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# Module 3: Configuring a Client IP Address

## Contents

Overview	1
Lesson: Configuring a Client to Use a Static IP Address	2
Lesson: Configuring a Client to Obtain an IP Address Automatically	10
Lesson: Using Alternate Configuration	20
Lab: Configuring Hosts to Connect to a Network Running the TCP/IP Protocol Suite	26
Course Evaluation	35



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# Instructor Notes

**Presentation:**  
50 minutes

**Lab:**  
10 minutes

This module provides students with the information that they need to configure an Internet Protocol (IP) address for a client computer running Microsoft® Windows. An IP address is required for each computer and device on a network that is running the Transmission Control Protocol/Internet Protocol (TCP/IP) suite. The IP address identifies a computer's location on the network. When systems administrators assign an IP address to a client, they ensure that the client can be accurately identified on the network when it sends and receives data.

After completing this module, students will be able to:

- Configure a client to use a static IP address.
- Configure a client to use a dynamic IP address.
- Configure a client with an alternate IP configuration.

## Required materials

To teach this module, you need the Microsoft Office PowerPoint® file 2276C\_03.ppt.

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**Important** It is recommended that you use PowerPoint 2002 or later to display the slides for this course. If you use PowerPoint Viewer or an earlier version of PowerPoint, some features of the slides might not be displayed correctly.

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## Preparation tasks

To prepare for this module:

- Read all the materials for this module.
- Complete the practices.
- Review the referenced RFCs.

## How to Teach This Module

This section contains information that will help you to teach this module.

### Lesson: Configuring a Client to Use a Static IP Address

This section describes the instructional methods for teaching this lesson.

#### Static and Dynamic IP Addresses

To illustrate the need for a static IP address, explain to students that computers providing services need static IP addresses so that clients know where to find them. Clients are typically configured with dynamic IP addresses.

#### Static TCP/IP Configuration

Most students should already be familiar with configuring static IP addresses. Be sure to note how important it is to configure the preferred Domain Name System (DNS) server properly.

#### How to Use Ipconfig for Viewing the TCP/IP Configuration

Show students how to use the **Ipconfig** command. Delay showing them the **/release** and **/renew** switches, because that will introduce many terms and concepts not yet covered. However, the **/all** switch can be demonstrated, including a discussion of how to determine that an address is dynamic. Also show the students how to view the status of a network connection.

#### Practice: Configuring a Client to Use a Static IP Address

This practice will be easy for most students and should take only a few minutes. The next practice is dependent on this one being completed.

### Lesson: Configuring a Client to Obtain an IP Address Automatically

This section describes the instructional methods for teaching this lesson.

#### What Is DHCP?

Use this topic as an overview of the Dynamic Host Configuration Protocol (DHCP). The most import point is for students to understand the benefits of DHCP. Demonstrate how to configure a client for DHCP.

#### Multimedia: The Role of DHCP in the Network Infrastructure

This presentation describes how DHCP responds to requests for IP addresses. Emphasize that students do not need a comprehensive understanding of how DHCP works. Discuss the presentation with students and make sure that they understand the reasons for configuring the router to connect to the DHCP server.

#### DHCP Address Renewal

The key difference between the DHCP renewal process and the initial lease process is that DHCP renewals are unicast packets, not broadcasts. Ensure that students understand the implications of long lease times when network changes are made.

#### DHCP Server Configuration

This topic is intended to be an overview of DHCP server configuration. Try not to get into an in-depth discussion about DHCP server configuration. Consider quickly demonstrating how DHCP servers are authorized, how a scope is created, and how to create a reservation.

#### Practice: Configuring a Client to Obtain an IP Address Automatically

Most students will already be familiar with the processes in this practice, and therefore, the practice should take only a few minutes. The next practice is dependent on the completion of this practice.

## Lesson: Using Alternate Configuration

This section describes the instructional methods for teaching this lesson.

### What Is Alternate Configuration?

Make sure that students understand that Alternate Configuration is used when a client is configured to obtain an IP address automatically by using DHCP, but a DHCP server cannot be located. Emphasize that two options for Alternate Configuration are available: Automatic Private IP Addressing (APIPA) and user configuration.

### What Is Automatic Private IP Addressing?

Emphasize that APIPA is appropriate only for networks that do not require a default gateway. In most cases, APIPA is not appropriate, even for small networks, because Internet connectivity is required.

### Practice: Using Alternate Configuration

Many students have not used alternate configurations and will be interested in testing these. The practice should take only about five minutes.

## Lab: Configuring Hosts to Connect to a Network Running the TCP/IP Protocol Suite

Remind the students that they can review the module for assistance in completing the lab. Tell students that a detailed answer key for each lab is provided in the Labdocs folder on the Student Materials compact disc.



# Overview

- Configuring a Client to Use a Static IP Address
- Configuring a Client to Obtain an IP Address Automatically
- Using Alternate Configuration

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## Introduction

This module describes how to configure an Internet Protocol (IP) address for a client computer running Microsoft® Windows®. An IP address is required for each computer and device on a network that is running the Transmission Control Protocol/Internet Protocol (TCP/IP) suite. The IP address identifies a computer's location on the network. When you assign an IP address to a client, you ensure that the client can be accurately identified on the network when it sends and receives data.

**Note** In this module, the term *client* refers to a computer running a Windows operating system on a network running TCP/IP. The term *host* includes clients and refers to any device on the network that has an IP address.

## Objectives

After completing this module, you will be able to:

- Configure a client to use a static IP address.
- Configure a client to use a dynamic IP address.
- Configure a client with an alternate IP configuration.

