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CPE 400

HW4

1.

    a. To prevent wastage of IP addresses, the company should use **class C** addressing. Class C has $2^8 - 2 = 254$ host addresses. $4000/254 = 15.75$ So, **16 networks** would be required. $(16*254) - 4000 = $ **64 wasted addresses**.

    b. With classless addressing, the minimum we would need to get to 4000 is $2^{12} = 4096$. So, **12 bits** will be required for the host part. **20 bits** will be the network part of the address. Out of 4096, only 4094 will be usable IP addresses. So $4096 - 4000 = $ **96 Addresses will be wasted**.

2.

	A	B	C	D	E	F
A	0	∞	∞	∞	∞	∞
B	0	2	∞	1	∞	∞
C	0	2	∞	1	4	∞
D	0	2	3	1	4	∞
E	0	2	3	1	4	5
F	0	2	3	1	4	5

dist.

A to D   1
A to B   2
A to C   3
A to E   4
A to F   5

shortest path:

A to B =   A → B
A to C =   A → B → C
A to D =   A → D
A to E =   A → D → E
A to F =   A → B → C → F

3.

    a. RIP uses a distance vector algorithm to calculate the best path to route through, while OSPF uses Shortest Path First. The maximum hop count for RIP is 15 while OSPF is unlimited. RIP is better for smaller networks while OSPF is better for larger ones. RIP has to stop different types of loops from happening in the network, while OSPF doesn't have to worry about this since it implements Shortest Path First.

    b. Intra-AS routing protocols are used to configure, maintain, and synchronize information within an AS. They are not used for communication outside of the single AS in which they reside. RIP and OSPF are examples of Intra-AS routing protocols. Inter-AS routing protocols, like BGP, are used to create routing policies for managing the networks of different organizations connected to the Internet.

    c. RIP is a proactive routing protocol while DSR is considered reactive. In RIP, routing information is propagated through the network periodically while DSR only propagates information when it is needed. In DSR, there is a reduced overhead for routing compared to RIP, but these differences result in DSR having a slower response time.

4.

    a. 192.168.0.0/24
    b. 192.168.0.255
    c. 192.168.0.1 - 192.168.0.254
    d. 192.168.0.0/27
    e. 192.168.0.1 - 192.168.0.30
    f. 192.168.0.31
    g. 8 subnets
    h. 30 hosts per subnet since 240 hosts. (240/8 = 30)

bootp   ⌫ → ▾   Expression...   +

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	BOOTP	342	Boot Request from a4:5e:60:df:d7:3d (Apple_df:d7:3d)
17	9.818574	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xb0cc0ef0
25	11.280378	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xb0cc0ef0
28	11.803902	192.168.0.1	192.168.0.15	DHCP	342	DHCP Offer - Transaction ID 0xb0cc0ef0
32	12.805411	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xb0cc0ef0
33	12.838898	192.168.0.1	192.168.0.15	DHCP	342	DHCP ACK - Transaction ID 0xb0cc0ef0
3042	20.908799	192.168.0.15	192.168.0.1	DHCP	342	DHCP Release - Transaction ID 0xb0cc0ef1
3045	22.239330	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x90b73e7c
3056	23.302497	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x90b73e7c
3061	23.898252	192.168.0.1	192.168.0.15	DHCP	342	DHCP Offer - Transaction ID 0x90b73e7c
3063	24.901083	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x90b73e7c
3064	24.911654	192.168.0.1	192.168.0.15	DHCP	342	DHCP ACK - Transaction ID 0x90b73e7c

```
  Message type: Boot Request (1)
  Hardware type: Ethernet (0x01)
  Hardware address length: 6
  Hops: 0
  Transaction ID: 0xb0cc0ef0
  Seconds elapsed: 3
▶ Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 0.0.0.0
  Next server IP address: 0.0.0.0
  Relay agent IP address: 0.0.0.0
  Client MAC address: Apple_df:d7:3d (a4:5e:60:df:d7:3d)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name not given
  Magic cookie: DHCP
▶ Option: (53) DHCP Message Type (Request)
▶ Option: (55) Parameter Request List
▶ Option: (57) Maximum DHCP Message Size
▶ Option: (61) Client identifier
▶ Option: (50) Requested IP Address
▶ Option: (54) DHCP Server Identifier
▶ Option: (12) Host Name
▶ Option: (255) End
  Padding: 000000000000
```

```
0110  00 00 00 00 00 00 63 82  53 63 35 01 03 37 0a 01   ······c· Sc5··7··
0120  79 03 06 0f 77 fc 5f 2c  2e 39 02 05 dc 3d 07 01   y···w·_, .9···=··
0130  a4 5e 60 df 7d 3d 32 04  c0 a8 00 0f 36 04 c0 a8   ·^`·}=2· ····6···
```

🟡 🔲   Bootp/Dhcp option type (bootp.option.type), 12 bytes   Packets: 6382 · Displayed: 19 (0.3%) · Dropped: 0 (0.0%)   Profile: Default