

# Chapter 17

## *BOOTP and DHCP*

# ***CONTENTS***

- **BOOTP**
- **DHCP**

***17.1***

# **BOOTP**

- BOOTP, however, is a static configuration protocol. When a client requests its IP address, the BOOTP server consults a table that matches the physical address of the client with its IP address. This implies that the binding between the physical address and the IP address of the client already exists. The binding is predetermined.
- There are some situations in which we need a dynamic configuration protocol. For example, when a host moves from one physical network to another, its physical address changes. As another example, **there are occasions when a host wants a temporary IP address to be used for a period of time. BOOTP cannot handle these situations because the binding between the physical and IP addresses is static and fixed in a table until changed by the administrator.** As we will see shortly, DHCP has been devised to handle these shortcomings.

***18.1***

# DHCP

Figure 17-4

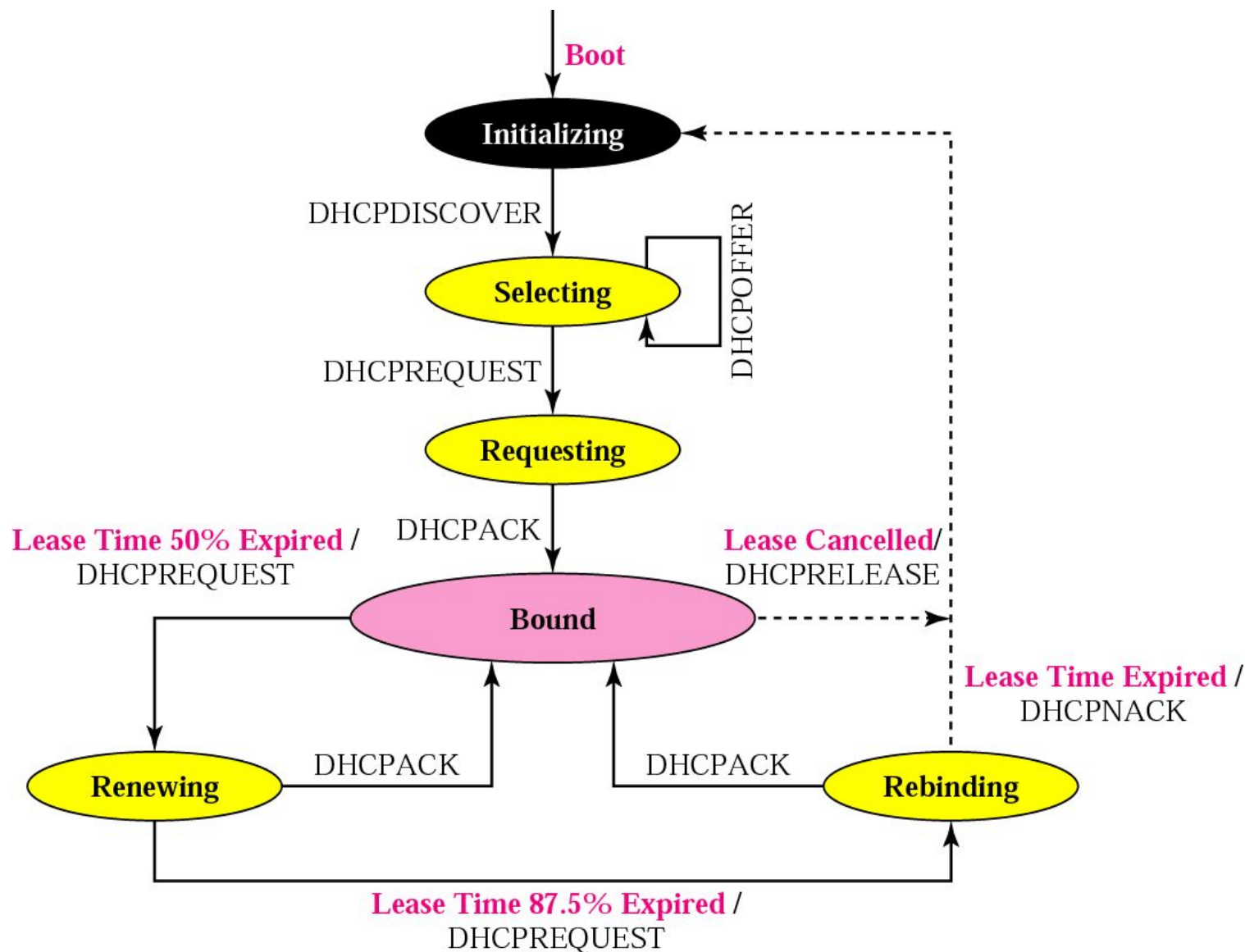
# DHCP packet

Operation code	Hardware type	Hardware length	Hop count
Transaction ID			
Number of seconds	F	Unused	
Client IP address			
Your IP address			
Server IP address			
Gateway IP address			
Client hardware address (16 bytes)			
Server name (64 bytes)			
Boot file name (128 bytes)			
Options (Variable length)			

- Dynamic Address Allocation
- DHCP has a second database with a pool of available IP addresses. This second database makes DHCP dynamic. When a DHCP client requests a temporary IP address, the DHCP server goes to the pool of available (unused) IP addresses and assigns an IP address for a negotiable period of time.
- When a DHCP client sends a request to a DHCP server, the server first checks its static database. If an entry with the requested physical address exists in the static database, the permanent IP address of the client is returned. On the other hand, if the entry does not exist in the static database, the server selects an IP address from the available pool, assigns the address to the client, and adds the entry to the dynamic database. The dynamic aspect of DHCP is needed when a host moves from network to network or is connected and disconnected from a network (for example, a subscriber to a service provider).
- DHCP provides temporary IP addresses for a limited period of time. The addresses assigned from the pool are temporary addresses. The DHCP server issues a lease for a specific period of time. When the lease expires, the client must either stop using the IP address or renew the lease. The server has the choice to agree or disagree with the renewal. If the server disagrees, the client stops using the address.

