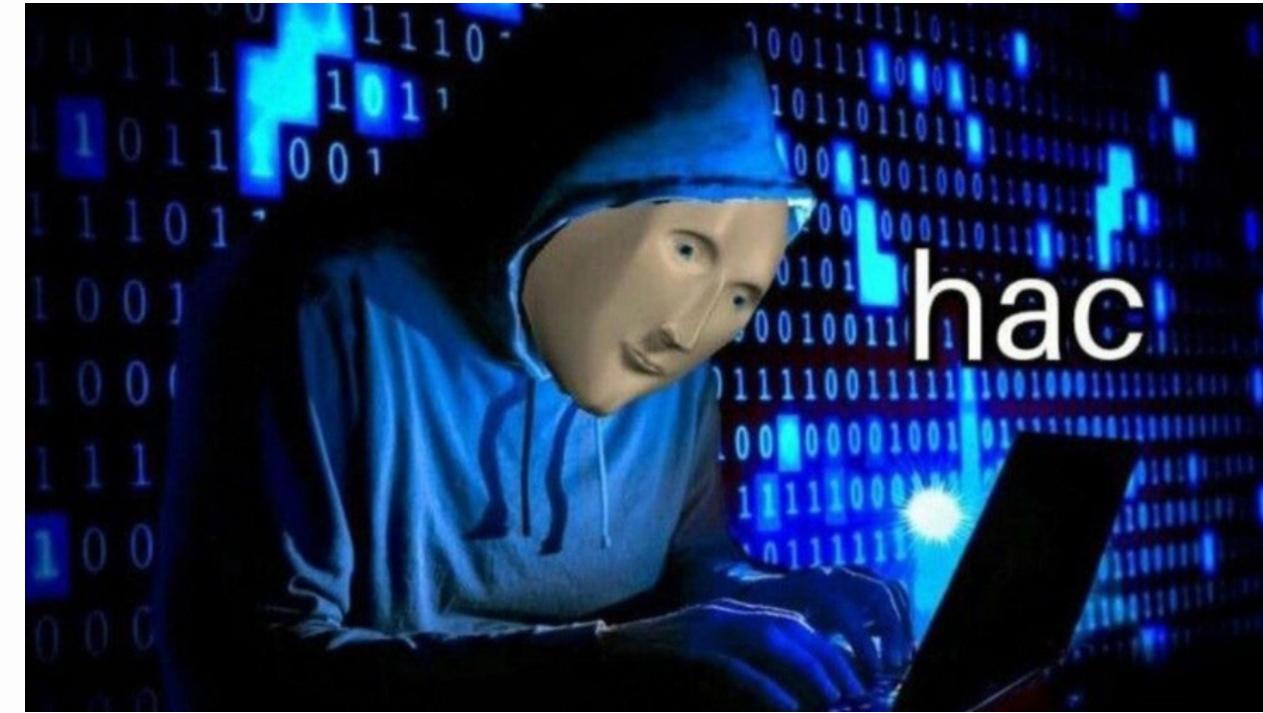




D H C P V 4



WHAT IS DHCP V4?

DHCP stands for Dynamic Host Configuration Protocol, a network protocol that allows devices to automatically obtain an IP address and other network configuration information from a DHCP server.



WHAT IS DHCPV4?

