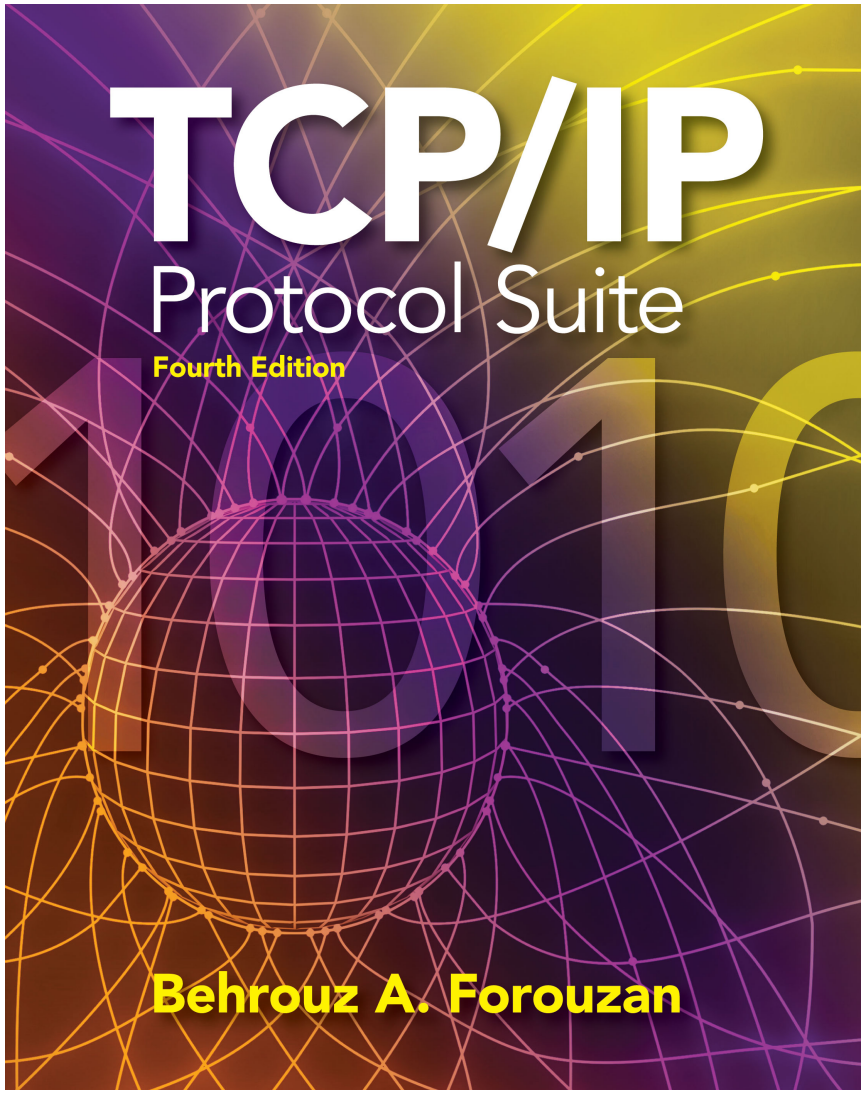
Chapter 18

Host Configuration: DHCP



OBJECTIVES:

- To give the reasons why we need host configuration.
- To give a historical background of two protocols used for host configuration in the past.
- To define DHCP as the current Dynamic Host Configuration Protocol.
- To discuss DHCP operation when the client and server are on the same network or on different networks.
- To show how DHCP uses two well-known ports of UDP to achieve configuration.
- To discuss the states the clients go through to lease an IP address from a DHCP server.

Chapter Outline

18-1 INTRODUCTION

Each computer that uses the TCP/IP protocol suite needs to know its IP address. If the computer uses classless addressing or is a member of a subnet, it also needs to know its subnet mask. Most computers today need two other pieces of information: the address of a default router to be able to communicate with other networks and the address of a name server to be able to use names instead of addresses as we will see in the next chapter. In other words, four pieces of information are normally needed.

