CCNA 2 - Eğitimi

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10. Bölüm: DHCP

Yönlendirme ve Anahtarlama Temel Bilgileri

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10. Bölüm

10.0 Giriş

10.1 Dinamik Host Yapılandırma Protokolü v4

10.2 Dinamik Host Yapılandırma Protokolü v6

10.3 Özet

10. Bölüm: Hedefler

- Küçük ve orta ölçekli bir işletme ağında DHCPv4 işleyişini açıklayın.
- Bir DHCPv4 sunucusuna benzer bir yönlendirici yapılandırın.
- Bir DHCPv4 istemcisine benzer bir yönlendirici yapılandırın.
- Anahtarlanan bir ağda IPv4 için bir DHCP yapılandırması sorun giderme işlemi gerçekleştirin.
- DHCPv6'nın işleyişini açıklayın.
- Küçük ve orta ölçekli bir iş için durum bilgisiz bir DHCPv6 yapılandırın.
- Küçük ve orta ölçekli bir iş için durum bilgili bir DHCPv6 yapılandırın.
- Anahtarlanmış bir ağda IPv6 için bir DHCP yapılandırmasında sorun giderin.

10.1 Dynamic Host Configuration Protocol v4

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DHCPv4 Tanıtımı

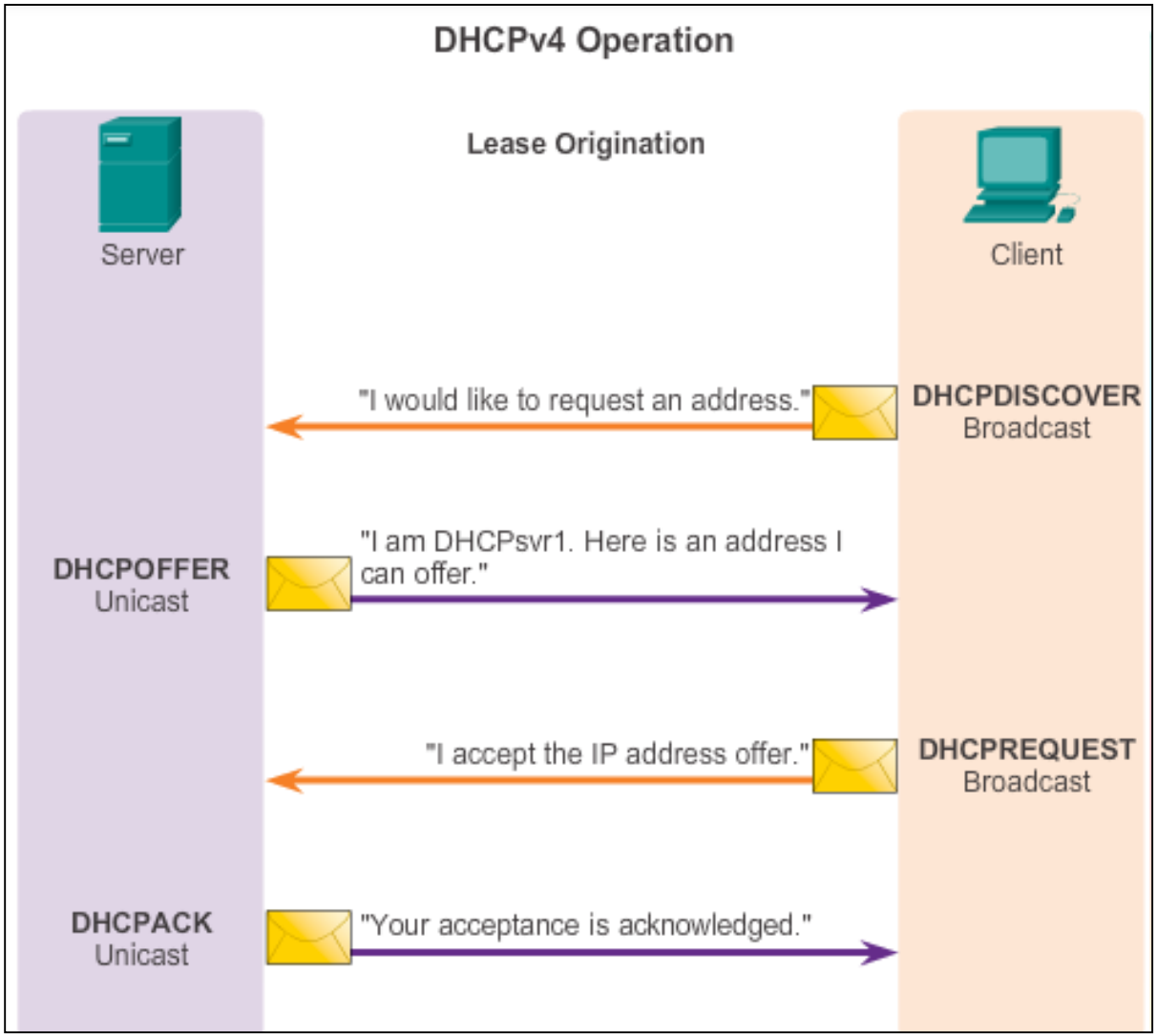
- DHCPv4 üç farklı adres atama yöntemi kullanır

Manuel Atama - Yönetici önceden atanmış IPv4 adresini istemciye atar ve DHCPv4 sadece IPv4 adresini cihaza iletir.

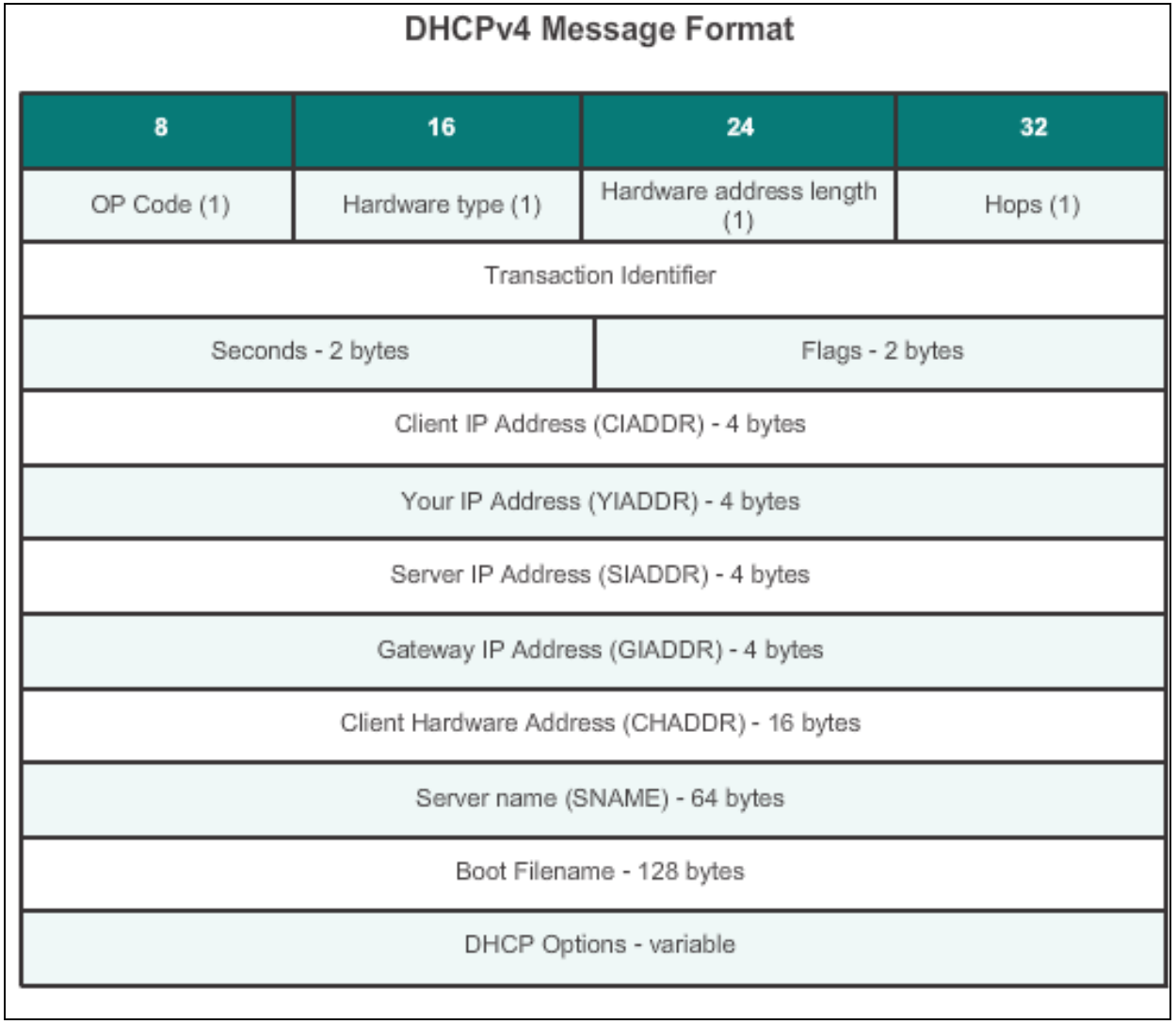
Otomatik Atama - DHCPv4, bir cihaza mevcut adres havuzunda seçerek otomatik olarak daimi bir IPv4 adresi atar. Kiralanmaz.

