CS 3251: Exam 1 **Name:**_____

Instructor: Dr. Clark October 5, 2006

CS 3251
Fall 2006 - Midterm Exam

Problem	Possible	Score
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

This test is closed book and closed notes. Answer the questions in the space provided. When answering questions, please state any and all assumptions you are making.

Part 1: Packets and Circuits (20 points)

The Internet we use today is primarily based on a packet switching, datagram service rather than a circuit switching, connection-oriented service.

1. **(10 pts)** Why is packet switching preferred in the Internet rather than circuit switching? What are the advantages?

2. **(10 pts)** What are the disadvantages? Provide several and indicate how these affect network applications.

Part 2: Addressing and Fragmentation (20 points)

1. **(10 pts)** A router is deployed between 5 separate subnets. The first will have up to 120 hosts, two will have 60 each and two will have 30 each. The administrator has the address block 202.92.32/23 to assign to these networks. Provide network addresses of the form a.b.c.d/x for these networks. **Make your allocation such that you maximize the flexibility in allocating the remaining addresses at a later time.**

2. **(10 pts)** Host *A* needs to send a 4000 byte datagram to host *B*. The datagram will traverse a link with MTU 1500 to reach intermediate router *X*. It will traverse a link with MTU 1000 before reaching *B*. Assume all fragments take the same path. Show the necessary IP header fields to support fragmentation and the values of each along the way. Assume the IP header must fit within the MTU but not the datalink header.

Part 3: Network Programming (20 points)

1. **(10 pts)** What are the possible techniques for determining the boundaries of an application protocol message when using TCP for the transport protocol.

2. **(10 pts)** A TCP server application successfully calls *socket()*, *bind()* and *listen()*. The application continues running but never makes any further calls on this socket.

   What will happen to clients that attempt to connect to this server on the port used by this server? (Be specific and complete for full credit.)

Part 4: Routing (24 points)

1. **(8 pts)** What is meant by the term *policy based routing*?

2. **(8 pts)** What is meant by the term *domain based routing*?

3. **(4 pts)** Why do the administrators of the Tier 1 (core) networks restrict route advertisements and routing table entries to netmasks of no more than 22 bits?

Part 5: Datalink Protocols (20 points)

1. **(8 pts)** We say that CSMA/CD cannot provide guaranteed bandwidth. Explain why this is the case.

2. **(12 pts)** Propose a MAC scheme that would provide such guarantees. Describe how it would work. Include advantages and drawbacks to your approach.