Topics Discussed in the Section

- ✔ **Previous Protocols**
- ✔ **DHCP**

18-2 DHCP OPERATION

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

Topics Discussed in the Section

- ✔ **Same Network**
- ✔ **Different Networks**
- ✔ **UDP Ports**
- ✔ **Using TFTP**
- ✔ **Error Control**
- ✔ **Packet Format**

Figure 18.1 *Client and server on the same network*

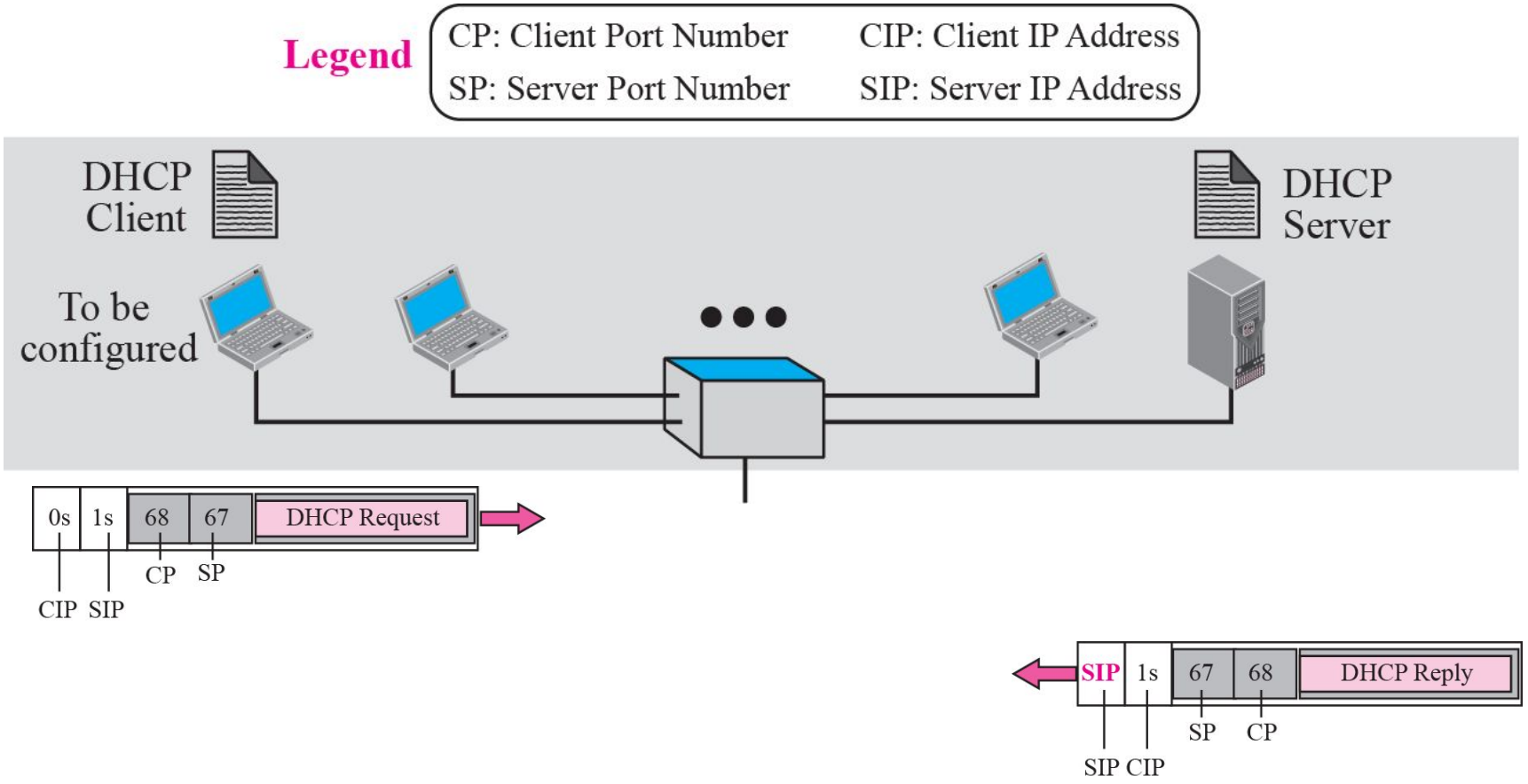


