Feedback — Midterm

You submitted this exam on **Sun 24 Feb 2013 12:59 PM EST -0500**. You got a score of **58.00** out of **60.00**.

This is the timed midterm for the course. Maximum number of points is 60. Please set aside two hours for the exam.

Question 1

(1 point) Which one of the following is not true for both wired ethernet and wireless mediums?

Your Answer		Score	Explanation
○ the speed of light is a potential limiting factor in end-to-end latency			
◉ if packets collide, all hosts will be able to detect the collision	✓	1.00	
○ exponential back-off could be used to deal with contention			
○ efficient packet flooding is possible			
Total		1.00 / 1.00	

Question Explanation

if packets collide, all hosts will be able to detect the collision

Question 2

(1 point) Which one of the following statements is true?

Your Answer		Score	Explanation
○ every IP packet must be carried in the payload of an Ethernet frame			
◉ IP packet headers indicate which higher-level transport protocol is associated with the data in the IP packet payload	✓	1.00	
○ every wireless ethernet message contains an IP packet in its payload			
○ it is always possible for a sender to determine if an IP packet it sent was received successfully			
Total		1.00 / 1.00	

Question Explanation

IP packet headers indicate which higher-level transport protocol is associated with the data in the IP packet payload

Question 3

(1 point) Which one of the following is a true assertion about the spanning tree algorithm even as switches and links are added/removed?

Hint: Consider the case of when switches may fail

Your Answer		Score	Explanation
○ at all times, at most one switch believes it is the root			
◉ at all times, at least one switch believes it is the root	✗	0.00	
○ at all times, every host connected to the switched network can communicate with every other host connected to the network (without resorting to flooding or			

broadcasting packets)		
○ none of the above		
Total		0.00 / 1.00

Question Explanation

none of the above

Question 4

(1 point) In a wireless network, which one of the following statements is **not** true?

Your Answer		Score	Explanation
○ a wireless node might observe a packet sent to some other node, but might not observe the acknowledgement			
◉ the sender of a packet can determine whether it collided with another packet	✓	1.00	
○ a wireless node might observe the acknowledgement for a packet without having observed the original packet			
○ two nearby nodes can receive two different packets simultaneously			
Total		1.00 / 1.00	

Question Explanation

the sender of a packet can determine whether it collided with another packet

Question 5

(1 point) Which one of the following statements is true?

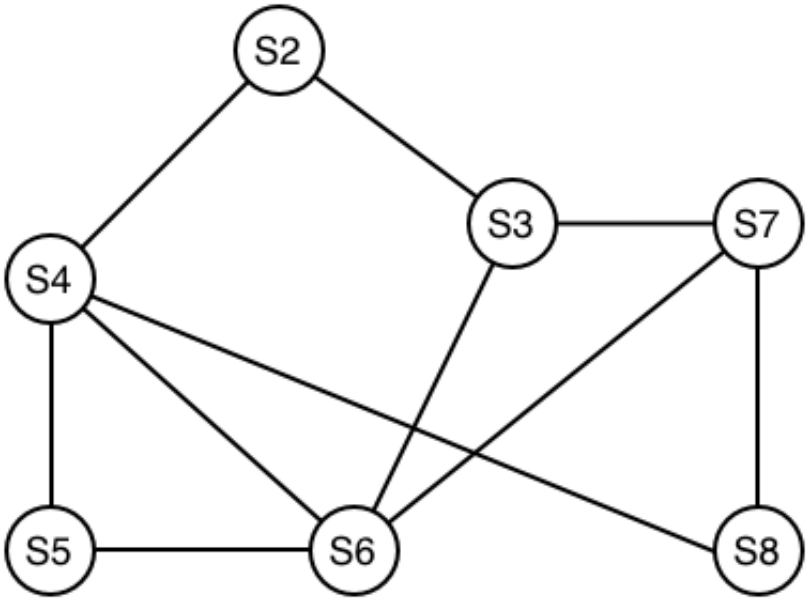
Your Answer		Score	Explanation
○ a packet transmitted over a 1 Gb/s network will always have lower packet delivery latency than the same packet transmitted over a 14.4 Kb/s modem			
○ None of these			
○ a packet transmitted over any 10-foot-long network link will always have a lower packet delivery latency than a same size packet transmitted over any 10-mile-long network link			
◉ if you measure the round-trip time between two hosts on the Internet, and afterwards you measure the one-way latency between the same two hosts on the Internet, the measured one-way latency will be half the measured round-trip time	✗	0.00	
Total		0.00 / 1.00	

Question Explanation

None of these

Question 6

Suppose you have a switched Ethernet network with the following topology:



The circles represent switches, the thick lines represent connections between the switches, and the id of a switch is the number encoded in the switch name (i.e., id of switch S4 is 4, and S4 has a lower numbered id than S7).

