

Assignment 6

Maximum Marks: 100

DUE: 29 March 2020 (Sunday)

Note: Please show your working for full credit

Note for references: Adding references does not allow you to copy text word to word

Q1. (10 Marks)

- Write in brief about the different error detection schemes and their use. (3-5 Lines only)
- Why is Slotted Aloha more efficient than Pure Aloha?

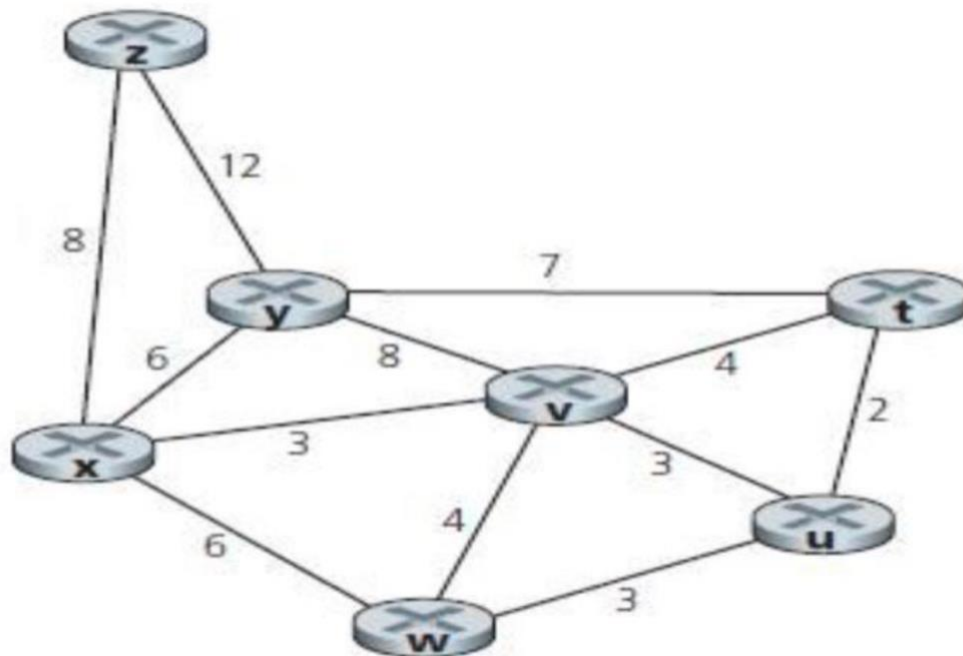
Q2. (10 Marks) Refer to the figure given below (Don't assume anything by yourself)



- Is there anything wrong with the above topology? Will it work or crash?
- If answer for part a is yes, how can it be prevented?
- Is it possible to use both the links for forwarding traffic? If yes, then how?

Q3. (5 Marks) Explain what is broadcast domain and collision domain. Differentiate repeater, hub, switch and Router according to broadcast and collision domain.

Q4. (15 Marks) Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table similar to Table 4.3 in the textbook.



Consider the network shown above. Using Dijkstra's algorithm, and showing your work, do the following:

- Compute the shortest path from t to all network nodes.
- Compute the shortest path from u to all network nodes.

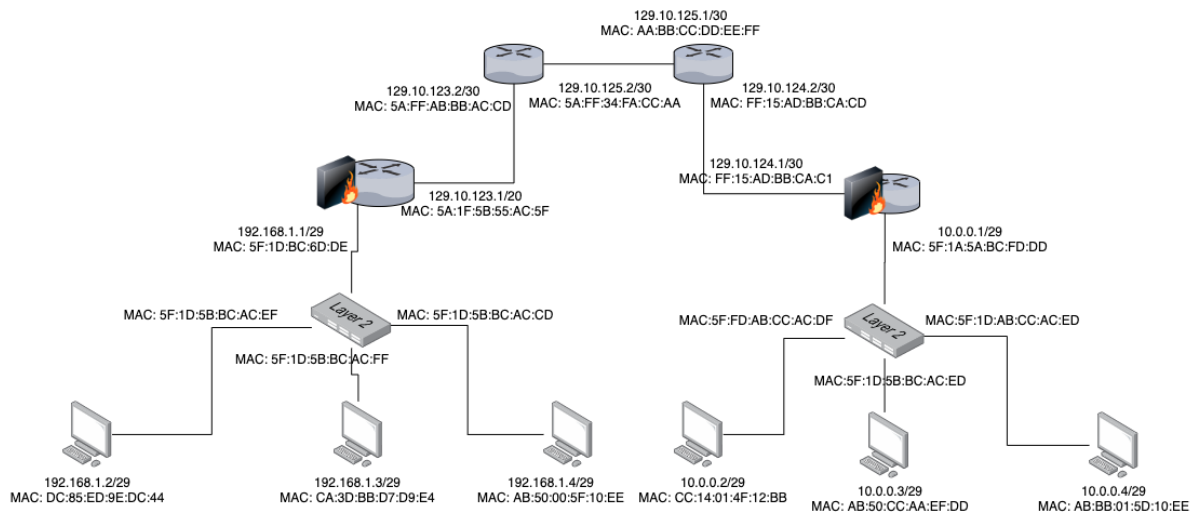
Q5. (10 Marks) Consider the operation of a learning switch in the context of a network in which 6 nodes labelled A through F are star-connected into an Ethernet switch. Suppose that:

- B sends a frame to E
- E replies with a frame to B
- A sends a frame to B
- B replies with a frame to A

The switch table is initially empty. Show the state of the switch table before and after each of the events. For each of these events, identify the link(s) on which the transmitted frame will be forwarded, and briefly justify your answers for each entry of the table.

Q6: (10 Marks) Why is there a minimum packet size constraint at the data link layer? Also state the minimum requirement.

Q7: (15 Marks) Refer the network diagram below. Consider a situation where host on the IP address 192.168.1.2 sends a message to the host on the IP address 10.0.0.3.



Specify the source MAC, Source IP, Destination MAC, Destination IP addresses for the packets at each node in the network. Explain your answers with up to two lines each. Do not consider NAT for this question. Your answers need to be in the below format:

Source IP	Destination IP	Source MAC	Destination MAC
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Q8. (15 Marks) Please refer the network diagram above. Suppose user on host with IP address 192.168.1.2/29 wants to send a packet to the user on host with IP address 10.0.0.2/29. Consider the gateway router connected to both of the private networks make use of NAT. (Also assume that you already know destination IPs and assume Random Port numbers wherever required). In general, what are the benefits of using NAT?

Kindly provide the respective Source IP, Destination IP, Source Port and Destination Port in the format below.:

Source IP	Destination IP	Source Port Number	Destination Port Number
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Q9. (10 Marks) In CSMA/CD what is the need of a jamming signal?