## Lesson: Configuring a Client to Use a Static IP Address

- Static and Dynamic IP Addresses
- Static TCP/IP Configuration
- How to Use Ipconfig for Viewing the TCP/IP Configuration
- Practice: Configuring a Client to Use a Static IP Address

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### Introduction

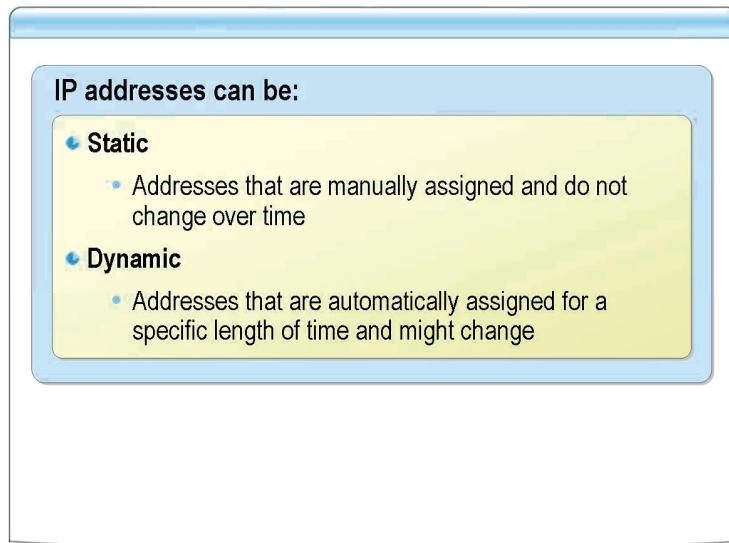
Assigning an IP address is a fundamental procedure for you to establish client network connectivity. By default, clients running Microsoft Windows are configured to obtain an IP address automatically by using DHCP. However, there will be instances in which it is necessary for you to assign manually and confirm the assignment of an IP address. An IP address that is manually assigned is called a *static address*.

### Lesson objectives

After completing this lesson, you will be able to:

- Describe static and dynamic IP addressing.
- View the static TCP/IP configuration.
- View the configuration of TCP/IP by using the Ipconfig command-line utility.
- Configure a client to use a static IP address.

## Static and Dynamic IP Addresses



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### Introduction

You can assign either static or dynamic IP addresses for client computers, depending on your network configuration and on the computer's function. In most cases, clients have dynamic IP addresses.

### What is a static IP address?

A static IP address is an address that always remains the same and must be manually configured. When you assign static IP addresses, you must manually configure the address for each computer on your network.

### When to use a static IP address

You use a static IP address when:

- A client is using an application that requires an IP address that does not change.
- You do not have a Dynamic Host Configuration Protocol (DHCP) server on your network.
- You are isolating network connectivity issues for a client computer and want to determine whether a DHCP server is incorrectly configured.

### Managing static IP addresses

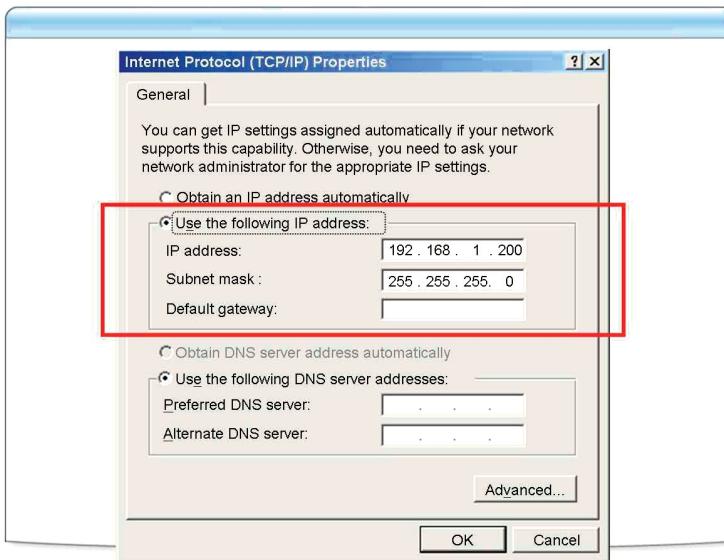
Every host on your TCP/IP network must be configured with a unique IP address. If the same IP address is assigned to a second host, one of the hosts will lose network connectivity.

On a small network, configuring the individual TCP/IP hosts and keeping track of their IP addresses is relatively straightforward. However, on a large network, managing IP addresses can be challenging, and in this case, you can use DHCP to simplify the task by assigning dynamic IP addresses.

### What is a dynamic IP address?

A *dynamic address* is an address that is automatically assigned for a specific length of time and can change. You use DHCP to assign dynamic addresses. When you assign IP addresses automatically, you can configure the addresses for an entire network from a single location and then dynamically assign them to each computer.

## Static TCP/IP Configuration



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### Introduction

In some situations, you might need to view the IP address information for a specific client. For example, a client on your network might not be able to communicate with other computers on the network. In this situation, you must know the IP addresses of the other computers to identify the problem.

### How to view a static IP address

You can use the **Internet Protocol (TCP/IP) Properties** dialog box to view static TCP/IP information.

By using the **Internet Protocol (TCP/IP) Properties** dialog box, you can determine whether the IP address configuration has been performed dynamically or statically. If the IP address is static, you can then view the IP address, subnet mask, and default gateway in this dialog box. However, if the IP address has been configured dynamically by using DHCP or Automatic Private IP Addressing (APIPA), you cannot determine the values of the TCP/IP configuration options by using this dialog box.

### Preferred DNS server

Incorrect configuration of the preferred DNS server in static configurations is the most common cause of network logon problems. In a domain-based environment, the preferred DNS server should be an internal DNS server with domain information, not an Internet DNS server.

**Advanced TCP/IP settings**

The Advanced TCP/IP Settings dialog box allows you to configure additional TCP/IP settings not available in the **Internet Protocol (TCP/IP) Properties** dialog box. Some of the settings that you can configure are:

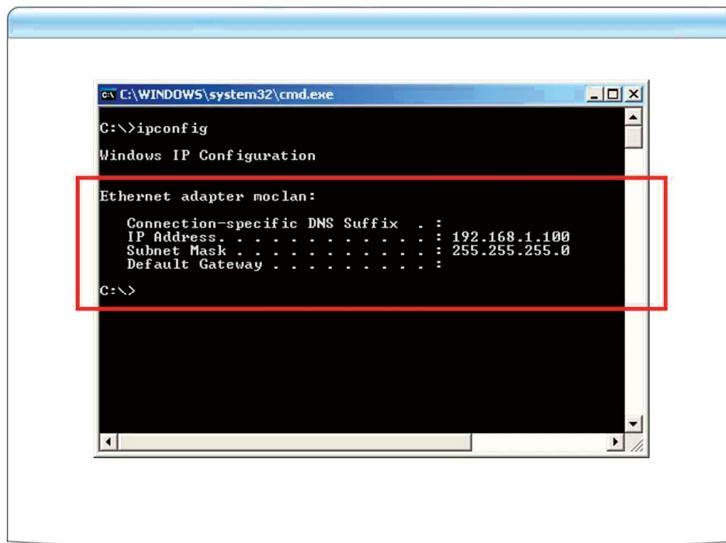
- *Additional IP Addresses.* A client can be configured with multiple IP addresses.
- *Additional Default Gateways.* Additional default gateways can be configured for fault tolerance.
- *Additional DNS Servers.* Additional DNS servers can be configured for enhanced fault tolerance.
- *DNS Suffix search.* You can configure which DNS suffixes are used when searching for host names.
- *DNS Suffix registration.* You can configure which DNS suffixes are used when registering this host by using dynamic DNS.
- *WINS configuration.* You can configure multiple Windows Internet Naming Service (WINS) servers for fault tolerance and enable or disable network basic input/output system (NetBIOS).
- *TCP/IP filtering.* TCP/IP filtering can be enabled as an alternative to Windows Firewall.

