

Lab 5-2 Implementing DHCP

Learning Objectives

As a result of this lab section, you should achieve the following tasks:

- Configuration of a global DHCP pool.
- Configuration of an interface based DHCP pool.
- Enable DHCP discovery and IP allocation for switch interfaces.
- Method of global address pool configuration.
- Method of interface address pool configuration.

Topology

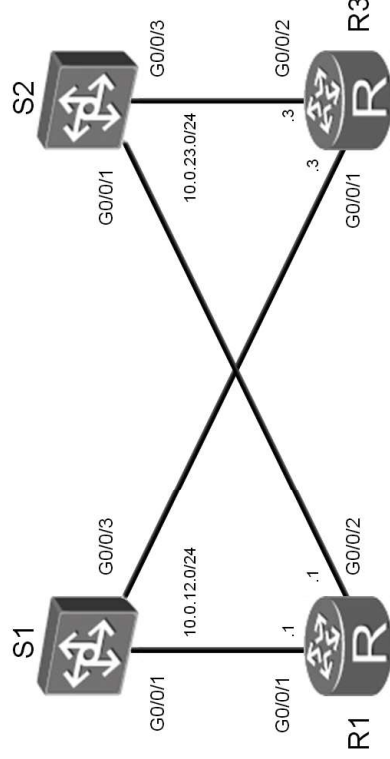


Figure 5.2 DHCP topology

Scenario

As the administrator of an enterprise you have been tasked with implementing DHCP application services within the network. The gateway router in the company network is to be configured as a DHCP server. IP addressing from an address pool are to be offered by the gateway(s) (R1 and R3) to respective access layer devices.

Tasks

Step 1 Preparing the environment.

If you are starting this section with a non-configured device, begin here and then move to step 3. For those continuing from previous labs, begin at step 2.

Establish the addressing for the lab and temporarily shut down the interfaces Gigabit Ethernet 0/0/2 of R1 and Gigabit Ethernet 0/0/1 of R3.

```
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname R1
[R1]interface GigabitEthernet 0/0/1
[R1-GigabitEthernet0/0/1]ip address 10.0.12.1 24
[R1-GigabitEthernet0/0/1]quit
```

```
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]sysname R3
[R3]interface GigabitEthernet 0/0/1
[R3-GigabitEthernet0/0/1]ip address 10.0.12.3 24
[R3-GigabitEthernet0/0/1]shutdown
[R3-GigabitEthernet0/0/1]quit
[R3]interface GigabitEthernet 0/0/2
[R3-GigabitEthernet0/0/2]ip address 10.0.23.3 24
```

```
<Quidway>system-view
Enter system view, return user view with Ctrl+Z.
[Quidway]sysname S1
```

```
<Quidway>system-view
Enter system view, return user view with Ctrl+Z.
[Quidway]sysname S2
```

Step 2 Cleaning up the previous configuration.

Re-enable to Gigabit Ethernet 0/0/2 interface on R3.

```
[R3]interface GigabitEthernet 0/0/2
```

```
[R3-GigabitEthernet0/0/2]undo shutdown
```

Step 3 Additional configuration.

Disable the port interfaces between S1 and S2 as well as other interfaces to prevent interference from other devices.

```
[S1]interface GigabitEthernet 0/0/9
[S1-GigabitEthernet0/0/9]shutdown
[S1-GigabitEthernet0/0/9]quit
[S1]interface GigabitEthernet 0/0/10
[S1-GigabitEthernet0/0/10]shutdown
[S1-GigabitEthernet0/0/10]quit
[S1]interface GigabitEthernet 0/0/13
[S1-GigabitEthernet0/0/13]shutdown
[S1-GigabitEthernet0/0/13]quit
[S1]interface GigabitEthernet 0/0/14
[S1-GigabitEthernet0/0/14]shutdown
```

```
[S2]interface GigabitEthernet 0/0/9
[S2-GigabitEthernet0/0/9]shutdown
[S2-GigabitEthernet0/0/9]quit
[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]shutdown
[S2-GigabitEthernet0/0/10]quit
[S2]interface GigabitEthernet 0/0/23
[S2-GigabitEthernet0/0/23]shutdown
[S2-GigabitEthernet0/0/23]quit
[S2]interface GigabitEthernet 0/0/24
[S2-GigabitEthernet0/0/24]shutdown
```

```
[R1]interface GigabitEthernet 0/0/2
[R1-GigabitEthernet0/0/2]ip address 10.0.23.1 24
[R1-GigabitEthernet0/0/2]shutdown
```

