# DHCPv4 + SLAAC and DHCPv6

# DHCPv4

- DHCPv4 server dynamically assigns, or leases, an IPv4 address from a pool of addresses (and other network configuration) for a limited period of time.
- Clients lease information from the server for a defined period.
  Lease expires ➡ client asks for another address

## Disable the Cisco IOS DHCPv4 Server

```
R1(config)# no service dhcp
```

## Configure Cisco Router as a DHCPv4 Client

```
SOHO(config)# interface G0/0/1
SOHO(config-if)# ip address dhcp
```
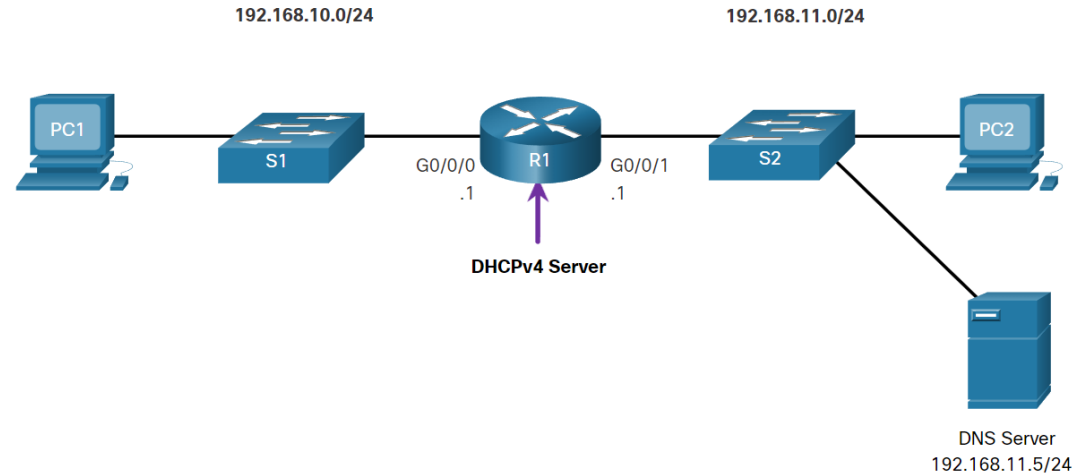
# Steps to Obtain a Lease

