

Homework 3 – Internet Applications and Whirlwind Intro

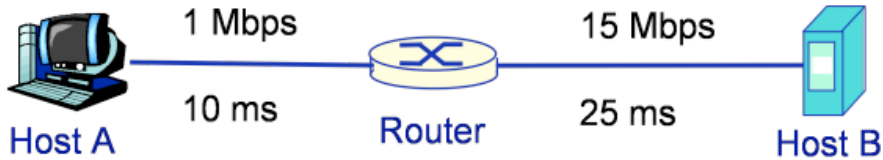
Assigned: Thursday, September 15, 2011

Due: Thursday, September 22, 2011 *at the beginning of class*

Notes:

- All homework assignments must be done on your own.
- Submit this assignment either through Blackboard or as a hard-copy before class begins.

Problems

- Consider two hosts, A and B, connected by a single link of rate R bps. Suppose that the two hosts are separated by m meters and that the propagation speed along the link is s meters/sec. Host A is to send a packet of size L bits to Host B.
 - Express the propagation delay, d_{prop} , in terms of m and s .
 - Determine the transmission time of the packet, d_{trans} , in terms of L and R .
 - Ignoring processing and queuing delays, give an expression for the end-to-end delay.
 - Suppose Host A begins to transmit the packet at time $t = 0$. At time $t = d_{trans}$, where is the last bit of the packet?
 - Suppose d_{prop} is greater than d_{trans} . At time $t = d_{trans}$, where is the first bit of the packet (at Host A, in the network, or at Host B)?
- Suppose two hosts, A and B, are separated by 6,250 kilometers and are connected by a direct link of $R = 5$ Mbps. Suppose the propagation speed over the link is 2.5×10^8 meters/sec.
 - Calculate the propagation delay, d_{prop} .
 - Assuming the file is sent continuously, how long does it take before the receiver has received the entire 750,000-bit file?
- Consider the network pictured below. Host A sends a 1500-**byte** packet to Host B. You may assume that the transmission time for a single bit is negligible (but you must still compute transmission delays for the entire packet). **Hints:** Don't forget to look back at your answers for Problem 1. Remember that the network is store-and-forward.
 

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graph LR
    A[Host A] -- "1 Mbps  
10 ms" --- R((Router))
    R -- "15 Mbps  
25 ms" --- B[Host B]
      
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- Compute the transmission delay of the packet from Host A to the router.
- Compute the transmission delay of the packet from the router to Host B.
- Assume Host A sends the packet at time 0. When will the *first* bit arrive at Host B?
- Assume Host A sends the packet at time 0. When will the *last* bit arrive at Host B (*i.e.*, what is the end-to-end delay)?

Review Questions

Review questions are for your reference only and will not be graded. The answers can be found in the lecture notes or were discussed in class. These are examples of short-answer or fill-in-the-blank questions you will find on the mid-term and final exam.

1. What is phishing?
2. What is the difference between a virus and a worm?
3. What are some differences between a distribution list that is maintained by your email client and an electronic mailing list?
4. Name one site you can use to determine if an email is a hoax or not.
5. What are some differences between a wiki and a blog?
6. What are the three main components of Google Search? Briefly describe each of them.
7. What is an end system? List some examples of end systems.
8. How many bits per second are in 3 Mbps?
9. How many milliseconds are in 2.5 seconds?
10. What is a network protocol and why are protocols important?
11. Out of dial-up modems, cable modems, and DSL modems, which provide dedicated access?
12. Explain how packets using datagram routing over a packet-switched network can arrive to the destination in a different order than they were sent.
13. Consider the delays that a *single* packet encounters from a source host to a destination host over a fixed route. List the delay components in the end-to-end delay. Which of these delays are constant (*i.e.*, do not change over time) and which are variable (*i.e.*, could change over time)?
14. What is the difference between propagation delay and propagation speed?
15. Does transmission delay occur when a packet is sent, received, or both?
16. List the five Internet protocol layers (top to bottom).