Dinamik Atama - DHCPv4 sunucu tarafından belirlenen sınırlı bir zaman dilimi için veya istemcinin artık adrese ihtiyaç duymayacağı zamana kadar adres havuzundan bir IPv4 adresi atar veya kiralar. En yaygın kullanılan yöntemdir.

DHCPv4 Operation

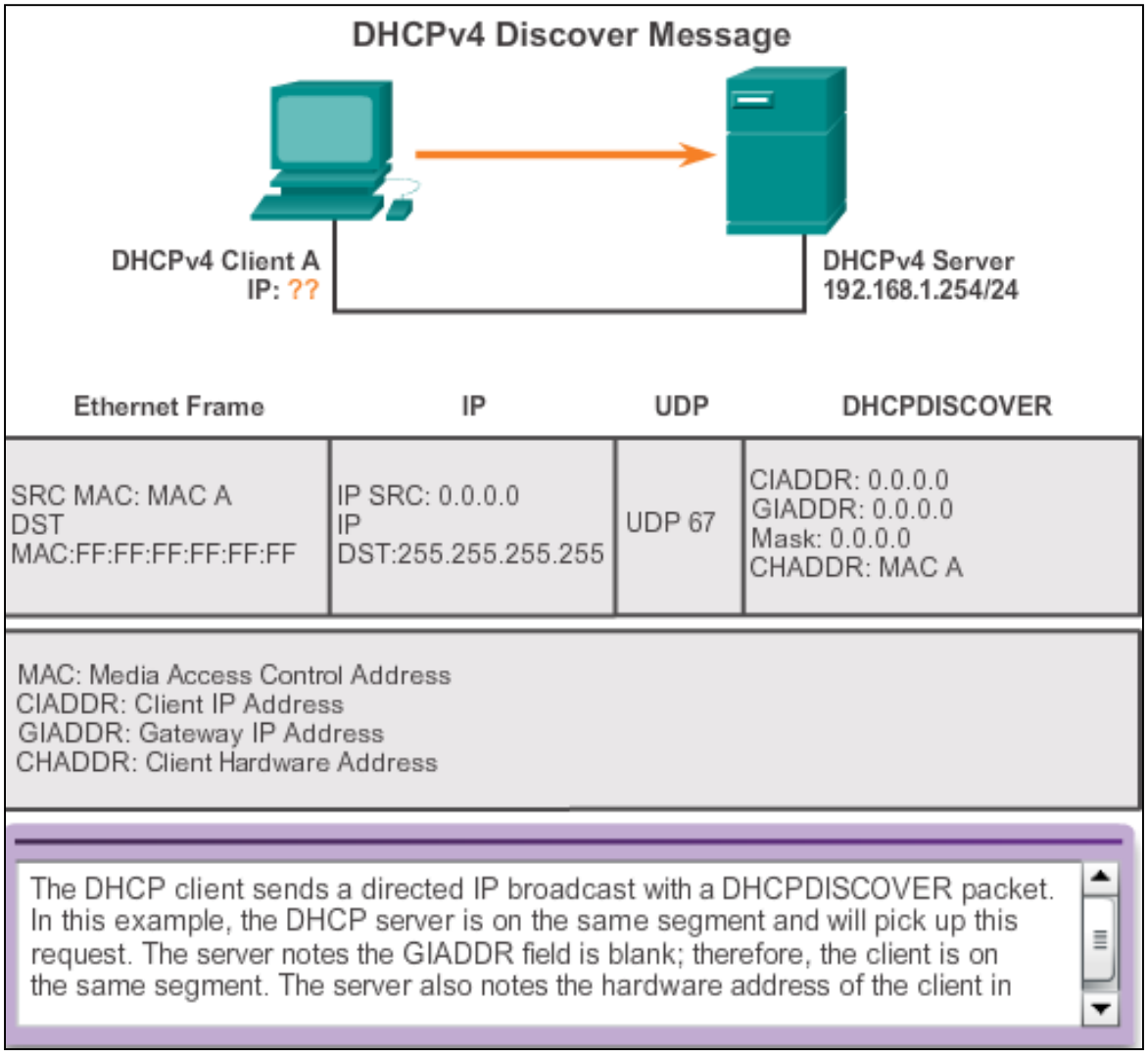


DHCPv4 Message Format



DHCPv4 Operation

Format DHCPv4 Discover and Offer Messages



DHCPv4 Sunucusu Yapılandırması

A Cisco router running the Cisco IOS software can be configured to act as a DHCPv4 server. To set up DHCP:

1. Exclude addresses from the pool.
2. Set up the DHCP pool name.
3. Define the range of addresses and subnet mask. Use the **default-router** command for the default gateway. Optional parameters that can be included in the *pool – dns server*, *domain-name*.

```
R1(config)# ip dhcp excluded-address 192.168.10.1 192.168.10.9
R1(config)# ip dhcp excluded-address 192.168.10.254
R1(config)# ip dhcp pool LAN-POOL-1
R1(dhcp-config)# network 192.168.10.0 255.255.255.0
R1(dhcp-config)# default-router 192.168.10.1
R1(dhcp-config)# dns-server 192.168.11.5
R1(dhcp-config)# domain-name example.com
R1(dhcp-config)# end
R1#
```

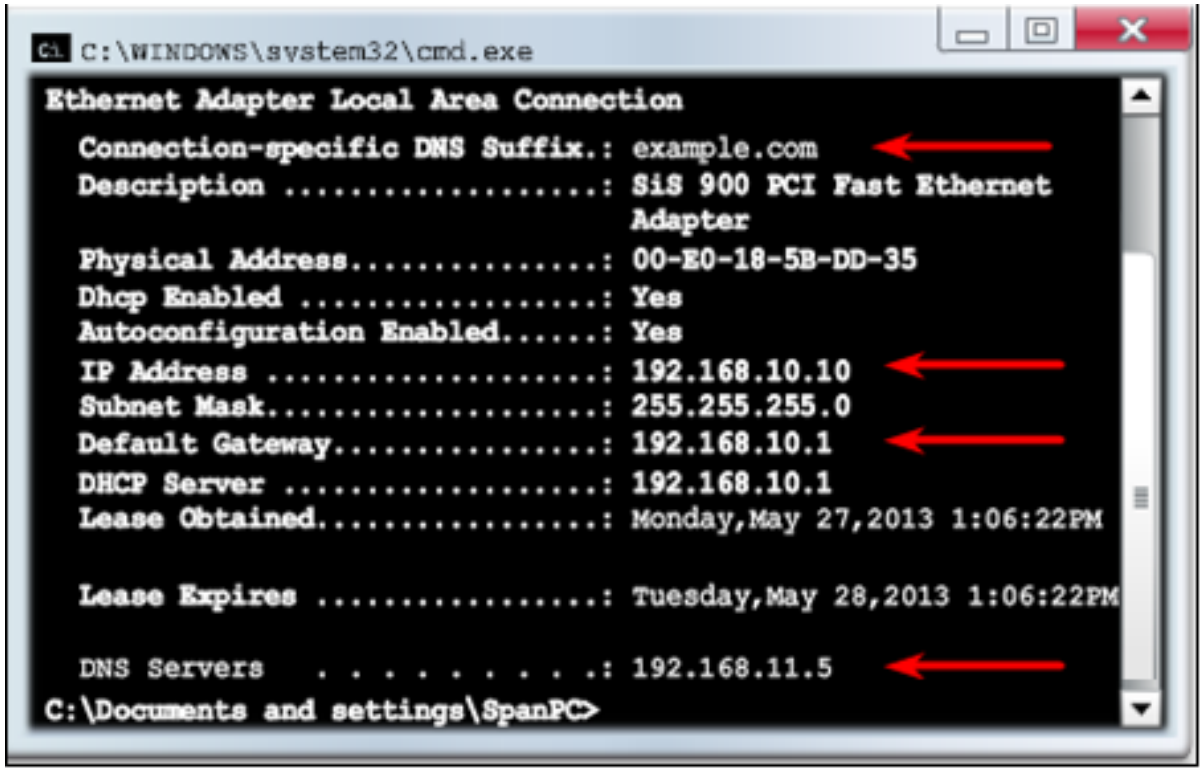
To disable DHCP, use the **no service dhcp** command.