1️⃣ **DHCPDISCOVER:** Broadcast 👨‍👩‍👧

2️⃣ **DHCPOFFER:** Unicast 🥷

3️⃣ **DHCPREQUEST:** Broadcast 👨‍👩‍👧

4️⃣ **DHCPACK:** Unicast 🥷

# Steps to Renew a Lease

1️⃣ **DHCPREQUEST:** Unicast 🥷

2️⃣ **DHCPACK:** Unicast 🥷

# Configure a Cisco IOS DHCPv4 Server



```
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# show running-config | section dhcp
R1# show ip dhcp binding
R1# show ip dhcp server statistics
```
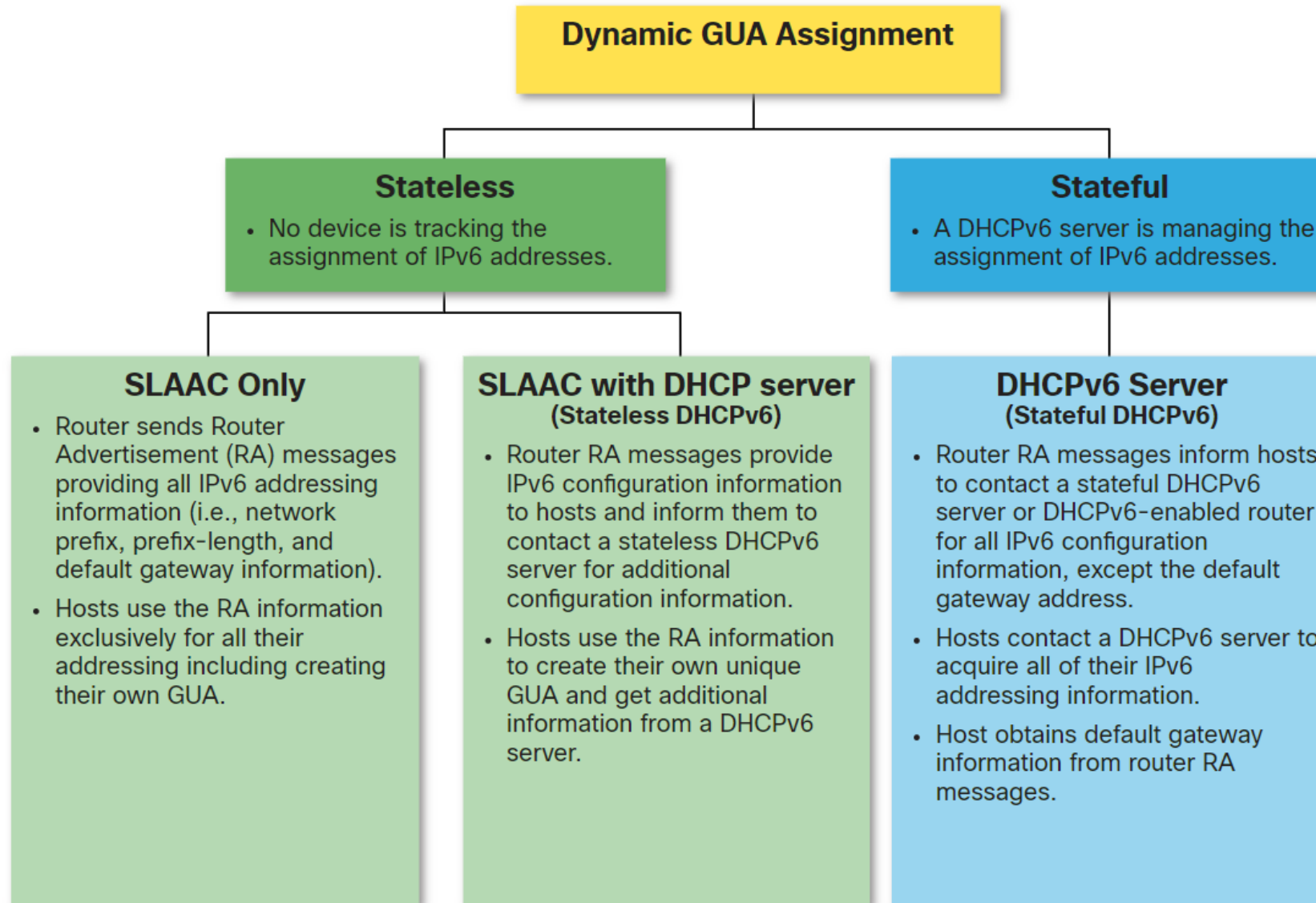
# DHCPv4 Relay
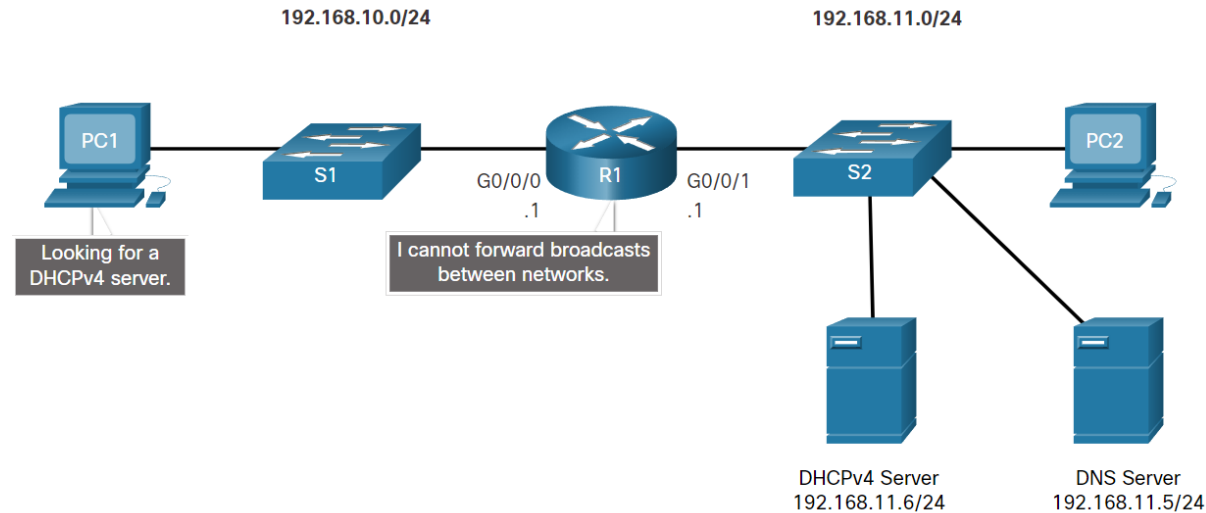


```
R1(config)# interface g0/0/0
R1(config-if)# ip helper-address 192.168.11.6
```

