

**SIMON FRASER UNIVERSITY  
SCHOOL OF ENGINEERING SCIENCE**

**Spring 2010**

**ENSC 427: COMMUNICATION NETWORKS  
ENSC 895 SPECIAL TOPICS II: COMMUNICATION NETWORKS**

Midterm No. 2

Wednesday, March 31, 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. Circuits-Switching Networks (25 points):**

- List three types of multiplexing and briefly describe each approach.
- What is SONET? Describe a typical SONET topology. What is ADM?
- What is a function of a circuit switch?
- List two main groups of circuit switches.
- Draw the Clos switch architecture. What is its main characteristic?

**2. Peer-to-Peer Protocols and Data Link Layer (25 points)**

- Describe the end-to-end and hop-to-hop settings and show the protocol stacks.
- What are ARQ protocols? Describe two major functions of ARQ protocols.
- Describe the following ARQ protocols using the flowing sequence of events diagrams:
  - Stop-and-Wait
  - Go-Back-N
  - Selective Repeat.

**3. Medium Access Control Protocols (25 points)**

- List two main approaches for sharing transmission medium. Briefly describe each approach. List one example in each category.
- Briefly describe reservation, polling, and token ring approaches.
- What is CSMA-CD? Briefly describe the algorithm.
- List and briefly describe CSMA-CD back-off mechanisms.
- What is the maximum probability of success in the CSMA-CD scheme?

**4. OPNET Tutorials, CSMA/CD (25 points):**

- List two channel access protocols that were modeled in this tutorial and show the digram of the modeling hierarchy.
- Show the elements of the Aloha transmitter process model and the generic transmitter node model.
- Show the elements of the generic receiver process model and the node model.
- Provide a graph showing simulated channel throughput as a function of channel traffic.
- What is the expected theoretical result for a pure Aloha system? How did the simulation results compare to the theoretical analysis?