



CS716: Advanced Computer Networks

Assignment 2

MS(CS), Spring 2011

Maximum Points: 100

Due Date: Wednesday, 11th May 2011

Instructions

The purpose of this assignment is to give you hands on practice. It is expected that students will solve the assignments themselves. Following rules will apply during the evaluation of assignment.

- ❖ Cheating from any source will result in zero marks in the assignment.
- ❖ Any student found cheating in any of the two assignments submitted will be awarded "F" grade in the course.
- ❖ No assignment after due date will be accepted

Question No. 1 (10 Points)

Suppose the round-trip propagation delay for Ethernet is 46.4 μ s. This yields a minimum packet size of 512 bits (464 bits corresponding to propagation delay + 48 bits of jam signal).

- a) What happens to the minimum packet size if the delay time is held constant, and the signalling rate rises to 100 Mbps?
- b) What are the drawbacks to so large a minimum packet size?
- c) If compatibility were not an issue, how the specifications might be written so as to permit a smaller minimum packet size?

Question No. 2 (10 Points)

Suppose A, B, and C all make their first carrier sense, as part of an attempt to transmit, while a fourth station D is transmitting. Draw a timeline showing one possible sequence of transmissions, attempts, collisions, and exponential backoff choices. Your timeline should also meet the following criteria:

- a) Initial transmission attempts should be in the order A, B, C, but successful transmissions should be in the order C, B, A.
- b) There should be at least four collisions.

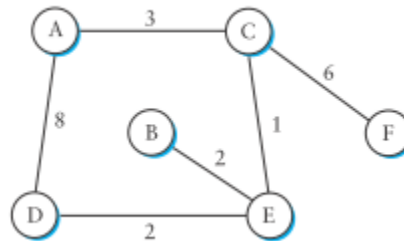
Question No. 3 (10 Points)

Consider a token ring with a ring latency of 200 μ s. Assuming that the delayed token release strategy is used, what is the effective throughput rate that can be achieved if the ring has a bandwidth of 4 Mbps? What is the effective throughput rate that can be achieved if the ring has a bandwidth of 100 Mbps? Answer for

both a single active host and for “many” hosts; for the latter, assume there are sufficiently many hosts transmitting that the time spent advancing the token can be ignored. Assume a packet size of 1 KB.

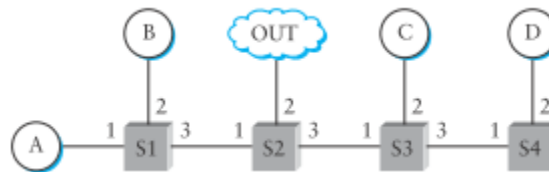
Question No. 4 (15 Points)

For the network given in the following figure, give the datagram forwarding table for each node. The links are labelled with relative costs; your tables should forward each packet via the lowest-cost path to its destination.



Question No. 5 (10 Points)

Give forwarding tables for switches S1-S4 in the following figure. Each switch should have a “default” routing entry, chosen to forward packets with unrecognized destination addresses toward OUT. Any specific destination table entries duplicated by the default entry should then be eliminated.



Question No. 6 (15 Points)

Propose a mechanism that virtual circuit switches might use so that if one switch loses all its state regarding connections, then a sender of packets along a path through that switch is informed of the failure.

Question No. 7 (15 Points)

Suppose that a switch is designed to have both input and output FIFO buffering. As packets arrive on an input port they are inserted at the tail of the FIFO. The switch then tries to forward the packets at the head of each FIFO to the tail of the appropriate output FIFO.

- a) Explain under what circumstances such a switch can lose a packet destined for an output port whose FIFO is empty.
- b) What is this behavior called?
- c) Assuming the FIFO buffering memory can be redistributed freely, suggest a reshuffling of the buffers that avoids the above problem, and explain why it does so.

Question No. 8 (15 Points)

Suppose a 10-Mbps Ethernet hub (repeater) is replaced by a 10-Mbps switch, in an environment where all traffic is between a single server and N "clients." Because all traffic must still traverse the server-switch link, nominally there is no improvement in bandwidth.

- a) Would you expect any improvement in bandwidth? If so, why?
- b) What would your answer be if the original hub were token ring rather than Ethernet?
- c) What other advantages and drawbacks might a switch offer versus a hub?

GOOD LUCK !