## Other Service Broadcasts Relayed

37 Time, 49 TACACS, 53 DNS, 67 DHCP/BOOTP server, 68 DHCP/BOOTP client, 69 TFTP, 137 NetBIOS name service, 138 NetBIOS datagram service

# SLAAC and DHCPv6 – Dynamic GUA Assignment

**Dynamic GUA Assignment**

**Stateless**
- No device is tracking the assignment of IPv6 addresses.

**Stateful**
- A DHCPv6 server is managing the assignment of IPv6 addresses.

**SLAAC Only**
- Router sends Router Advertisement (RA) messages providing all IPv6 addressing information (i.e., network prefix, prefix-length, and default gateway information).
- Hosts use the RA information exclusively for all their addressing including creating their own GUA.

**SLAAC with DHCP server**
(Stateless DHCPv6)
- Router RA messages provide IPv6 configuration information to hosts and inform them to contact a stateless DHCPv6 server for additional configuration information.
- Hosts use the RA information to create their own unique GUA and get additional information from a DHCPv6 server.

**DHCPv6 Server**
(Stateful DHCPv6)
- Router RA messages inform hosts to contact a stateful DHCPv6 server or DHCPv6-enabled router for all IPv6 configuration information, except the default gateway address.
- Hosts contact a DHCPv6 server to acquire all of their IPv6 addressing information.
- Host obtains default gateway information from router RA messages.

# IPv6 GUA Assignment - 3 RA Message Flags

- A flag (A: `1`, O: `0`, M: `0`): Autoconfiguration. **SLAAC Only**

```
R1(config)# ipv6 unicast-routing
```

- O flag (A: `1`, O: `1`, M: `0`): Other configuration. **SLAAC with DHCPv6 Server (Stateless DHCPv6)**

```
R1(config)# ipv6 nd other-config-flag
```

- M flag (A: `0`, O: `0`, M: `1`): Managed address configuration. **DHCPv6 Server (Stateful DHCPv6)**

```
R1(config)# int g0/0/1
R1(config-if)# ipv6 nd managed-config-flag
R1(config-if)# ipv6 nd prefix default no-autoconfig
```

