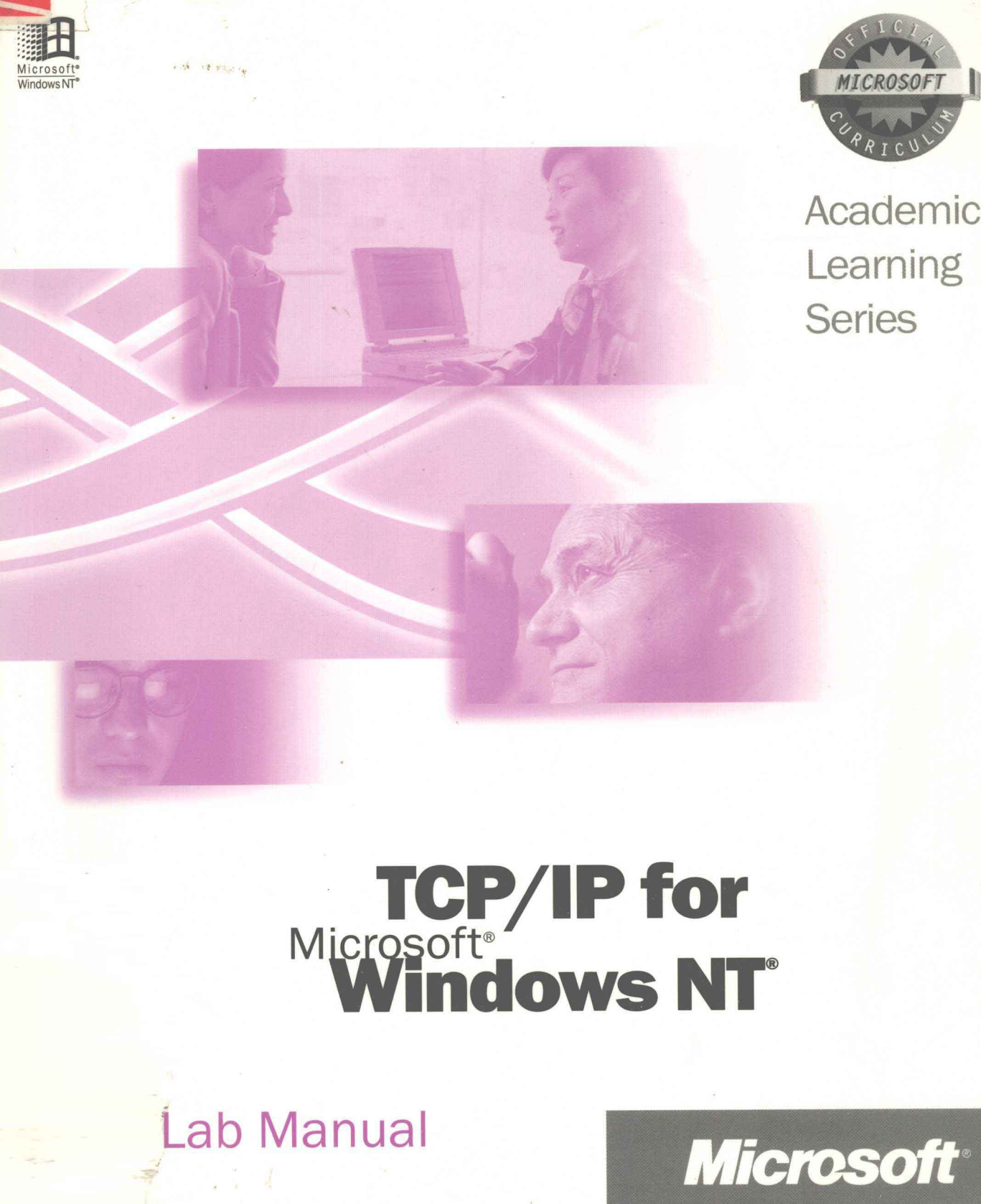


Academic  
Learning  
Series



# **TCP/IP for** Microsoft® **Windows NT®**

Lab Manual

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Lab Manual

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# Introduction to Laboratory Exercises

Included with the Academic Learning Series (ALS) texts are hands-on lab exercises designed to give you practical experience using Microsoft Windows NT 4.0. This hands-on experience is an essential part of your training because it is difficult to truly understand and use the operating system and its features without having had the opportunity to explore firsthand the menus, options, and responses. The tasks included in these exercises provide an opportunity for you to test the concepts presented in the text and to use the utilities and tools of TCP/IP for Microsoft Windows NT.