(2 points) Which node eventually becomes the root of the tree?

Your Answer		Score	Explanation
◉ S2	✓	2.00	
○ S3			
○ S4			
○ S5			
○ S6			
○ S7			
○ S8			
Total		2.00 / 2.00	

Question Explanation

S2. Lowest id

Question 7

(4 points) Which links remain enabled for forwarding messages after the spanning tree algorithm has stabilized. Select all valid options.

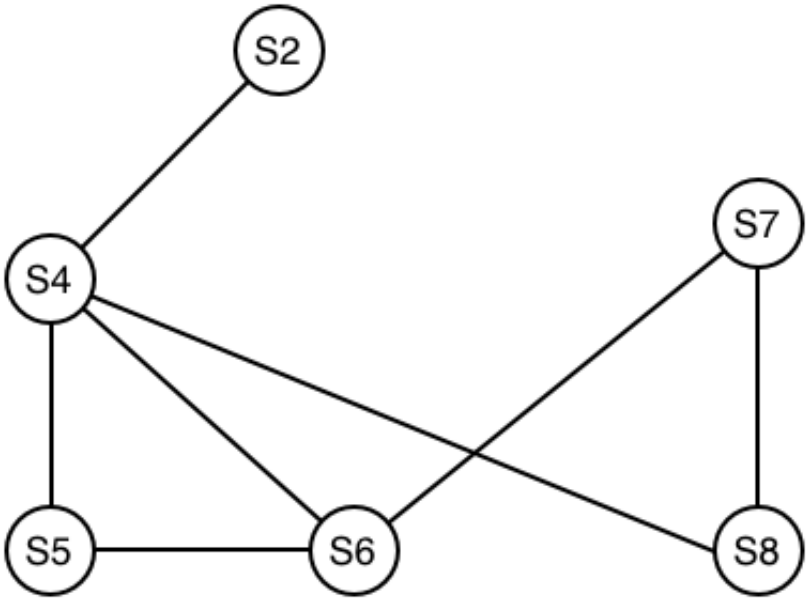
Your Answer		Score	Explanation
☐ S4-S6	✓	1.00	
☐ S7-S8	✓	1.00	
☑ S3-S6	✓	1.00	
☑ S4-S8	✓	1.00	
Total		4.00 / 4.00	

Question Explanation

S3-S6
S4-S8

Question 8

(4 points) Switch S3 fails. Which links remain enabled for forwarding messages, after the spanning tree algorithm has once again stabilized. Select all valid options.



Your Answer		Score	Explanation
☑ S6-S7	✓	1.00	
☑ S4-S6	✓	1.00	
☑ S4-S8	✓	1.00	
☐ S8-S7	✓	1.00	
Total		4.00 / 4.00	

Question Explanation

S6-S7
S4-S6
S4-S8

Question 9

Suppose you have the following network topology, where lines are links, circles are routers, squares are packets, and H1/H2 are hosts:

Packet 1 and packet 2 are both 125 bytes long, and they are sent in a back-to-back "packet train" by H1: as soon as H1 finishes transmitting packet 1, it begins transmitting packet 2. Both packets are destined for host H2. Assume that H1 begins transmitting packet 1 at time t=0 seconds.

The "thick" network links (between each host and its adjacent router) are 1 Mb/s (1 million bits per second). The "thin" network link (between the routers) is 100 Kb/s (100 kilobits per second). The propagation delay across each network link is 1 second. Note that there are three network links between H1 and H2.