Figure 17-5

# DHCP transition diagram

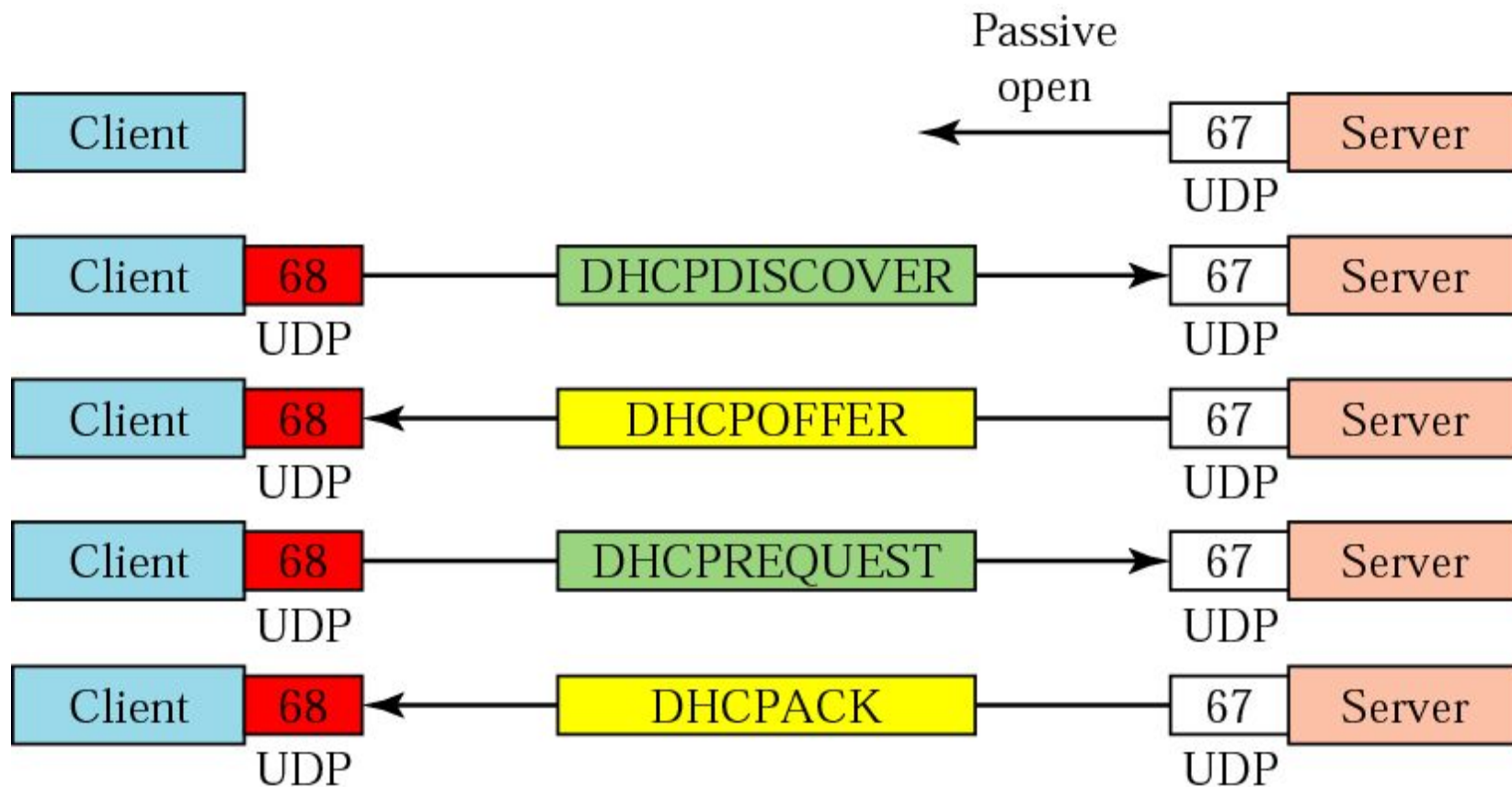




- INIT State :When the DHCP client first starts, it is in the INIT state (initializing state). The client broadcasts a DHCPDISCOVER message (a request message with the DHCPDISCOVER option), using port 67.
- SELECTING State: After sending the DHCPDISCOVER message, the client goes to the selecting state. Those servers that can provide this type of service respond with a DHCPOFFER message. In these messages, **the servers offer an IP address. They can also offer the lease duration. The default is 1 hour.** The server that sends a DHCPOFFER locks the offered IP address so that it is not available to any other clients. The client chooses one of the offers and sends a DHCPREQUEST message to the selected server. It then goes to the requesting state. However, if the client receives no DHCPOFFER message, it tries four more times, each with a span of 2 seconds. If there is no reply to any of these DHCPDISCOVERs, the client sleeps for 5 minutes before trying again.

- **REQUESTING State** The client remains in the requesting state until it receives a DHCPACK message from the server that creates the binding between the client physical address and its IP address. After receipt of the DHCPACK, the client goes to the bound state.
- **BOUND State** In this state, the client can use the IP address until the lease expires. When 50 percent of the lease period is reached, the client sends another DHCPREQUEST to ask for renewal. It then goes to the renewing state. When in the bound state, the client can also cancel the lease and go to the initializing state.
- **RENEWING State** The client remains in the renewing state until one of two events happens. It can receive a DHCPACK, which renews the lease agreement. In this case, the client resets its timer and goes back to the bound state. Or, if a DHCPACK is not received, and 87.5 percent of the lease time expires, the client goes to the rebinding state.
- **REBINDING State** The client remains in the rebinding state until one of three events happens. If the client receives a DHCPNACK or the lease expires, it goes back to the initializing state and tries to get another IP address. If the client receives a DHCPACK, it goes to the bound state and resets the timer.

# Exchanging messages



# Exchanging messages

