Name:_____ ID:_____

CSE 474 Computer Networks

Spring 2011 Midterm Exam

13.04.2011 Wednesday, Duration: 100 minutes

Q1	Q2	Q3	Q4	B	SUM
/60	/12	/12	/16	/10	/100

Q1: Short Questions (3 x 20 = 60pts): Answers should be as brief as possible.

1.1. Give two key differences between DSL and Cable.

1.2. Give an advantage and a disadvantage of low-earth orbiting (LEO) satellites comparing to geostationary satellites.

1.3. Give an advantage of circuit-switched network over packet switched network.

1.4. What happens if traffic intensity is greater than 1?

1.5. What is the meaning of "bottleneck link"?

1.6. Does a transport layer segment of a message greater than its corresponding link layer frame? Why?

1.7. What is the difference between virus and worm?

1.8. Give two examples for the application layer protocols that use UDP protocol.

1.9. Give two examples for the stateful application layer protocols.

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1.10. What is mail access protocol? Give an example.

1.11. Suppose that canonical name of `www.ibm.com` is `servereast.backup2.ibm.com`. What would be the resource record that provide the canonical name for `www.ibm.com`?

1.12. Which utility (program) would you use to find out the corresponding IP address of a host name by contacting Internet Domain Name Servers?

1.13. Give two applications that are naturally suitable for P2P architecture.

1.14. Is there an RFC for BitTorrent protocol? Why?

1.15. Does TCP provide delay guarantee? Bandwidth guarantee? Reliability?

1.16. Give an advantage of UDP over TCP.

1.17. In Selective Repeat protocol, if there are 16 sequence numbers, what would be the maximum window size? (To avoid Selective Repeat dilemma)

1.18. What is the difference between flow control and congestion control?

1.19. What is premature timeout in TCP protocol? Give a possible cause of it.

1.20. What is the UDP checksum of the following three 16-bit words?: w_1= 0110011001100000, w2 = 0101010101010101, w3 = 1000111100001100

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Q-2. (12 pts) Consider two hosts, A and B, connected by a single link of rate R=50 Kbps. Suppose that two hosts are separated by D=1000 kilometers, and suppose that propagation speed along the link is $2{,}5 \cdot 10^8$ meters/sec. Host A is to send a packet of 200 bits to Host B.

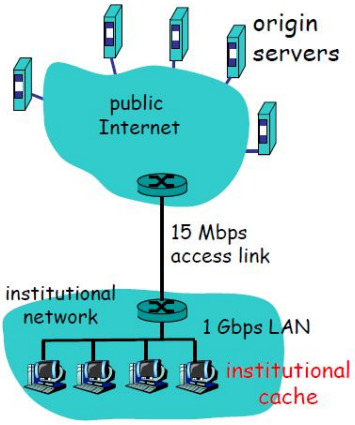
a. Find the propagation delay, d_{prop}, in terms of miliseconds. (3 pts)

b. Find the transmission delay of the packet, d_{trans}, in terms of miliseconds. (3 pts)

c. Ignoring processing and queuing delays, find the end-to-end delay. (2 pts)

d. Suppose Host A begins to transmit the packet at time t=0. At the time t= d_{trans}, where is the first bit and last bit of the packet? (4 pts)

Q-3. (12 pts) Consider the figure below, for which there is an institutional network connected to the Internet. Suppose that the average object size is 900,000 bits and that the average request rate from the institution's browsers to the origin servers is 15 requests per second. Also suppose that the amount of time it takes from when the router on the Internet side of the access link forwards an HTTP request until it receives the response is 200 milliseconds on average (that is, the average Internet delay is 200ms.). The access link transmits data at a rate of 15 Mbps. Model the total average response time as the sum of the average access delay (that is, the delay from Internet router to institution router) and the average Internet delay. For the average access delay, use Δ / (1 - $\Delta \cdot \beta$), where Δ is the average time required to send an object over the access link and β is the arrival rate of objects to the access link.



(a) (6 pts) Find the total average response time

(b) (6 pts) Now suppose a cache is installed in the institutional LAN. Suppose the hit rate is 0.4. Find the total response time.

You may write your answers in a separate sheet.