The lab exercises are best used in a classroom setting, though some exercises can be completed individually. The exercises presume a classroom network setup in one or more Windows NT domains with shared resources (depending upon the specific ALS text being used).

The directory of subdirectories, programs, and data files designed to support these labs can be shared from the instructor's system or installed on each student's system. A lab setup guide is provided for the instructor to use in setting up the classroom to support the labs.

The lab exercises do not precisely mirror the text's practice activities. Domain names, user names, IP addresses, shared resources, and other specific references in the lab exercises may be somewhat different from similar references in the ALS text or from those used in setting up the classroom network.

Local constraints must be followed to ensure proper network operations. Since it is not possible to predict each institution's local networking requirements, your instructor will explain differences that occur.

The old saying "The way to get to Carnegie Hall is to practice, practice, practice" is equally true of the pursuit of personal competency and Microsoft Certification. The tests required for Microsoft Certified Product Specialist, Systems Engineer, or other Microsoft certifications are demanding. One of the best ways to become confident in the use of TCP/IP for Microsoft Windows NT is to complete each of the assigned lab exercises as well as the practice tasks included in the text.

# Lab 1: Installing, Configuring, and Testing TCP/IP

## Objectives

After completing this lab, you will be able to:

- Install TCP/IP.
- Manually configure TCP/IP parameters.
- Use the IPCONFIG utility to view configured IP parameters.
- Use the PING utility to test TCP/IP communications.
- Install Network Monitor.

## Before You Begin

To complete this lab, you need a computer with Microsoft Windows NT Workstation or Microsoft Windows NT Server installed.

You will also need the following information. Refer to the next page for the configuration of the classroom.

When this information is required	Use
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Subnet ID	
-----------	--

Host ID	
---------	--

Gateway	
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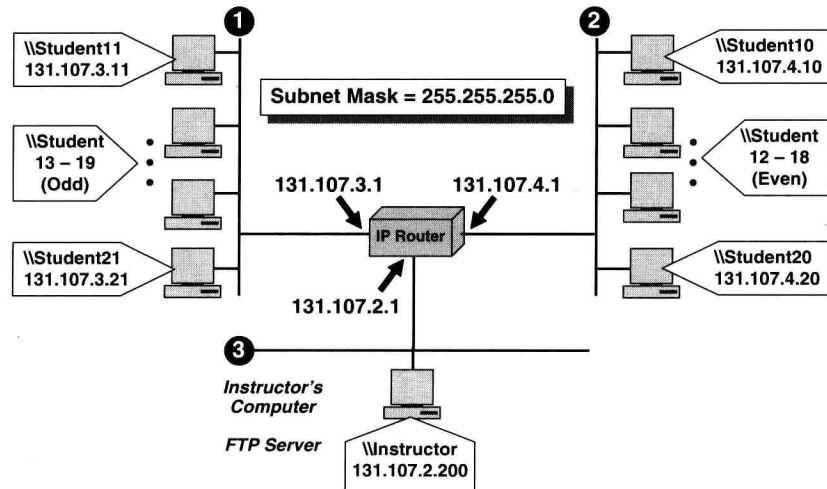
**Estimated time to complete this lab: 15 minutes**

## Classroom Configuration

The classroom configuration is set up as three physical segments, or subnets, connected by an IP router. The following illustration shows the classroom configuration.

Students are divided between two subnets. Students on subnet 1 (131.107.3.0) are assigned a unique student number that ends with an odd number. Students on subnet 2 (131.107.4.0) are assigned a unique student number that ends with an even number.

The instructor's server is on network 3 (131.107.2.0). This configuration was designed so that the instructions for accessing the instructor server are the same for each student network.