Verify that Gigabit Ethernet interfaces 0/0/9, 0/0/10, 0/0/13 and 0/0/14, have been shut down on S1 and that Gigabit Ethernet interfaces 0/0/9, 0/0/10, 0/0/23 and 0/0/24 have been shut down on S2.

```
<S1>display interface brief
...output omitted...
```

Interface	PHY	Protocol	InUti	OutUti	inErrors	outErrors
GigabitEthernet0/0/1	up	up	0.01%	0.01%	0	0

GigabitEthernet0/0/2	up	up	0.01%	0.01%	0	0
GigabitEthernet0/0/3	down	down	0%	0%	0	0
GigabitEthernet0/0/4	up	up	0%	0.01%	0	0
GigabitEthernet0/0/5	up	up	0%	0.01%	0	0
GigabitEthernet0/0/6	down	down	0%	0%	0	0
GigabitEthernet0/0/7	down	down	0%	0%	0	0
GigabitEthernet0/0/8	down	down	0%	0%	0	0
GigabitEthernet0/0/9	*down	down	0%	0%	0	0
GigabitEthernet0/0/10	*down	down	0%	0%	0	0
GigabitEthernet0/0/11	down	down	0%	0%	0	0
GigabitEthernet0/0/12	down	down	0%	0%	0	0
GigabitEthernet0/0/13	*down	down	0%	0%	0	0
GigabitEthernet0/0/14	*down	down	0%	0%	0	0

...output omitted...

<S2>display interface brief

...output omitted...

GigabitEthernet0/0/9	*down	down	0%	0%	0	0
GigabitEthernet0/0/10	*down	down	0%	0%	0	0
GigabitEthernet0/0/11	up	up	0.01%	0.01%	0	0
GigabitEthernet0/0/12	up	up	0.01%	0.01%	0	0
GigabitEthernet0/0/13	up	up	0%	0.01%	0	0
GigabitEthernet0/0/14	down	down	0%	0%	0	0
GigabitEthernet0/0/15	down	down	0%	0%	0	0
GigabitEthernet0/0/16	down	down	0%	0%	0	0
GigabitEthernet0/0/17	down	down	0%	0%	0	0
GigabitEthernet0/0/18	down	down	0%	0%	0	0
GigabitEthernet0/0/19	down	down	0%	0%	0	0
GigabitEthernet0/0/20	down	down	0%	0%	0	0
GigabitEthernet0/0/21	down	down	0%	0%	0	0
GigabitEthernet0/0/22	down	down	0%	0%	0	0
GigabitEthernet0/0/23	*down	down	0%	0%	0	0
GigabitEthernet0/0/24	*down	down	0%	0%	0	0

...output omitted...

Verify that only interface Gigabit Ethernet 0/0/2 is disabled on R1 and that only interface Gigabit Ethernet 0/0/1 is disabled on R3.

<R1>display ip interface brief

...output omitted...

GigabitEthernet0/0/1	10.0.12.1/24	up	up
GigabitEthernet0/0/2	10.0.23.1/24	*down	down

...output omitted...

```
<R3>display ip interface brief
...output omitted...
GigabitEthernet0/0/1    10.0.12.3/24    *down    down
GigabitEthernet0/0/2    10.0.23.3/24    up       up
...output omitted...
```

Step 4 Enable the DHCP function.

The DHCP service is not enabled by default, enable the DHCP service on the router(s).

```
[R1]dhcp enable
```

```
[R3]dhcp enable
```

Step 5 Create a global IP address pool.

Create an address pool named **pool1** for R1 and **pool2** for R3. Configure attributes for **pool1** and **pool2**, including address range, egress gateway, and IP address lease period.

```
[R1]ip pool pool1
Info: It's successful to create an IP address pool.
[R1-ip-pool-pool1]network 10.0.12.0 mask 24
[R1-ip-pool-pool1]gateway-list 10.0.12.1
[R1-ip-pool-pool1]lease day 1 hour 12
[R1]interface GigabitEthernet 0/0/1
[R1-GigabitEthernet0/0/1]dhcp select global
```

```
[R3]ip pool pool2
Info: It's successful to create an IP address pool.
[R3-ip-pool-pool2]network 10.0.23.0 mask 24
[R3-ip-pool-pool2]gateway-list 10.0.23.3
[R3-ip-pool-pool2]lease day 1 hour 12
[R3]interface GigabitEthernet 0/0/2
[R3-GigabitEthernet0/0/2]dhcp select global
```