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**Note** Additional information about DNS and WINS configuration can be found in Module 4, “Configuring a Client for Name Resolution.”

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## How to Use Ipconfig for Viewing the TCP/IP Configuration



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### Introduction

When you want to obtain information about static or dynamic IP addresses, you can use Ipconfig. You can also use Ipconfig to view information about static IP addresses not provided when you use the Internet Protocol (TCP/IP) Properties dialog box.

### What is Ipconfig?

Ipconfig is a command-line utility that you can use to view, but not set, the TCP/IP configuration options on a client, including the IP address, subnet mask, and default gateway. Ipconfig provides additional information that is not available in the **Internet Protocol (TCP/IP) Properties** dialog box, such as the media state (connected or disconnected).

### Ipconfig syntax

The basic command syntax for this utility is **ipconfig**. To start the Ipconfig utility, at a command prompt, type **ipconfig**. The values of the three primary configuration parameters are displayed. The following table contains options that can be used with Ipconfig.

Option	Description
<b>/?</b>	Displays the help message.
<b>/all</b>	Displays all of the current TCP/IP configuration values, including the IP address, subnet mask, default gateway, and WINS and DNS configurations.
<b>/release</b>	Releases the dynamic IP address of the specified adapter.
<b>/renew</b>	Renews the dynamic IP address of the specified adapter.
<b>/flushdns</b>	Purges the DNS resolver cache.
<b>/registerdns</b>	Refreshes all DHCP leases and reregisters DNS names.
<b>/displaydns</b>	Displays the contents of the DNS resolver cache.
<b>/showclassid</b>	Displays all the DHCP ClassIDs allowed for the specified adapter.
<b>/setclassid</b>	Modifies the DHCP ClassID.

**Ipconfig DNS options**

A DNS host record is used to resolve a DNS name to an IP address. DNS host records are used extensively by the Active Directory® directory service and management tools. If the IP address of a host changes, some functionality might be lost. You can force the host record to be updated on the DNS server by using the **ipconfig** command with the **/registerdns** option.

After a client has resolved a DNS name to an IP address, the result is stored in the DNS resolver cache. If the IP address of a remote computer changes and the host record is updated, the client will still resolve the name of the remote computer to the original IP address because it is stored in the DNS resolver cache. You can clear the contents of the DNS resolver cache by using **ipconfig** with the **/flushdns** option.

**Connection status**

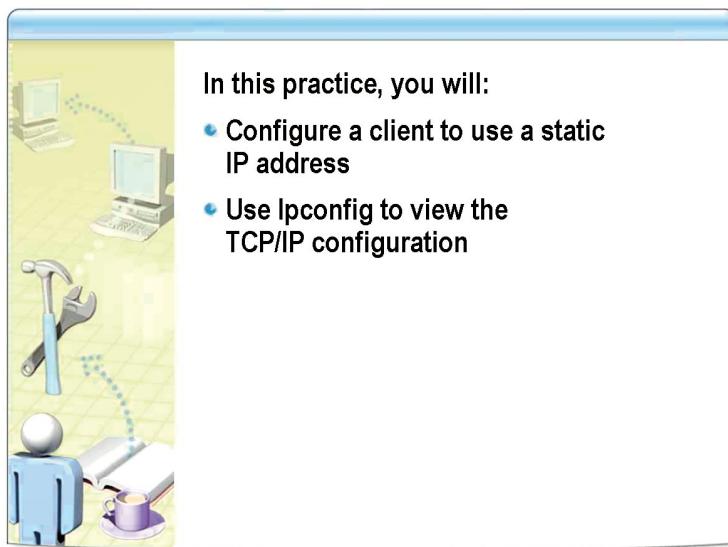
The **Support** tab in the **Local Area Connection Status** dialog box also allows you to view static or dynamic TCP/IP configuration information. The information displayed on this tab is similar to running **ipconfig** without options. Clicking the **Details** button displays information similar to what you would receive by running **ipconfig /all**.

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**Note** More information about DNS name resolution can be found in Module 4, “Configuring a Client for Name Resolution.”

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## Practice: Configuring a Client to Use a Static IP Address



In this practice, you will:

- Configure a client to use a static IP address
- Use Ipconfig to view the TCP/IP configuration

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### Objectives

In this practice, you will:

- Configure a client to use a static IP address.
- Use Ipconfig to view the TCP/IP configuration.

### Instructions

Ensure that the DEN-DC1 and DEN-CL1 virtual machines are running.

### Practice

#### ► Configure a client to use a static IP address

1. On DEN-CL1, log on to the **CONTOSO** domain as **Paul**, with a password of **Pa\$\$w0rd**.
2. Click **Start**, and then click **Control Panel**.
3. Click **Network Connections**.
4. Double-click **Local Area Connection**.
5. Click **Properties**.
6. Click **Internet Protocol (TCP/IP)**, and then click **Properties**.
7. Click **Use the following IP address**.
8. In the **IP address** box, change the IP address to **10.10.0.21**.
9. In the **Subnet mask** box, verify that the subnet mask is **255.255.0.0**.
10. In the **Preferred DNS server** box, verify that the DNS server address is **10.10.0.2**.
11. To close the **Internet Protocol (TCP/IP) Properties** dialog box, click **OK**.
12. To close the **Local Area Connection Properties** dialog box, click **Close**.
13. Click the **Support** tab. Notice that the **Address Type** setting is manually configured.
14. To close the **Local Area Connection Status** dialog box, click **Close**.
15. Close the Network Connections window.

► **Use Ipconfig to view the TCP/IP configuration**

1. Click **Start**, click **Run**, type **cmd**, and then click **OK**.
2. Type **ipconfig**, and then press ENTER.
3. Verify that the **IP Address** setting is **10.10.0.21**.
4. Verify that the **Subnet Mask** attribute is **255.255.0.0**.
5. Close the command prompt window.

