Name_____

EE602 Test 2

Nov. 27, 6:30 - 8:30 PM

(1) The test has six questions for a total of 40 points.

(2) Clearly show your work if you want to get partial credit.

(3) State your assumptions, if any.

Question	Max. points	Points Scored
1	6	
2	6	
3	6	
4	6	
5	8	
6	8	
Total	40	

(1)(a) Suppose client A initiates an HTTP session with server S. At about the same time, client B initiates an HTTP session with server S. Provide possible source and destination port numbers for:
(i) the segments from A to S. (1 point)

(ii) the segments from B to S. (1 point)

(iii) If A and B are different hosts, is it possible that the source port numbers in the segments from A to S are the same as those from B to S? (1 point)

(b) A token ring LAN interconnects M stations using a star topology in the following way. All the input and output lines of the token ring station interfaces are connected to a cabinet where the actual ring is placed. Suppose that the distance from each station to the cabinet is 100 meters and the ring latency per station is 8 bits. Assume that all packets are 250 bytes and that the ring speed is 10 Mbps.
What is the maximum possible arrival rate that can be supported if stations are allowed to transmit 1 packet/token? (3 points)

(2) (i) Suppose the maximum congestion window size threshold is set to 64KB for a TCP session. How large a file can we dowload in 6 RTTs, assuming that the TCP session uses an MSS of 1KB? Ignore packet header overheads. (3 points)

(ii) How large a file can we download in 12 RTTs if we don't employ any TCP options? (3 points)

(3) Find the shortest path routing table entries for nodes B and E using the link-state algorithm, in the following network. Fill the following table showing the progression of routing table entry updates. Extend the tables as long as you need. (6 points)

Iteration	N	A	C	D	E	F	G
Initial	{B}						

Routing table for B:

Destination	Next Hop
A	
C	
D	
E	
F	
G	

Iteration	N	A	B	C	D	F	G
Initial	{E}						

Routing table for E:

Destination	Next Hop
A	
B	
C	
D	
F	
G	

(4) (a) What is the expected time for a succesful capture of a CSMA-CD channel when n stations are contending for the channel with each station contending for the channel with a probability of $p = 1/\text{n}$. Assume the channel has a rate of R and a propagation delay of t_{prop}. (4 points)

(b) Consider 10Gps ethernet. If we allow the ethernet segments to have a maximum distance of 100 meters, what should be the minimum size of the frame? Assume speed of light is $2x10^8$ meters/second. (2 points)

(5) (a) A user sends a 3000 byte message. Assume that the transport and network layer headers each take up 20 bytes per packet. The packet traverses through two networks to reach the destination. The first network has an MTU of 900 bytes and the second network has an MTU of 600 bytes. Show how packets are transmitted in each network. How many bytes are transmitted on the last link? (3 points)

(b) Consider sending a message of size L bytes in two networks. Network1 is a virtual-circuit based network with C byte cells with each cell having a header of h bytes. Network2 is a packet switched network with a maximum packet size of P bytes and a header of H bytes. The two networks have identical bandwidth B bytes/sec and RTTs of R seconds. Assume you want to transmit the message as fast as possible. What is the total time to transmit the message in each network? (3 points)

(c) Two flows A and B are transmitting at a constant 1 Mb/s and 2 Mb/s respectively. What are the drop rates likely to be experienced by these two flows at an RED (Random Early Drop) router if the output link has a capacity of 2.5 Mb/s. (2 points)

(6)(a) Suppose that Cambridge University needs 2048 addresses and is assigned the addresses 194.24.0.0 through 194.24.7.255, along with mask 255.255.248.0. Next, Oxford University asks for 4096 addresses and University of Edinburgh asks for 1024 addresses.

(i) If the addresses need to be restricted to the range from 194.24.0.0 through 194.24.31.255, what addresses should be assigned to Oxford and Edinburgh? Why? (3 points)

(ii) Show the routing table entries (destination address and mask only) for these three Universities. (3 points)

(b) What is Head-of-line blocking? How can this be avoided? (2 points)