endsemQ

The google form will stop taking responses at exactly 12:05 PM.

* Required

1. Email *

2. Name of the Student *

3. Roll No. *

4. Email of the student *

Questions

5. 1. Two hosts are connected via a packet switch with 100 Mbps links. The link has a propagation delay of 5 microseconds. The switch begins forwarding a packet 2 microseconds after it receives the same. Assume receiving end host processing delay as negligible. If the packet size is 500 bits, the time elapsed between the transmission of the first bit of packet at the sending host and the reception of the last bit of the packet at the receiving host in microseconds is _____. 3 points

6. 2. [2+1+2 marks] 5 points

Consider cyclic redundancy check (CRC) code is used for error detection and correction at the link layer. The generator polynomial $x^5 + x^4 + x^2 + 1$ (i.e., the generator pattern is 110101) is used.

(a) The following message M = 1010101101 has to be transmitted from the sender to the receiver. The cyclic redundancy check (CRC) value for the message, M is _____

[2 marks]

(b) For the above message, M, the message transmitted by the sender, T is _____

[1 marks]

(c) Consider that receiver receives some message, R = 1010101001000 . Does the receiver find the received message in error? If there was no error, what was the original data (excluding CRC code) sent by the sender? Note that this question is independent of (a) and (b). [2 marks]

Note: Show the working in the rough sheet.

7. 3. Consider hosts A, B, C, D, E, and F in Figure 1. Given that the learning switches S1, S2, and S3 have empty forwarding tables initially. Fill the answers in the table 1 from (a) to (x). Assume the format for the switch entry as "MAC address, interface"; you can assume the MAC address of "Host X" as "X" and the switch interfaces are shown in the figure (e.g., p1). Note: Write the switch learning algorithm in the rough sheet. 6 points