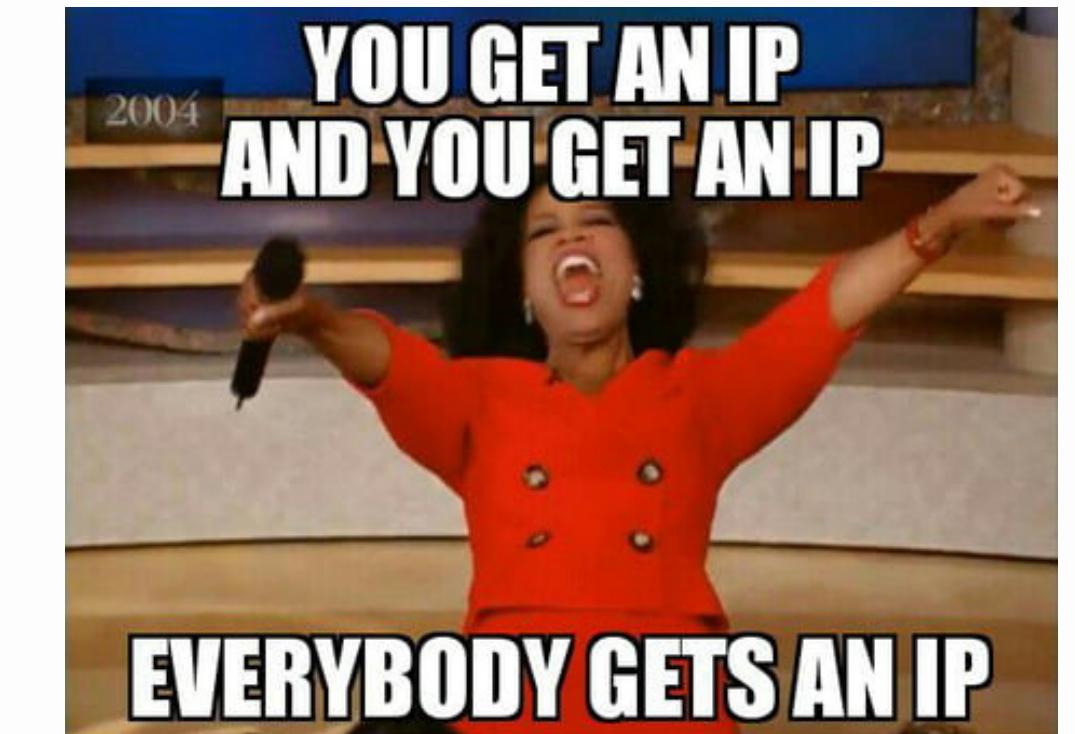
The DHCPv4 server dynamically assigns, or leases, an IPv4 address from a pool of addresses for a limited period of time chosen by the server, or until the client no longer needs the address.

D H C P V 4 O P E R A T I O N S

DHCPv4 works in a client/server mode. When a client communicates with a DHCPv4 server, the server assigns or leases an IPv4 address to that client.

The client connects to the network with that leased IPv4 address until the lease expires. The client must contact the DHCP server periodically to extend the lease.

This lease mechanism ensures that clients that move or power off do not keep addresses that they no longer need.