Figure 18.2 *Client and server on two different networks*

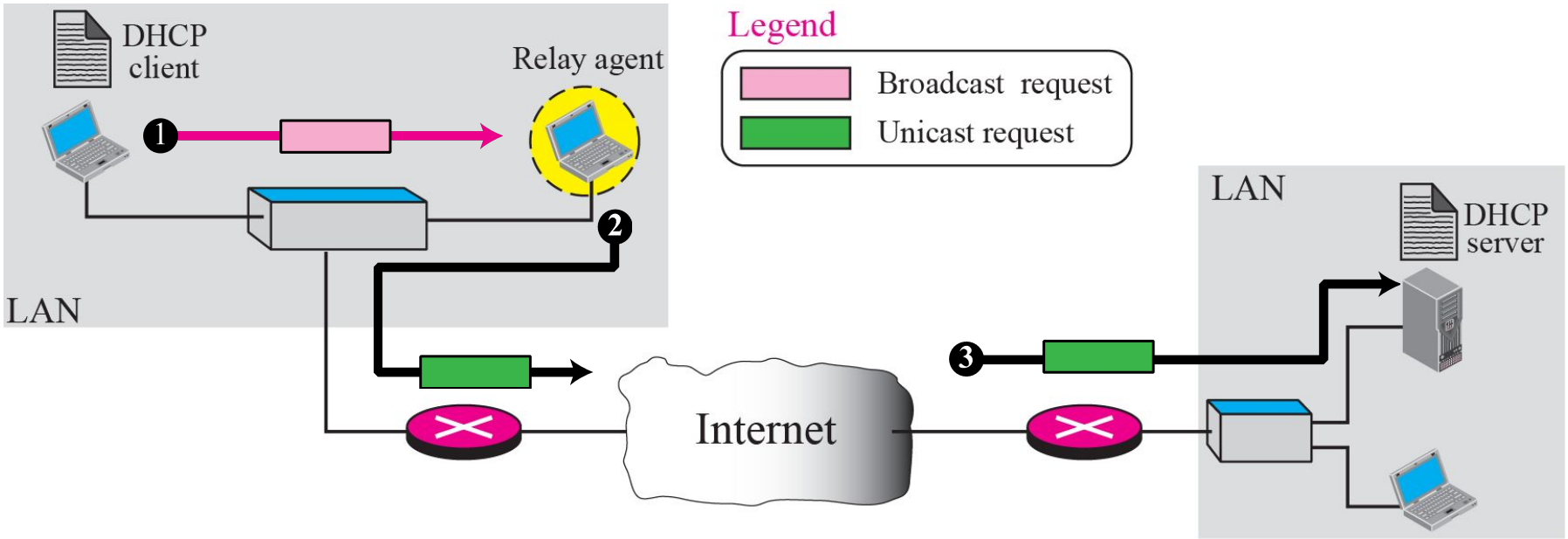


Figure 18.3 *Use of UDP ports*

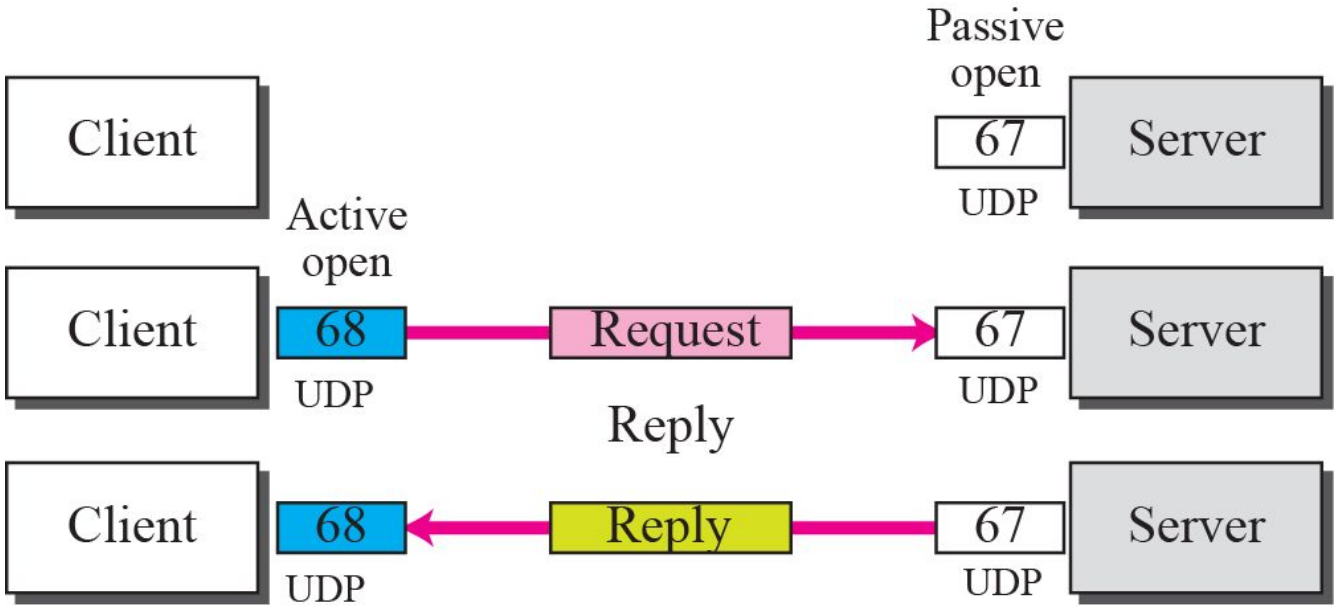


Figure 18.4 *DHCP packet format*

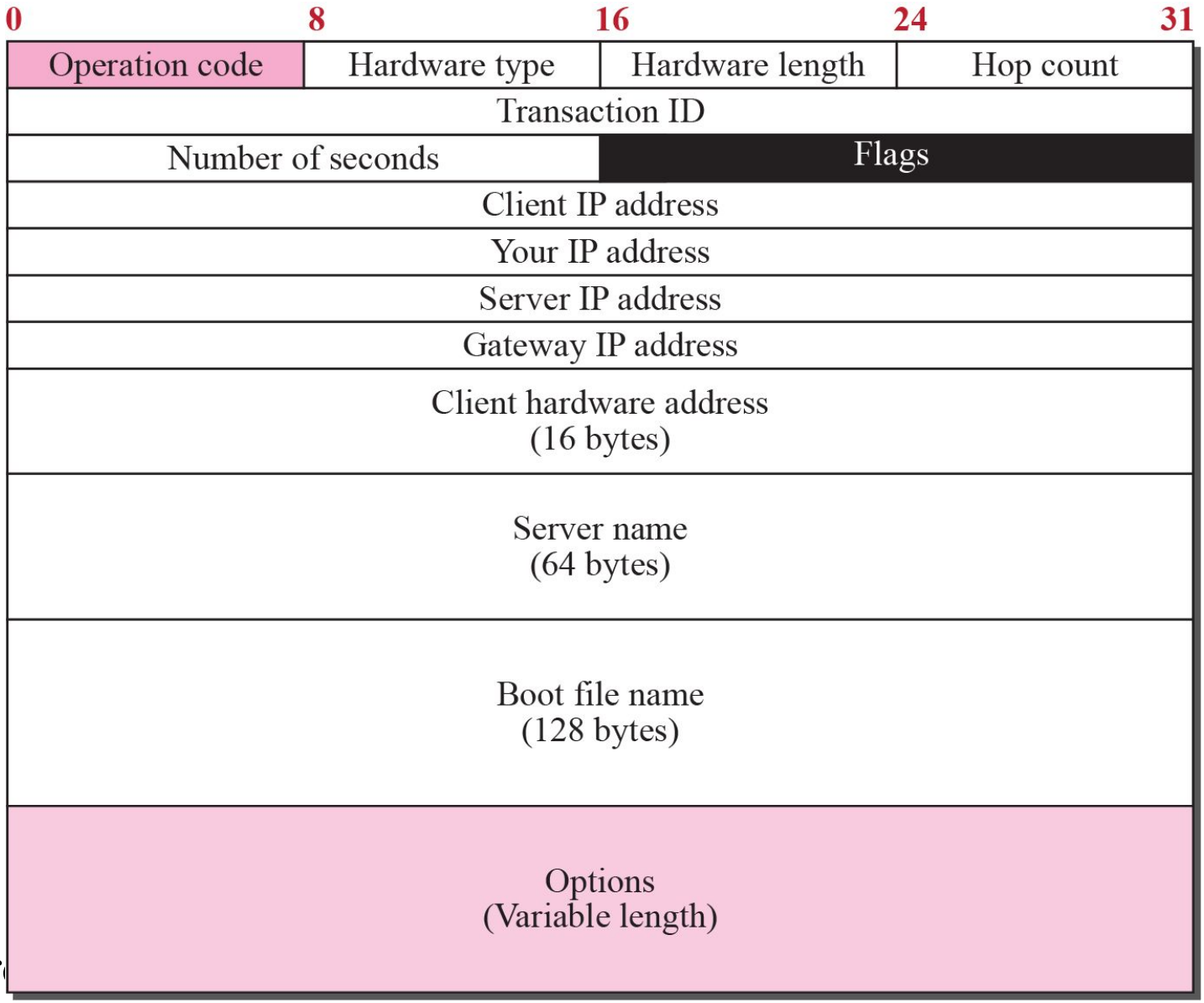


Figure 18.5 *Flag format*

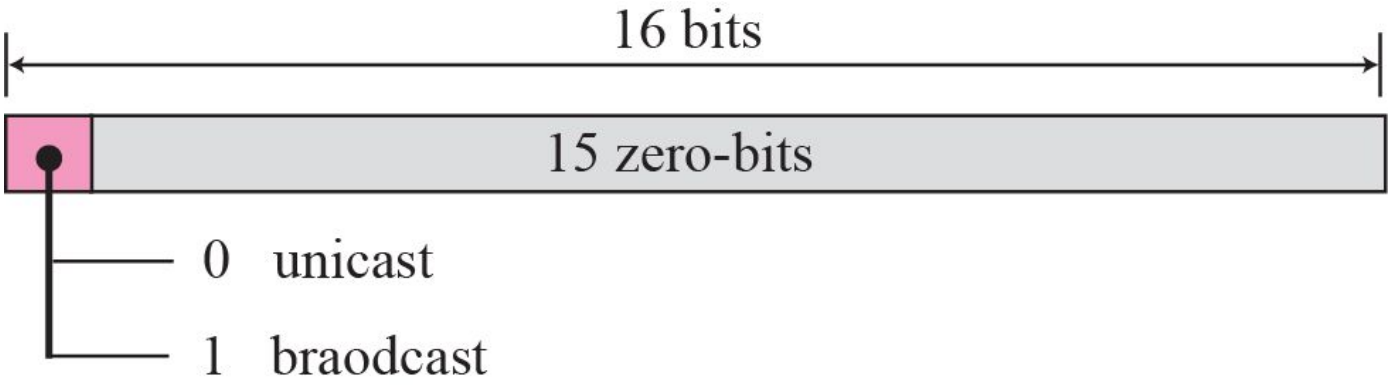


Figure 18.6 *Option format*

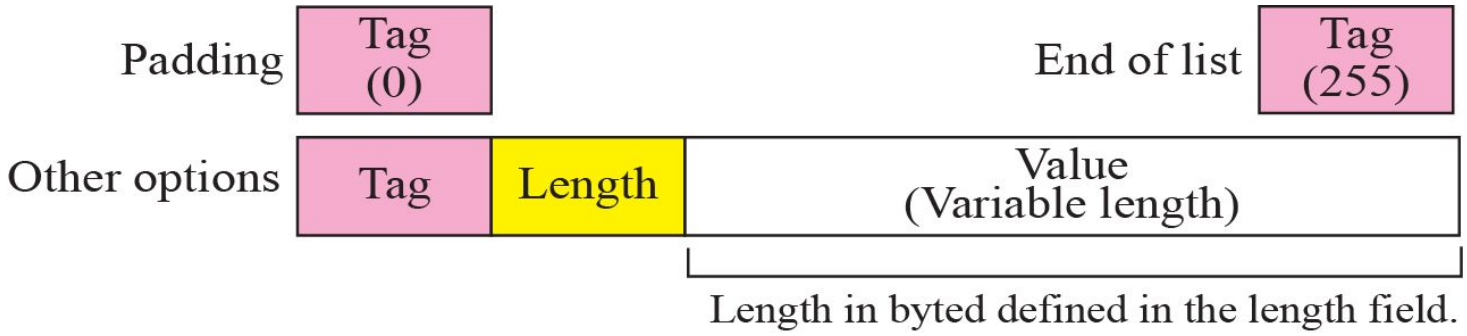


Table 18.1 *Options for DHCP*

Tag	*Length*	*Value*	*Description*
0			Padding
1	4	Subnet mask	Subnet mask
2	4	Time of the day	Time offset
3	Variable	IP addresses	Default router
4	Variable	IP addresses	Time server
5	Variable	IP addresses	IEN 16 server
6	Variable	IP addresses	DNS server
7	Variable	IP addresses	Log server
8	Variable	IP addresses	Quote server
9	Variable	IP addresses	Print server
10	Variable	IP addresses	Impress
11	Variable	IP addresses	RLP server
12	Variable	DNS name	Host name
13	2	Integer	Boot file size
53	1	Discussed later	Used for dynamic configuration
128–254	Variable	Specific information	Vendor specific
255			End of list

18-3 CONFIGURATION

The DHCP has been devised to provide static and dynamic address allocation.

Topics Discussed in the Section

- ✔ **Static Address Allocation**
- ✔ **Dynamic Address Allocation**
- ✔ **Transition States**
- ✔ **Other Issues**
- ✔ **Exchanging Messages**

