ECE 750-T4 Final Exam (closed book). Aug. 8, 2011. 12:30 PM – 3:00 PM. Room DWE 1501. Answer all questions. Should there be a need, make reasonable assumptions and proceed. Page count = 1. Total marks = 100. *Best wishes!*

1. GSM + Channel Assignment 30

a. [10] Explain the inter-BSC, intra-MSC handover process in the GSM system using typical signals and a message sequence chart. Explain the decision points and the resource allocation steps, if they exist.

b. [10] Clearly explain how a destination mobile handset is located in GSM networks at the time of call establishment. Identify the different kinds of logical channels used in the locating process.

c. [10] Clearly explain four techniques to improve the performance of channel assignment algorithms.

2. Broadcasting Techniques + Ad Hoc Networking 30

a. [10] Clearly explain the AODV protocol in detail.
b. [10] Clearly explain the *flooding with self-pruning* broadcast protocol in detail.
c. [10] Clearly explain *three* techniques to make the above two protocols energy efficient.

3. TCP Support for Mobile Nodes 20

Consider the following scenario. A fixed correspondent node (CN) has established a TCP connection with a mobile node (MN). The fixed network does not lose any packet, and the MN generates an ACK for every data packet received. The CN sends five consecutive data packets, 1 through 5, to the MN. Packets with sequence numbers 2 and 3 and the ACK for packet 4 are lost in the wireless medium. Because of all these losses, the CN's timers expire and the node has to retransmit packets 2, 3 and 4.

a. [10] Assuming that you are using the **I-TCP**, describe the **actions of the foreign agent** corresponding to the above scenario using a message sequence chart. Make reasonable assumptions, if there is a need.
b. [10] Assuming that you are using the **snooping TCP**, describe the **actions of the foreign agent** corresponding to the above scenario using a message sequence chart. Make reasonable assumptions, if there is a need.

4. Environment Awareness 20

Assume that your have been hired by a major software development company with the responsibility of redesigning their operating system (OS) such that an application provides the "best" service to the user depending on the quantity of available resources on a modern-day laptop. Explain the necessary updates to be made to a standard OS, the need for any middleware, and the required structuring of application programs to take advantage of the new functionalities provided by the OS and the new middleware.