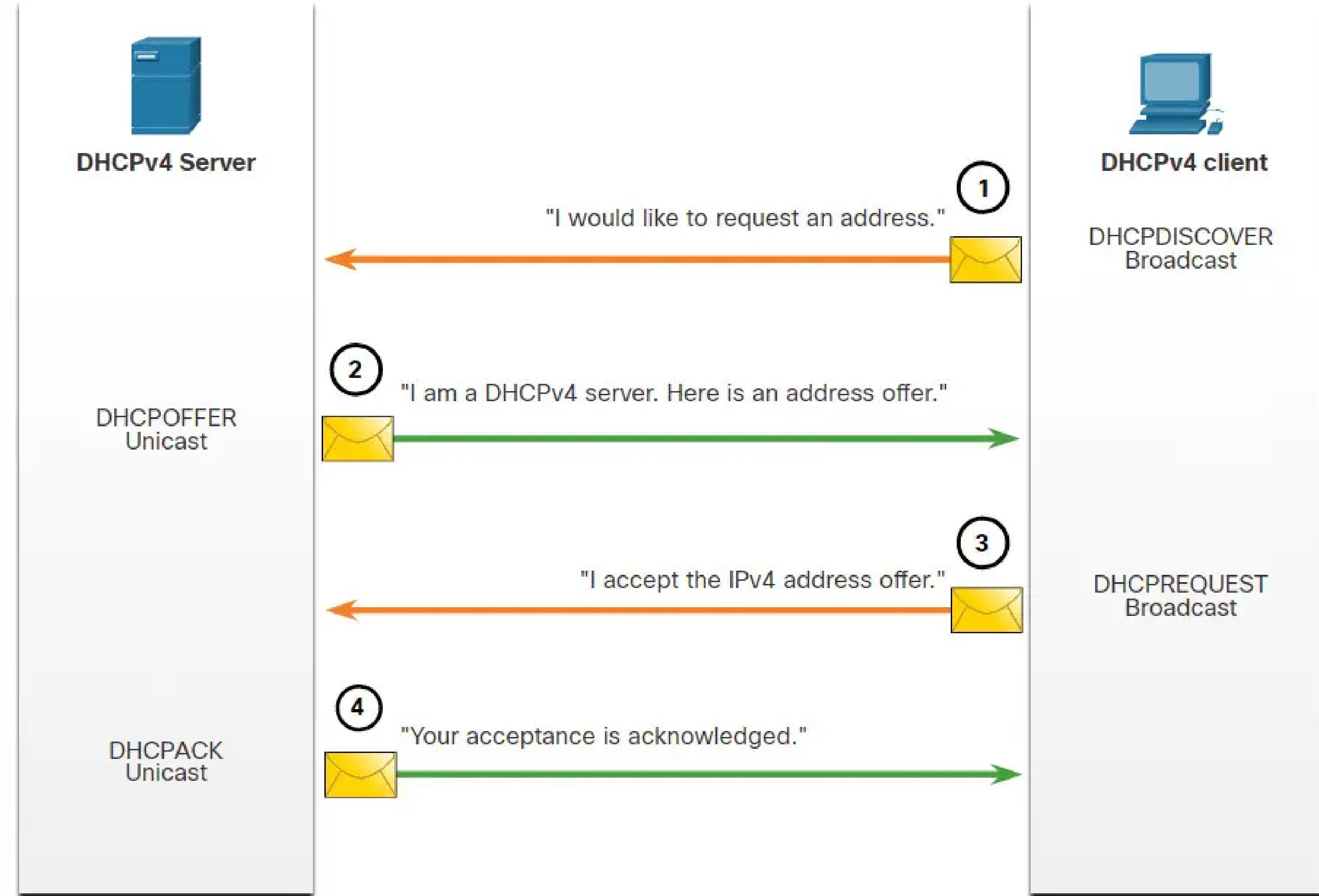


When a lease expires, the DHCP server returns the address to the pool where it can be reallocated as necessary.



STEPS TO OBTAIN THE LEASE

1. **DHCP Discover (DHCPDISCOVER)**
2. **DHCP Offer (DHCPOFFER)**
3. **DHCP Request (DHCPREQUEST)**
4. **DHCP Acknowledgment (DHCPACK)**





DHCPv4 Server



DHCPv4 Client

①

"I would like to renew my lease."



②

"Your request is acknowledged."



DHCPACK
Unicast

ADVANTAGES AND
DISADVANTAGES OF
DHCPV4

ADVANTAGES OF DHCPV4

- Simplifies network management: DHCPv4 eliminates the need for manual IP address assignment, which can be time-consuming and error-prone, especially in large networks.
- Centralized IP address management: DHCPv4 allows for centralized management of IP addresses, making it easier to track and manage IP address usage.
- Dynamic IP address assignment: DHCPv4 can assign dynamic IP addresses to clients, which means that IP addresses are only assigned when needed, reducing IP address waste.
- Supports automatic network configuration: DHCPv4 can automatically configure network settings, such as DNS servers, gateways, and subnet masks, which simplifies network configuration for clients.

DISADVANTAGES OF DHCPV4

- Dependency on DHCP server: Clients that rely on DHCPv4 for IP address assignment are dependent on the availability and reliability of the DHCP server.
