Lab 1.1.6 PC Network TCP/IP Configuration

Objective

- Identify tools used to discover a computer network configuration with various operating systems.

- Gather information including connection, host name, Layer 2 MAC address and Layer 3 TCP/IP network address information.

- Compare network information to other PCs on the network.

Background

This lab assumes the use of any version of Windows. This is a non-destructive lab and can be done on any machine without concern of changing the system configuration.

Ideally, this lab is performed in a classroom or other LAN environment that connects to the Internet. This lab can be done from a single remote connection using a modem or DSL-type connection. The instructor will furnish IP addresses.

In the following instructions the lab runs twice. The two runs reflect the operating system differences between the Windows 95/98/ME systems and Windows NT/2000/XP systems. Students should perform the lab on both types of systems if possible.
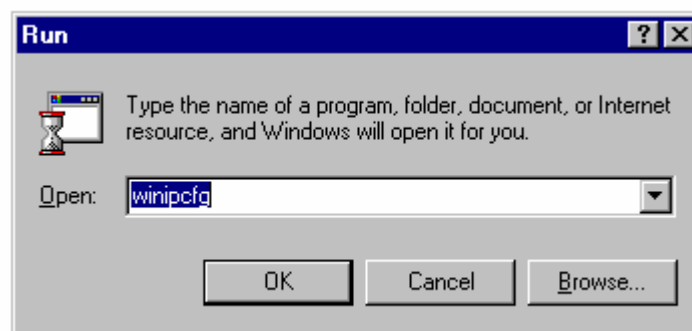
Note: All users complete Step 1

Step 1 Connect into the Internet

Establish and verify connectivity to the Internet. This ensures the computer has an IP address.
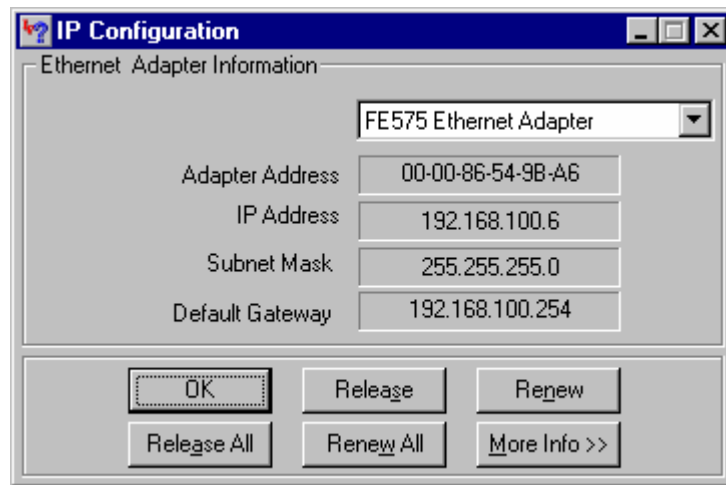
Note: Windows 95/98/Me users complete Steps 2 through 6.

Step 2 Gather basic TCP/IP configuration information

Using the taskbar, choose **Start** then **Run**. The following box will appear. Type `winipcfg` and press the **Enter** key. `Winipcfg` spelling is critical while case is not. It is short for Windows IP Configuration.

This first screen shows the Adapter Address, or MAC address of the computer. The first screen also shows IP Address, Subnet Mask, and the Default Gateway. The following graphic shows the basic IP Configuration screen. Select the correct adapter if more than one is listed.

The IP address and the default gateway should be in the same network or subnet. Otherwise, this host would not be able to communicate outside the network. In the previous figure the subnet mask tells us that the first three octets must be the same to be in the same network. IP addressing will be discussed in Module 9.

Note: If this computer is on a LAN, the default gateway might not be seen if it is running behind a Proxy Server. Record the following information for this computer:

IP address: 192.168.100.6

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.100.254

Step 3 Compare the TCP/IP configuration

If this computer is on a LAN, compare the information on several machines.

Are there any similarities? Answers will vary.

What is similar about the IP addresses? Answers will vary. If the machines are on the same network segment, it may just be that the first 1, 2 or 3 octets are the same depending on the address class.

What is similar about the default gateways? They should match if the computers are all on the same segment.

