



3.2 Lab 2: DHCP Configuration

3.2.1 Introduction

3.2.1.1 About This Lab

The Dynamic Host Configuration Protocol (DHCP) dynamically configures and uniformly manages IP addresses of hosts. It simplifies network deployment and scale-out, even for small networks.

DHCP is defined in RFC 2131 and uses the client/server communication mode. A client (DHCP client) requests configuration information from a server (DHCP server), and the server returns the configuration information allocated to the client.

DHCP supports dynamic and static IP address allocation.

- Dynamic allocation: DHCP allocates an IP address with a limited validity period (known as a lease) to a client. This mechanism applies to scenarios where hosts temporarily access the network and the number of idle IP addresses is less than the total number of hosts.
- Static allocation: DHCP allocates fixed IP addresses to clients as configured. Compared with manual IP address configuration, DHCP static allocation prevents manual configuration errors and enables unified maintenance and management.

3.2.1.2 Objectives

Upon completion of this task, you will be able to:

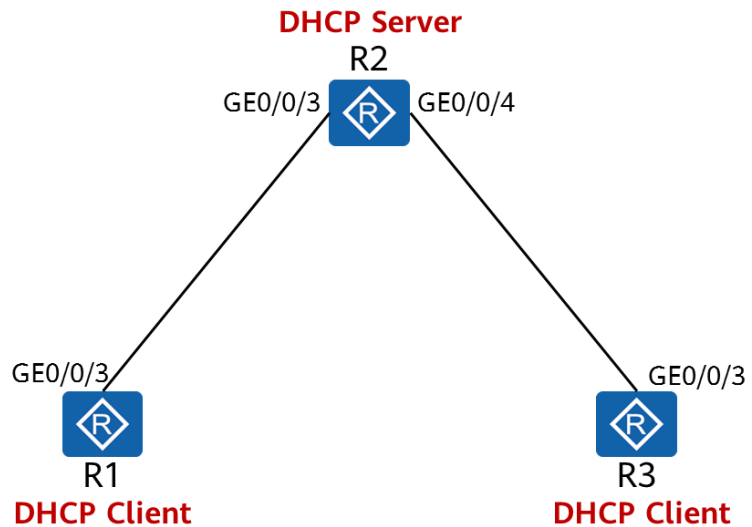
- Learn how to configure an interface address pool on the DHCP server
- Learn how to configure a global address pool on the DHCP server
- Learn how to use DHCP to allocate static IP addresses

3.2.1.3 Networking Topology

To reduce the workload of IP address maintenance and improve IP address utilization, an enterprise plans to deploy DHCP on the network.

1. Configure R1 and R3 as DHCP clients.
2. Configure R2 as the DHCP server to assign IP addresses to R1 and R3.

Figure 3-1 Lab topology for DHCP configuration



3.2.2 Lab Configuration

3.2.2.1 Configuration Roadmap

1. Configure the DHCP server.
2. Configure the DHCP clients.

3.2.2.2 Configuration Procedure

Step 1 Complete basic configurations.

Configure interface addresses on R2.

```
[R2]interface GigabitEthernet 0/0/3
[R2-GigabitEthernet0/0/3] ip address 10.0.12.2 24
[R2-GigabitEthernet0/0/3]quit
[R2]interface GigabitEthernet 0/0/4
[R2-GigabitEthernet0/0/4]ip address 10.0.23.2 24
[R2-GigabitEthernet0/0/4]quit
```

Step 2 Enable DHCP.

```
[R1]dhcp enable
Info: The operation may take a few seconds. Please wait for a moment.done.
```

The **dhcp enable** command must be executed before executing any other DHCP-related commands, regardless for DHCP servers or clients.

```
[R2]dhcp enable
Info: The operation may take a few seconds. Please wait for a moment.done.
```

```
[R3]dhcp enable
Info: The operation may take a few seconds. Please wait for a moment.done.
```

Step 3 Configure an address pool.

Configure an IP address pool on GE 0/0/3 of R2 to assign an IP address to R1.



```
[R2]interface GigabitEthernet 0/0/3
[R2-GigabitEthernet0/0/3]dhcp select interface
```

The **dhcp select interface** command enables an interface to use the interface address pool. If you do not run this command, parameters related to the interface address pool cannot be configured.

```
[R2-GigabitEthernet0/0/3]dhcp server dns-list 10.0.12.2
```

The **dhcp server dns-list** command configures DNS server addresses for an interface address pool. A maximum of eight DNS server addresses can be configured. These IP addresses are separated by spaces.

Configure a global address pool.

```
[R2]ip pool GlobalPool
Info: It's successful to create an IP address pool.
# Create an IP address pool named GlobalPool.
[R2-ip-pool-GlobalPool]network 10.0.23.0 mask 24
```

The **network** command specifies a network address for a global address pool.

```
[R2-ip-pool-GlobalPool]dns-list 10.0.23.2
[R2-ip-pool-GlobalPool]gateway-list 10.0.23.2
```

The **gateway-list** command configures a gateway address for a DHCP client. After R3 obtains an IP address, it generates a default route with the next-hop address being 10.0.23.2.

```
[R2-ip-pool-GlobalPool]lease day 2 hour 2
```

The **lease** command specifies the lease for IP addresses in a global IP address pool. If the lease is set to **unlimited**, the lease is unlimited. By default, the lease of IP addresses is one day.

```
[R2-ip-pool-GlobalPool]static-bind ip-address 10.0.23.3 mac-address 00e0-fc6f-6d1f
```

