

Host Configuration: DHCP

INTRODUCTION TO DHCP

Dynamic Host Configuration Protocol

Each computer that uses the TCP/IP protocol suite needs to know its IP address.

DHCP consists of two components:

- **A protocol for delivering host-specific configuration parameters from a DHCP Server to a host**
- **A mechanism for allocating network addresses to hosts.**

DHCP is built on a client/server model, where designated DHCP Server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts.

By default, Cisco routers running Cisco IOS software include DHCP server and relay agent software.

DHCP supports three mechanisms for IP address allocation:

Automatic allocation—DHCP assigns a permanent IP address to a client.

Dynamic allocation—DHCP assigns an IP address to a client for a limited period of time (or until the client explicitly relinquishes the address).

Manual allocation—The network administrator assigns an IP address to a client and DHCP is used simply to convey the assigned address to the client.

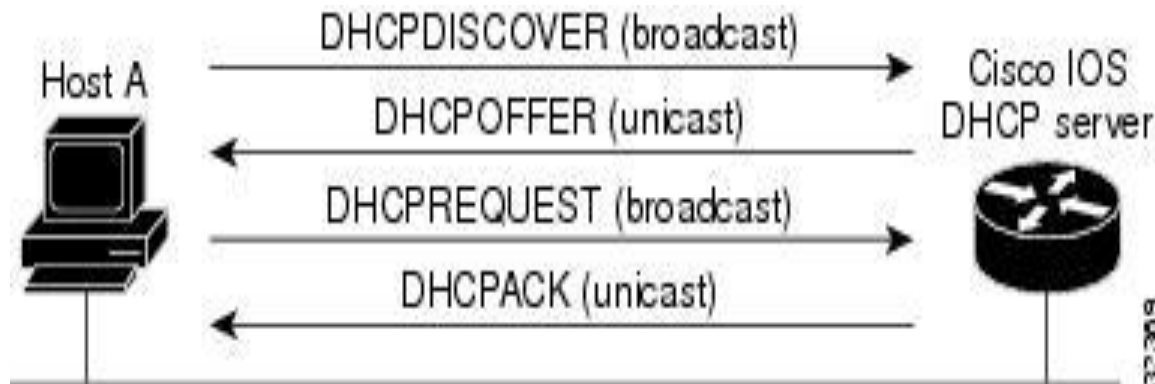
The format of DHCP messages is based on the format of Bootstrap Protocol (BOOTP) messages

Process of Address Allocation in DHCP

The client, Host A, sends a DHCPDISCOVER broadcast message to locate a Cisco IOS DHCP Server

A DHCP Server offers configuration parameters (such as an IP address, a MAC address, a domain name, and a lease for the IP address) to the client in a DHCPOFFER unicast message.

If the configuration parameters sent to the client in the DHCPOFFER unicast message by the DHCP Server are invalid (a misconfiguration error exists), the client returns a DHCPDECLINE broadcast message to the DHCP Server.



Process of Address Allocation in DHCP

The client returns a formal request for the offered IP address to the DHCP Server in a DHCPREQUEST broadcast message

The DHCP Server confirms that the IP address has been allocated to the client by returning a DHCPACK unicast message to the client.

A DHCP client may receive offers from multiple DHCP Servers and can accept any one of the offers; however, the client usually accepts the first offer it receives.

Additionally, the offer from the DHCP Server is not a guarantee that the IP address will be allocated to the client; however, the server usually reserves the address until the client has had a chance to formally request the address.

Process of Address Allocation in DHCP

The DHCP Server will send to the client a DHCPNAK denial broadcast message, which means the offered configuration parameters have not been assigned, if an error has occurred during the negotiation of the parameters or the client has been slow in responding to the DHCPOFFER message (the DHCP Server assigned the parameters to another client) of the DHCP Server.

The DHCP client and server can either be on the same network or on different networks. Let us discuss each situation separately.