What is similar about the MAC addresses? If computers were all bought at the same time and from the same vendor, there is a good chance that some of the MAC addresses may possess similar characters but at least one character must be different.
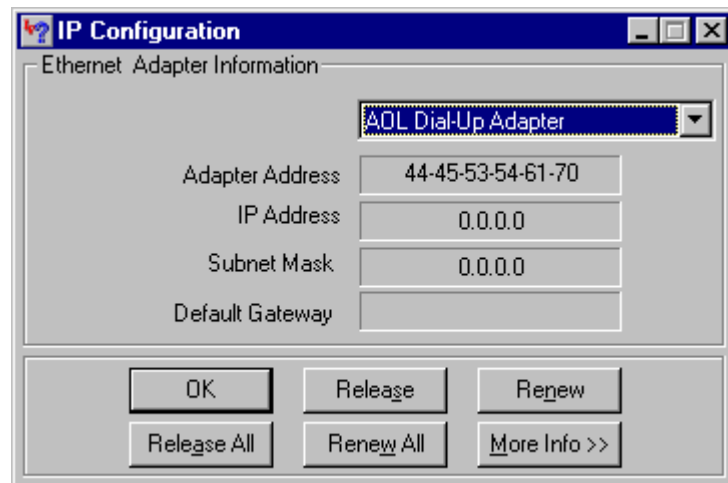
The IP addresses should share the same network portion. All machines in the LAN should share the same default gateway. While not a requirement, most LAN administrators try to standardize components like NICs. Therefore, all machines may share the first three Hex pairs in the adapter address. These three pairs identify the manufacturer of the adapter.

Record a couple of the IP Addresses

Answers will vary. Examples: 192.168.100.6, 192.168.100.7

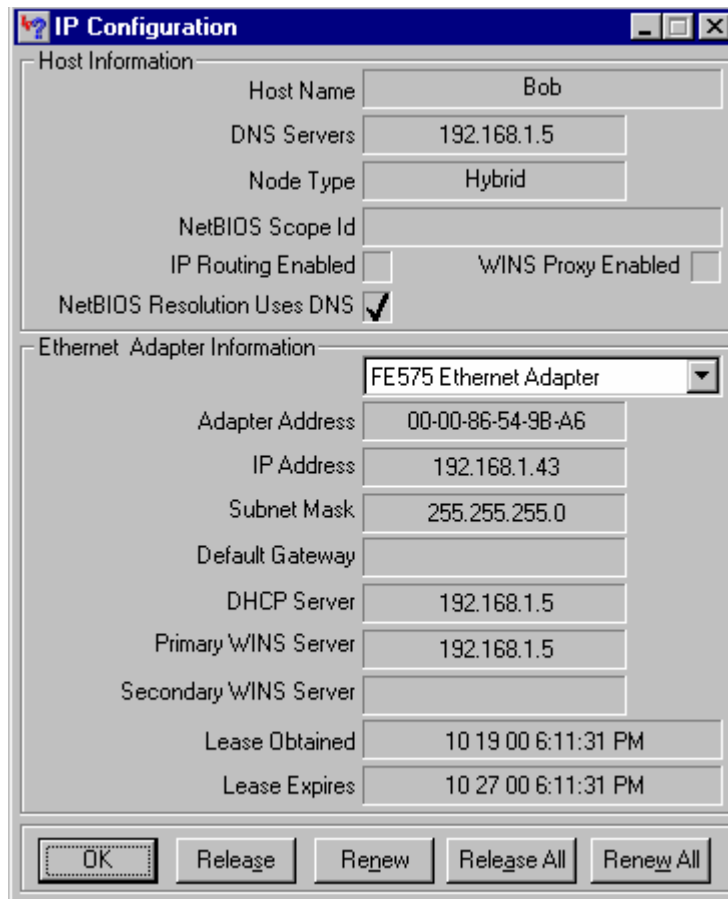## Step 4 Verify selection of network adapter

The adapter model of this computer should be displayed in the box at the top of the screen. Use the drop-down arrow in that box to see if there are any other configurations for this adapter, such as PPP. This could be true for a modem if this computer connects to the Internet with a dial-up account. On a server, it is possible to find another NIC or a machine with both a NIC and a modem. The following figure shows an AOL modem IP configuration screen. Notice that there is no IP address in the figure. This is what a home system could look like if the user did not log on to the Internet connection.