Verifying a DHCPv4 Server

- DHCP sunucusunu doğrulama komutları:

```
show running-config | section dhcp
show ip dhcp binding
show ip dhcp server statistics
```

- PC'de **ipconfig /all** komutunu çalıştırın



DHCPv4 Relay

Using an IP helper address enables a router to forward DHCPv4 broadcasts to the DHCPv4 server. Acting as a relay.

```
R1(config)# interface g0/0
R1(config-if)# ip helper-address 192.168.11.6
R1(config-if)# end
R1# show ip interface g0/0
GigabitEthernet0/0 is up, line protocol is up
  Internet address is 192.168.10.1/24
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is 192.168.11.6
<Output omitted>
```

Configuring a Router as a DHCPv4 Client


```
SOHO(config)# interface g0/1
SOHO(config-if)# ip address dhcp
SOHO(config-if)# no shutdown
SOHO(config-if)#
*Jan 31 17:31:11.507: %DHCP-6-ADDRESS_ASSIGN: Interface
GigabitEthernet0/1 assigned DHCP address 209.165.201.12, mask
255.255.255.224, hostname SOHO
SOHO(config-if)# end
SOHO# show ip interface g0/1
GigabitEthernet0/1 is up, line protocol is up
  Internet address is 209.165.201.12/27
  Broadcast address is 255.255.255.255
  Address determined by DHCP
  <Output omitted>
```

Troubleshooting Tasks

Troubleshooting Task 1:	Resolve conflicts.
Troubleshooting Task 2:	Verify physical connectivity.
Troubleshooting Task 3:	Test with a static IPv4 address.
Troubleshooting Task 4:	Verify switch port configuration.
Troubleshooting Task 5:	Test from the same subnet or VLAN.

Verifying the Router DHCPv4 Configuration

Verifying DHCPv4 Relay and DHCPv4 Services

```
R1# show running-config | section interface GigabitEthernet0/0
interface GigabitEthernet0/0
 ip address 192.168.10.1 255.255.255.0
 ip helper-address 192.168.11.6
 duplex auto
 speed auto
R1#
R1# show running-config | include no service dhcp
R1#
```

Debugging DHCPv4

Verifying DHCPv4 Using Router debug Commands

```
R1(config)# access-list 100 permit udp any any eq 67
R1(config)# access-list 100 permit udp any any eq 68
R1(config)# end
R1# debug ip packet 100
IP packet debugging is on for access list 100
*IP: s=0.0.0.0 (GigabitEthernet0/1), d=255.255.255.255, len 333,
rcvd 2
*IP: s=0.0.0.0 (GigabitEthernet0/1), d=255.255.255.255, len 333,
stop process pak for forus packet
*IP: s=192.168.11.1 (local), d=255.255.255.255
(GigabitEthernet0/1), len 328, sending broad/multicast

<Output omitted>

Router1# debug ip dhcp server events
DHCPD: returned 192.168.10.11 to address pool LAN-POOL-1
DHCPD: assigned IP address 192.168.10.12 to client
0100.0103.85e9.87.
DHCPD: checking for expired leases.
DHCPD: the lease for address 192.168.10.10 has expired.
DHCPD: returned 192.168.10.10 to address pool LAN-POOL-1
```

10.2 Dynamic Host Configuration Protocol v6

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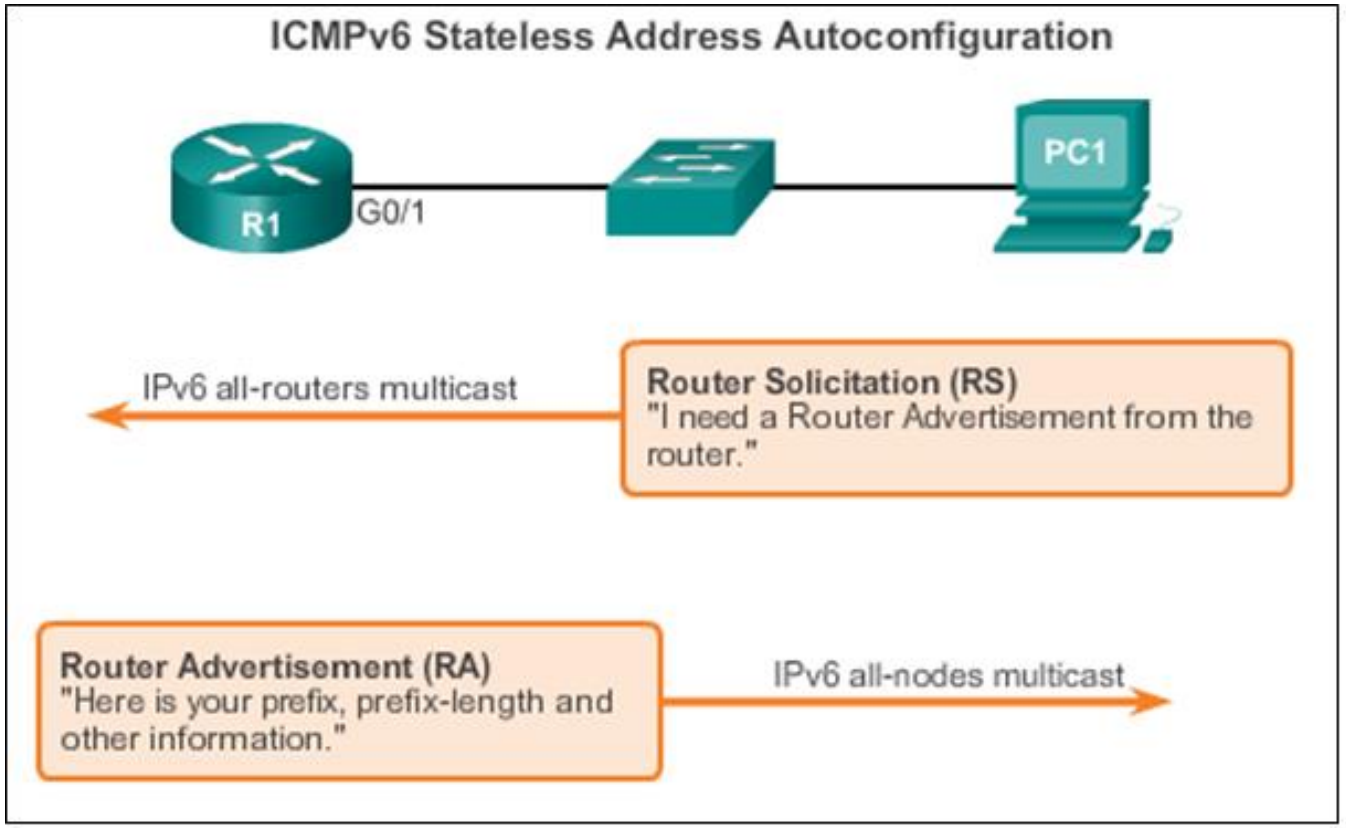
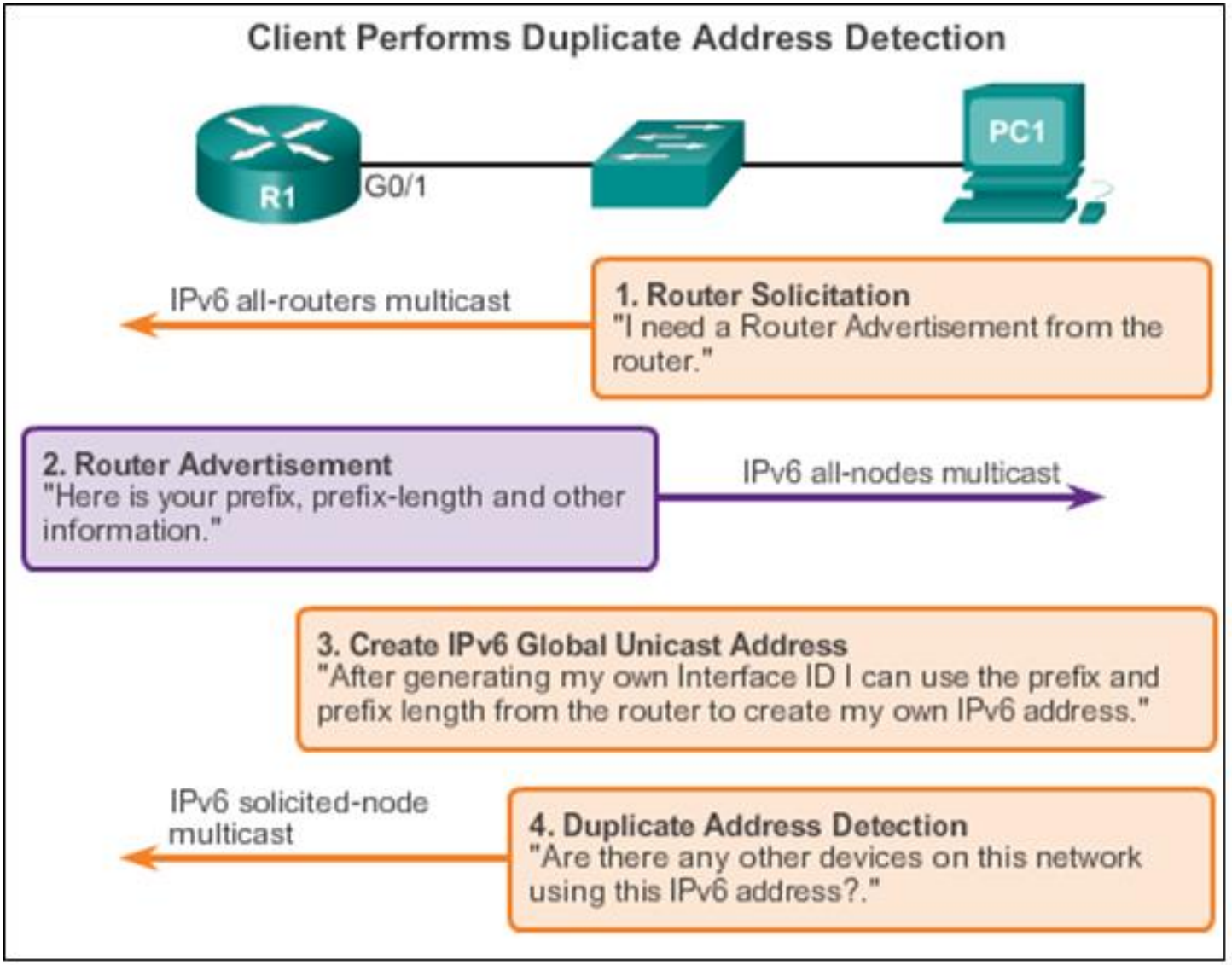
Stateless Address Autoconfiguration

