SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

Spring 2010
ENSC 427: COMMUNICATION NETWORKS
ENSC 895 SPECIAL TOPICS II: COMMUNICATION NETWORKS

Midterm No. 1
Wednesday, February 10, 2010
Duration: 50 minutes. Attempt all problems. Please provide brief and concise answers and include diagrams and tables, as needed. Expand all acronyms. Questions may not be equally weighted. Closed book and closed notes. Simple calculators (with no graphing/programming functions) are permitted. PDAs, laptops, and wireless phones are not permitted.

1. **Applications and Layered Architecture (25 points)**:

   - What is the OSI reference model for communication networks?
   - Name the OSI layer responsible for:
     - Determining the best path to route packets.
     - Providing end-to-end communications with reliable service.
     - Providing node-to-node communications with reliable service.
   - Show the graph that illustrates elements of the TCP/IP protocol suite.

2. **Digital Transmission Fundamentals (25 points)**:

   - Provide the formula and an explanation for the Shannon channel capacity.
   - Explain the Nyquist signaling rate.
   - Show examples for the Unipolar NRZ and the Manchester line-coding methods.
   - Show the graph for power spectra density of the NRZ encoding and the Manchester encoding and briefly address their difference.
   - List two simple models for communication channels.

3. **Case Studies, GPRS (25 points)**:

   - List main characteristics of the GPRS technology.
   - Describe main elements of the GPRS network architecture.
   - List network elements and protocols simulated in the GPRS case study.
   - Explain the cell update and the mechanism used in GPRS networks to perform hand-over of mobile users.
   - Illustrate graphically simulation results of a successful cell update.

4. **OPNET Tutorials, LAN Modeling (25 points)**:

- List two aspects in modeling of LAN networks addressed in the tutorial.
- List main steps in creating the LAN simulation scenario.
- Briefly explain functions of the Profile Configuration and the Application Configuration?
- Which application was simulated in the LAN Modeling Tutorial?
- List three types of statistics collected from the OPNET LAN simulations.