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**Important** Do not shut down the virtual machines.

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# Lesson: Configuring a Client to Obtain an IP Address Automatically

- What Is DHCP?
- Multimedia: The Role of DHCP in the Network Infrastructure
- DHCP Address Renewal
- DHCP Server Configuration
- Practice: Configuring a Client to Obtain an IP Address Automatically

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## Introduction

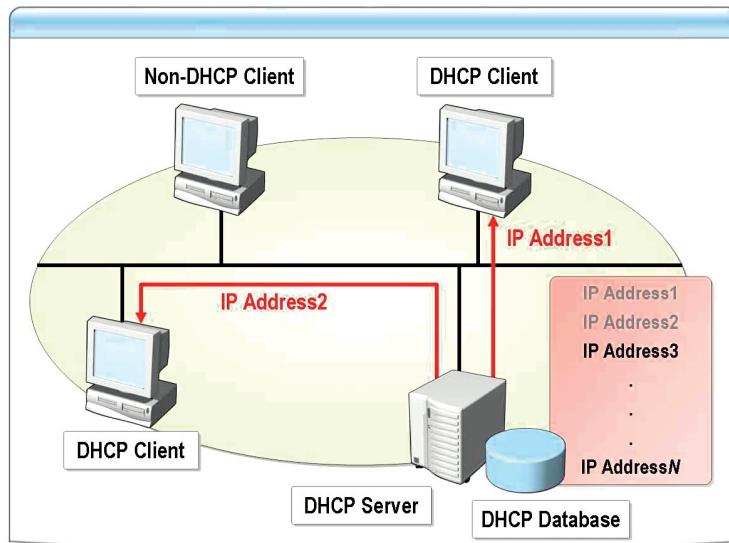
Windows Server 2003 includes DHCP, a TCP/IP standard that you can use to automatically assign dynamic IP addresses and other TCP/IP configuration parameters to client computers on your network. When you use DHCP, you centralize the management of IP addresses and other TCP/IP configuration settings, thereby simplifying your administrative tasks.

## Lesson objectives

After completing this lesson, you will be able to:

- Describe DHCP.
- Describe the role of DHCP in the network.
- Describe renewing an IP address.
- Describe configuring a DHCP server.
- Configure a client to obtain an IP address automatically.

## What Is DHCP?



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### Definition

DHCP is a service and a protocol that work together to automatically assign IP addresses and other configuration settings to the computers on a network. DHCP dynamically assigns IP addresses to clients from a pool of addresses.

### Benefits of using DHCP

When you use DHCP, you:

- Do not have to manually configure each client with an IP address.
- No longer have to maintain a record of each individual IP address that you assign.
- Can automatically assign a new IP address when you move a client from one subnet to another.
- Can release the IP address of a computer that is offline for a specific amount of time, and then reassign the address to another computer.
- Reduce the possibility of address duplication, because DHCP automatically tracks IP address assignments.
- Can rely on the DHCP server to detect unauthorized DHCP servers on the network.

### How DHCP works

When a DHCP server receives a request from a DHCP client, it selects an IP address from a pool of addresses (called a *scope*) defined in its database and offers the address to the DHCP client. If the client accepts the offer, the IP addressing information is leased to the client for a specified period. As the lease interval progresses, the client renews the address assignment each time it logs on to the network. If the lease expires without a renewal, the IP address is returned to the pool for reassignment. Certain addresses in the scope might be excluded from distribution because they are already assigned as static addresses.

The DHCP server provides the client with the following basic information:

- IP address
- Subnet mask

Other information can be distributed by using DHCP as well, such as a default gateway address, DNS server addresses, and WINS server addresses.

#### How to enable DHCP

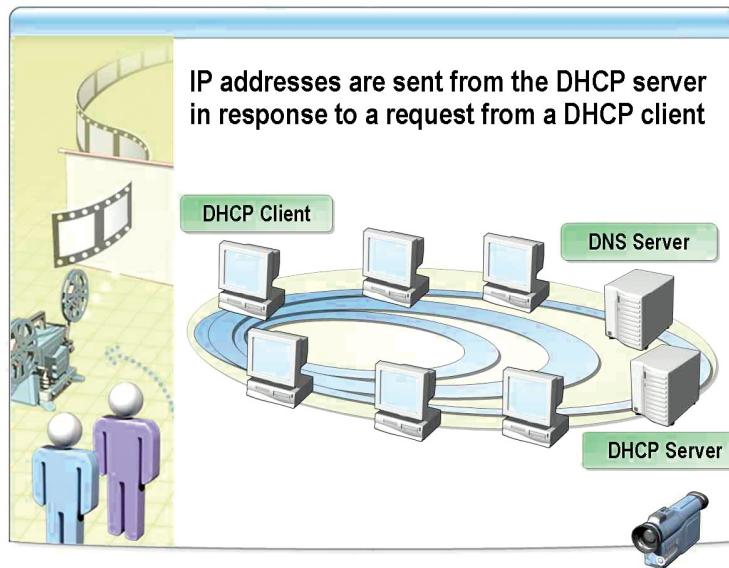
You must enable clients in the network to use DHCP by selecting **Obtain an IP address automatically** in the **Internet Protocol (TCP/IP) Properties** dialog box; this option is selected by default in Windows XP.

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**Note** For more information about DHCP, see RFC 2131 under **Additional Reading** on the Student Materials compact disc and Course 2277, *Implementing, Managing, and Maintaining a Microsoft Windows Server™ 2003 Network Infrastructure: Network Services*.

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## Multimedia: The Role of DHCP in the Network Infrastructure



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### File location

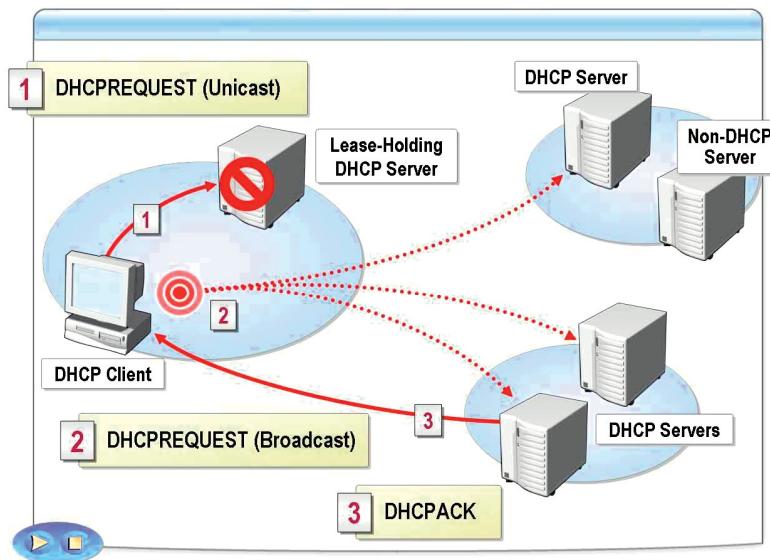
To view the multimedia presentation *The Role of DHCP in the Network Infrastructure*, open the Web page on the Student Materials compact disc, click **Multimedia**, and then click the title of the presentation.

