Module 2: Allocating IP Addressing by Using Dynamic Host Configuration Protocol (DHCP)
Overview

- Multimedia: The Role of DHCP in the Network Infrastructure
- Adding and Authorizing a DHCP Server Service
- Configuring a DHCP Scope
- Configuring a DHCP Reservation
- Configuring DHCP Options
- Configuring a DHCP Relay Agent
The objective of this media is to provide a high-level overview of DHCP in the network infrastructure.

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

- Explain what DHCP is
- Describe how DHCP works
- Explain how routers can forward DHCP broadcast packets
- Describe how a DHCP relay agent works
Lesson: Adding and Authorizing a DHCP Server Service

- Why Use DHCP?
- How DHCP Allocates IP Addresses
- How the DHCP Lease Generation Process Works
- How the DHCP Lease Renewal Process Works
- How to Add a DHCP Server Service
- How a DHCP Server Service Is Authorized
- How to Authorize a DHCP Server Service
Why Use DHCP?

DHCP reduces the complexity and amount of administrative work by using automatic TCP/IP configuration.

Manual TCP/IP Configuration
- IP addresses are entered manually on each client computer
- Possibility of entering incorrect or invalid IP address
- Incorrect configuration can lead to communication and network issues
- Administrative overload on networks where computers are frequently moved

Automatic TCP/IP Configuration
- IP addresses are supplied automatically to client computers
- Ensures that clients always use correct configuration information
- Client configuration is updated automatically to reflect changes in network structure
- Eliminates a common source of network problems
How DHCP Allocates IP Addresses

Non-DHCP Client: Static IP configuration

DHCP Client1: IP configuration from DHCP server

DHCP Client2: IP configuration from DHCP server

Lease Renewal

Lease Generation

DHCP Server

DHCP Database

IP Address1: Leased to DHCP Client1
IP Address2: Leased to DHCP Client2
IP Address3: Available to be leased
How the DHCP Lease Generation Process Works

1. DHCP client broadcasts a DHCPDISCOVER packet
2. DHCP servers broadcast a DHCPOFFER packet
3. DHCP client broadcasts a DHCPREQUEST packet
4. DHCP Server1 broadcasts a DHCPACK packet
How the DHCP Lease Renewal Process Works

1. DHCP client sends a DHCPREQUEST packet
2. DHCP Server1 sends a DHCPACK packet

If the client fails to renew its lease, after 50% of the lease duration has expired, then the DHCP lease renewal process will begin again after 87.5% of the lease duration has expired.

If the client fails to renew its lease, after 87.5% of the lease duration has expired, then the DHCP lease renewal process starts over again with a DHCP client broadcasting a DHCPDISCOVER packet.
How to Add a DHCP Server Service

Your instructor will demonstrate how to:

- Prepare to add a DHCP Server service
- Add a DHCP Server service
DHCP authorization is the process of registering the DHCP Server service in the Active Directory domain to support DHCP clients.
How to Authorize a DHCP Server Service

Your instructor will demonstrate how to:

- Apply the requirement for authorizing a DHCP Server service
- Authorize a DHCP Server service
In this practice, you will add and authorize a DHCP Server service.
Lesson: Configuring a DHCP Scope

- What Are DHCP Scopes?
- How to Configure a DHCP Scope
What Are DHCP Scopes?

A scope is a range of IP addresses that are available to be leased.

**Scope Properties**
- Network ID
- Subnet mask
- Network IP address range
- Lease duration
- Router
- Scope name
- Exclusion range
How to Configure a DHCP Scope

Your instructor will demonstrate how to:

- Configure a DHCP scope
- Activate a DHCP scope
Practice: Configuring a DHCP Scope

In this practice, you will configure a DHCP scope
Lesson: Configuring a DHCP Reservation

- What Is a DHCP Reservation?
- How to Configure a DHCP Reservation
What Is a DHCP Reservation?

A reservation is a specific IP address, within a scope, that is permanently reserved for leased use to a specific DHCP client.
How to Configure a DHCP Reservation

Your instructor will demonstrate how to:

- Configure a DHCP reservation
- Verify a DHCP reservation
Practice: Configuring a DHCP Reservation

In this practice, you will configure a DHCP reservation
Lesson: Configuring DHCP Options

- What Are DHCP Options?
- How DHCP Server, Scope, and Reserved Client Options Are Applied
- How DHCP Class-level Options Are Applied
- How to Configure DHCP Options
DHCP options are configuration parameters that a DHCP service assigns to clients along with the IP address and default gateway.

**DHCP Option Examples:**
- Client’s IP address
- Client’s subnet mask
- DHCP options such as:
  - Router’s IP address
  - DNS server’s IP address
  - WINS server’s IP address
  - DNS domain name
How DHCP Server, Scope, and Reserved Client Options Are Applied

- DHCP option applied at the server level
- DHCP option applied at the scope level
- DHCP option applied at the reserved client level

<table>
<thead>
<tr>
<th>Scope A</th>
<th>Scope B</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCP Server</td>
<td>File and Print Server</td>
</tr>
<tr>
<td>Windows 98</td>
<td>Windows XP</td>
</tr>
<tr>
<td>Windows XP</td>
<td>Router</td>
</tr>
</tbody>
</table>

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How DHCP Class-level Options Are Applied

DHCP option applied at the class level
How to Configure DHCP Options

Your instructor will demonstrate how to:

- Configure a DHCP server option
- Configure a DHCP scope option

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In this practice, you will configure DHCP options
Lesson: Configuring a DHCP Relay Agent

- What Is a DHCP Relay Agent?
- How a DHCP Relay Agent Works
- How a DHCP Relay Agent Uses Hop Count
- How a DHCP Relay Agent Uses Boot Threshold
- How to Configure a DHCP Relay Agent
A DHCP relay agent is a computer or router configured to listen for DHCP/BOOTP broadcasts from DHCP clients and then relay those messages to DHCP servers on different subnets.
How a DHCP Relay Agent Works

1. Client1 broadcasts a DHCPDISCOVER packet
2. Relay agent forwards the DHCPDISCOVER message to the DHCP server
3. Server sends a DHCPOFFER message to the DHCP relay agent
4. Relay agent broadcasts the DHCPOFFER packet
5. Client1 broadcasts a DHCPREQUEST packet
6. Relay agent forwards the DHCPREQUEST message to the DHCP server
7. Server sends a DHCPACK message to the DHCP relay agent
8. Relay agent broadcasts the DHCPACK packet
How a DHCP Relay Agent Uses Hop Count

The *hop count threshold* is the number of routers that the packet can be transmitted through before being discarded.

![Diagram showing how a DHCP Relay Agent uses hop count](https://fb.com/tailieudientucntt)
How a DHCP Relay Agent Uses Boot Threshold

The *boot threshold* is the length of time in seconds that the DHCP Relay Agent will wait for a local DHCP server to respond to client requests before forwarding the request.
How to Configure a DHCP Relay Agent

Your instructor will demonstrate how to:

- Apply guidelines for setting the hop count and boot threshold
- Add a DHCP Relay Agent
- Configure a DHCP Relay Agent with the IP address of the DHCP server
- Enable the DHCP Relay Agent on a router interface
Practice: Configuring the DHCP Relay Agent

In this practice, you will configure a DHCP Relay Agent
In this lab, you will identify and resolve common issues when allocating IP addressing by using DHCP