Stateless Address Autoconfiguration (SLAAC) is a method in which a device can obtain an IPv6 global unicast address without the services of a DHCPv6 server.

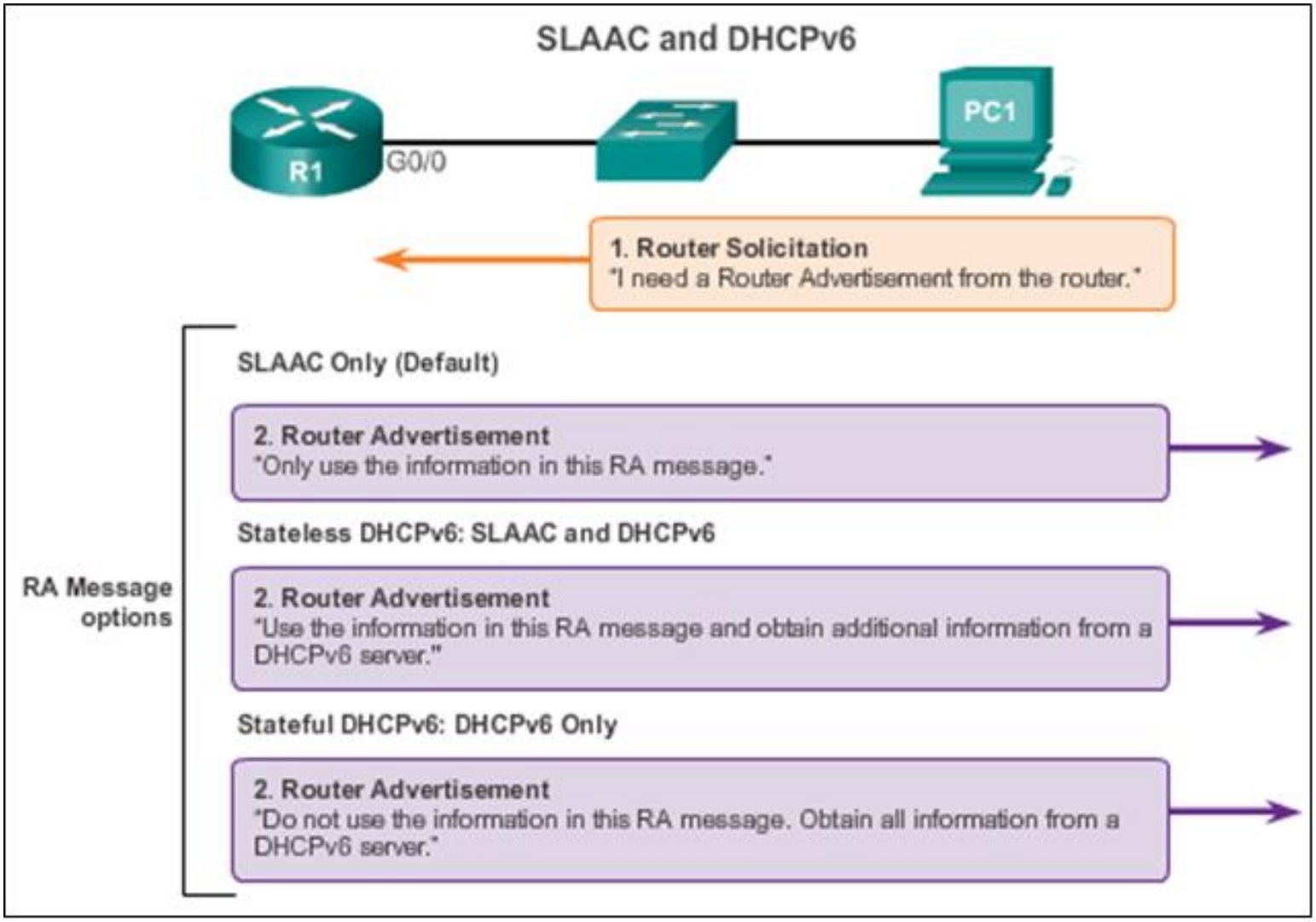


SLAAC and DHCPv6

SLAAC Operasyonu

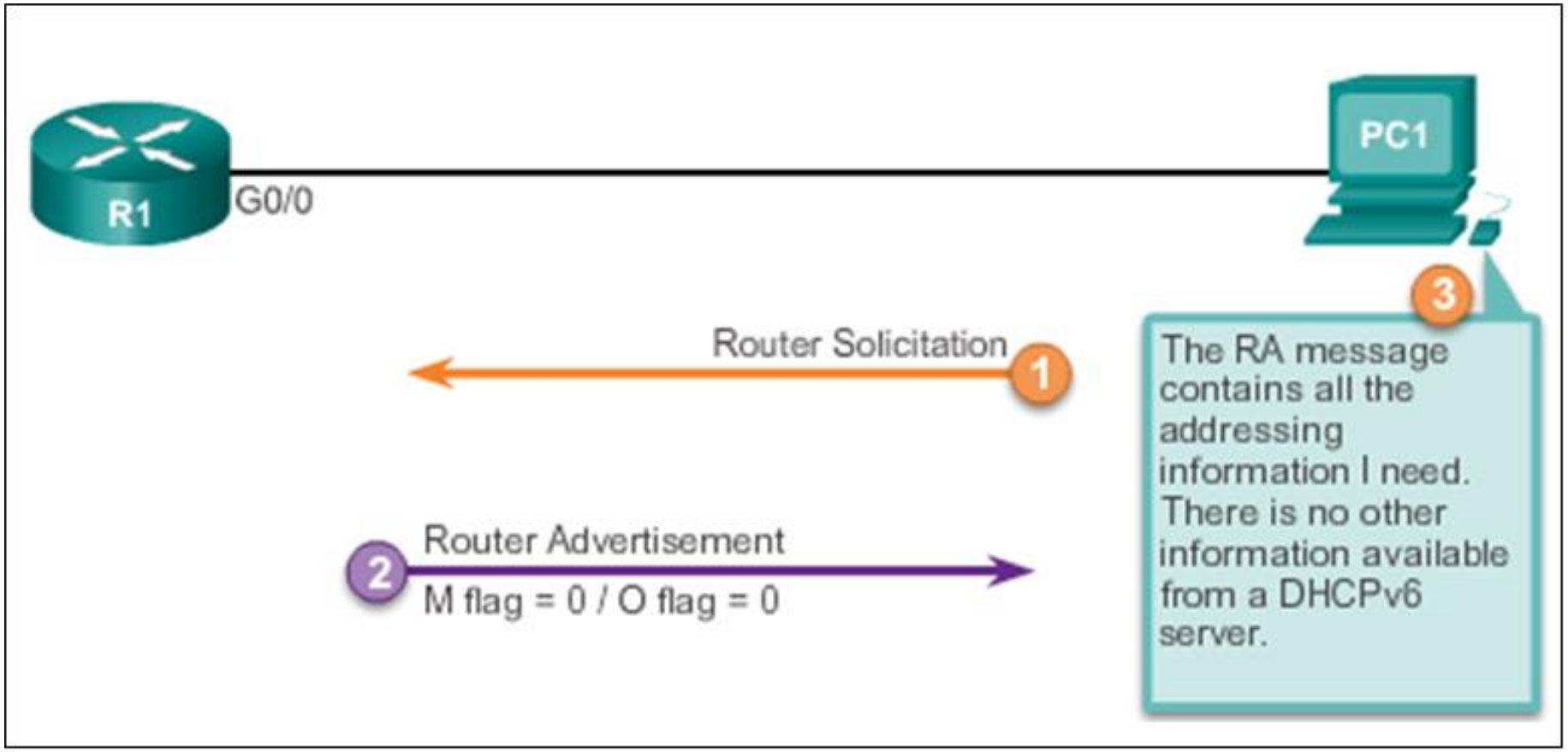


SLAAC and DHCPv6

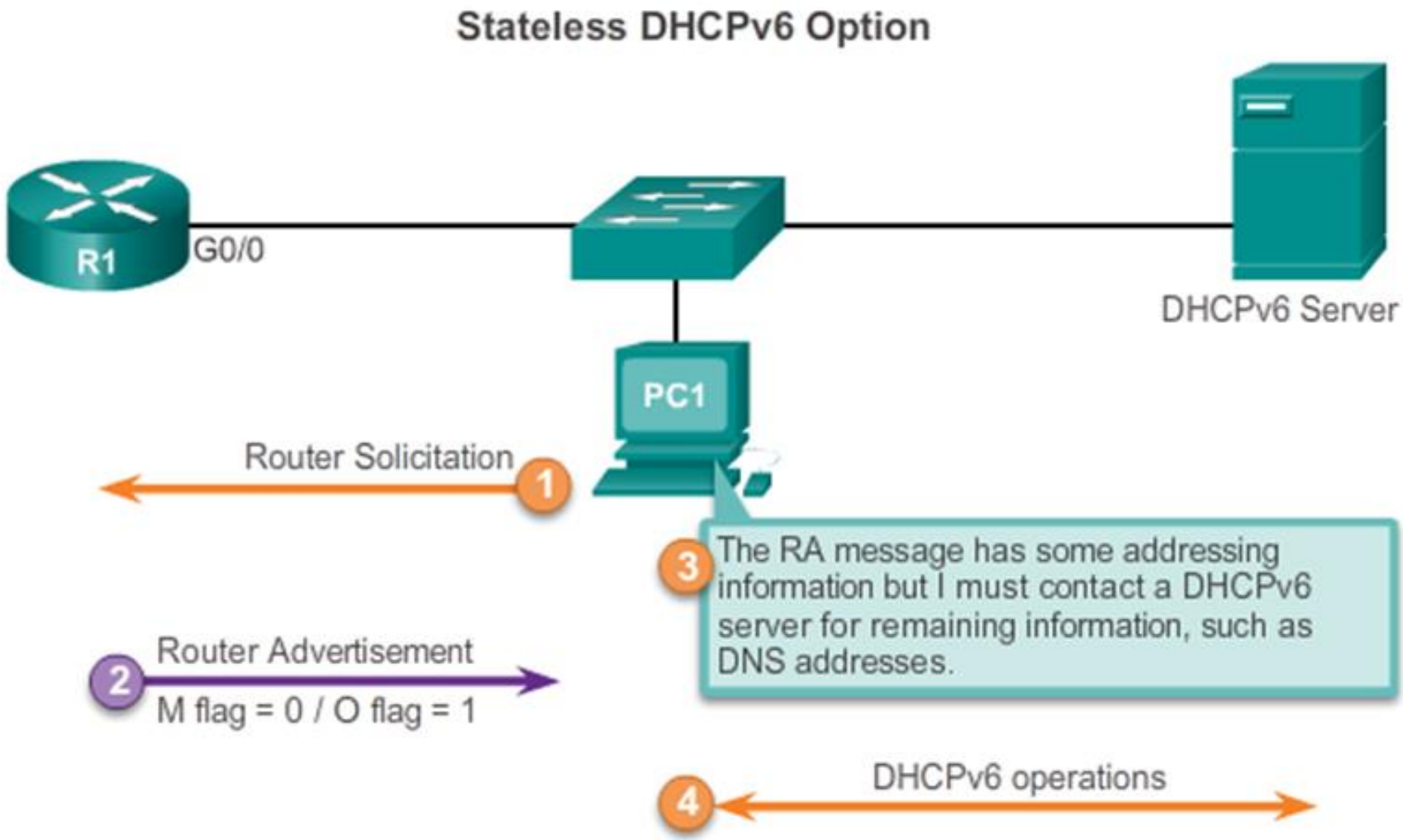


SLAAC and DHCPv6