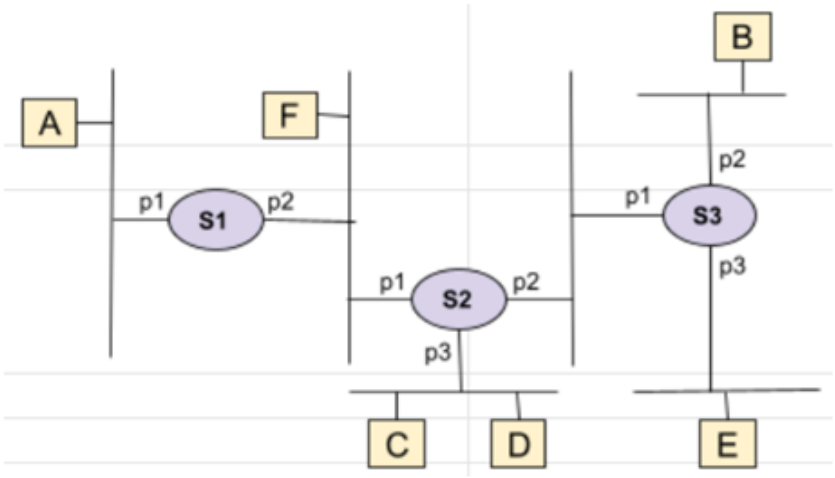
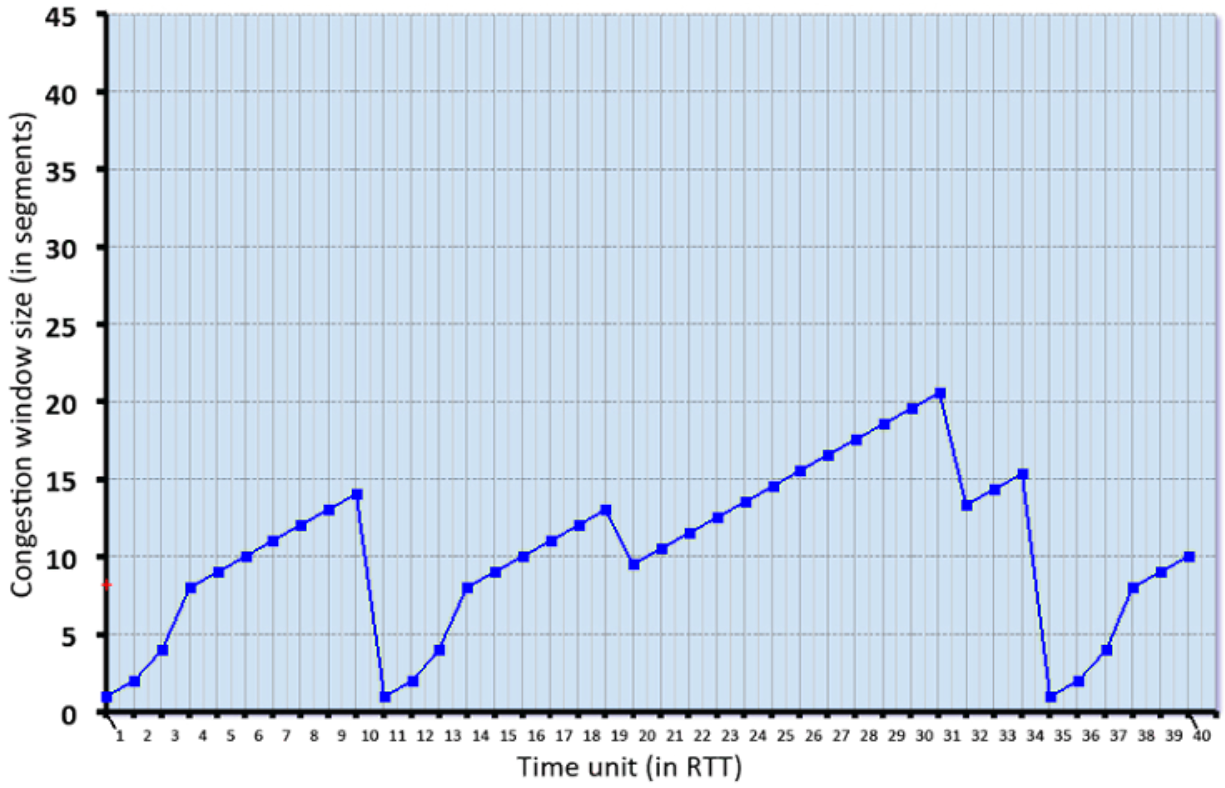


Figure 1

Frame sent with src MAC, dest MAC	New entry in S1: MAC, interface	S1's action	New entry in S2: MAC, interface	S2's action	New entry in S3: MAC, interface	S3's action
A, B	(a)	(b)	(c)	(d)	(e)	(f)
F, D	(g)	(h)	(i)	(j)	(k)	(l)
E, F	(m)	(n)	(o)	(p)	(q)	(r)
A, E	(s)	(t)	(u)	(v)	(w)	(x)

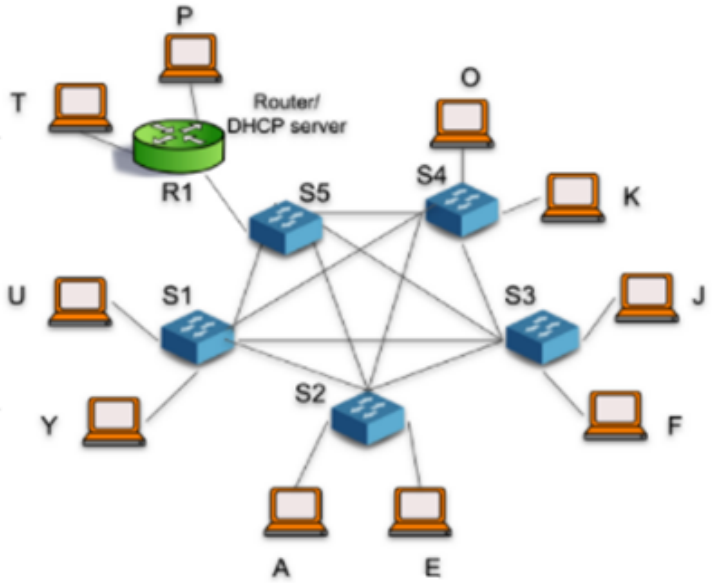
Table 1

8. 4. Consider the following congestion window plot. Identify the state of the TCP sender with time. 4 points