### Objectives

At the end of this presentation, you will be able to describe how DHCP:

- Assigns TCP/IP configuration data to clients.
- Manages IP address allocation.
- Ensures that IP address conflicts do not occur.
- Provides configuration data for a specific period.

## DHCP Address Renewal



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### Introduction

When you identify a connectivity problem with a client on your network, an effective first step is to release and renew the IP address manually. This action frequently resolves the issue. For example, when you move a client from one subnet to another, the IP address might not be automatically updated for the new subnet. In this case, releasing and renewing the IP address might be all you need to do to solve the problem.

### Automatic renewal of IP addresses

In most cases, the client retains the settings assigned to it by the DHCP server until someone explicitly changes them or forces a reassignment. However, when the server dynamically allocates settings, the client leases its IP address for a certain period of time (configured at the server) and must renew the lease to continue using it.

The length of an IP address lease is typically measured in days and is generally based on whether computers are frequently moved around the network or whether IP addresses are in short supply. Shorter leases generate more network traffic, but they enable DHCP servers to reclaim unused addresses faster. For a relatively stable network, longer leases reduce the amount of traffic that DHCP generates.

**The lease renewal process**

The lease renewal process begins when a *bound client* (a DHCP client with a leased address) reaches what is known as the *renewal time value*, or *T1 value*, of its lease. By default, the renewal time value is 50 percent of the lease period. When a client reaches this point, it enters the *renewing state* and begins generating DHCPREQUEST messages as follows:

1. The client transmits a unicast DHCPREQUEST message to the server that holds the lease.

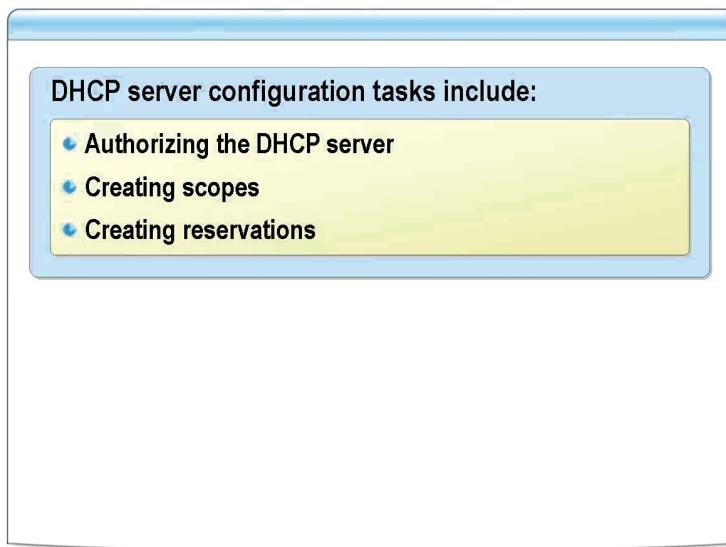
If the server is available to receive the message, it responds with either a DHCPACK message, which renews the lease and restarts the lease time clock, or a DHCPNACK message, which terminates the lease and forces the client to begin the address assignment process again from the beginning.

A DHCPREQUEST to the server that holds the lease is also sent by the client when the client is restarted. If the IP address is available, the lease will be treated like a renewal. If the address is not available, the client receives a DHCPNAK message and restarts the lease process.

2. If the server does not respond to the DHCPREQUEST unicast message, the client continues to send messages until it reaches the *rebinding time value*, or *T2 value*, which defaults to 87.5 percent of the lease period. At this point, the client enters the *rebinding state* and begins transmitting broadcast DHCPREQUEST messages, soliciting an address assignment from any DHCP server on the network.
3. A server can respond with either a DHCPACK or a DHCPNACK message.

If the lease time expires with no response from any DHCP server, the client's IP address is released, and all of its TCP/IP communication ceases, except for the transmission of broadcast DHCPDISCOVER messages. The DHCPDISCOVER broadcasts are used to request configuration parameters from a DHCP server.

## DHCP Server Configuration



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### Introduction

A DHCP server is required to hand out DHCP addresses to clients. On many networks, this role is performed by a server running Windows; however, it can also be done by most routers.

### Authorizing a DHCP server

After the DHCP service is installed, DHCP servers running Windows 2000 Server or Windows Server 2003 must be authorized in Active Directory to assign IP addresses to clients. The ability to authorize DHCP servers can be controlled and delegated. Restricting DHCP server authorization allows senior networking staff to control who can install and configure DHCP servers to prevent errors. “Rogue” DHCP servers (a DHCP server that has not been or cannot be authorized in Active Directory) can cause serious connectivity problems on corporate networks.

### Creating scopes

A *scope* is a range of valid IP addresses that are available for lease or assignment to client computers on a particular subnet. You configure a scope on the DHCP server to determine the pool of IP addresses that the server can assign to DHCP clients. A scope must be activated before a DHCP server uses it.

A scope has many possible configuration properties. Some of the configuration properties are required; others are optional. The following table lists some of the available properties.