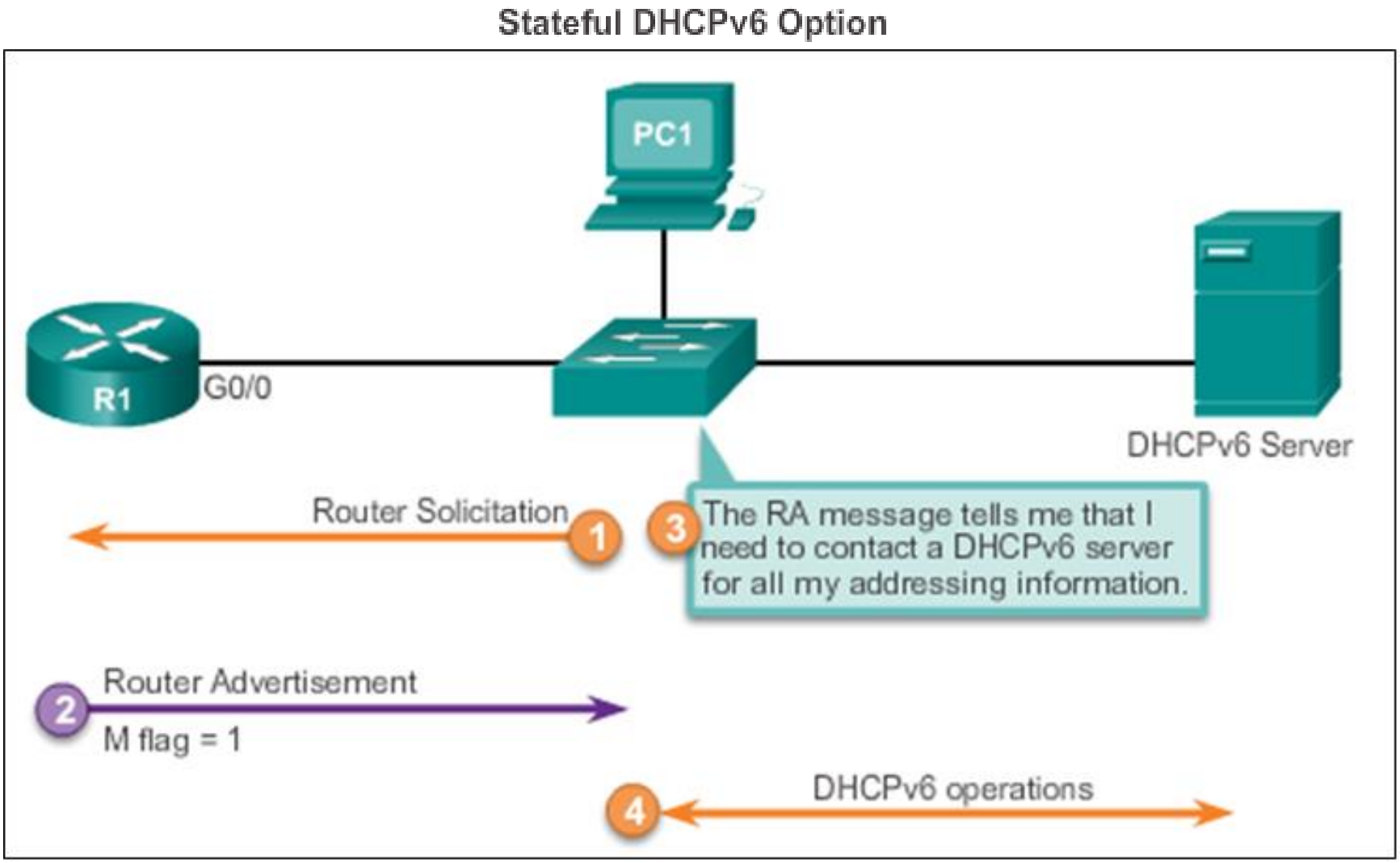
SLAAC Option



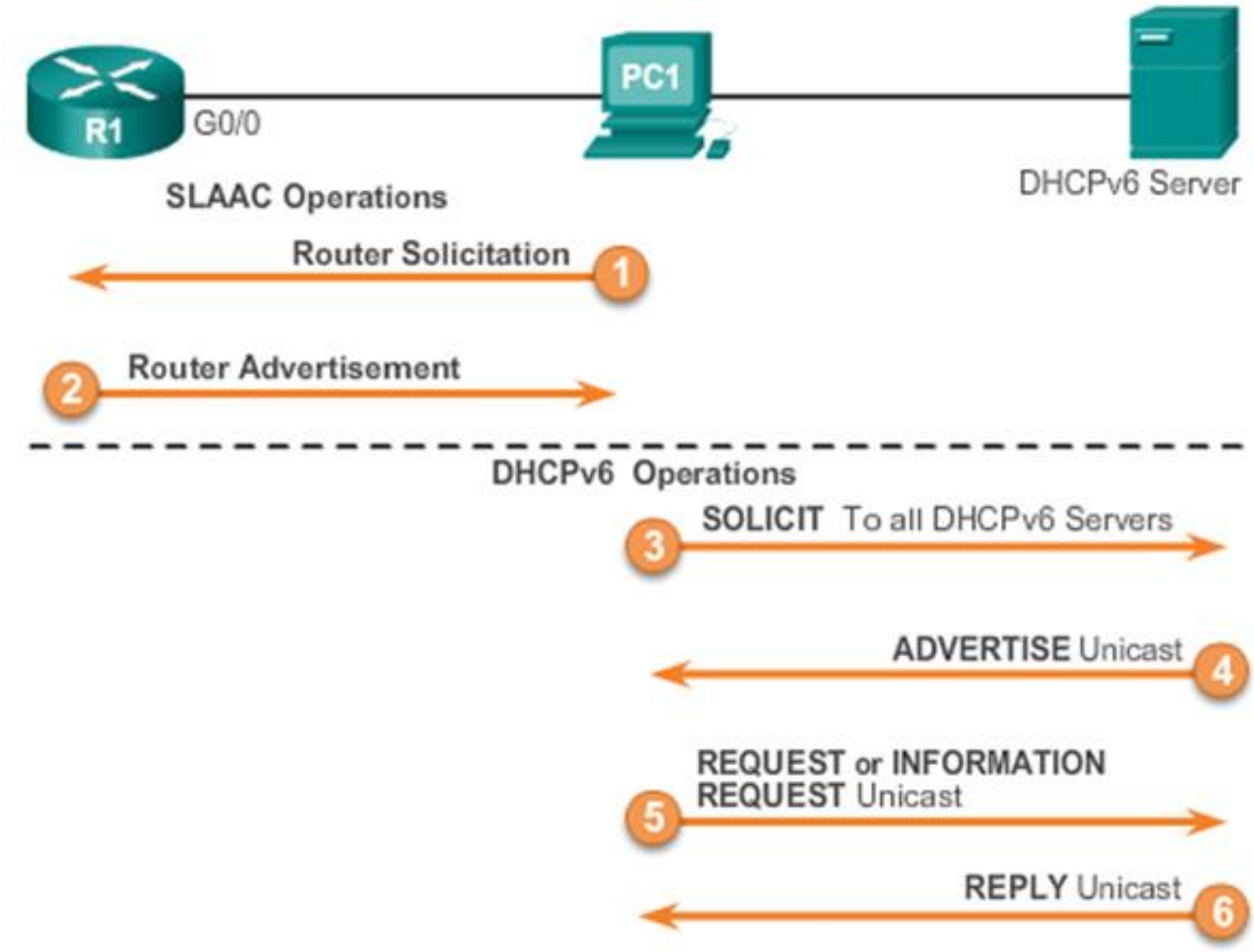
Stateless DHCP Option



Stateful DHCP Option

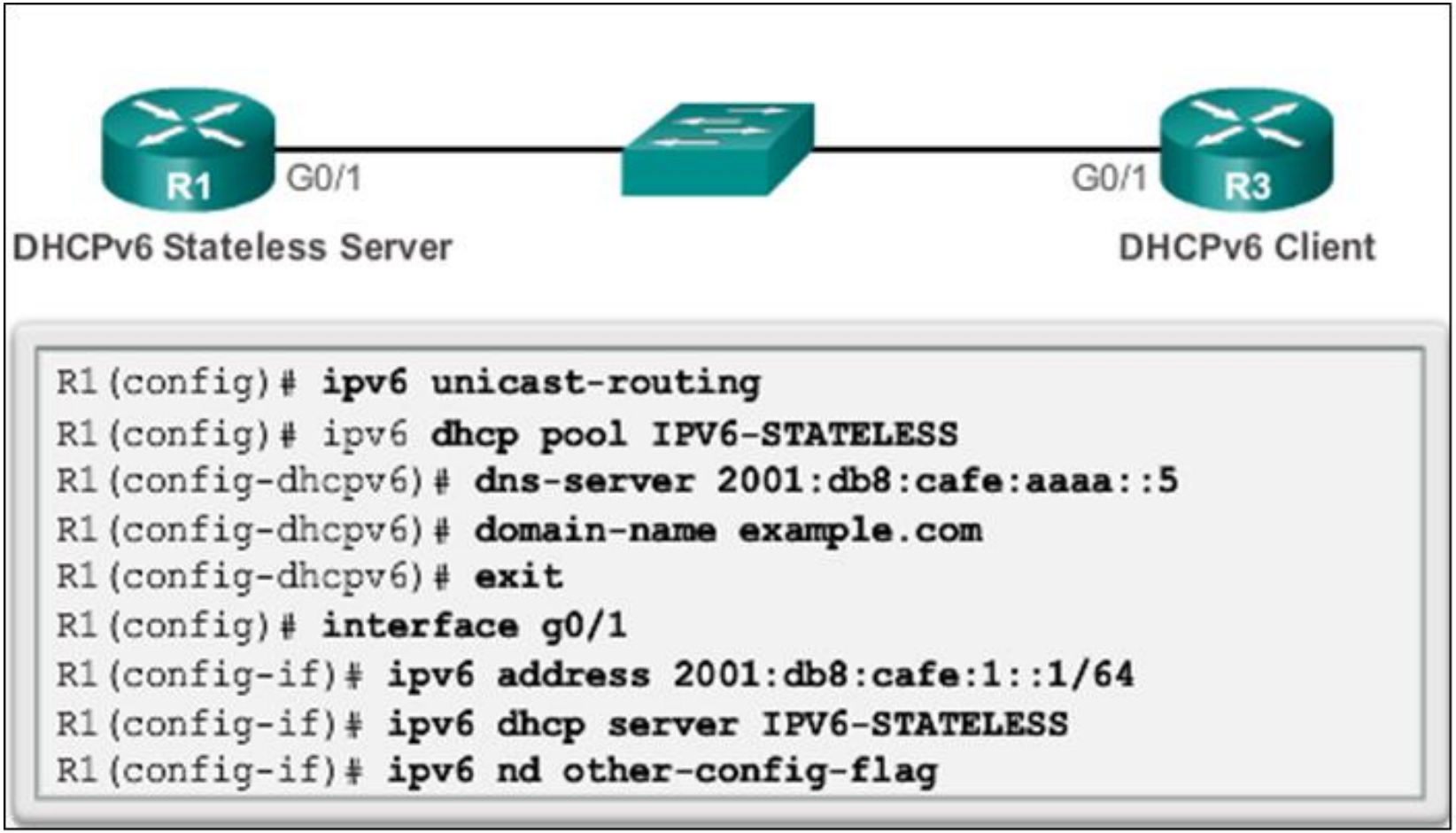


DHCPv6 Operations



Stateless DHCPv6

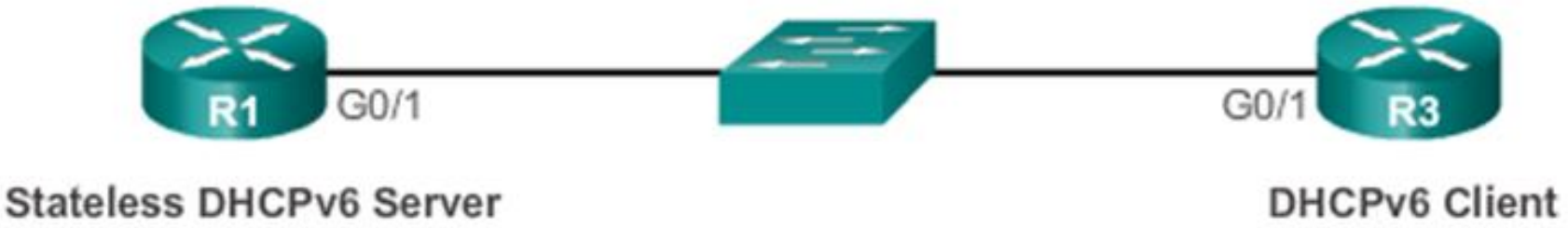
Configuring a Router as a Stateless DHCPv6 Server




```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATELESS
