

Introduction to Computer Networks

Midterm Exam#1

April 20, 2001

1. Suppose a 100-Mbps point-to-point link is being set up between the earth and a new lunar colony. The distance from the moon to the earth is approximately 385,000km, and data travels over the link at the speed of light 3×10^8 m/s. Calculate the round trip delay for the link. (5%) Suppose Mission Control on earth wishes to download an image of size 25MB that has been taken by a camera on the lunar base. What is the minimum amount of time between the requests for the image goes out and the transfer is finished, and what are the assumptions you make for the previous calculation? (10%)
2. Give two reasons that the CRC error check is used in most communication systems?(8%) Use modulo 2 arithmetic to compute the CRC code for message 10100001 with the divisor polynomial $x^3 + x^2 + 1$.(5%) Draw the diagram of the hardware to compute CRC code for the above example.(7%) Give a transmission error that cannot be detected by the above divisor polynomial.(5%)
3. Suppose that we attempt to run the sliding window algorithm with $SWS = RWS = 3$ and with data sequence numbers 0, 1, 2, 3, 4. Give an example in which the algorithm becomes confused. (10%)
4. Explain why 1-persistent CSMA is used in Ethernet. (7%) Explain why a binary exponential backoff is used after a packet collision. (8%)
5. For a token ring with a ring latency of 200 microseconds, the delayed token release strategy is used. Assume a packet size of 1 KB. What is the effective throughput rate that can be achieved for an active station if the ring has a bandwidth of 100 Mbps? Answer both for a single active host (7%) and for two active hosts. (8%)
6. Give two reasons that Ethernet is recently more widely used than token ring. (6%) Give two situations that token ring is more suitable than Ethernet.(6%)
7. What is the hidden node problem in wireless LAN? (6%) Explain why exchanging RTS/CTS frames can alleviate the problem. (6%) Give a solution that a higher priority packet can transmit before a low priority packet in wireless LAN. (6%)