The **static-bind** command binds an IP address in a global address pool to a MAC address of a client. 00e0-fc6f-6d1f is the MAC address of GigabitEthernet0/0/3 on R3. You can run the **display interface GigabitEthernet0/0/3** command on R3 to display the MAC address of GigabitEthernet0/0/3. After the command is executed, R3 obtains the fixed IP address of 10.0.23.3.

```
[R2-ip-pool-GlobalPool]quit
```

Step 4 Enable the DHCP server function on GigabitEthernet 0/0/4 of R2 to assign an IP address to R3.

```
[R2]interface GigabitEthernet 0/0/4
[R2-GigabitEthernet0/0/4]dhcp select global
```

The **dhcp select global** command enables an interface to use the global address pool. After receiving a request from a DHCP client, the interface searches the global address pool for an available IP address and assigns the IP address to the DHCP client.

Step 5 Configure a DHCP client.

```
[R1]interface GigabitEthernet 0/0/3
[R1-GigabitEthernet0/0/3] ip address dhcp-alloc
```

```
[R3]interface GigabitEthernet 0/0/3
[R3-GigabitEthernet0/0/3] ip address dhcp-alloc
```

----End



3.2.3 Verification

3.2.3.1 Display the IP addresses and routes of R1 and R3.

```
[R1]display ip interface brief
```

Interface	IP Address/Mask	Physical	Protocol
GigabitEthernet0/0/3	10.0.12.254/24	up	up

Only key information is provided here. The command output shows that R1 has obtained an IP address.

```
[R1]display dns server
```

Type:

D:Dynamic S:Static

No.	Type	IP Address
1	D	10.0.12.2

Only key information is provided here. The command output shows that R1 has obtained the DNS address.

```
[R1]display ip routing-table
```

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	Unr	60	0	D	10.0.12.2	GigabitEthernet0/0/3

Only key information is provided here. The command output shows that R1 has obtained the default route.

```
[R3]display ip interface brief
```

Interface	IP Address/Mask	Physical	Protocol
GigabitEthernet0/0/3	10.0.23.3/24	up	up

Only key information is provided here. The command output shows that R3 has obtained a fixed IP address.

```
[R3]display dns server
```

Type:

D:Dynamic S:Static

No.	Type	IP Address
1	D	2.23.0.10

Only key information is provided here. The command output shows that R3 has obtained the DNS address.

```
[R3]display ip routing-table
```

Route Flags: R - relay, D - download to fib

Routing Tables: Public

Destinations : 8 Routes : 8

Destination/Mask	Proto	Pre	Cost	Flags	NextHop	Interface
0.0.0.0/0	Unr	60	0	D	10.0.23.2	GigabitEthernet0/0/3

Only key information is provided here. The command output shows that R3 has obtained the default route.

3.2.3.2 Display the address allocation on R2.

```
[R2]display ip pool name GlobalPool
```

```
Pool-name      : GlobalPool
Pool-No       : 1
Lease         : 2 Days 2 Hours 0 Minutes
Domain-name   : -
DNS-server0   : 10.0.23.2
NBNS-server0  : -
Netbios-type  : -
Position      : Local      Status      : Unlocked
Gateway-0     : 10.0.23.2
Mask         : 255.255.255.0
VPN instance  : --
```

Start	End	Total	Used	Idle(Expired)	Conflict	Disable
10.0.23.1	10.0.23.254	253	1	252(0)	0	0

The **display ip pool** command displays the address pool configuration information, including the name, lease, lock status, and IP address status.

```
[R2]display ip pool interface GigabitEthernet0/0/4
```

```
Pool-name      : GigabitEthernet0/0/4
Pool-No       : 0
Lease         : 1 Days 0 Hours 0 Minutes
Domain-name   : -
```



```
DNS-server0 : 10.0.12.2
NBNS-server0 : -
Netbios-type : -
Position : Interface Status : Unlocked
Gateway-0 : 10.0.12.2
Mask : 255.255.255.0
VPN instance : --
```

Start	End	Total	Used	Idle(Expired)	Conflict	Disable
10.0.12.1	10.0.12.254	253	1	252(0)	0	0

When an interface address pool is configured, the name of the address pool is the interface name. The allocated gateway address is the IP address of the interface and cannot be changed.

3.2.4 Configuration Reference

Configuration on R1

```
#
sysname R1
#
dhcp enable
#
interface GigabitEthernet0/0/3
ip address dhcp-alloc
#
return
```

Configuration on R2

```
#
sysname R2
#
dhcp enable
#
ip pool GlobalPool
gateway-list 10.0.23.2
network 10.0.23.0 mask 255.255.255.0
static-bind ip-address 10.0.23.3 mac-address a008-6fe1-0c47
lease day 2 hour 2 minute 0
dns-list 10.0.23.2
#
interface GigabitEthernet0/0/3
ip address 10.0.12.2 255.255.255.0
dhcp select interface
dhcp server dns-list 10.0.12.2
#
interface GigabitEthernet0/0/4
ip address 10.0.23.2 255.255.255.0
dhcp select global
#
return
```

Configuration on R3

```
#
sysname R3
#
dhcp enable
#
interface GigabitEthernet0/0/3
ip address dhcp-alloc
#
return
```



3.2.5 Quiz

1. What are the differences between the application scenarios of a global address pool and those of an interface address pool?
2. If there are multiple global address pools, how do you determine the global address pool for a DHCP client?