Scope property	Description
Scope Name (required)	The name of the scope in Active Directory
Start IP Address (required)	The first IP address that can be leased to clients
End IP Address (required)	The last IP address that can be leased to clients
Subnet Mask (required)	The subnet mask that is delivered to clients with the IP addresses

*(continued)*

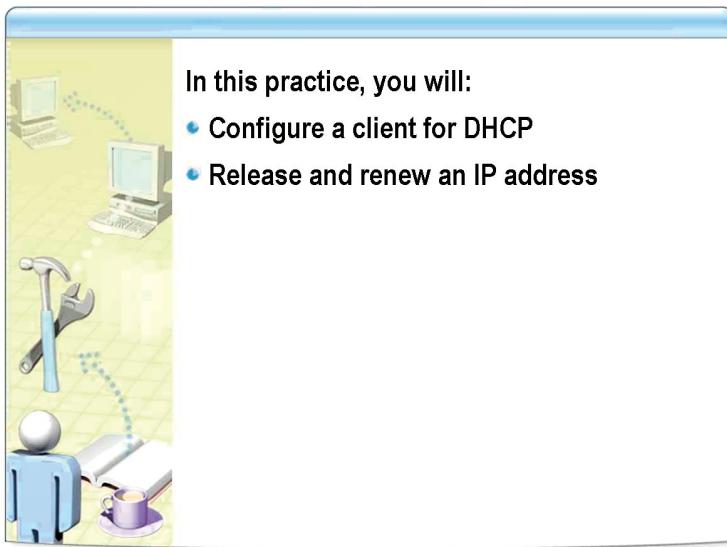
### **Creating DHCP reservations**

<b>Scope property</b>	<b>Description</b>
Lease Duration (required)	The period that the DHCP server holds an issued IP address for a client before removing the lease
Router	A DHCP option that allows DHCP clients to access remote networks
Exclusion Range	The range of IP addresses in the scope that are excluded from being leased

A *reservation* is a specific IP address, within a scope, that is permanently reserved for a specific DHCP client. Reservations allow devices to have a static IP address without having to visit the device to configure it statically. Additionally, if IP address changes are needed in the future, the IP address of the device can be easily changed by editing the existing reservation or creating a new reservation.

To use a reservation, you must know the media access control (MAC) address of the device being configured. The DHCP server correlates DHCP clients to reservations by using the MAC address of the client.

## Practice: Configuring a Client to Obtain an IP Address Automatically



In this practice, you will:

- Configure a client for DHCP
- Release and renew an IP address

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### Objectives

In this practice, you will:

- Configure a client for DHCP.
- Release and renew an IP address.

### Instructions

Ensure that the DEN-DC1 and DEN-CL1 virtual machines are running.

### Practice

#### ► Configure a client for DHCP

1. On DEN-CL1, click **Start**, and then click **Control Panel**.
2. Click **Network Connections**.
3. Double-click **Local Area Connection**.
4. Click **Properties**.
5. Click **Internet Protocol (TCP/IP)**, and then click **Properties**.
6. Click **Obtain an IP address automatically**, click **Obtain DNS server address automatically**, and then click **OK**.
7. To close the **Internet Protocol (TCP/IP) Properties** dialog box, click **OK**.
8. To close the **Local Area Connection Properties** dialog box, click **Close**.
9. Click the **Support** tab. Notice that the **Address Type** property is assigned by DHCP. This may take a few seconds to complete.
10. To close the **Local Area Connection Status** dialog box, click **Close**.
11. Close the Network Connections window.

► **Release and renew an IP address**

1. Click **Start**, click **Run**, type **cmd**, and then click **OK**.
2. At the command prompt, type **ipconfig /all**, and then press ENTER.
3. Verify that the **DHCP enabled** attribute is **Yes** and that you have an IP address.
4. At the command prompt, type **ipconfig /release**, and then press ENTER.  
The IP address and subnet mask of your adapter should read **0.0.0.0**. You may receive an error message stating that the local area connection has limited or no connectivity.
5. At the command prompt, type **ipconfig /renew**, and then press ENTER.  
You should now have a valid IP address and subnet mask.
6. At the command prompt, type **ipconfig /all**, and then press ENTER.
7. Note the time of the **Lease Obtained** attribute. What date and time does it show?

**The date and time should be the date and time at which the ipconfig /renew command was issued.**

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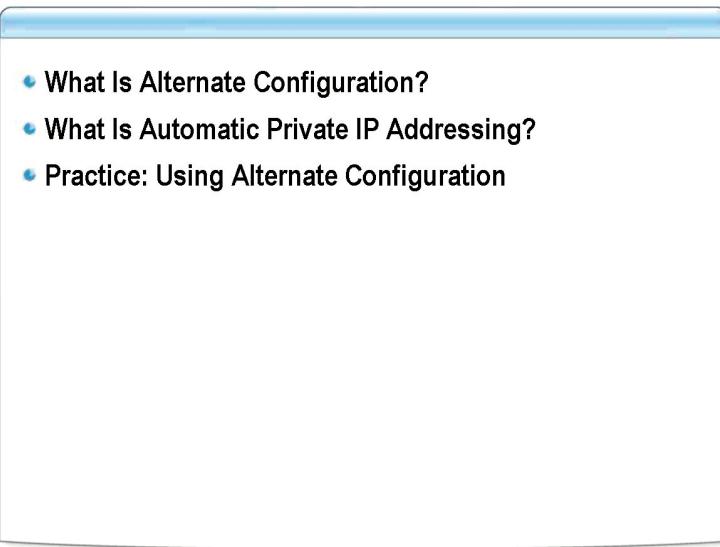
8. Close the command prompt window.

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**Important** Do not shut down the virtual machines.

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## Lesson: Using Alternate Configuration



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### Introduction

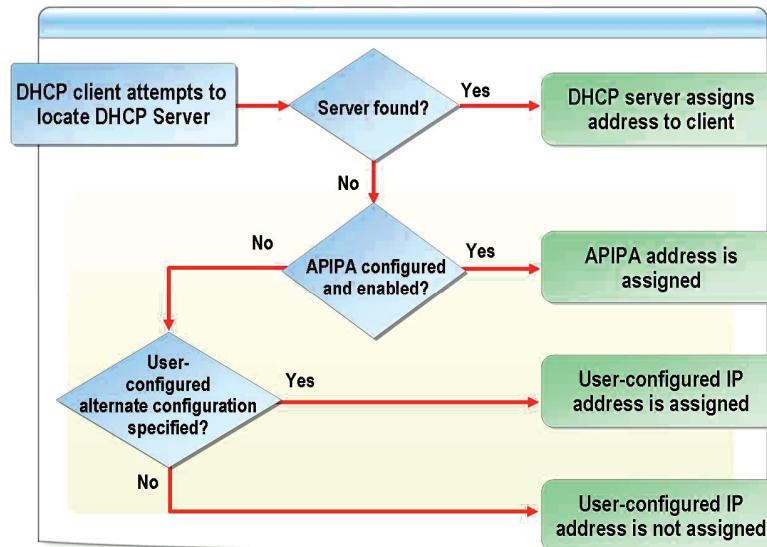
Alternate Configuration is a feature of Windows Server 2003 that you can use to streamline multiple-network connectivity. Alternate Configuration is useful when you are using a computer on more than one network and at least one of the networks does not have a DHCP server. Mobile computer users can use Alternate Configuration to assign IP addresses automatically on both office and home networks without having to reconfigure TCP/IP settings manually.

