

Midterm – October 18

Open book section (40 points)

The exam is to be turned in at 2:50 pm. The closed book section should be turned in before you open your books and notes to work the open book section. For the open book section, write your answers on separate pieces of paper.

Problem 1. (8 points)

An Ethernet segment (no repeaters and no bridges) has four stations: A , B , C , and X . Suppose X is transmitting a 1000 byte frame. After X has transmitted 300 bytes, all three of the other stations “decide” to transmit at the next opportunity (according to the CSMA/CD protocol of 802.3).

What is the probability of there being a collision immediately after X finishes sending its frame? What is the probability of there being collisions in two consecutive slots after X 's frame?

For tractability, assume that all transmission attempts will start at precise slot boundaries. (Hint: If your answer is complicated, it is probably incorrect.)

Problem 2. (16 points)

Consider a company with four departments, all located within the same building. Each department has about twenty-five computers. This semester, we've examined at least four ways to interconnect these one hundred computers.

- (1) Use a single LAN and connect at the physical layer.
- (2) Use several LANs interconnected by “ordinary” bridges. By “ordinary,” I mean bridges that learn but do not build spanning trees.
- (3) Use several LANs interconnected by spanning tree bridges.
- (4) Use several logical networks interconnected by gateways.

Compare these four means of interconnection in terms of efficiency, reliability, and ease of system administration.

Problem 3. (16 points)

Packet direction is the task of receiving packets from several input queues I_1, I_2, \dots, I_n and directing them to several output queues O_1, O_2, \dots, O_m . One example of packet direction occurs when a received Ethernet packet is routed to either the ARP, RARP, or IP queues according to the Ethernet protocol type.

Identify at least three *additional* and *distinct*[†] types of packet direction that will occur when a TCP segment travels from UNC-Chapel Hill to a **finger** server at Purdue. In each of the three cases, point out the fields that must be examined in order to choose the appropriate output queue.

[†] Naming the same sort of packet direction multiple times at different places doesn't count.