- Security risks: DHCPv4 can be vulnerable to security threats, such as rogue DHCP servers, which can distribute incorrect or malicious IP addresses or intercept traffic on the network.
- Limited flexibility: DHCPv4 does not support advanced network configurations, such as load balancing or failover, which may be required in larger or more complex networks.
- IPv4 only: DHCPv4 is only applicable to IPv4 networks and does not support IPv6, which may be a limitation as more networks transition to IPv6



STEPS TO CONFIGURE A CISCO IOS DHCPV4 SERVER

Step 1. Exclude IPv4 addresses.

Step 2. Define a DHCPv4 pool name.

Step 3. Configure the DHCPv4 pool.

Task	Command
Define the address pool.	<code>network network-number [mask / prefix-length]</code>
Define the default router or gateway.	<code>default-router address [address2...address8]</code>
Define a DNS server.	<code>dns-server address [address2...address8]</code>
Define the domain name.	<code>domain-name domain</code>
Define the duration of the DHCP lease.	<code>lease {days [hours [minutes]] infinite}</code>
Define the NetBIOS WINS server.	<code>netbios-name-server address [address2...address8]</code>

Command	Description
show running-config section dhcp	Displays the DHCPv4 commands configured on the router.
show ip dhcp binding	Displays a list of all IPv4 address to MAC address bindings provided by the DHCPv4 service.
show ip dhcp server statistics	Displays count information regarding the number of DHCPv4 messages that have been sent and received.