### Lesson objectives

After completing this lesson, you will be able to:

- Describe Alternate Configuration.
- Describe automatic private IP addressing.
- Configure and use Alternate Configuration for TCP/IP.

## What Is Alternate Configuration?



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### Definition

Alternate Configuration is another way to assign IP addresses. There are two Alternate Configuration methods: User-Configured Alternate Configuration (also known as a static address) and Automatic Private IP Addressing (APIPA). Alternate Configuration is used only if DHCP fails to obtain an IP address.

### How to determine which Alternate Configuration method to use

User-Configured Alternate Configuration provides more detailed parameters than APIPA. In situations for which you require a specific IP address and subnet mask for a client, or if you require a default gateway, DNS server, or WINS server, you should use Alternate Configuration.

APIPA is most useful in situations where a reserved IP address in the range 169.254.0.1 through 169.254.255.254 is acceptable and you do not need access to a default gateway, DNS server, or WINS server. APIPA functions without any user configuration.

### How Alternate Configuration works

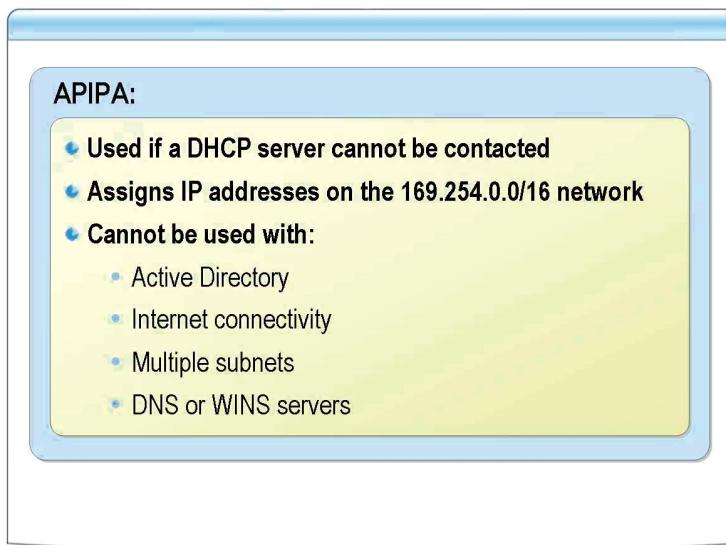
By default, a client computer first tries to contact a DHCP server on the network to dynamically obtain a configuration for each installed network connection. When the client contacts the server:

- If a DHCP server is reached and the leased configuration is successful, TCP/IP configuration is completed.
- If a DHCP server is not reached, by default the computer instead uses either APIPA or a user-configured alternate configuration to configure TCP/IP.

When specifying a user-configured alternate configuration, you can also specify a default gateway, WINS servers, and DNS servers.

The **Alternate Configuration** tab is visible only if **Obtain an IP address automatically** is selected on the **General** tab in the **Internet Protocol (TCP/IP) Properties** dialog box.

## What Is Automatic Private IP Addressing?



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### Definition

APIPA is one of two methods that you can use to specify an alternate configuration. When you use APIPA, you can create a functioning, single-subnet TCP/IP network without having to manually configure the TCP/IP protocol or set up a DHCP server. APIPA eliminates errors associated with missing IP addresses that often occur in single-network small-office or home-office networks.

### How APIPA works

If a DHCP server cannot be reached to assign an IP address automatically and APIPA has been selected as the mode of alternate configuration, Windows selects an address in the reserved IP addressing class ranging from 169.254.0.1 through 169.254.255.254 and assigns the subnet mask of 255.255.0.0.

In addition to receiving an address on the 169.254.0.0 network, Microsoft Windows XP clients using APIPA also display a warning icon in the system tray. This icon is often overlooked by users, and might be missed when they are describing the problem to the help desk.

### APIPA limitations

The limitations of APIPA make it unsuitable for even most small networks. APIPA does not assign DNS servers, WINS servers, or a default gateway. Using APIPA is not appropriate for networks that have any of the following characteristics:

- Active Directory
- Internet connectivity
- Multiple subnets
- DNS servers
- WINS servers

### Disabling APIPA

Some network administrators prefer to disable APIPA on client computers. However, in Windows XP the warning icon displayed to users is exactly the same as when APIPA is used. If APIPA is disabled, clients that would normally be configured with an APIPA address will display an IP address of 0.0.0.0 when `Ipconfig` is run.

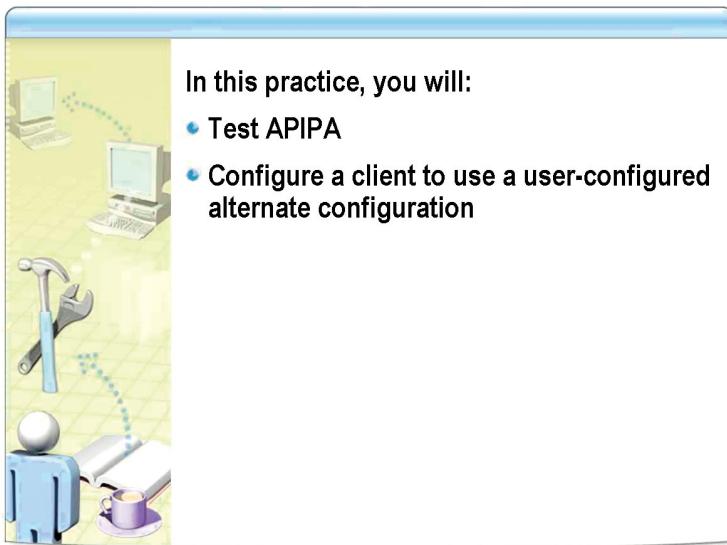
To disable APIPA, you must edit the registry. In the key `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters`, add a DWORD value named **IPAutoconfigurationEnabled** with a value of **0**.

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**Note** For more information about APIPA, see article 220874, “How to Use Automatic TCP/IP Addressing Without a DHCP Server,” in the Microsoft Knowledge Base.

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## Practice: Using Alternate Configuration



In this practice, you will:

- Test APIPA
- Configure a client to use a user-configured alternate configuration

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### Objectives

In this practice, you will:

- Test APIPA.
- Configure a client to use a user-configured alternate configuration.