Assume that the routers behave as store and forward nodes; as an incoming packet arrives at a router, it is drained off of the incoming link and placed into a queue. Once the packet has fully drained into the router queue, it then immediately becomes eligible for transmission on the outgoing link. If the second packet arrives at a router before the router has finished placing the first packet on the outgoing link, the second packet will queue up inside the router, waiting for its turn to start going onto the outgoing link. Assume that the routing operations are instantaneous and that there is no other cross traffic other than these two packets.

Answer the following questions. (Pay attention to the fact that packets are 125 BYTES and the line rates are in bits per second.)

(3 points) When does packet 1 finish arriving at router 1? ["time Ta"]

Your Answer		Score	Explanation
○ 1 millisecond			
◉ 1001 milliseconds	✓	3.00	
○ 1010 milliseconds			
○ 1000 milliseconds			

Total	3.00 / 3.00

Question Explanation

1.001 secs

Question 10

(3 points) When does packet 2 finish arriving at router 1? ["time Tb"]

Note that Tb – Ta is called the "interarrival time" of packets 1 and 2 at router 1.

Your Answer		Score	Explanation
○ 2001 milliseconds			
◉ 1002 milliseconds	✓	3.00	
○ 2 millisecond			
○ 2002 milliseconds			
Total		3.00 / 3.00	

Question Explanation

1002 milliseconds

Question 11

(3 points) When does packet 1 finish arriving at H2? ["time Tc"]

Your Answer	Score	Explanation
○ 3.011 secs		

◉ 3.012 secs	✓	3.00
○ 3.013 secs		
○ 3.01 secs		
Total		3.00 / 3.00

Question Explanation

3.012 secs

Question 12

(3 points) When does packet 2 finish arriving at H2? [“time Td”]

Your Answer		Score	Explanation
○ 3.021 secs			
◉ 3.022 secs	✓	3.00	
○ 4.021 secs			
○ 4.022 secs			
Total		3.00 / 3.00	

Question Explanation

3.022 secs

Question 13

(2 points) Calculate the following number: the size of packet 1 (in bits) divided by the interarrival time of packets 1 and 2 at host H2. *(Note that the interarrival time is the difference between the times at which the packets were received by H2.)*

Your Answer		Score	Explanation
90.90 Kb/s			
100 Kb/s	✓	2.00	
10 Kb/s			
909 Kb/s			
Total		2.00 / 2.00	

Question 14

(3 points) If we asked you to redo the calculation in Q13, but for the scenario in which the link between H1 and router 1 was upgraded to 1 Gb/s, how would the answer change?

Your Answer		Score	Explanation
909.0 Kb/s			
100 Kb/s	✓	3.00	
1000 Kb/s			
9090 Kb/s			
Total		3.00 / 3.00	

Question Explanation

100 Kb/s. Note that packet 2 is delayed by packet 1 at the bottleneck link. The additional speed of link 3 does not affect this delay.

Question 15

(3 points) If we asked you to redo the calculation in Q13, but for the scenario in which

the link between router 1 and router 2 was upgraded to 200 Kb/s, would the answer change?

Your Answer		Score	Explanation
○ 181.8 Kb/s			
◉ 200 Kb/s	✓	3.00	
○ 100 Kb/s			
○ 1818 Kb/s			
Total		3.00 / 3.00	

Question Explanation

200 Kb/s. Making the bottleneck link go faster, reduces the delay experienced by packet 2 in traversing link 2.

Question 16

(5 points) Assume that there is a transmission medium that has a signal to noise ratio of 3, i.e., S/N is 3. Let us say that a device is able to achieve 10 Mbps over this transmission medium. Calculate the bandwidth (i.e., width of the frequency spectrum) associated with the channel.

Your Answer		Score	Explanation
○ 20 Mbps			
◉ 5 Mhz	✓	5.00	
○ 20 Mhz			
○ 5 Mbps			
Total		5.00 / 5.00	

Question Explanation

5 Mhz using Shannon's limit theorem.

Question 17

Consider six wireless stations, A, B, C, D, E, and F. Stations A, B, C, and D can communicate with each other, i.e., A's transmissions can be heard by B, C, and D, B's transmissions can be heard by A, C, and D, etc. In addition, stations D, E, and F can communicate with each other. In addition, B and E can communicate with each other. All other communications are not possible. For example, E cannot communicate with A. Given this setting, determine whether each of the following simultaneous communications are possible.

(2 points) A sends data to B and F sends data to E.