Client and server on the same network

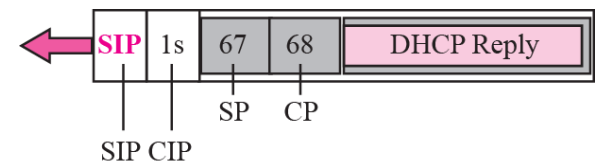
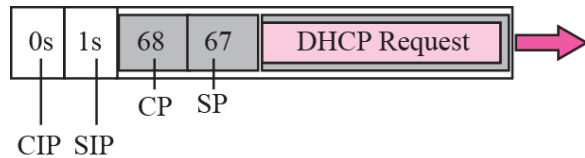
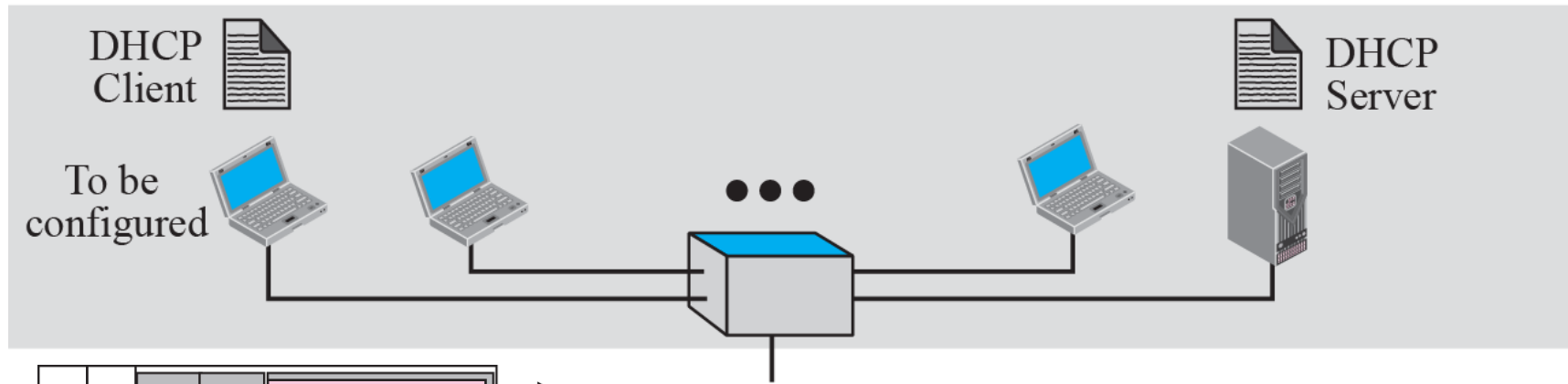
Legend

CP: Client Port Number

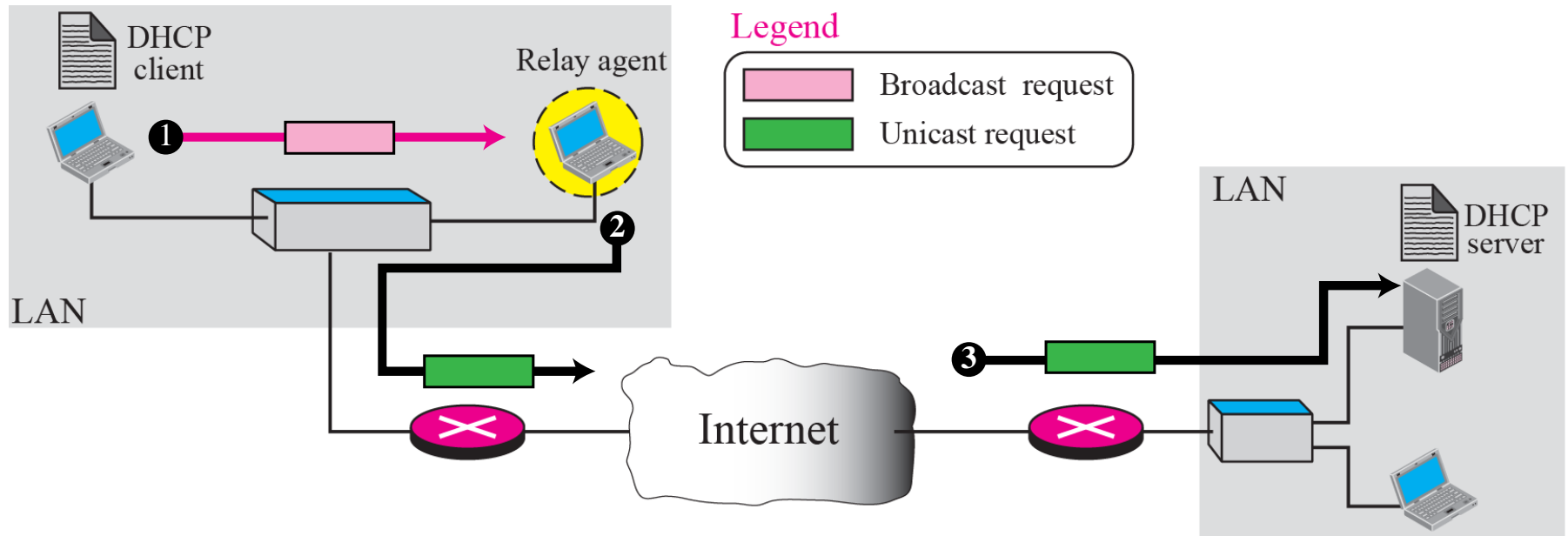
CIP: Client IP Address

SP: Server Port Number

SIP: Server IP Address



Client and server on two different networks



Use of UDP ports