# Configure a Stateless DHCPv6 Server (A: 1, O: 1, M: 0)

**Stateless DHCPv6 Server**

R1

2001:db8:acad:1::1/64
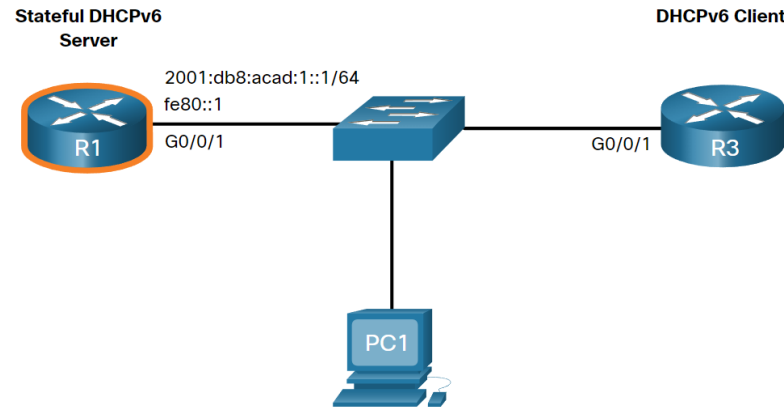fe80::1
G0/0/1

**Client**

R3

G0/0/1

PC1
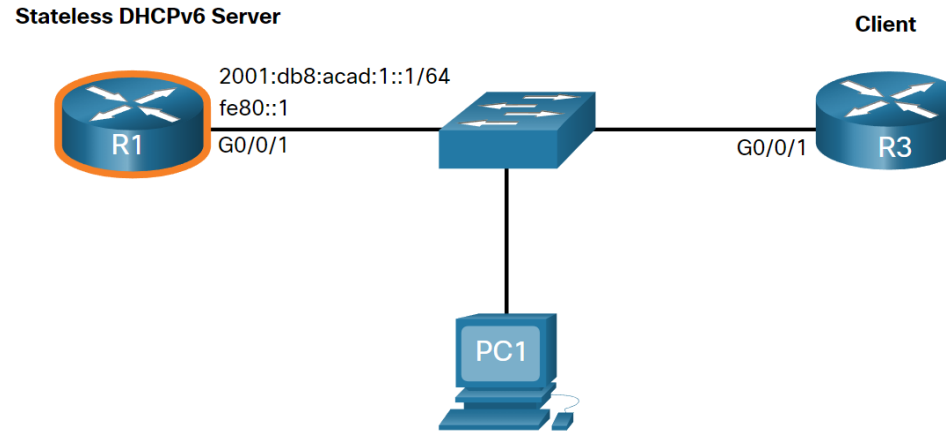
```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATELESS
R1(config-dhcpv6)# dns-server 2001:db8:acad:1::254
R1(config-dhcpv6)# domain-name example.com
R1(config)# interface GigabitEthernet0/0/1
R1(config-if)# description Link to LAN
R1(config-if)# ipv6 address fe80::1 link-local
R1(config-if)# ipv6 address 2001:db8:acad:1::1/64
R1(config-if)# ipv6 nd other-config-flag
R1(config-if)# ipv6 dhcp server IPV6-STATELESS
R1(config-if)# no shut
```

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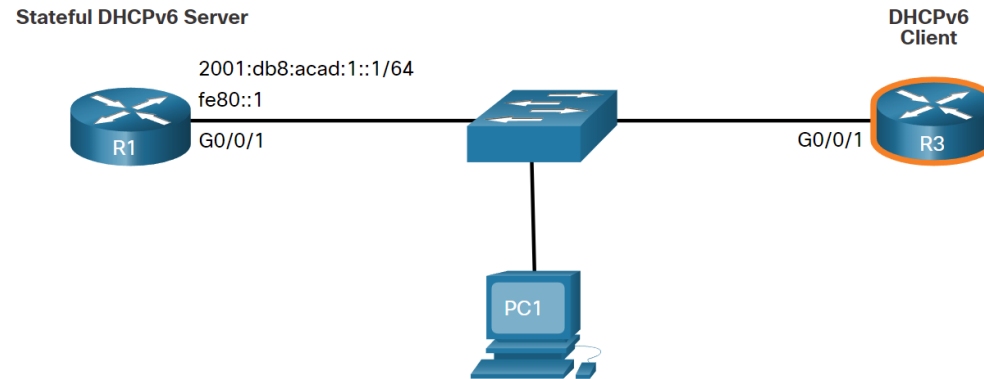# Configure a Stateless DHCPv6 Client (A: 1, O: 1, M: 0)
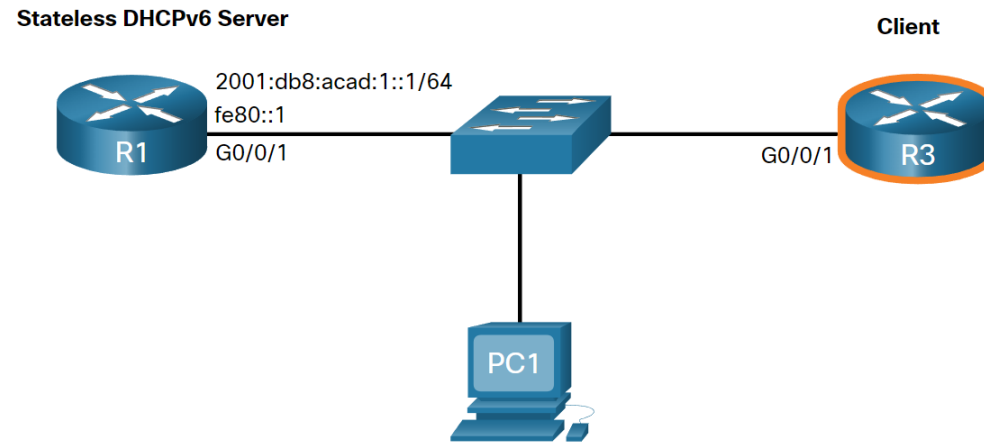


```
R1(config)# ipv6 unicast-routing
R3(config)# interface g0/0/1
R3(config-if)# ipv6 enable
R3(config-if)# ipv6 address autoconfig
R3(config-if)# end
R3# show ipv6 interface brief
R3# show ipv6 dhcp interface g0/0/1
```