Figure 18.7 *Option with tag 53*

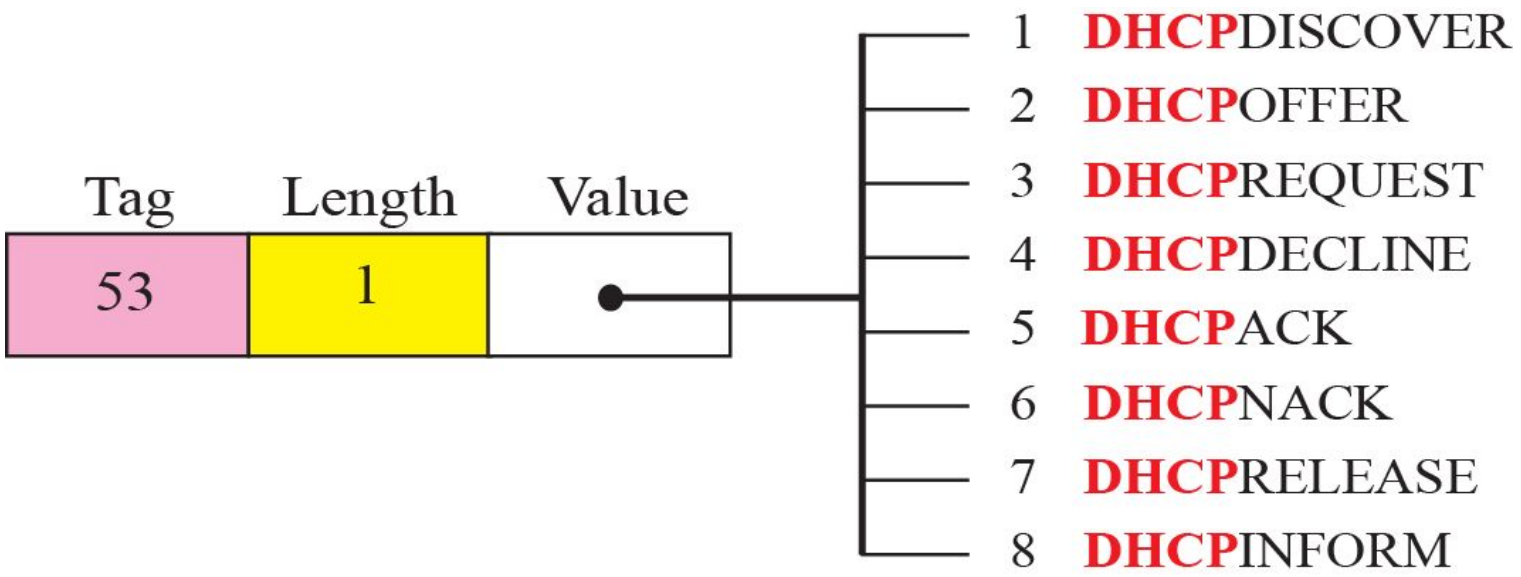


Figure 18.8 *DHCP client