Run the **display ip pool name <name>** command on the router to view the assigned IP address pool configuration parameters.

```
<R1>display ip pool name pool1
Pool-name      : pool1
Pool-No       : 0
Lease         : 1 Days 12 Hours 0 Minutes
Domain-name   : -
```

```
DNS-server0      : -
NENS-server0     : -
Netbios-type     : -
Position         : Local      Status      : Unlocked
Gateway-0        : 10.0.12.1
Mask             : 255.255.255.0
VPN instance     : --
```

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

Configure the default management interface for S1 to request an IP address from the DHCP server (R1). Perform the same steps on S2 for R3.

```
[S1]dhcp enable
[S1]interface Vlanif 1
[S1-Vlanif1]ip address dhcp-alloc
```

```
<S1>display ip interface brief
...output omitted...
```

Interface	IP Address/Mask	Physical	Protocol
Meth0/0/1	unassigned	down	down
NULL0	unassigned	up	up (s)
Vlanif1	10.0.12.254/24	up	up

Verify that this address was taken from the DHCP pool named pool1 on R1, and for S2, from the DHCP pool named pool2 on R3.

```
<R1>display ip pool name pool1
Pool-name       : pool1
Pool-No        : 0
Lease           : 1 Days 12 Hours 0 Minutes
Domain-name     : -
DNS-server0    : -
NENS-server0   : -
Netbios-type    : -
Position       : Local      Status      : Unlocked
Gateway-0      : 10.0.12.1
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

```
<R3>display ip pool name pool2
Pool-name      : pool2
Pool-No        : 0
Lease          : 1 Days 12 Hours 0 Minutes
Domain-name    : -
DNS-server0    : -
NENS-server0   : -
Netbios-type   : -
Position       : Local      Status      : Unlocked
Gateway-0      : 10.0.23.3
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

Ensure that global pool configuration has been completed for both R1 and R3 before continuing!

Step 6 Create an interface based IP address pool.

Disable the interface Gigabit Ethernet 0/0/1 R1. For R3 disable interface Gigabit Ethernet 0/0/2.

```
[R1]interface GigabitEthernet 0/0/1
[R1-GigabitEthernet0/0/1]shutdown
```

```
[R3]interface GigabitEthernet 0/0/2
[R3-GigabitEthernet0/0/2]shutdown
```

Configure an interface address pool to allow the clients connected via Gigabit Ethernet 0/0/2 of R1 to obtain IP addresses. Perform the same operation for Gigabit Ethernet 0/0/1 of R3. Do not enable these interfaces, as we do not yet wish to activate the DHCP service on the network.

```
[R1]interface GigabitEthernet 0/0/2
[R1-GigabitEthernet0/0/2]dhcp select interface

[R3]interface GigabitEthernet 0/0/1
[R3-GigabitEthernet0/0/1]dhcp select interface
```

Isolate addresses from the pool GigabitEthernet0/0/2 for R1, and the pool GigabitEthernet0/0/1 for R3, for DNS services. Additionally, set the IP address lease period for the interface address pool.

```
[R1-GigabitEthernet0/0/2]dhcp server dns-list 10.0.23.254
[R1-GigabitEthernet0/0/2]dhcp server excluded-ip-address 10.0.23.254
[R1-GigabitEthernet0/0/2]dhcp server lease day 1 hour 12

[R3-GigabitEthernet0/0/1]dhcp server dns-list 10.0.12.254
[R3-GigabitEthernet0/0/1]dhcp server excluded-ip-address 10.0.12.254
[R3-GigabitEthernet0/0/1]dhcp server lease day 1 hour 12
```

Run the **display ip pool interface** command on the router to view the configured parameters of the interface address pool. For R3 the interface is Gigabit Ethernet 0/0/1.

```
<R1>display ip pool interface GigabitEthernet0/0/2
```

```
Pool-name       : GigabitEthernet0/0/2
Pool-No         : 1
Lease           : 1 Days 12 Hours 0 Minutes
Domain-name     : -
DNS-server0     : 10.0.23.254
NENS-server0    : -
Netbios-type    : -
Position        : Interface          Status      : Unlocked
Gateway-0       : 10.0.23.1
Mask            : 255.255.255.0
VPN instance    : --
```

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

Flush the existing Vlanif1 address from S2 to allow for dynamic allocation

of a new IP address from the interface GigabitEthernet0/0/2 pool.

```
[S2]interface Vlanif 1
[S2-Vlanif1]shutdown
[S2-Vlanif1]undo shutdown
```

