ECS 152A Computer Networks
Instructor: Liu

Name:

Student ID #:

Mid Exam:

Duration: 50 Minutes
1. The exam is closed book. However, you may refer to one sheet of A4 paper (double sided) of your own notes.
2. Try to solve as many as can.
3. Be brief.
4. Show your reasoning clearly. If your reasoning is correct, but the final answer is wrong, you will receive most of the credit.
5. Write your solution on this paper. If you need extra paper, use plain white paper. Write your name on any extra paper.

Good Luck!

Do not write in this box.

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1. True or False.
   1) Statistical multiplexing is most useful when the peak rate is close to the average rate
   2) The changing of either the IP address or the name leads to an update of DNS.
   3) TCP uses destination IP address and port number to identify the application layer process.
2. Multiple Choices  (One or more choices may be correct, you need to pick them all, -1 point for each missing correct one, and -1 point for each wrong answer.)

1) Circuit switching can provide
   a. Delay guarantees
   b. Resource efficiency
   c. Admission guarantees
   d. Rate guarantees
   e. Simplicity in network core
   f. Reliable delivery.

2) Today’s Internet
   a. is a datagram network
   b. has multiple network layer protocols
   c. runs multiple applications
   d. has a flat structure
   e. emphasizes simplicity at the network edge
   f. is distributed
   g. exclusively uses client-server architecture in the application layer.
3. Short questions.
   1) Name two applications using TCP.

   2) List all the layers in the five-layer Internet architecture and briefly the main functionality of each layer.
4. Consider a 1 Mbps WAN channel with 10 msec propagation delay. Data packets are 1000 bits long while ACK/NAK packets are negligible in length. Window size (N) = 5 packets, and there are 10 packets to be transmitted. Assume a Selective Repeat ARQ protocol with a new addition: NAKs are sent for packets detected lost at the receiver. Assume that the timeout window is set to be 0.1 sec.

1) Assume no errors and no lost packets or ACKs/NAKs. How much time is required to complete the transfer of the 10 pkts and receive the final ack.

2) Now assume every 9th packet which crosses the forward channel is lost. ACKs/NAKs are not lost or corrupted. How much time is required to complete the transfer of the 10 pkts and receive the final ack.
1. True or False.
   
   3) Statistical multiplexing is most useful when the peak rate is close to the average rate. False
   4) The changing of either the IP address or the name leads to an update of DNS. True
   5) TCP uses destination IP address and port number to identify the application layer process. False
2. Multiple Choices (8 points) (One or more choices may be correct, you need to pick them all, -1 point for each missing correct one, and -1 point for each wrong answer.)

   Circuit switching can provide
   a. Delay guarantees
   b. Resource efficiency
   c. Admission guarantees
   d. Rate guarantees
   e. Simplicity in network core
   f. Reliable delivery.

   Ans: a, d.

   Today’s Internet
   g. is a datagram network
   h. has multiple network layer protocols
   i. runs multiple applications
   j. has a flat structure
   k. emphasizes simplicity at the network edge
   l. is distributed
   m. only uses client-server architecture in the application layer.

   Ans: a, c, f
3. Short questions.
   Name two applications using TCP.

   HTTP, Email

   List all the layers in the five-layer Internet architecture and briefly the main functionality of each layer.

   See lecture slides.
4. Consider a 1 Mbps WAN channel with 10 msec propagation delay. Data packets are 1000 bits long while ACK/NAK packets are negligible in length. Window size (N) = 5 packets, and there are 10 packets to be transmitted. Assume a Selective Repeat ARQ protocol with a new addition: NAKs are sent for packets detected lost at the receiver. Assume that the timeout window is set to be 0.1 sec.

Assume no errors and no lost packets or ACKs/NAKs. How much time is required to complete the transfer of the 10 pkts and receive the final ack.

Now assume every 9th packet which crosses the forward channel is lost. ACKs/NAKs are not lost or corrupted. How much time is required to complete the transfer of the 10 pkts and receive the final ack? Consider both the case the 10th packet is received and lost.

Answer: First packet of first window receives an ACK at 21ms. So first packet of 2nd window receives an ACK at 42ms and the last packet receives an ACK at 42+4 = 46ms.

First packet of first window receives an ACK at 21ms. So first packet of 2nd window receives an ACK at 42ms and the last packet receives an ACK at 42+4 = 46ms.

Retransmit caused – so 46+21 = 67ms are required

If 10th packet as being lost, then they should get the result as given by the following formula:
Total = 46+ (Timeout )
The timeout should be greater than 21ms.