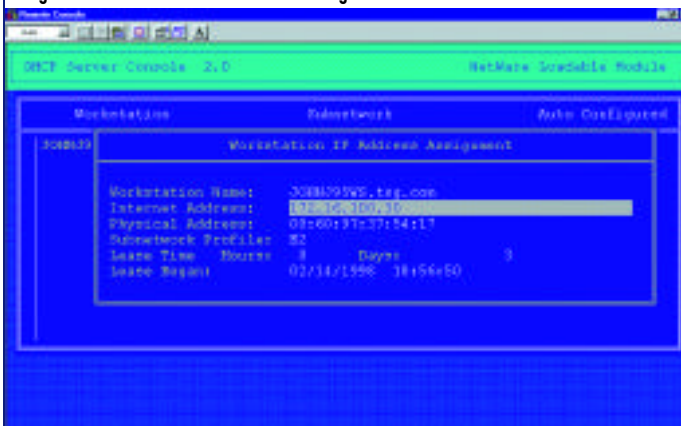
There are two special configuration techniques available with the Novell DHCP program. These two options allow you to assign a static IP address to specified MAC addresses and define excluded nodes that the DHCP will ignore.

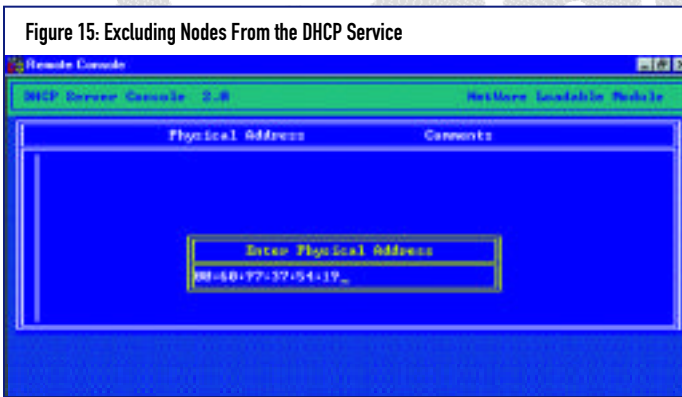
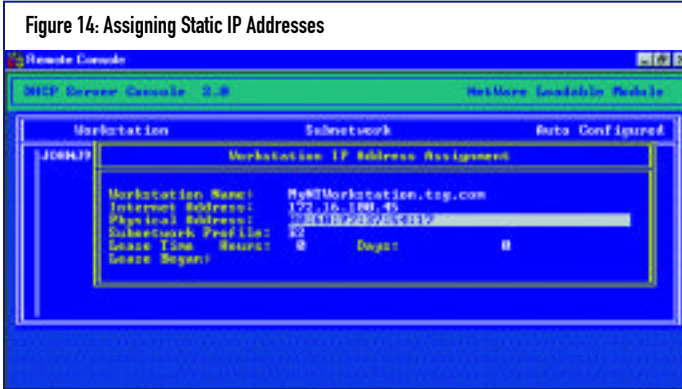
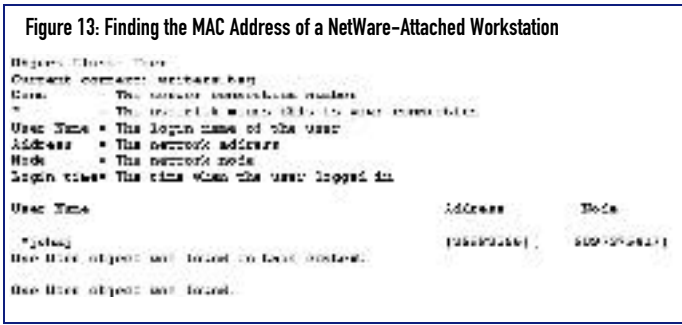
ASSIGNING STATIC IP ADDRESSES

There may be times when you would like the DHCP server to always assign the same IP address to a given node on your network. To configure the DHCP server to assign a static address to a node on the network, perform the following:

1. Load DHCPCFG.NLM.
2. Select the **IP Address Assignment** function.
3. Press the **INS** key to create an entry. You will be prompted for a workstation name. This is an arbitrary name. Enter up to 48 characters of information to describe the node being assigned a static address.
4. Next, you will be prompted for the static IP address to be assigned to the node. Enter a valid IP address.
5. You will be prompted for a Physical Address. This is the MAC address of the node. If you don't know the MAC address, you can find it by entering the "nlist user /a" command. Figure 13 shows the output of the nlist command. The "node" field contains the MAC address. The MAC address

Figure 12: Extended DHCP IP Address Assignment Information





is a series of six hexadecimal bytes of data separated by colons. Figure 14 shows the completed static IP address assignment form.

DEFINING EXCLUDED NODES

You may need to exclude nodes from being assigned TCP/IP addresses from the DHCP server. You can tell the DHCP server to ignore DHCP broadcast requests from specified MAC addresses.

To exclude nodes from the DHCP service, perform the following:

1. Load DHCPCFG.NLM.
2. Select the Exclude Nodes option.
3. Press the INS key to add a new entry. You will be prompted to enter the MAC address of the node, as shown in Figure 15. You may use the "*" wildcard character.
4. After entering the MAC address you will be prompted for a comment. Enter the comment, then press ENTER to add the entry.

CONCLUSION

The whole world is embracing the TCP/IP protocol. It's only a matter of time before you will need to implement a DHCP server to assign IP addresses to your workstations. You could, of course, manually assign TCP/IP addresses on each individual node on your network, but the minute you change any major component in your TCP/IP environment, such as adding a new DNS server, you would have to re-configure all of your workstations. Had you implemented a DHCP server, this change would be picked up by your workstations automatically.

You can use the Novell DHCP server for all nodes on your network, not just the NetWare nodes. Conversely, you can also use the Windows NT Server DHCP service for all nodes on your network, including NetWare workstations.



NaSPA member John E. Johnston is manager of technical support and communications for a major hospital in Pennsylvania. He designs and maintains cross-platform local and wide area networks utilizing NetWare, OS/2, DOS, and Windows.

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