

First Third-Term Exam

*Closed book and notes; In class**Thursday, October 8th*

- ⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*
- ⊕ *Be **neat and precise**. I will not grade answers I cannot read.*
- ⊕ *You should draw simple figures if you think it will make your answers clearer.*
- ⊕ *Good luck and remember, brevity is the soul of wit*

- All problems are mandatory
- I cannot stress this point enough: **Be precise**. If you have written something incorrect along with the correct answer, you should **not** expect to get all the points. I will grade based upon what you **wrote**, not what you **meant**.
- Maximum possible points: 50.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

1. Routing

(a) Describe the *Split Horizon* technique with an example. How is it used? (4 points)

(b) Are packet sequence numbers *required* to implement reliable flooding for link state routing? Why or why not? (3 points)

(c) What is the condition that must be satisfied in order for the Dijkstra algorithm to add a new node to the stable set? (The stable set is the set of nodes to whom the shortest path is known). (3 points)

2. IP, Addressing

(a) What is a *gateway*? (2 points)

(b) What specific problems does *subnetting* solve? (3 points)

(c) How is IP route lookup affected by CIDR? Explain with a small example. (5 points)

3. More IP

- (a) Consider the IP network shown in Figure 1 with two hosts and two routers. The link level MTUs are as given in the figure. The TCP layer MSS (maximum segment size) at host A is configured to be 1500 bytes (i.e. TCP will send a 1500 bytes in a single “segment” to IP if the TCP has at least 1500 bytes to send). The IP at each node layer is properly configured, i.e. each IP implementation can send the link MTU sized datagrams (obviously modulo link-level headers). Assume (1) no

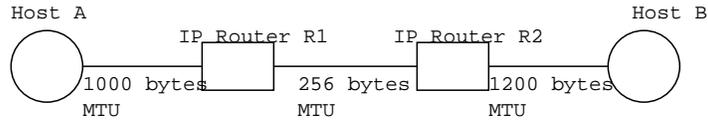


Figure 1: IP network (link MTUs shown in figure)

data loss; (2) each layer (application, TCP, IP) *always* sends the maximum sized packet/segment it can send; and (3) all the link-layer headers are 10 bytes in length.

Assume an application at host A sends a single 1200 byte TCP message. Fill in the IP datagrams fields the resultant set of IP packets that are sent from host A to host B. You only need to list packets that will be sent on the link between A and router R1. Hint: Both the IP and TCP headers are 20 bytes each. (3 points)

Src	Dst	IP Id	Flags (DF,MF only)	IP Len

- (b) What is the service model provided by IP? (2 points)

- (c) Suppose IP (tried to) provide a reliable bit stream service. Construct a reasonable example where this might be considered a *bad* idea. (5 points)

4. Multicast Forwarding

(a) What is multicast? (2 points)

(b) How is DVMRP flooding different than reliable flooding for a link state protocol? (4 points)

(c) Why is PIM-SM (sparse mode) more efficient than DVMRP. (Consider the case of a sparse group with multiple senders). (4 points)

5. TCP, Reliable Transfer

(a) What is a shortcoming of the *stop-and-go* protocol? (2 points)

(b) Construct an example where a $SWS=2$ leads to a protocol error. (4 points)

(c) What is the TCP flow control algorithm used for? How is it implemented in the TCP header? (4 points)