EECS 325/425

Homework 6

Due Dec. 9 before 11:59pm
39 points

Problem 1. Given the following forwarding table in a router, fill in the interface number on which packets destined for the given IP addresses will be transmitted.

Rule #	Prefix	Interface
1	**129.22.0.0/16**	**1**
2	**129.22.150.0/24**	**14**
3	**129.22.144.0/20**	**5**
4	**129.22.150.96/28**	**8**
5	**default**	**15**

(a) 129.23.1.1 _____ **(2 points)**

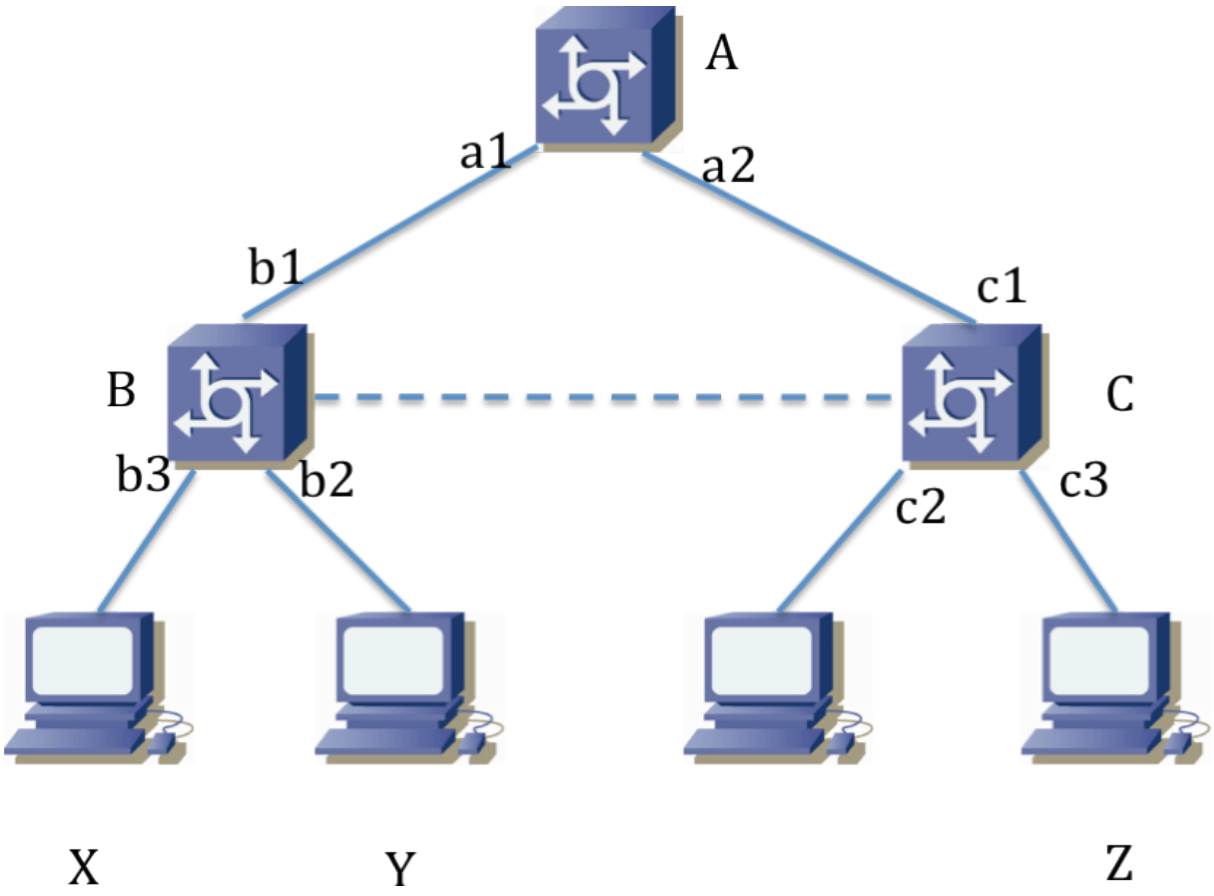
(b) 129.22.151.22 _____ **(2 points)**

(c) 129.22.150.78 _____ **(2 points)**

(d) 129.22.150.106 _____ **(2 points)**

Problem 2: Consider the following network:

1. Consider the following topology, where four end-hosts are connected through two levels of level-2 switches (the switches are denoted with capital letters and their ports with small letters). Disregard the dashed line for problems (a)-(d).



(a) How many subnets does this network contain? **(1 pt)**
(b) Assign MAC addresses to all entities that must have them. **(2 pts)**
(c) Assume that these were brand new switches installed into this network out of the boxes and no frames have been transmitted. Assume X sends a frame to Y. Draw this frame on each link over which it will be sent, showing its source and destination MAC address. Show switch tables of each switch after this frame delivery. **(2pts)**
(d) Assume Y responds to X. Draw this frame on each link over which it will be sent, showing its source and destination MAC address. Show switch tables of each switch after this frame delivery. **(2pts)**
(e) Assume a link is added between switches B and C as shown by the dotted line. Give specific scenario (at the detail of frame transmissions) demonstrating problem with this network setup. **(2 pts)**

Problem 3. Consider an Ethernet segment with propagation delay between any two nodes at most 225 bit times. Assuming the smallest possible Ethernet frame to be 576 bits (which it is), can a host transmit a frame without detecting a collision while in fact this frame does collide with another frame transmission? Justify your answer **(3 points)**

Problem 4. Textbook 6th edition, Chapter 5, problem 14. For 14c, assume that the forwarding tables at routers indicate, for each prefix, (a) the outbound interface, and (b) the IP address of the next-hop router. **(8 points)**

Problem 5. Chapter 5, Problem 29. **(2 points)**

Problem 6. Consider the network below, where the home network uses a wi-fi access point that combines a base station, DHCP server, and a NAT box, and a router (which they commonly do). In this network, host H uses access point AP as the DHCP server to obtain its private IP address and other necessary information to connect to the Internet (in particular, it will obtain the AP's private IP address as the address of the default router). The AP obtains its public IP address from the ISP's DHCP server S and configures its routing table to use router R for all external IP addresses.

a. Assign all IP addresses (public and private) to all relevant interfaces in this network. Assign subnet masks to each subnet (it should agree with your assigned IP addresses) **(3 points)**
b. Assume H is trying to access an external web server at address X. So it sends a TCP SYN segment to that address at port 80. Specify the frame carrying this segment as it travels from H to AP to switch to R and to the Internet. Make sure to indicate all port numbers, IP addresses, and MAC addresses in this frame/packet/segment across each link mentioned above. (You can use a table, with left column specifying a link, e.g., "H-to-AP" and the right column a drawing of the frame traversing this link with relevant header fields.) **(3 points)**
c. Assume that the web server now responds with a SYN-ACK segment. Specify the frame carrying this segment as it travels from the Internet to R to switch to AP and to H. Make sure to indicate all ports, IP addresses, and MAC addresses in this frame/packet/segment. (Again, a table will be a convenient way to answer this). **(3 points)**