# Configure a Stateful DHCPv6 Server (A: 0, O: 0, M: 1)



```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 dhcp pool IPV6-STATEFUL
R1(config-dhcpv6)# address prefix 2001:db8:acad:1::/64
R1(config-dhcpv6)# dns-server 2001:4860:4860::8888
R1(config-dhcpv6)# domain-name example.com
R1(config)# interface GigabitEthernet0/0/1
R1(config-if)# description Link to LAN
R1(config-if)# ipv6 address fe80::1 link-local
R1(config-if)# ipv6 address 2001:db8:acad:1::1/64
R1(config-if)# ipv6 nd managed-config-flag
R1(config-if)# ipv6 nd prefix default no-autoconfig
R1(config-if)# ipv6 dhcp server IPV6-STATEFUL
R1(config-if)# no shut
```

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# Configure a Stateful DHCPv6 Client (A: 0 , O: 0 , M: 1 )



**Stateful DHCPv6 Server**

2001:db8:acad:1::1/64
fe80::1

R1    G0/0/1

**DHCPv6 Client**

G0/0/1    R3

PC1

```
R3(config)# ipv6 unicast-routing
R3(config)# interface g0/0/1
R3(config-if)# ipv6 enable
R3(config-if)# ipv6 address dhcp
R3(config-if)# end
R3# show ipv6 interface brief
R3# show ipv6 dhcp interface g0/0/1

R1# show ipv6 dhcp pool
R1# show ipv6 dhcp binding
```

# Configure a DHCPv6 Relay Agent

**2001:db8:acad:2::/64**                    **2001:db8:acad:1::/64**
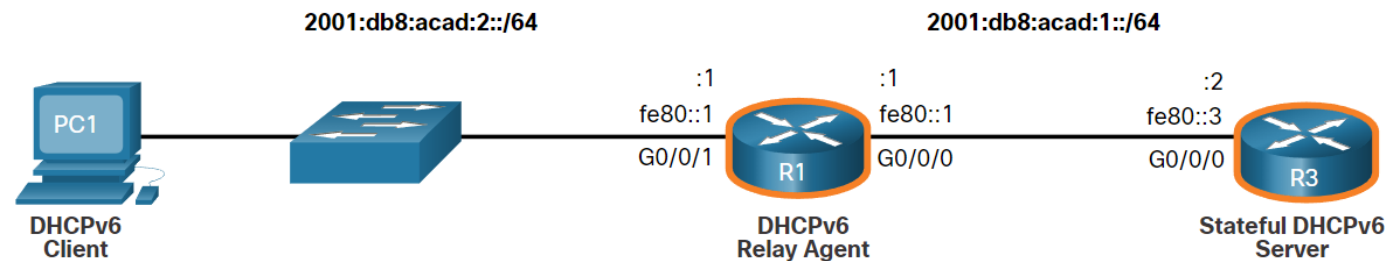


```
R1(config)# interface gigabitethernet 0/0/1
R1(config-if)# ipv6 dhcp relay destination 2001:db8:acad:1::2 G0/0/0
R1(config-if)# exit
R1# show ipv6 dhcp interface
R3# show ipv6 dhcp binding
```