Be sure to return to the adapter that displays the NIC or modem data with an IP address

Step 5 Check additional TCP/IP configuration information

Click on the **More Info >>** button. The next figure shows the detailed IP Configuration screen.

The **More Info** button displays the Host Name, which includes the computer name and NetBIOS name. It also displays the DHCP server address, if used, and the date the IP lease starts and ends. Look over the remaining information. Entries for DNS and WINS servers may also be displayed. These entries are used in name resolution.

Write down the IP addresses of any servers listed:

DNS Server 192.168.1.5

DHCP Server 192.168.1.5

Primary WINS Server 192.168.1.5

Note that one server is performing all three functions in this case.

Write down the computer Host Name: Bob

Write down the Host Names of a couple of other computers: Answers will vary.

Do all of the servers and workstations share the same network portion of the IP address as the student workstation? Answers will vary. It would not be unusual for some or all of the servers and workstations to be in another network. It means that the default gateway of this computer is going to forward requests to the other network.

> **Note:** It would not be unusual for some or all of the servers and workstations to be in another network. It means that the default gateway of this computer is going to forward requests to the other network.

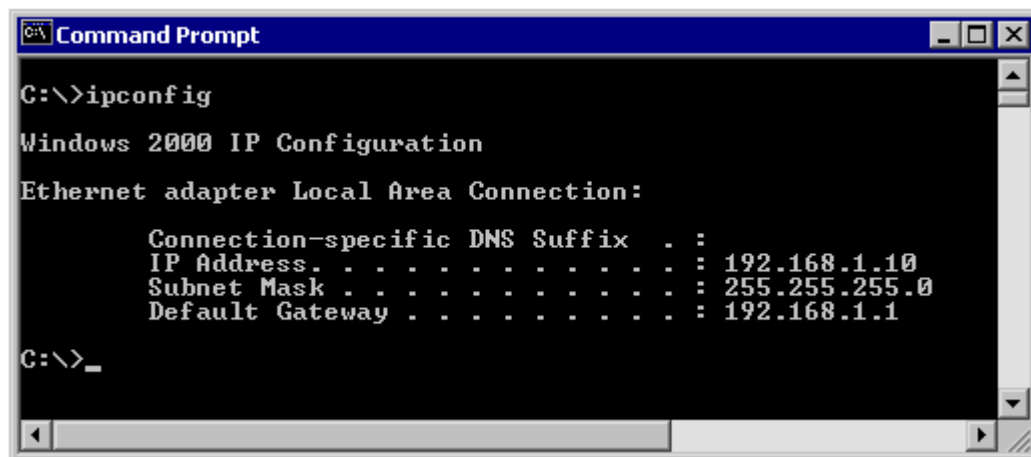## Step 6 Close the screen when finished examining network settings

Repeat the previous steps as necessary to make sure that there are no problems in returning to, and interpreting, this screen.

> **Note:** Windows NT/2000/XP users complete Steps 7 through 11.

Step 7 Gather TCP/IP configuration information

Use the Start menu to open the Command Prompt, an MS-DOS-like window. Press **Start** > **Programs** > **Accessories** > **Command Prompt** or **Start** > **Programs** > **Command Prompt**.

The following figure shows the Command screen. Type `ipconfig` and press the **Enter** key. The spelling of `ipconfig` is critical while case is not. It is short for IP Configuration.

This first screen shows the IP address, subnet mask, and default gateway. The IP address and the default gateway should be in the same network or subnet, otherwise this host would not be able to communicate outside the network. In the figure the subnet mask tells us that the first three octets must be the same to be in the same network.

> **Note:** If this computer is on a LAN, the default gateway might not be seen if it is running behind a Proxy Server.

Step 8 Record the following TCP/IP information for this computer

IP address: <u>192.168.1.10</u>

Subnet Mask: <u>255.255.255.0</u>

Default Gateway: <u>192.168.1.1</u>

Step 9 Compare the TCP/IP configuration of this computer to others on the LAN

If this computer is on a LAN, compare the information of several machines.

