CS 655: Computer Networks
Fall 2024
Homework 1

To be completed individually or in group size of two. Please review the academic conduct rules mentioned in the syllabus.
Answer all questions. Submit on Gradescope.

1. Hosts A and B are each connected to a router R via 100Mbps links as shown.

   The propagation delay on each link is 20 μs. R is a store-and-forward device; it begins relaying a received packet 35 μs after it has finished receiving it. Calculate the total time required to transmit 1250 bytes from A to B.
   a. As
   b. As

2. Suppose th...overhead of 50 bytes for he..however, one data byte is corr..are 3 options for packet size..f these sizes is optimal (i.e...nsmitted)

3. Traffic inte..uing delay.
   a. Tru...ng delay. Please als...
   b. Fo..ffer, suppose pac..ng link is 10Mbps. Ca..ing rates

4. There are 3..ing 100Mbps, 20Mbps and 50Mbps. We define **throughput** as the measurement of all data transferring (whether that be useful or not), **goodput** measures useful data only. (For simplicity, only consider retransmissions as overhead)
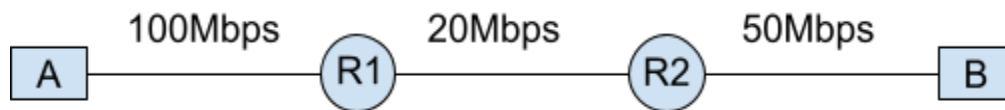
   a. Suppose both routers R1 and R2 have infinite buffers. What are the throughputs and goodputs when A sends at rate 5Mbps, 10Mbps, 20Mbps, 50Mbps and 100Mbps?
   b. Suppose R1's buffer is infinite while R2's buffer can only hold one packet. What's the answer for a) now?
   c. Suppose both R1 and R2's buffer is finite, what will happen if A keeps sending at rate 50Mbps? What's the throughput? What will happen to goodput?

5. The Unix utility ping can be used to find the RTT to various Internet hosts. Read the man page for ping, and use it to find the RTT to www.google.com. Measure the RTT values at different times of day and compare the results. What do you think accounts for the differences?

6. The Unix utility traceroute, or its Windows equivalent tracert, can be used to find the sequence of routers through which a message is routed. Use this to find the path from your site to www.google.com. How well does the number of hops correlate with the measured RTTs (is the RTT measured for router i always less than that for router i + 1)? Have you observed any packet loss?