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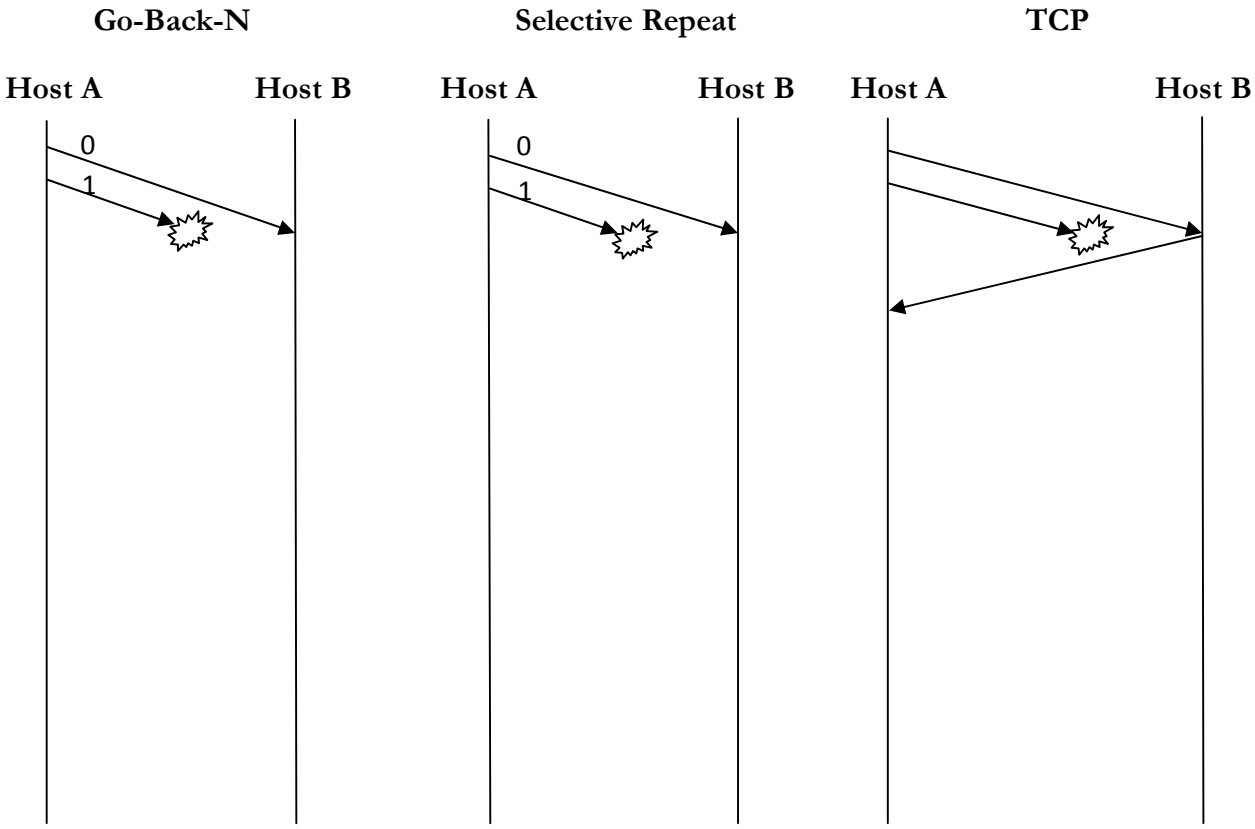
Q-4 (16 pts) Assume that host A wants to send 4 segments (of 10 bytes each). The timeout values at hosts A and B are 2 · RTT. Suppose that the 2nd segment is lost whereas all the following segments and all acknowledgments are delivered without error. The hosts can use Go-Back-N (GBN), Selective Repeat (SR), or TCP at the transport layer. The window size in all protocols is greater than 10.

(a) (12 pts) Draw the missing segments and acknowledgments with their sequence numbers in the following figure, for all three protocols (Assume TCP doesn't use fast retransmit).

(b) (4 pts) How would the message flow for TCP change, if fast retransmit was used?



Bonus Questions (10 pts) (for whom read the book carefully):

B-1 (3 pts): What is the name of first multiple-access protocol? (Hint: It was used in a packet-based radio network that allowed multiple remote sites on the Hawaiian Islands to communicate with each other.)

B-2 : What is SYN flood attack? (3 pts) Give an effective defense for this attack. (4 pts)