

CS A342

HW #3, 47 points total

Due Tuesday, Oct. 30, 11:59PM

1. (4 pts) What are the pros and cons of intermediate reassembly of an Internet fragmented datagram versus reassembly at the final destination?

2. (5 pts). Suppose two programs use TCP to establish a connection, communicate, terminate the connection, and then open a new connection. Further suppose a FIN message sent to shut down the first connection is duplicated and delayed until the second connection has been established. If a copy of the old FIN is delivered, will TCP terminate the new connection?

3. (8 pts) Although slow start with congestion avoidance is an effective technique for coping with congestion, it can result in long recovery times in high-speed networks, as this problem demonstrates.
 - a. Assume a round-trip delay of 60ms (about what might occur across a continent) and a link with an available bandwidth of 1Gbps and a segment size of 576 bytes. Determine:
 - 1) The window size needed to keep the pipe full and
 - 2) The time it will take to reach that window size after a timeout using TCP's slow start/congestion avoidance algorithm (Figure 3.52), although in this case we are only interested in the algorithm until the first segment times out.

You may find the following handy:

$$\text{throughput} = \frac{w * MSS}{RTT} \text{ Bytes/sec}$$

- b. Repeat (a) for a segment size of 16Kbytes.

4. (6 pts) Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:

Prefix Match	Interface
1	0
10	1
111	2
Otherwise	3

For each of the four interfaces, give the associated range of destination host addresses and the number of addresses in the range.

5. (6 pts) Consider a subnet with prefix 128.119.40.128/26. Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network. Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?

6. (18 pts) For this problem refer to the Wireshark trace file, tcp-ethereal-trace-1.

- a. What are the frame numbers that correspond to the 3-way handshake between the client (192.168.1.102) and server (128.119.245.12)?
- b. Frames 4,5,7, and 8 are sent from the client to the server. What are the frames that Acknowledge 4,5,7, and 8 from the server to the client?
- c. What is the RTT for the sequence sent in Frame 4 and in Frame 5?
- d. If EstimatedRTT is set to the actual RTT for Frame 4, what will EstimatedRTT be set to after receiving the ack for Frame 5?
- e. Can you see any evidence of TCP's Slow Start in the log? If so describe what evidence you see.
- f. The size of the receiver window advertised by the server maxes out at 62780. What does this say about the amount of data being transferred from client to server?