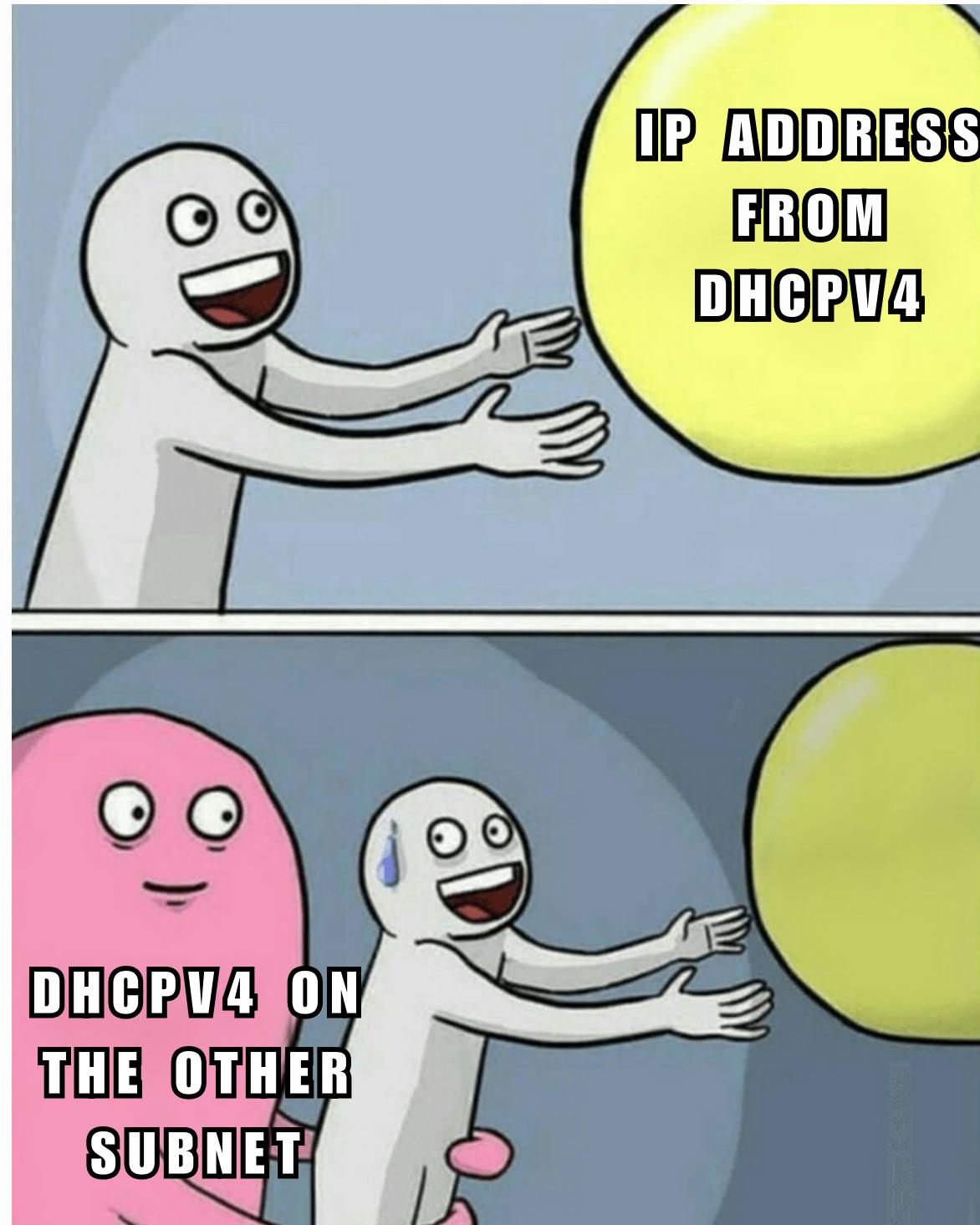


```
R1(config)# ip dhcp excluded-address 192.168.10.1 192.168.10.9  
R1(config)# ip dhcp excluded-address 192.168.10.254  
R1(config)# ip dhcp pool LAN-POOL-1  
R1(dhcp-config)# network 192.168.10.0 255.255.255.0  
R1(dhcp-config)# default-router 192.168.10.1  
R1(dhcp-config)# dns-server 192.168.11.5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

DISABLE THE CISCO IOS DHCPV4 SERVER

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





D H C P V 4 R E L A Y

A DHCPv4 relay is a device that forwards DHCPv4 messages from one network segment to another. This is useful when devices requesting an IP address are not on the same subnet as the DHCP server that assigns the addresses. The DHCPv4 relay helps the devices obtain IP addresses by forwarding the messages to the DHCP server on their behalf.



192.168.10.0/24



Looking for a
DHCPv4 server.



