SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

Spring 2015
ENSC 427: COMMUNICATION NETWORKS
ENSC 894 SPECIAL TOPICS II: COMMUNICATION NETWORKS

Midterm No. 1
Wednesday, February 18, 2015

Duration: 50 minutes. Attempt all problems. Questions are not equally weighted.

Closed book and closed notes. Simple calculators (with no graphing/programming functions) are permitted. PDAs, laptops, and wireless phones are not permitted.

Please provide brief and concise answers and include diagrams, graphs, and tables, as needed. Expand all acronyms.

Please write legibly. Illegible text will not be graded. Please use a pen (no pencils, please).

1. **Applications and Layered Architecture (30 points)**:

   Consider Transport Layer Protocols:

   (a) Name two such protocols implemented in the Internet. Expand the acronyms.

   (b) What type of services does each protocol provide?

   (c) List their main characteristics and differences.

   (d) For each protocol, provide examples of application layer protocols that use its services.

2. **Digital Transmission Fundamentals (40 points)**:

   (a) Describe main differences between analog and digital transmissions.

   (b) How is the signal level recovered in each case?

   (c) What is the bandwidth of a signal and a bandwidth of a channel?

   (d) How do we model a communication channel?

   (e) What is SNR? Expand the acronym. How is it calculated? Specify the units.

   (f) What is Shannon channel capacity? List all variables.

3. **Case Study: GPRS (15 points)**:

   (a) What is GPRS? Expand the acronym.

   (b) Provide a high-level diagram of the simulated GPRS network and its main components.

   (c) Describe the main result for the wireless mobile simulation scenario.

4. **ns-2 Tutorial (15 points)**:
   Write the ns-2 TCL command to:

   (a) Define a UPD agent named $udp0$.

   (b) Define a sink node named $null0$.

   (c) Define an application that generates CBR traffic named $cbr0$.