CSE 4213 Deferred Final Exam
Winter 2007
August 9, 2007
Instructor: S. Datta

Name (LAST, FIRST): _____

Student number: _____

Instructions:

1. If you have not done so, put away all books, papers, cell phones and pagers. Write your name and student number NOW!

2. Check that this examination has 13 pages. There should be 5 questions worth 90 points.

3. You have 180 minutes to complete the exam. Use your time judiciously.

4. Show all your work. Partial credit may be given for an answer, but only if you show the intermediate steps in obtaining the answer.

5. If you need to make an assumption to answer a question, please state the assumption clearly.

6. Points WILL be deducted for vague and ambiguous answers.

7. Your answers MUST be LEGIBLE.

8. Good luck!

> Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.

DO NOT WRITE ANYTHING ON THIS PAGE.

Q	part a	part b	part c	part d	part e	TOTAL
1						/18
2						/18
3						/18
4						/18
5						/18

Aggregate score =

1. (a) (4 points) Describe BRIEFLY the Additive-increase-multiplicative-decrease strategy used by the TCP congestion control algorithm.

   (b) (7 points) How is TCP fair? Using a diagram, prove that the AIMD algorithm is fair and that the AIAD algorithm is unfair.

(c) (4 points) Using arguments similar to (b) describe the pros and cons of using a multiplicative factor of 0.75 instead of the 0.5 used by TCP. Which factor (0.75 or 0.5) would be better for a multimedia application and why?

(d) (3 points) Describe the Slow Start algorithm and the philosophy behind its use.

2. (a) (5 points) Is TCP suitable for networks in which the bit error rate is very high (e.g. wireless networks)? If you had a network that had both wireless and wired portions, how would you modify TCP so that it performs well on this network?

  (b) (4 points) Imagine hosts A, B, C behind (different) NATs that are part of a P2P system like Kazaa. The NATs prevent some direct communication – for example, A cannot initiate a TCP connection to

B. What does the P2P system have to do to enable the P2P system to function normally?

(c) (5 points) What is head-of-line (HOL) blocking? Describe some solutions within the framework of input-queuing and indicate to what extent the problems are solved.

(d) (4 points) What are the pros and cons of output-queued switches as compared to input-queued switches?

3. (a) (5 points) Describe the different aspects of the addressing scheme used by the IP protocol that makes the scheme scalable.

(b) (6 points) How is the Border Gateway Protocol (BGP) different from intra-AS algorithms like RIP and OSPF? Why are these differences necessary?

(c) (3 points) Describe how the traceroute function is implemented using the TTL field of IP headers and ICMP messages.

(d) (4 points) What are the security problems with DHCP? Describe some solutions that require little manual configuration and no per-session manual intervention.

4. (a) (4 points) Describe the aspects of TCP that make it non-ideal for multimedia networking.

   (b) (3 points) Provide a short description of the functionality provided by the Session Initiation Protocol (SIP).

   (c) (2 points) Describe two ways of alleviating jitter in multimedia communications.

(d) (5 points) Describe how a leaky bucket policer and a weighted fair queuing scheduler are used in conjunction to prove guaranteed delay bounds to a TCP session.

(e) (4 points) What are two fundamental differences between the Intserv and Diffserv proposals?

5. (a) (4 points) Describe the man-in-the-middle attack in public-key-cryptosystems and how it can be prevented.

   (b) (4 points) What are the differences between packet filtering firewalls and application gateways? Are application gateways used alone or in conjunction with packet filers? Why?

(c) (5 points) Draw the block diagram of Pretty Good Privacy (PGP), naming the blocks appropriately.

(d) (5 points) Describe how key distribution centers are used for symmetric key cryptography. You must describe the registration process for users as well as how keys are generated for individual sessions.