Assignment 9

Chaiwat Plongkaew 2021326660023

P11. Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.

Ans

**Subnet 1** requires at least 60 interfaces, we need to use a subnet mask at least 6 bits (2^6 = 64)

The subnet mask for Subnet 1 is 255.255.255.192, which in binary is:

11111111 11111111 11111111 11000000

The first 26 bits of the IP address are used for the network portion, which means that the remaining 6 bits are used for the host portion. Therefore, the valid host addresses for Subnet 1 range from 223.1.17.1 to 223.1.17.62, with **223.1.17.0 as the network address** and 223.1.17.63 as the broadcast address.

**Subnet 2** requires at least 90 interfaces, we need to use a subnet mask at least 6 bits (2^7 = 128)

The subnet mask for Subnet 2 is 255.255.255.128, which in binary is:

11111111 11111111 11111111 10000000

The first 25 bits of the IP address are used for the network portion, which means that the remaining 7 bits are used for the host portion. Therefore, the valid host addresses for Subnet 2 range from 223.1.17.65 to 223.1.17.190, with **223.1.17.64 as the network address** and 223.1.17.191 as the broadcast address.

**Subnet 3** requires at least 12 interfaces, we need to use a subnet mask at least 6 bits (2^4 = 16)

The subnet mask for Subnet 3 is 255.255.255.240, which in binary is:

11111111 11111111 11111111 11110000

The first 28 bits of the IP address are used for the network portion, which means that the remaining 4 bits are used for the host portion. Therefore, the valid host addresses for Subnet 3 range from 223.1.17.193 to 223.1.17.206, with **223.1.17.192 as the network address** and 223.1.17.207 as the broadcast address.

P17. Suppose datagrams are limited to 1,500 bytes (including header) between source Host A and destination Host B. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 consisting of 5 million bytes? Explain how you computed your answer.

Ans

MP3 = 5 \* 10^6 bytes

Each datagram will carry 1500 – 20 (from IP header) – 20 (from TCP header) which is 1460 bytes.

The number of datagrams required = 5\*10^6/1460 = 3,424.657 = 3425, but the last datagram can be up to 1500 bytes.

5\*10^6 - (3424 \* 1460 bytes) = 960 bytes

Therefore, the last datagram would be 960 plus 20 bytes TCP header and 20 bytes IP header for a total size of 1000 bytes.