9. 5. [1+1+1 marks] 3 points

Consider the following network topology, MAC address of each node is specified in the Figure e.g. A, B. Suppose a new node with MAC address Z joins the network via connecting to the switch S1. The node needs to obtain an IP address first. It sends a DHCP discover message.
(a) Which all nodes will the receive DHCP discover message?
(b) What are the source and destination Ethernet addresses of the DHCP discover message?
(c) What are the source and destination IP addresses of the DHCP discover message?



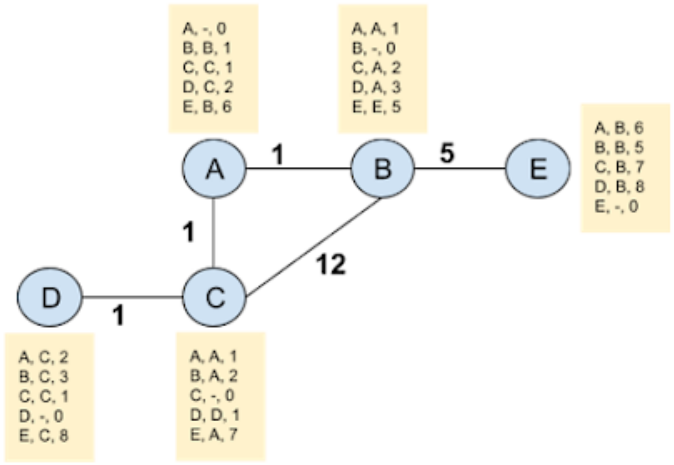
10. 6. [2+1+2 marks] 5 points

Consider the following figure with routers A to F that employ Distance Vector (DV) routing. Assume that the routes have converged. Figure shows the routing table entries after convergence. The format for each routing table entry is: Destination, NextHop, Cost.

(a) Now, the cost of the link B-E changes to 1. Write updated routing table entry for destination E after the first exchange, post link cost changes.

(b) Write the converged routing table for each node.

(c) Assume that the routes have converged after the update in (a). Now, the cost of the link C-D changes to 20. Write updated routing table entry for destination D after the first exchange, post link cost changes.



11. 7. The routing table of a router is shown below: 3 points

Destination	Subnet mask	Interface
145.85.15.0	255.255.255.0	Eth0
145.85.15.0	255.255.255.128	Eth1
195.12.16.0	255.255.255.0	Eth2
195.12.16.0	255.255.248.0	Eth3
195.12.17.5	255.255.255.255	Eth4
default		Eth5

On which interface will the router forward packets addressed to the following destinations?