R1(config-dhcpv6)# dns-server 2001:db8:cafe:aaaa::5
R1(config-dhcpv6)# domain-name example.com
R1(config-dhcpv6)# exit
R1(config)# interface g0/1
R1(config-if)# ipv6 address 2001:db8:cafe:1::1/64
R1(config-if)# ipv6 dhcp server IPV6-STATELESS
R1(config-if)# ipv6 nd other-config-flag
```

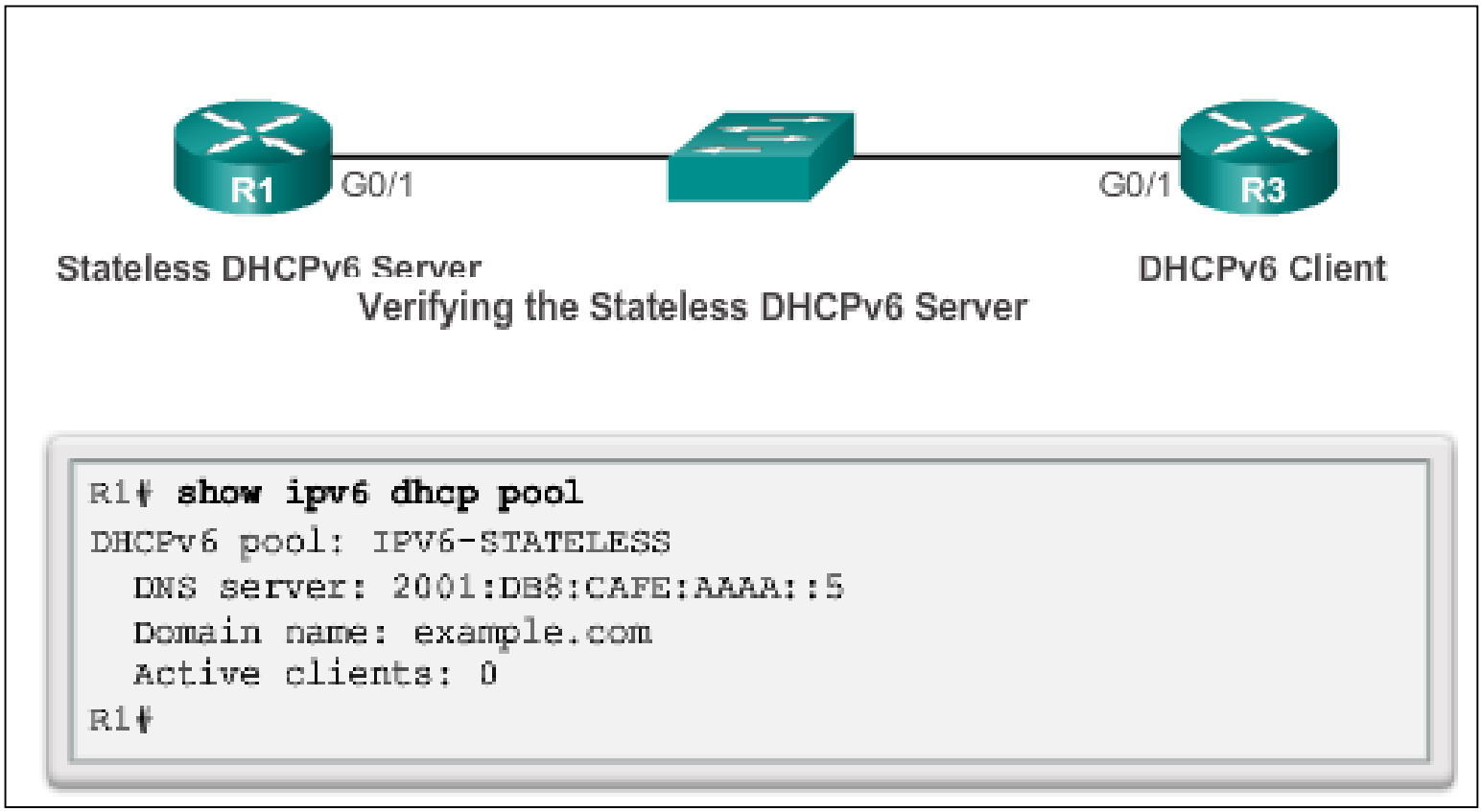