G0/0/0
.1

R1
.1



G0/0/1
.1

S2



PC2



DHCPv4 Server
192.168.11.6/24



DNS Server
192.168.11.5/24

I cannot forward broadcasts
between networks.

An IP helper is a feature that allows a device to forward certain types of network traffic, such as DHCP requests, to a different network segment. This is done by modifying the destination IP address of the network traffic to that of the device that provides the required service on the different network segment.



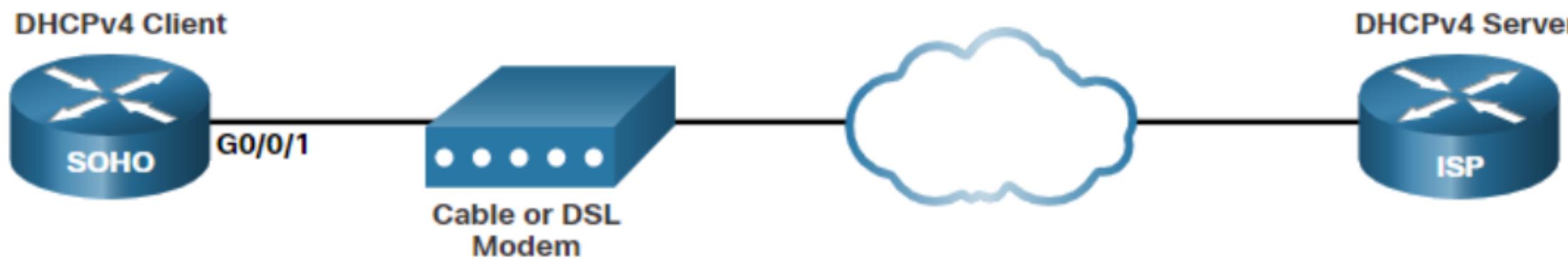
```
R1(config)# interface g0/0/0
R1(config-if)# ip helper-address 192.168.11.6
R1(config-if)# end
R1#
```



CONFIGURE A DHCP V4 CLIENT

CISCO ROUTER AS DHCPV4 CLIENT

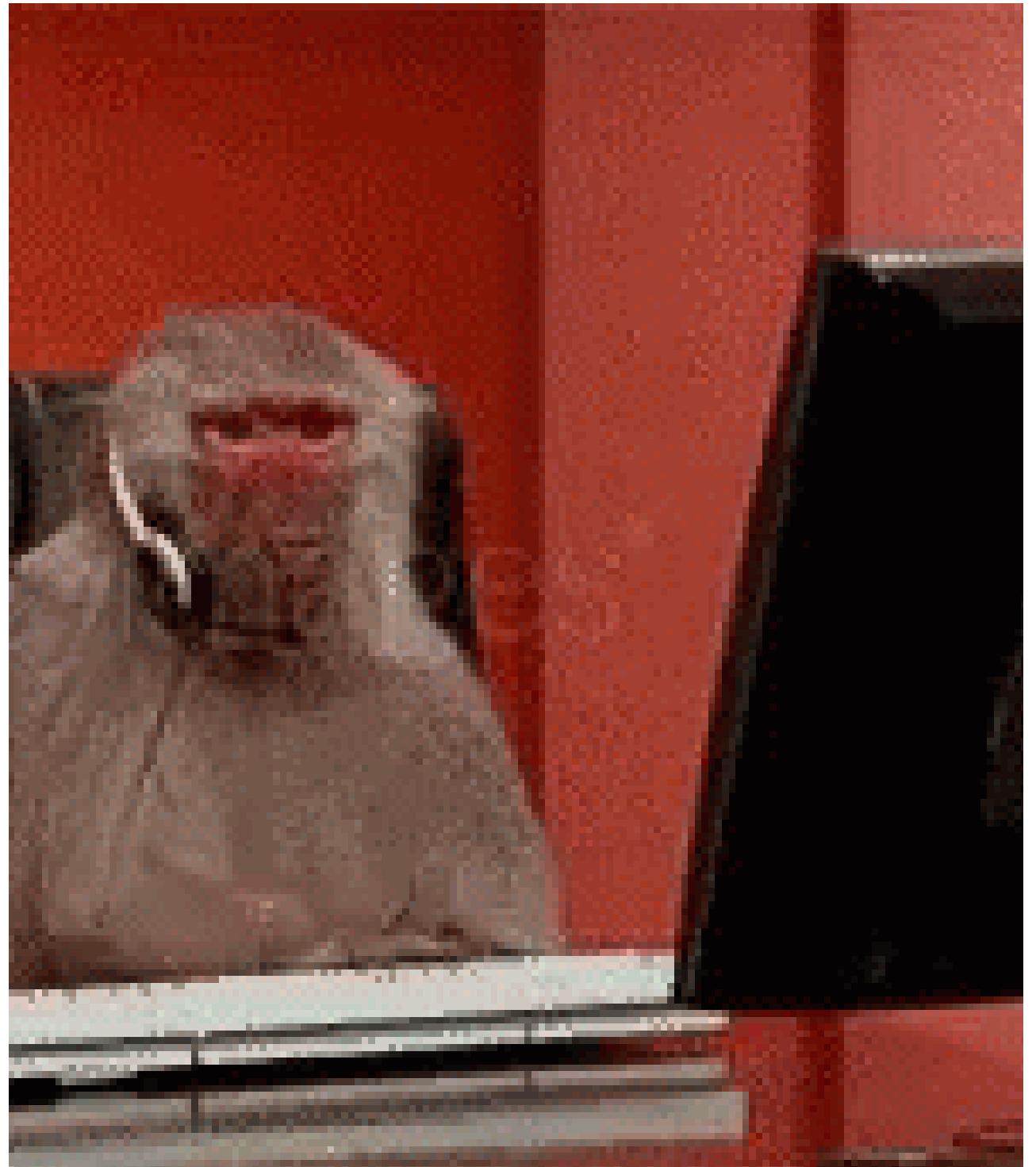
There are scenarios where you might have access to a DHCP server through your ISP. In these instances, you can configure a Cisco IOS router as a DHCPv4 client.



CONFIGURATION EXAMPLE