(a) 145.85.15.16

(b) 95.12.17.10

(c) 195.12.17.15

12. 8. 4 points

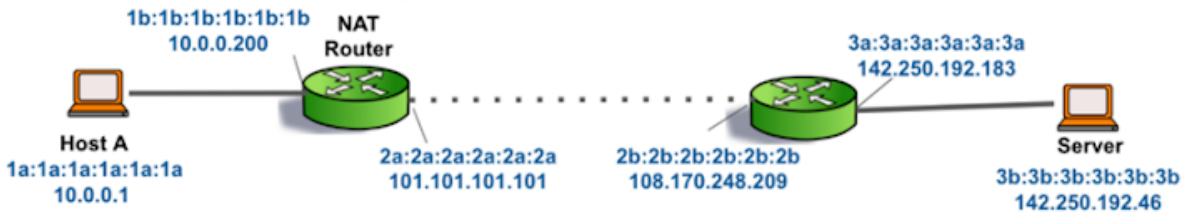
Alice wants to send a large file to Bob and wants to ensure reliable data transfer. Suppose the packet header uses 10 bits to provide sequence numbers the packets. What should be the maximum sender and receiver window sizes for the following cases?
(a) Stop & wait protocol is used; sender window size = _____ ; receiver window size = _____
(b) Go-Back-N protocol is used and receiver discards out of order packets; sender window size = _____ ; receiver window size = _____

13. 9. [0.5 marks for each blank] 3 points

Consider the network connectivity and IP/MAC address assignment shown in the figure. Host A is part of a LAN that uses NAT to communicate with the outside. Host A communicates with the server that has a public IP address. Answer the following questions for the above scenario.

(i) Host A generates a packet for the server with ___(a)_____as the destination IP address and _____(b)_____ as the destination MAC address.

(ii) After receiving the packet from host, A, the NAT router performs address translation and generates a packet with ___(c)____ as the source IP address, ____(d)____ as the destination IP address, ____(e)____ as the source MAC address, and _____(f)_____ as the destination MAC address.



14. 10. 1 point

Suppose Alice wishes to send an email to Bob. Alice uses SMTP to push emails to her email server. Alice's email application performs the following. The SMTP client establishes a TCP connection with Alice's SMTP server, after which it proceeds with SMTP handshake, transfers SMTP data (email), closes SMTP connection, and finally closes the TCP connection. Which of the following statements are TRUE? Provide justification in the rough sheet.

A) The purpose of SMTP handshake is to ensure that the SMTP server is ready
B) The purpose of SMTP handshake is to ensure that the SMTP client is ready
C) The purpose of SMTP handshake is to pass SMTP client's information
D) In the above scenario, once the TCP connection is closed, Bob will be able to view the email sent by Alice.

Mark only one oval.

- A & C are TRUE
- B & C are TRUE
- A, C, & D are TRUE
- All statements are TRUE

15. 11. 1 point

Consider the following statements.
A. In a client-server architecture, the server should be powerful in terms of compute, memory, and bandwidth
B. In a peer-to-peer (P2P) architecture, the peers should be powerful
C. File server is a good use case for P2P architecture

Mark only one oval.

- All statements are TRUE
- B & C are FALSE
- All statements are FALSE
- B is FALSE

16. 12. 1 point

Consider the following statements for a TCP sender.
(A) The TCP timeout interval value is revised ONLY after a timeout occurs.
(B) The TCP sender uses unique timer for each in-flight (unacknowledged) segment.
(C) RTT (Round Trip Time) value estimated by the TCP sender is always greater than current/sample RTT.
(D) The sender TCP congestion window (cwnd) can be incremented by a value smaller than MSS (Maximum Segment Size).

Mark only one oval.

- ◯ All statements are TRUE
- ◯ A, B, and C are TRUE; D is FALSE
- ◯ A, B, and C are FALSE; D is TRUE
- ◯ All statements are FALSE

17. 13. Consider the following statements; mark the ones that are TRUE. 1 point

Check all that apply.

- ☐ DVR takes more time to converge compared to LSR
- ☐ LSR suffers from count-to-infinity problem
- ☐ LSR suffers from route oscillation problem if the links costs are not dependent on amount of traffic carried
- ☐ LSR forms more routing loops compared to DVR

18. 14. Consider the following statements; mark the ones that are FALSE. 1 point

Check all that apply.

- ☐ Ethernet uses CRC code for error detection because it runs as a software
- ☐ TCP uses checksum technique for error detection because it runs as a software
- ☐ UDP uses checksum technique for error detection because it runs on software
- ☐ Ethernet uses CRC code for error detection because it runs on hardware