
CHAPTER 16

Host Configuration: BOOTP and DHCP

Exercises

1. The minimum length of a BOOTP packet is 44 bytes since the server name field, the boot filename field and the options field are optional. The maximum is 300 bytes.
2. We assume that the packet contains the server name field and the boot filename field:

BOOTP packet	236 bytes
UDP header	8 bytes
IP header	20 bytes
Ethernet frame with preamble	26 bytes

Total	290 bytes

$$\text{Efficiency} = 236 / 290 = 0.8138 \text{ or } \mathbf{81\%}$$

RARP packet	28 bytes
padding	18 bytes
IP header	20 bytes
Ethernet frame with preamble	26 bytes

Total	72 bytes

$$\text{Efficiency} = 28 / 72 = 0.3889 \text{ or } \mathbf{39\%}$$

3. Figure 16.1 shows an example of the *padding* option. We assume that the packet is using the *subnet mask* option. We also need the *end of list* option.

Figure 16.1 Exercise 3

Code: 2	Hardware type	Hardware length	Hop count
Transaction ID			
No. of seconds		0	
Client IP address			
Client IP address			
Server IP address			
Gateway IP address			
Client hardware address			
99.130.83.99			
1	4	Subnet mask	
Subnet mask		0	255

4. Figure 16.2 shows an example of the *end of list* option. We assume that the packet is using the *subnet mask* and *time of day* options. We need three *padding options* and one *end of list* option.

Figure 16.2 Exercise 4

Code: 2	Hardware type	Hardware length	Hop count
Transaction ID			
No. of seconds		0	
Client IP address			
Client IP address			
Server IP address			
Gateway IP address			
Client hardware address			
99.130.83.99			
1	4	Subnet mask	
Subnet mask		0	0
2	4	Time of day	
Time of day		0	255

5. $2^{16} - 1 = 65,535$
6. See Figure 16.3.
7. See Figure 16.4.
8. See Figure 16.5.

Figure 16.3 Exercise 6

Code: 1	1	6	Hop count
Transaction ID			
No. of seconds		0	
0			
0			
0			
0x00112115			
0xEA21			
10 bytes of 0s			

Figure 16.4 Exercise 7

Code: 2	1	6	Hop count
Transaction ID			
No. of seconds		0	
Client IP address			
Client IP address			
Server IP address			
Gateway IP address			
0x00112115			
0xEA21			
10 bytes of 0s			

Figure 16.5 Exercise 8

68		67	
52		Checksum	
Code: 1	1	6	Hop count
Transaction ID			
No. of seconds		0	
0			
0			
0			
0			
0x00112115			
0xEA21			
10 bytes of 0s			

9. See Figure 16.6.

10. See Figure 16.7.

11. See Figure 16.8.

Figure 16.6 Exercise 9

67		68	
52		Checksum	
Code: 2	1	6	Hop count
Transaction ID			
No. of seconds		0	
Client IP address			
Client IP address			
Server IP address			
Gateway IP address			
0x00112115			
0xEA21			
10 bytes of 0s			

Figure 16.7 Exercise 10

4	5	0	72
Identification		0	0
TTL	17	Header checksum	
0x00000000			
0xFFFFFFFF			
68		67	
52		Checksum	
Code: 1	1	6	Hop count
Transaction ID			
No. of seconds		0	
0			
0			
0			
0			
0x00112115			
0xEA21			
10 bytes of 0s			

Figure 16.8 Exercise 11

4	5	0	72
Identification		0	0
TTL	17	Header checksum	
Server IP address			
Client IP address			
67		68	
52		Checksum	
Code: 2	1	6	Hop count
Transaction ID			
No. of seconds		0	
Client IP address			
Client IP address			
Server IP address			
Gateway IP address			
0x00112115			
0xEA21			
10 bytes of 0s			

12. A newly added host needs to know its subnet mask because this allows the host to find out which subnet it is on.
13. A newly added host needs to know the address of a router in order to send a message outside of its own local network.
14. A newly added host needs to know the address of a name server in order to resolve a domain name to an IP address.
15. BOOTP needs the services of TFTP because the BOOTP packet is of a set size and format. If a BOOTP client needs more information than a packet can hold, the client must retrieve the information using some other method.
16. See Figure 16.9. We assume that the server is 4 hops away. We also use transaction ID of 1456. The messages between the client and the relay agent are broadcast. The messages between the relay agent and the server are unicast.

Figure 16.9 Exercise 16