### Instructions

Ensure that the DEN-DC1 and DEN-CL1 virtual machines are running.

### Practice

#### ► Test APIPA

1. Log on to DEN-DC1 as **Administrator** with the password of **Pa\$\$w0rd**.
2. On DEN-DC1, click **Start**, point to **Administrative Tools**, and then click **DHCP**.
3. Click **DEN-DC1.contoso.msft**.
4. Right-click **DEN-DC1.contoso.msft**, point to **All Tasks**, and then click **Stop**.
5. On DEN-CL1, click **Start**, click **Run**, type **cmd**, and then click **OK**.
6. Type **ipconfig /release**, and then press ENTER.
7. Type **ipconfig /renew**, and then press ENTER. After a couple of minutes, an error message will be displayed, indicating that a DHCP server could not be contacted.
8. Type **ipconfig**, and then press ENTER. An address on the 169.254.0.0 network will be displayed.
9. Close the command prompt window.

► **Configure a client to use a user-configured alternate configuration**

1. On DEN-CL1, click **Start**, and then click **Control Panel**.
2. Click **Network Connections**.
3. Double-click **Local Area Connection**.
4. Click **Properties**.
5. Click **Internet Protocol (TCP/IP)**, and then click **Properties**.
6. On the **Alternate Configuration** tab, click **User configured**.
7. In the **IP address** box, type **10.10.0.20**.
8. In the **Subnet mask** box, type **255.255.0.0**.
9. In the **Default gateway** box, type **10.10.0.1**.
10. In the **Preferred DNS server** box, type **10.10.0.2**.
11. In the **Preferred WINS server** box, type **10.10.0.2**.
12. To close the **Internet Protocol (TCP/IP) Properties** dialog box, click **OK**.
13. To close the **Local Area Connection Properties** dialog box, click **Close**.
14. Click the **Support** tab.

Notice that the **Address Type** setting is **Alternate Manually Configured**.

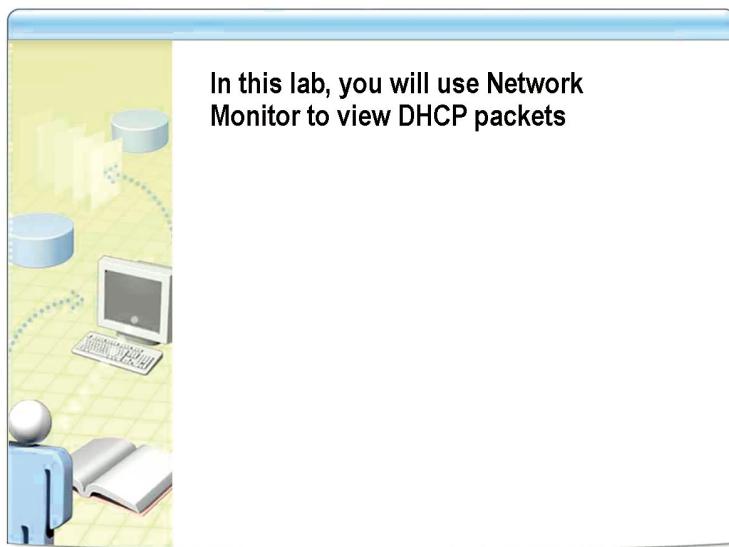
15. To close the **Local Area Connection Status** dialog box, click **Close**.
16. Close the Network Connections window.
17. Click **Start**, click **Run**, type **cmd**, and then click **OK**.
18. Type **ipconfig**, and then press ENTER.  
The IP address 10.10.0.20 will be displayed.
19. Close the command prompt window.
20. On DEN-DC1, right-click **DEN-DC1.contoso.msft**, point to **All Tasks**, and then click **Start**.
21. Close the DHCP window.

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**Important** Do not shut down the virtual machines.

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## Lab: Configuring Hosts to Connect to a Network Running the TCP/IP Protocol Suite



In this lab, you will use Network Monitor to view DHCP packets

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**Objective**

In this lab, you will use Network Monitor to view DHCP packets.

**Instructions**

Ensure that the DEN-DC1 and DEN-CL1 virtual machines are running.

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

## Exercise 1

### Viewing DHCP Packets

In this exercise, you will view the DHCP packets sent between a DHCP client and a DHCP server. Viewing the DHCP packets reinforces the DHCP communication process and can be used to confirm that proper communication is occurring.

#### Scenario

A client computer on your network has been intermittently obtaining unusual IP configuration information from DHCP. You will view the DHCP packets passed between the client and the DHCP server to verify that the proper communication process is occurring. To do this, you use Network Monitor.

Tasks	Detailed steps
1. Ensure that DEN-CL1 has a dynamic IP address.	<ol style="list-style-type: none"><li>If necessary, on DEN-CL1, log on to the <b>CONTOSO</b> domain as <b>Paul</b> with the password of <b>Pa\$\$w0rd</b>.</li><li>Open a command prompt window.</li><li>Renew the IP address by using <b>ipconfig</b>.</li></ol>
2. Start capturing packets on DEN-DC1.	<ol style="list-style-type: none"><li>If necessary, log on to DEN-DC1 as <b>Administrator</b> with the password of <b>Pa\$\$w0rd</b>.</li><li>Open Network Monitor.</li><li>If necessary, select <b>Local Area Connection</b> for the network.</li><li>Start a capture.</li></ol>
3. Renew the IP address on DEN-CL1.	<ul style="list-style-type: none"><li>▪ Renew the IP address by using ipconfig.</li></ul>
4. View the DHCP packets in Network Monitor.	<ol style="list-style-type: none"><li>Stop and view the capture.</li><li>Filter the capture to show only DHCP packets.</li><li>View the details of each DHCP packet.</li></ol>
5. Complete the lab exercise.	<ol style="list-style-type: none"><li>Close all programs and shut down all computers. Do not save changes.</li><li>To prepare for the next module, start the DEN-DC1 and DEN-CL1 virtual computers.</li></ol>

## Course Evaluation



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Your evaluation of this course will help Microsoft understand the quality of your learning experience.

At a convenient time before the end of the course, please complete a course evaluation, which is available on the Metrics That Matter page of the Knowledge Advisors Web site at <http://www.metricsthatmatter.com/MTMStudent/ClassListPage.aspx?&orig=6&VendorAlias=survey>.

Microsoft will keep your evaluation strictly confidential and will use your responses to improve your future learning experience.