Are there any similarities? <u>Answers will vary.</u>

What is similar about the IP addresses? <u>Answers will vary. If the machines are on the same network segment, it may just be that the first one, two or three octets are the same depending on the address class.</u>

What is similar about the default gateways? <u>They should match in most cases.</u>

The IP addresses should share the same network portion. All machines in the LAN should share the same default gateway.

Record a couple of the IP Addresses:

<u>Answers will vary. Examples: 192.168.100.11, 192.168.100.12</u>

Step 10 Check additional TCP/IP configuration information

To see detailed information, type **`ipconfig /all`** and press **Enter**. The figure shows the detailed IP configuration screen.

```
Command Prompt                                                    _ □ ×
C:\>ipconfig /all

Windows 2000 IP Configuration

        Host Name . . . . . . . . . . . . : thunder
        Primary DNS Suffix  . . . . . . . :
        Node Type . . . . . . . . . . . . : Hybrid
        IP Routing Enabled. . . . . . . . : No
        WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        Description . . . . . . . . . . . : LNE100TX Fast Ethernet Adapter Version 1.0
        Physical Address. . . . . . . . . : 00-A0-CC-23-FE-40
        DHCP Enabled. . . . . . . . . . . : Yes
        Autoconfiguration Enabled . . . . : Yes
        IP Address. . . . . . . . . . . . : 192.168.1.10
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.1.1
        DHCP Server . . . . . . . . . . . : 192.168.1.1
        DNS Servers . . . . . . . . . . . : 24.0.224.33
                                            24.0.224.34
        Lease Obtained. . . . . . . . . . : Tuesday, January 09, 2001 10:56:19 AM
        Lease Expires . . . . . . . . . . : Monday, January 15, 2001 10:56:19 AM
C:\>
```

The host name, including the computer name and NetBIOS name should be displayed. Also, the DHCP server address, if used, and the date the IP lease starts and ends should be displayed. Look over the information. Entries for the DNS, used in name resolution servers, may also be present.

The previous figure reveals that the router is performing DHCP service for this network. This would likely be a small office or home office (SOHO) or small branch office implementation.

Notice the Physical Address (MAC) and the NIC model (Description).

In the LAN, what similarities about the Physical (MAC) Addresses are seen?

While not a requirement, most LAN administrators try to standardize components like NICs. Therefore, it would not be surprising to find all machines share the first three Hex pairs in the adapter address. These three pairs identify the manufacturer of the adapter.

While not a requirement, most LAN administrators try to standardize components like NICs. Therefore, it would not be surprising to find all machines share the first three Hex pairs in the adapter address. These three pairs identify the manufacturer of the adapter.

Write down the IP addresses of any servers listed:

DHCP Server 192.168.1.1, DNS Servers – 24.0.224.33 and 24.0.224.34

Write down the computer Host Name: thunder

Write down the Host Names of a couple other computers: Answers will vary.

Do all of the servers and workstations share the same network portion of the IP address as the student workstation? Answers will vary, although probably not. The workstation is probably on a different segment than the servers.

It would not be unusual for some or all of the servers and workstations to be in another network. It means that the computer default gateway is going to forward requests to the other network.

Step 11 Close the screen

Close the screen when finished examining network settings.

Repeat the previous steps as necessary. Make sure that it is possible to return to and interpret this screen.

This concludes the lab.

Reflection

Based on observations, what can be deduced about the following results taken from three computers connected to one switch?

Computer 1
IP Address: 192.168.12.113
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.12.1

Computer 2
IP Address: 192.168.12.205
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.12.1

Computer 3
IP Address: 192.168.112.97
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.12.1

Should they be able to talk to each other? Are they all on the same network? Why or why not? If something is wrong, what is most likely the problem?

If everything else is working, Computer 3 will NOT have IP connectivity to the other two machines, even if they are on the same switch. They must have IP addresses on the same network. (However, if the IP addresses were all on the 192.168.12.x net and the gateway on the 192.168.112.x net, all three machines could 'see' each other using IP. Computer 1, 2, and 3 just would not be able to get to any other network.)