## Exercise 1

### Installing and Configuring TCP/IP

In this exercise, you will install and configure Microsoft TCP/IP. First you will remove the NWLink IPX/SPX transport from your workstation configuration.

➤ **To install TCP/IP**

1. Log on as Administrator with no password.
2. On the **Start** menu, point to **Settings** and then click **Control Panel**.

The **Control Panel** appears.

3. Double-click **Network**.

The **Network** dialog box appears.

4. Document the network services and protocols installed on your workstation. You will reference them later in the exercise.

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5. On the **Protocols** tab, select **NWLink IPX/SPX Compatible Transport Protocol**, and then click **Remove**.

A warning box confirms the operation.

6. Click **Yes**.

The **NWLink IPX/SPX Compatible Transport** no longer appears.

7. Click **Add**.

The **Select Network Protocol** dialog box appears.

8. In the **Select Network Protocol** box, select **TCP/IP Protocol** and then click **OK**.

The **TCP/IP Setup** dialog box appears, prompting you to install DHCP.

9. Click **No**.

The **Windows NT Setup** box appears, prompting for the full path of the Windows NT distribution files.

10. Type **C:\I386** and then click **Continue**.

The appropriate files are copied to your workstation.

➤ **To configure TCP/IP**

1. In the **Network** dialog box, click **Close**.

Windows NT will display binding information and then the **Microsoft TCP/IP Properties** dialog box appears.

2. Type the following configuration information (refer to the “Before You Begin” section of this lab for your subnet ID and host ID):

<b>In this box</b>	<b>Type</b>
IP Address	<b>131.107.subnet_id.host_id</b>
Subnet Mask	<b>255.255.255.0</b>
Default Gateway	<b>131.107.subnet_id.1</b>

3. Click **OK**.

A **Network Settings Change** dialog box appears indicating the computer needs to be restarted to initialize the new configuration.

4. Click **No**.

---

**Important** Do not shut down your computer. If you shut down and restart your computer, the following exercise will not work.

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## Exercise 2

### Testing the TCP/IP Configuration

In this exercise, you will use the IPCONFIG utility to view an IP configuration and the PING utility to test your workstation configuration and connections to other TCP/IP hosts. You will see PING fail and succeed.

➤ **To test the configuration without initializing TCP/IP**

In this procedure, use the IPCONFIG utility to view the TCP/IP configuration when TCP/IP has not been initialized.

1. At a command prompt, type **ipconfig** and then press ENTER.

Notice that the response is an empty table.

2. Ping the loopback address. Type:

**ping 127.0.0.1**

and then press ENTER.

3. Document the error message.

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4. Shut down and restart your computer.

➤ **To test the configuration with TCP/IP initialized**

1. Log on to the computer as Administrator, and open a command prompt.

2. Use the IPCONFIG utility to view the TCP/IP configuration.

3. Document the information that is supplied by the IPCONFIG utility.

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4. Ping the loopback IP address to verify that the bindings for TCP/IP are correct. Type:

**ping 127.0.0.1**

and then press ENTER.

5. Could you ping successfully?

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6. Ping the IP address of your workstation to verify that it was configured correctly. Type the following command, where *y* and *z* are your assigned subnet and host IDs:

**ping 131.107.y.z**  
and then press ENTER.

7. Could you ping successfully?

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8. Ping the IP address of your default gateway to verify the configuration and connection. Type the following command, where *y* is your assigned subnet ID number:

**ping 131.107.y.1**  
and press ENTER.

9. Could you ping successfully?

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10. Try to ping the IP address of another student. Type the following command, where *y* and *z* are the subnet and host IDs assigned to the other student:

**ping 131.107.y.z**  
and press ENTER.

11. Ping an IP address that is not in use to see the error message. Type:

**ping 131.107.200.200**  
and press ENTER.

12. Document the error message.

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## Exercise 3

### Installing Network Monitor

➤ **To install the Network Monitor**

1. Start **Control Panel**, double-click **Network**, and then click the **Services** tab.
2. Click **Add**.

The **Select Network Service** dialog box appears.