```
SOHO(config)# interface G0/0/1
SOHO(config-if)# ip address dhcp
SOHO(config-if)# no shutdown
Sep 12 10:01:25.773: %DHCP-6-ADDRESS_ASSIGN: Interface
GigabitEthernet0/0/1 assigned DHCP address 209.165.201.12,
mask 255.255.255.254, hostname SOHO
```

```
SOHO# show ip interface g0/0/1
GigabitEthernet0/0/1 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)
```



HOME ROUTER AS A DHCPV4 CLIENT

Home routers are typically already set to receive IPv4 addressing information automatically from the ISP. This is so that customers can easily set up the router and connect to the internet.

The screenshot shows a web-based configuration interface for a "Wireless Tri-Band Home Router". The top navigation bar includes the router's name, "Firmware Version: v0.9.7", and tabs for "Setup", "Wireless", "Security", "Access Restrictions", "Applications & Gaming", "Administration", and "Status". The "Setup" tab is currently selected. Below the tabs, sub-options like "Basic Setup" and "Advanced Routing" are visible. The main content area is titled "Internet Setup" and contains a dropdown menu set to "Automatic Configuration - DHCP". To the left, a sidebar lists "Internet Connection type" and "Optional Settings (required by some internet service providers)". The optional settings include fields for "Host Name", "Domain Name", and "MTU Size". A "Help..." link is located on the right side of the main content area.

Wireless Tri-Band Home Router

Firmware Version: v0.9.7

Setup **Wireless** **Security** **Access Restrictions** **Applications & Gaming** **Administration** **Status**

Basic Setup DDNS MAC Address Clone Advanced Routing

Internet Setup

Internet Connection type: Automatic Configuration - DHCP

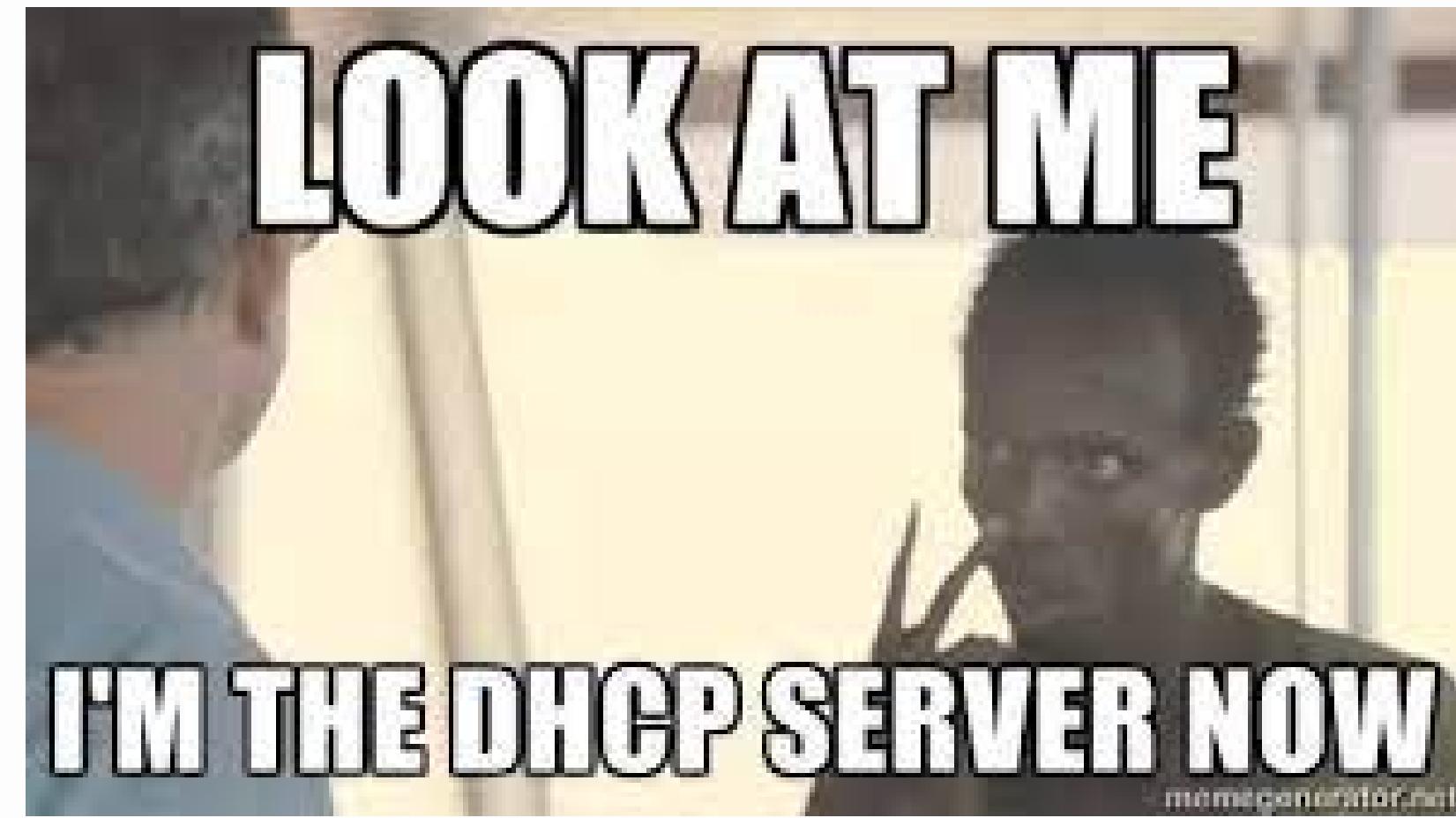
Host Name:

Domain Name:

Optional Settings (required by some internet service providers)

MTU: Size: 1500

Help...



THANK YOU