Lecture 10: Midterm review

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We'll go over a few topics for Wednesday's midterm. Here are examples of the kind of questions you can expect.

Exercise 1 *What were the goals of the Internet when it was first developed? How was this a departure from the goals of the telephone network?*

Exercise 2 *If your applications send a lot of traffic 50 % of the timer and stay dormant 50 % of the time, does it make more sense to use packet switching or circuit switching? Why?*

Exercise 3 *What if each application sent a steady low-rate stream of (say) 60 kbit/s, such as audio? Would it make more sense to use packet or circuit switching now?*

Exercise 4 *Say you were loading a web page (www.google.com/index.html) from your laptop. Describe exactly how this page load happens starting from the application layer all the way down to the physical layer.*

Exercise 5 *If the minimum round-trip time on a path is RTT_{min}, what is the throughput of the Stop-And-Wait protocol? What is the throughput of the sliding window protocol?*

Exercise 6 *At some point, a receiver in the Stop-And-Wait protocol has received the following sequence of packet sequence numbers: 1, 2, 3, 4, 7, 8, 10, 12, 13, 14. Is this a valid sequence? Why or why not? Is it a valid sequence in the sliding window protocol?*

Exercise 7 *What happens if everyone uses a large window in the sliding window protocol? What happens if everyone uses a small window?*

Exercise 8 *Give a few examples of congestion collapse. Explain precisely how the offered load is measured in your example, how a user's individual utility is measured, and how the aggregate utility is measured? Draw a curve showing this congestion collapse graphically for your chosen example (don't draw a generic congestion collapse figure).*

Exercise 9 *Show the workings of the distance vector protocol on this particular example. Assume it takes one time unit to send a DV advertisement on any link. How long does it take for node A to learn about a route to node B?*

Exercise 10 *Let's assume you are on a link with a capacity of 10 Mbit/s and a minimum round-trip time (i.e., excluding queueing delays) to the server of 10 ms. Let's say you want to retrieve a file from the server as quickly as possible. Consider two cases: a small file that can fit into a single maximum-sized packet and a large file that needs several thousand such packets. You have two choices to improve network performance: you can buy a better link with higher capacity or you can move the server closer to you. Which choice makes sense if you want to minimize the total time that it takes for you to retrieve the file from the moment you issue the file retrieve command? Answer this separately for the small and large file case.*

Exercise 11 *In an interdomain routing protocol such as BGP, what is the consequence of not authenticating a route advertisement? Demonstrate one example in detail where you think a router lying in its advertisements could severely disrupt Internet service.*

Exercise 12 *(Won't be tested). Between AIMD, MIMD, AIAD, and MIAD, which of these protocols are suitable to guarantee both efficiency and fairness starting from an arbitrary value of the window size for two senders. Demonstrate this graphically using the phase diagram we used in the lecture.*

Exercise 13 *Why is DNS structured as a hierarchical collection of servers?*

Exercise 14 *Give a few examples of where using hierarchy allows the Internet to scale better.*

Exercise 15 *How does the gain parameter α affect the retransmission timeout calculation?*