Enable interface Gigabit Ethernet 0/0/2 to allow the DHCP server to become active on the network and to begin sending DHCP discover messages.

```
[R1]interface GigabitEthernet0/0/2
[R1-GigabitEthernet0/0/2]undo shutdown
```

```
<R1>display ip pool interface GigabitEthernet0/0/2
```

```
Pool-name      : GigabitEthernet0/0/2
Pool-No        : 1
Lease          : 1 Days 12 Hours 0 Minutes
Domain-name    : -
DNS-server0    : 10.0.23.254
NENS-server0   : -
Netbios-type   : -
Position       : Interface      Status      : Unlocked
Gateway-0      : 10.0.23.1
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	251(0)	0	1

```
<S2>display ip interface brief
...output omitted...
```

Interface	IP Address/Mask	Physical	Protocol
Meth0/0/1	unassigned	down	down
NULL0	unassigned	up	up(s)
Vlanif1	10.0.23.253/24	up	up

The interface Vlanif1 shows to have been allocated an address from the GigabitEthernet0/0/2 address pool of R1.

Flush the existing Vlanif1 address from S1 to allow for dynamic allocation of a new IP address from the interface GigabitEther0/0/1 pool.

```
[S1]interface Vlanif 1
```

```
[S1-Vlanif1]shutdown
[S1-Vlanif1]undo shutdown
```

Enable interface Gigabit Ethernet 0/0/1 to allow the DHCP server to become active on the network and to begin sending DHCP discover messages.

```
[R3]interface GigabitEthernet 0/0/1
[R3-GigabitEthernet0/0/1]undo shutdown
```

Verify that the new IP address as been allocated from the interface pool.

```
<R3>display ip pool interface GigabitEthernet0/0/1
```

```
Pool-name      : GigabitEthernet0/0/1
Pool-No        : 1
Lease          : 1 Days 12 Hours 0 Minutes
Domain-name    : -
DNS-server0    : 10.0.12.254
NENS-server0   : -
Netbios-type   : -
Position       : Interface      Status      : Unlocked
Gateway-0      : 10.0.12.3
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	251(0)	0	1

```
<S1>display ip interface brief
```

...output omitted...

Interface	IP Address/Mask	Physical	Protocol
Meth0/0/1	unassigned	down	down
NULL0	unassigned	up	up(s)
Vlanif1	10.0.12.253/24	up	up

It should also be noted that a default static route pointing to the DHCP server is automatically generated by the switch, as seen in the final configuration below.

Final Configuration

```
[R1]display current-configuration
[V200R003C00SPC200]
#
sysname R1
#
dhcp enable
#
ip pool pool1
gateway-list 10.0.12.1
network 10.0.12.0 mask 255.255.255.0
lease day 1 hour 12 minute 0
#
interface GigabitEthernet0/0/1
shutdown
ip address 10.0.12.1 255.255.255.0
dhcp select global
#
interface GigabitEthernet0/0/2
ip address 10.0.23.1 255.255.255.0
dhcp select interface
dhcp server excluded-ip-address 10.0.23.254
dhcp server lease day 1 hour 12 minute 0
dhcp server dns-list 10.0.23.254
#
user-interface con 0
authentication-mode password
set authentication password cipher %$${L'YR&IZt'4,}>-*#lH",}%K-oJ_M9+'lOU~bD
(\WTqB){%N,%$%$user-interface vty 0 4
#
return

[R3]dis current-configuration
[V200R003C00SPC200]
#
sysname R3
#
dhcp enable
#
ip pool pool2
gateway-list 10.0.23.3
```

```
network 10.0.23.0 mask 255.255.255.0
lease day 1 hour 12 minute 0
#
interface GigabitEthernet0/0/1
ip address 10.0.12.3 255.255.255.0
dhcp select interface
dhcp server excluded-ip-address 10.0.12.254
dhcp server lease day 1 hour 12 minute 0
dhcp server dns-list 10.0.12.254
#
interface GigabitEthernet0/0/2
shutdown
ip address 10.0.23.3 255.255.255.0
dhcp select global
#
user-interface con 0
authentication-mode password
set authentication password cipher %$ksXDMg7Ry6yUU:63:DQ),#/sQg"@*S\U#.s.bHW
xQ,y%#/v,%$%$
user-interface vty 0 4
#
return

<S1>dis current-configuration
#
!Software Version V100R006C00SPC800
sysname S1
#
dhcp enable
#
interface Vlanif1
ip address dhcp-alloc
#
ip route-static 0.0.0.0 0.0.0.0 10.0.12.3
#
user-interface con 0
user-interface vty 0 4
#
return

<S2>display current-configuration
#
!Software Version V100R006C00SPC800
```

```
sysname S2
#
dhcp enable
#
interface Vlanif1
 ip address dhcp-alloc
#
 ip route-static 0.0.0.0 0.0.0.0 10.0.23.1
#
user-interface con 0
user-interface vty 0 4
#
return
```