CMPEN/EE 362 - HW4

Student Name: _____

Problem 1

Consider a datagram network using 8-bit host addresses. Suppose a router using longest prefix matching has the following forwarding table:

Prefix	Interface
0	0
001	1
010	2
11	2
otherwise	3

For each of the four interfaces, give the associated range of destination host addresses and the number of addresses in the range.

Problem 2

Consider an ISP that owns the block of addresses in 123.119.14.64/26. Suppose it wants to create three subnets, where Subnet1 supports at least 30 interfaces, Subnet2 supports at least 12 interfaces, and Subnet3 supports at least 9 interfaces. Provide the network addresses (of the form a.b.c.d/x) of the three subnets that satisfy these requirements.

Problem 3

Consider the network shown in Figure 1.

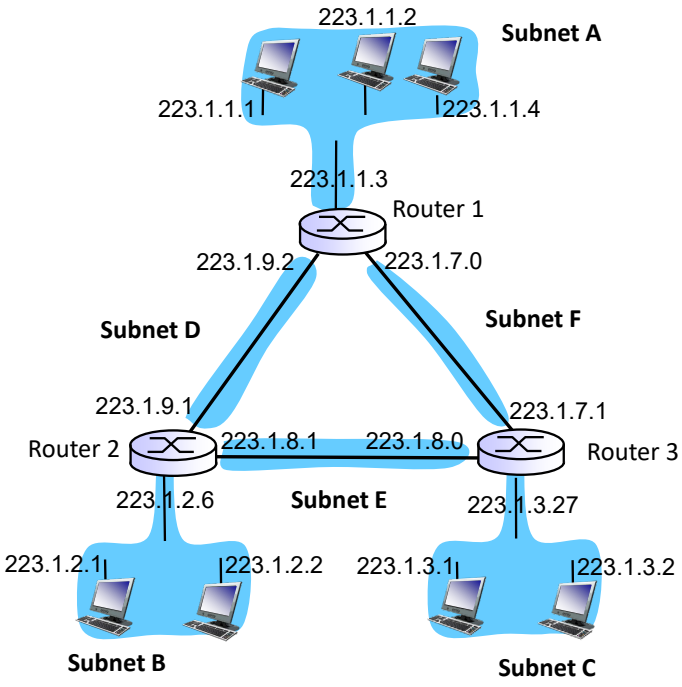

Figure 1. Illustration for Problem 3.

a) Give the network addresses of Subnets A, B, and C in the form of a.b.c.d/x, such that: Subnet A supports 6 interfaces, Subnet B supports 12 interfaces, Subnet C supports 30 interfaces.
b) Using answer to a), provide the forwarding tables (each row containing "prefix match" and "outgoing interface" fields) for each of the three routers, so that the shortest path (in hop count) is used for each packet. Suppose that no packet will have a router interface as the final destination (i.e., the destination IP address will always be for a host). Denote the prefix in binary format; denote the outgoing interface by the subnet the packet needs to be forwarded to (e.g., Router 1 can forward packets to Subnet A, Subnet D, Subnet F).

Problem 4

Consider sending a 5000-byte datagram (including IP header) to a link that has an MTU of 1020 bytes. Suppose that the original datagram has an identification number of 301. Answer the following:

a) How many fragments are generated?
b) Which header fields are used to support fragmentation?
c) What are the values of these header fields for each of the fragment?

Problem 5

Consider the SDN network shown in Figure 2. Specify the flow table entries in s2 (each row contains "match" and "action" fields) to achieve the following behaviors (simultaneously):

- datagrams arriving on port 1 from hosts h5 or h6 that are destined to hosts h1 or h2 should be forwarded to port 2;
- datagrams arriving on port 2 from hosts h1 or h2 that are destined to hosts h5 or h6 should be forwarded to port 1;
- datagrams arriving on ports 1 or 2 that are destined to hosts h3 or h4 should be delivered to the respective host;
- datagrams from host h3 to hosts h1, h2, h5, and h6 should be forwarded to port 1;
- datagrams from host h4 to hosts h1, h2, h5, and h6 should be forwarded to port 2;
- allow TCP traffic but block UDP traffic between hosts h3 and h4.

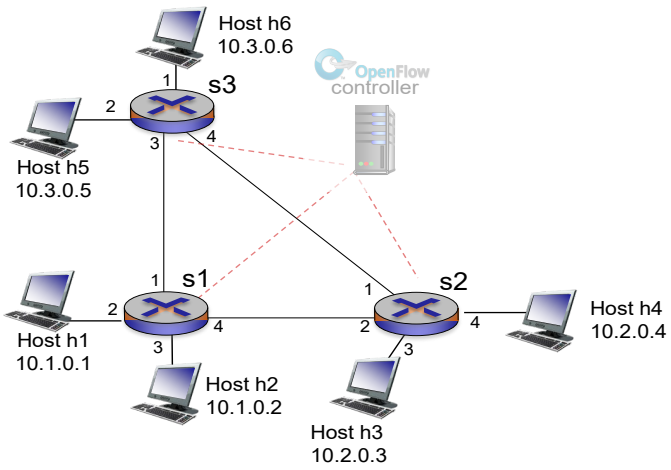

Figure 2. Illustration for Problem 5.