SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

Fall 2021
ENSC 427: COMMUNICATION NETWORKS
ENSC 894: SPECIAL TOPICS II COMMUNICATION NETWORKS

Midterm No. 1
Monday, October 18, 2021

Duration: 60 minutes. Attempt all problems. Questions are not equally weighted. Please provide detailed answers and include diagrams, graphs, and tables, as needed. Expand all acronyms. Closed book and closed notes. Simple calculators (with no graphing/programming functions) are permitted. PDAs, laptops, and wireless phones are not permitted. Please write legibly. Illegible text will not be graded. Please use a pen (no pencils, please).

1. **Chapter 1 Computer Networks and the Internet (15 points)**:

   Suppose you would like to urgently deliver 50 terabytes data from Boston to Los Angeles. You have available a 100 Mbps dedicated link for data transfer.

   (a) Would you prefer to transmit the data via this link or instead use FedEx overnight delivery? (5 points)

   (b) Explain. (10 points)

2. **Chapter 2 Application Layer (25 points)**:

   (a) For a communication session between a pair of processes, which process is the client and which is the server? (5 points)

   (b) Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? Why? (10 points)

   (c) Describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why? (10 points)

3. **Chapter 3 Transport Layer (35 points)**:

   (a) List the mechanisms employed by reliable data transfer (rdt) to deal with:

      i. Channel with bit errors: How to recover from errors? (5 points)

      ii. Duplicate packets: How to handle duplicates? (5 points)

      iii. Channel with errors and loss: What is the sender's approach? (5 points)

   (b) Show the states and main specifications of the fine state machine (FSM) for the rdt3.0 protocol over channels with bit errors and loss (20 points)

4. **Case Study: WiMAX Broadband Access (25 points)**:

   (a) What is WiMAX? (5 points)

   (b) List the main elements of the WiMAX broadband architecture. (5 points)

   (c) Describe the goals of the case study and the simulation scenario. (5 points)

   (d) Describe the traffic used to evaluate WiMAX performance? (5 points)

   (e) State the conclusion of the study. (5 points)