transition diagram*

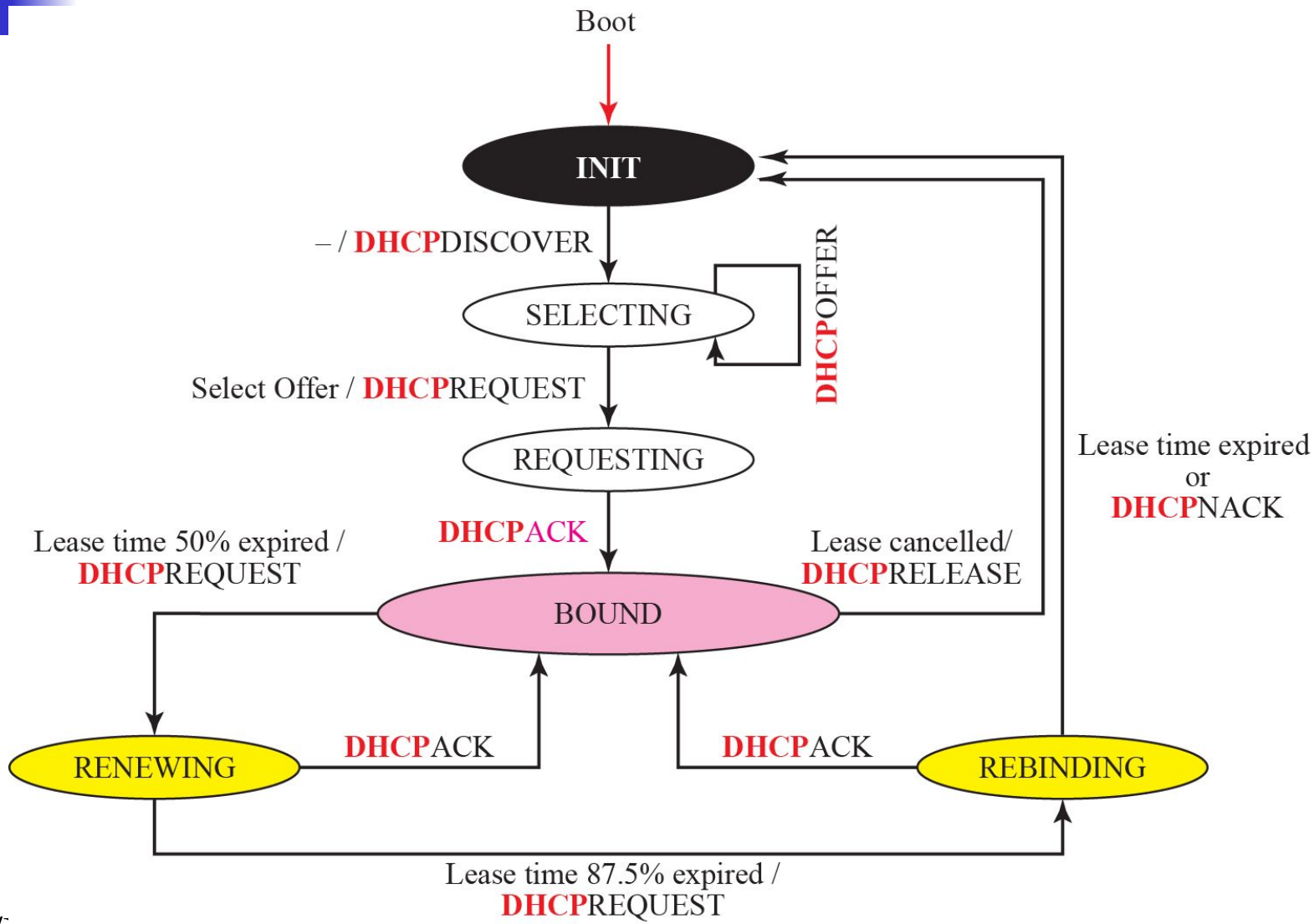


Figure 18.9 *Exchanging messages*