Your Answer		Score	Explanation
○ Only data from A is delivered			
◉ Both messages are delivered	✓	2.00	
○ Only data from F is delivered			
○ Both messages are not delivered			
Total		2.00 / 2.00	

Question Explanation

Both messages are delivered

Question 18

(2 points) B sends data to C and D sends data to E.

Your Answer	Score	Explanation

○ Both messages are delivered		
◉ Both messages are not delivered	✓	2.00
○ Only data from B is delivered		
○ Only data from D is delivered		
Total		2.00 / 2.00

Question Explanation

Both messages are not delivered

Question 19

(2 points) B sends data to C and D sends data to F.

Your Answer		Score	Explanation
○ Both messages are delivered			
◉ Only data from D is delivered	✓	2.00	
○ Only data from B is delivered			
○ Both messages are not delivered			
Total		2.00 / 2.00	

Question Explanation

Only data from D is delivered. D's transmissions interfere at C.

Question 20

(2 points) When B is transmitting data to some node in the system, F can transmit data to ..?

Your Answer		Score	Explanation
◉ F cannot transmit to any node	✓	2.00	
○ F can transmit to E			
○ F can transmit to D			
Total		2.00 / 2.00	

Question Explanation

No, F will not be able to communicate with D or E.

Question 21

(2 points) When B is transmitting data to some node in the system, E can transmit data to ..?

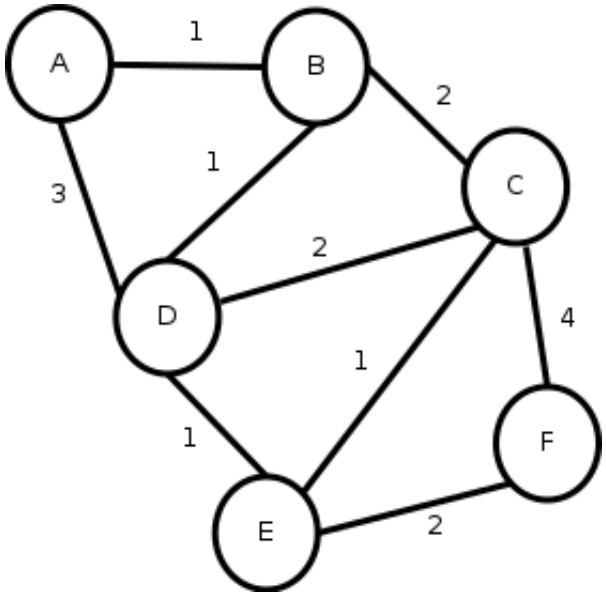
Your Answer		Score	Explanation
◉ E can transmit to F	✓	2.00	
○ E cannot transmit to any node			
○ E can transmit to D			
Total		2.00 / 2.00	

Question Explanation

Yes, E can transmit to F.

Question 22

In the given diagram, A, B, C, D, E, and F are routers in a network, and the links between them are labeled with their respective costs.



(3 points) What is the total cost of the optimal path from A to F

Your Answer		Score	Explanation
6			
5	✓	3.00	
9			
4			
Total		3.00 / 3.00	

Question Explanation

A->B->D->E->F

Question 23

(3 points) Once the optimal route has been established, to which node would C forward a packet destined for F?

Your Answer	Score	Explanation
F		

◉ E	✓	3.00
○ D		
○ B		
Total		3.00 / 3.00

Question Explanation

Optimal path from C to F is C->E->F

Question 24

(4 points) In an intermediate stage of the distance vector protocol (when the optimal route has not yet been established), E's routing table is (4,3,1,1,0,2). If now, it hears an advertisement from D saying (3,1,2,0,1,6), what would its updated routing table be? (A routing vector, gives the costs of the paths from a given node to every other node in the system. For example, the routing vector at E indicates that its distance to A is 4, its distance to B is 3, and so on. The advertisement is simply the routing vector for D)

Your Answer		Score	Explanation
○ (4,3,1,1,0,2)			
◉ (4,2,1,1,0,2)	✓	4.00	
○ (4,2,3,1,2,7)			
○ (4,2,3,0,1,6)			
Total		4.00 / 4.00	

Question Explanation

Since the best known cost to D is 1, for each node, compute the minimum of the cost known so far, and the cost from D + 1