3. In the **Network Service** list, click **Network Monitor Tools and Agent**, and then click **OK**.

**Windows NT Setup** displays a dialog box asking for the full path to the Windows NT distribution files.

4. Type the path **C:\I386** and then click **Continue**.

All necessary files, including the sample files, are copied to your hard disk.

5. In the **Network** dialog box, click **Close**.
6. When prompted, click **Yes** to restart your computer.
7. Log on as Administrator.

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**Note** You will use Network Monitor to view packets in Lab 3.

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# Lab 2: Viewing and Modifying the ARP Cache

## Objectives

After completing this lab, you will be able to:

- View the ARP cache.
- Modify an entry in the ARP cache.
- Modify the default gateway address.
- Test communication problems with incorrect parameters.

**Estimated time to complete this lab: 15 minutes**

## Exercise 1

### Viewing the ARP Cache

In this exercise, you will use the ARP utility to view entries in your computer's ARP cache.

➤ **To view the ARP cache**

1. At a command prompt, type **arp -g** and then press ENTER to view the ARP cache.
2. Document any entries.

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➤ **To ping a local host**

1. Ping the IP address of a student on your local network.  
This will add an entry to the cache.
2. View the new entry in the ARP cache.
3. What entry was added?

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4. What is the entry's type?

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➤ **To ping a remote host**

1. Ping the IP address of a host on a remote network (the instructor's server, 131.107.2.200).
2. View the entries in the ARP cache.
3. What entry was added to the ARP cache?

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4. Why was this entry added?

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## Exercise 2

### Modifying the ARP Cache

In this exercise, you will use the ARP utility to modify entries in your computer's ARP cache.

➤ **To add an ARP entry**

1. View the ARP cache, and document the entry for your default gateway—for example: 131.107.x.1 08-00-02-6c-28-93.

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2. Type the following **arp** command to add the entry from step 1 to the cache. Type: **arp -s 131.107.subnet\_id.1 hardware\_address**

**Note** Make sure that you type the physical address using hyphens between as listed in step 1.

3. View the ARP cache to verify that the entry has been added.
4. What is the entry's type?

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5. Why was this entry's type different from previous entries?

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6. To verify that the ARP cache entry for the default gateway is correct, ping a remote host.

## Exercise 3

### Identifying IP Address Resolution Problems

In this exercise, you will add an invalid hardware address for the default gateway to the ARP cache, and then configure the default gateway with an invalid IP address to see what happens when ARP cannot resolve an IP address to a hardware address.

➤ **To add an incorrect ARP entry**

In this procedure, you will add an entry into the ARP cache with an invalid hardware address, and then document the problem it causes in remote communications.

1. Use the **arp** command to change the hardware address of the default gateway. Type:  
**arp -s 131.107.subnet\_id.1 08-00-02-12-34-56**
2. Try to communicate with a remote host (the instructor's computer, **131.107.2.200**).
3. Were you successful? If not, document the error below.

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➤ **To remove the incorrect ARP entry**

1. Use the **arp** command to delete the incorrect entry from cache. Type:  
**arp -d 131.107.subnet\_id.1**
2. Try to communicate with a remote host (the instructor computer, **131.107.2.200**).
3. Were you successful? If not, document the error message below.

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➤ **To configure the default gateway address incorrectly**

1. In the **Network** dialog box, click the **Protocols** tab.
2. Click **Properties**.  
The **Microsoft TCP/IP Properties** dialog box appears.
3. In the **Default Gateway** box, change the last octet to **199**.
4. Click **OK**.  
The **Network** dialog box appears.
5. Click **OK**.



➤ **To test the incorrect default gateway address**

1. Ping the IP address of your default gateway (**131.107.subnet\_id.1**, not the incorrect address configured in the previous step).
2. Could you ping successfully? Why or why not?

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3. Ping a host on a remote network.
4. Could you ping successfully? Why or why not?

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5. Why could you ping the default gateway, but not a remote host?

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➤ **To correct and test the correct default gateway address**

1. Restore the IP address of the default gateway to its original value.
2. To verify that the configuration of the default gateway is correct, ping the instructor's computer.