CMSC 417 Final (Spring 1997)

1.) (20 points) Define or explain the following terms:

a) CSMA/CD

b) packet

c) leaky bucket

d) CIDR (Classless InterDomain Routing)

e) Hamming distance

2.) (15 points) Describe one advantage and one disadvantage of layering protocols in a computer network.

3.) (20 Points) Explain how Manchester encoding provides a way for the sender and receiver to synchronize their clocks. Why does this ability to recover the clock have the effect of reducing the bandwidth utilization?

4.) (25 Points) Information security

a) Why should a one time pad be used only once?

b) Explain how a one time pad can be used to provide authentication and privacy of a message.

c) If only authentication is required, explain how the addition of MD-5 could be used to reduce the rate of rate of consumption of a one-time pad.

5.) (20 points) Frame and cell sizes

a) Bob Bright thinks that 5 bytes of header for the payload in a 53 byte ATM cell is wasteful and proposes that ATM cells should be 1029 bytes long with a 5 byte header. Explain why this solution may not be such a good idea.

b) Sally Smart thinks that having a minimum frame size is wasteful for Ethernet. She proposes that the minimum frame size be reduced to 1 byte. Explain why this may not be a good idea.

6.) (15 points) The available bandwidth on transcontinental links is increasing every year, yet the round-trip latency is starting to approach the speed of light limits. What are the implications of this for applications such as http?

7.) (10 Points) What is the max data rate possible over a 3Mhz channel with 10dB noise?

8.) (25 Points) TCP

a) Why is it sometimes necessary to fragment a TCP packet even though it is shorter than the maximum allowed length of (65,495 bytes)?

b) TCP supports having a receiver set it receive window size to zero, why might a receiver do this?

c) TCP supports sending packets with zero length, why is this useful?

d) TCP uses a packet header and AAL-7 (in your project) used a trailer. Describe the potential performance advantages of using a trailer vs. a header.