CSE316
Assignment 2 Solutions

Chapter - 18

Q18-3

Forwarding is delivery to the next node. A router uses its forwarding table to send a packet out of one of its interfaces and to make it to reach to the next node. In other words, forwarding is the decision a router makes to send a packet out of one of its interfaces. Routing, on the other hand, is an end-to-end delivery resulting in a path from the source to the destination for each packet. This means a routing process is a series of forwarding processes. To enable each router to perform its forwarding duty, routing protocols need to be running all of the time to provide updated information for forwarding tables. Although forwarding is something we can see in the foreground, in the background routing provides help to the routers to do forwarding.

Q18-9

The throughput is the smallest transmission rate, or 140 Kbps. The bottleneck is now the link between the source host and R1.

Q18-10

Yes. We can find the prefix length.

- **a.** We first find the size of the block as shown below:

  $N = \text{last address} - \text{first address} + 1$

- **b.** We then find the prefix length.

  $n = 32 - \log_2 N$

Q18-12

Yes, the prefix length defines the size of the block, but the blocks can belong to different locations in the address space.

P18-4

The class can be defined by looking at the first byte (see figure 4.31):
a. Since the first byte is between 128 and 191, the class is B.
b. Since the first byte is between 192 and 223, the class is C.
c. Since the first byte is between 240 and 255, the class is E.

P18-8

The size of the block can be found as $n = 32 - \log_2 N$
a. $n = 32 - \log_2 1 = 32$
b. $n = 32 - \log_2 1024 = 22$
c. $n = 32 - \log_2 2^{32} = 0$

P18-11

We first write each potential mask in binary notation and then check if it has a contiguous number of 1s from the left followed by 0s.

a. 11111111 11100001 00000000 00000000 Not a mask
b. 11111111 11000000 00000000 00000000 A mask
c. 11111111 11111111 11111111 00000110 Not a mask

P18-12

We can write the address in binary. Set the last 32 – *n* bits to 0s to get the first address; set the last 32 – *n* bits to 1s to get the last address.

a.
Given: 00001110 00001100 01001000 00001000 14.12.72.8/24
First: 00001110 00001100 01001000 00000000 14.12.72.0/24
Last: 00001110 00001100 01001000 11111111 14.12.72.255/24

b.
Given: 11001000 01101011 00010000 00010001 200.107.16.17/18
First: 11001000 01101011 00000000 00000000 200.107.0.0/18
Last: 11001000 01101011 00111111 11111111 200.107.63.255/18

c.
Given: 01000110 01101110 00010011 00010001 200.107.16.17/18
First: 01000110 01101110 00000000 00000000 200.107.0.0/18
Last: 01000110 01101110 11111111 11111111 200.107.63.255/18

P18-Extra

(a)

First Address: 11.10.0.0/22
Last Address: 11.10.3.255/22
N = 232-22 = 210 = 1024

(b)

First Sub-block: 256 addresses

First Address: 11.10.0.0/24
Last Address: 11.10.0.255/24

Second Sub-block: 32 addresses

First Address: 11.10.1.0/27
Last Address: 11.10.1.31/27

Third Sub-block: 16 addresses

First Address: 11.10.1.32/28
Last Address: 11.10.1.47/28

Unused:
First Address: 11.10.1.48
Last Address: 11.10.3.255

(c)

First Sub-block: 512 addresses

First Address: 11.10.2.0/23
Last Address: 11.10.3.255/23

Second Sub-block: 128 addresses

First Address: 11.10.1.128/25
Last Address: 11.10.1.255/25

Third Sub-block: 64 addresses

First Address: 11.10.1.64/26
Last Address: 11.10.1.127/26

Unused:
First Address: 11.10.1.48
Last Address: 11.10.1.63