Configuring a Router as a Stateless DHCPv6 Client

Configuring a Router as Stateless DHCPv6 Client




```
R3(config)# interface g0/1
R3(config-if)# ipv6 enable
R3(config-if)# ipv6 address autoconfig
R3(config-if)#
```

Verifying Stateless DHCPv6

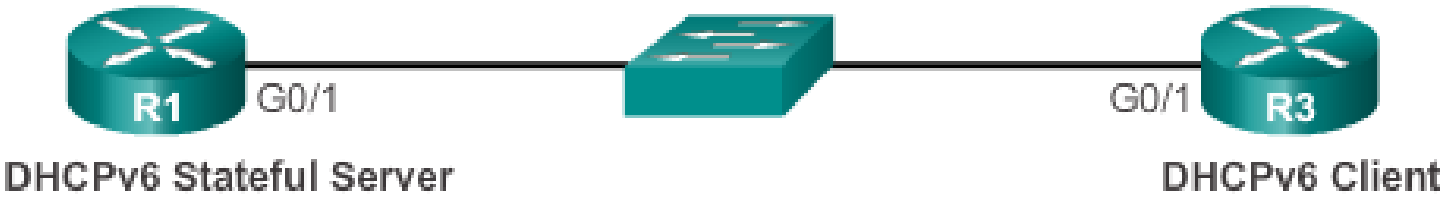


Verify the stateless DHCP client using the following commands:

- **show IPv6 interface**
- **debug ipv6 dhcp detail**

Stateful DHCPv6

Configuring a Router as a Stateful DHCPv6 Server



Configuring a Router as a Stateful DHCPv6 Server

```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATEFUL
R1(config-dhcpv6)# address prefix 2001:DB8:CAFE:1::/64
                    lifetime infinite infinite
R1(config-dhcpv6)# dns-server 2001:db8:cafe:aaaa::5
R1(config-dhcpv6)# domain-name example.com
R1(config-dhcpv6)# exit
R1(config)# interface g0/1
R1(config-if)# ipv6 address 2001:db8:cafe:1::1/64
R1(config-if)# ipv6 dhcp server IPV6-STATEFUL
R1(config-if)# ipv6 nd managed-config-flag
```

Verifying Stateful DHCPv6

- Verify the stateful DHCPv6 server using the following commands:

  show ipv6 dhcp pool
  show ipv6 dhcp binding

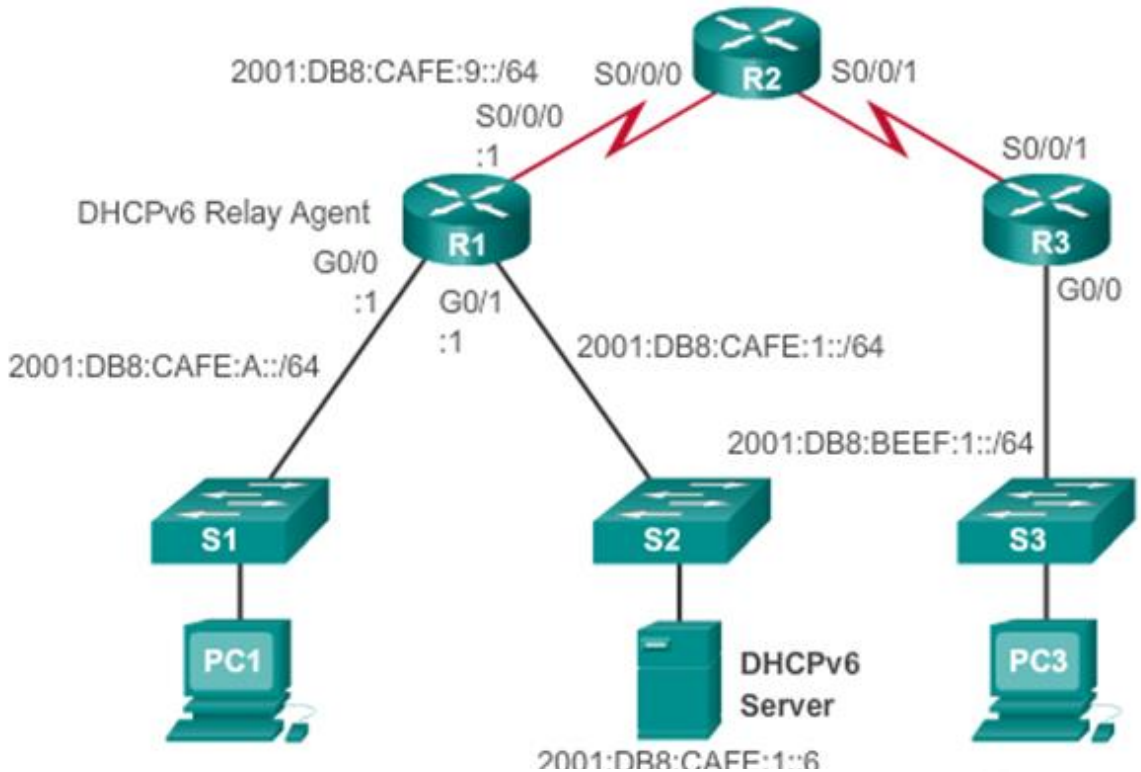
- Verify the stateful DHCPv6 client using the **show ipv6 interface** command.

```
R3# show ipv6 interface g0/1
GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is
FE80::32F7:DFF:FE25:2DE1
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:CAFE:1:5844:47B2:2603:C171, subnet is
2001:DB8:CAFE:1:5844:47B2:2603:C171/128
  Joined group address(es):
    FF02::1
    FF02::1:FF03:C171
    FF02::1:FF25:2DE1
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND NS retransmit interval is 1000 milliseconds
  Default router is FE80::D68C:B5FF:FECE:A0C1 on
```

Stateful DHCPv6

Configuring a Router as a Stateful DHCPv6 Relay Agent

DHCPv6 Relay Agent




```
R1(config)# interface g0/0
R1(config-if)# ipv6 dhcp relay destination 2001:db8:cafe:1::6
R1(config-if)# end
R1# show ipv6 dhcp interface g0/0
GigabitEthernet0/0 is in relay mode
  Relay destinations:
    2001:DB8:CAFE:1::6
```

Troubleshooting Tasks

Troubleshooting Task 1:	Resolve conflicts.
Troubleshooting Task 2:	Verify allocation method.
Troubleshooting Task 3:	Test with a static IPv6 address.
Troubleshooting Task 4:	Verify switch port configuration.
Troubleshooting Task 5:	Test from the same subnet or VLAN.

Troubleshooting DHCPv6

Verifying the Router DHCPv6 Configuration

```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATEFUL
R1(config-dhcpv6)# address prefix 2001:DB8:CAFE:1::/64 lifetime
infinite infinite
R1(config-dhcpv6)# dns-server 2001:db8:cafe:aaaa::5
R1(config-dhcpv6)# domain-name example.com
R1(config-dhcpv6)# exit
R1(config)# interface g0/1
R1(config-if)# ipv6 address 2001:db8:cafe:1::1/64
R1(config-if)# ipv6 dhcp server IPV6-STATEFUL
R1(config-if)# ipv6 nd managed-config-flag
```

Stateless DHCPv6 Services

```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATELESS
R1(config-dhcpv6)# dns-server 2001:db8:cafe:aaaa::5
R1(config-dhcpv6)# domain-name example.com
R1(config-dhcpv6)# exit
R1(config)# interface g0/1
R1(config-if)# ipv6 address 2001:db8:cafe:1::1/64
R1(config-if)# ipv6 dhcp server IPV6-STATELESS
R1(config-if)# ipv6 nd other-config-flag
```

Troubleshooting DHCPv6

Debugging DHCPv6

```
R1# debug ipv6 dhcp detail
   IPv6 DHCP debugging is on (detailed)
R1#
*Feb  3 21:27:41.123: IPv6 DHCP: Received SOLICIT from
FE80::32F7:DFF:FE25:2DE1 on GigabitEthernet0/1
*Feb  3 21:27:41.123: IPv6 DHCP: detailed packet contents
*Feb  3 21:27:41.123:   src FE80::32F7:DFF:FE25:2DE1
(GigabitEthernet0/1)
*Feb  3 21:27:41.127:   dst FF02::1:2
*Feb  3 21:27:41.127:   type SOLICIT(1), xid 13190645
*Feb  3 21:27:41.127:   option ELAPSED-TIME(8), len 2
*Feb  3 21:27:41.127:     elapsed-time 0
*Feb  3 21:27:41.127:   option CLIENTID(1), len 10
*Feb  3 21:27:41.127:     000
*Feb  3 21:27:41.127: IPv6 DHCP: Using interface pool IPV6-
STATEFUL
*Feb  3 21:27:41.127: IPv6 DHCP: Creating binding for
FE80::32F7:DFF:FE25:2DE1 in pool IPV6-STATEFUL
```

<Output omitted>

10.3 Summary

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Chapter 10: Summary

- All nodes on a network require a unique IP address to communicate with other devices.
- DHCPv4 includes three different address allocation methods:

  Manual Allocation

  Automatic Allocation

  Dynamic Allocation

- There are two methods available for the dynamic configuration of IPv6 global unicast addresses:

  Stateless Address Autoconfiguration (SLAAC)

  Dynamic Host Configuration Protocol for IPv6 (Stateful DHCPv6)

Chapter 10: Summary (cont.)

The same tasks are involved when troubleshooting DHCPv4 and DHCPv6:

- Resolve address conflicts.
- Verify physical connectivity.
- Test connectivity using a static IP address.
- Verify the switch port configuration.
- Test the operation on the same subnet or VLAN.