Homework III (due: 04/16/2013)

CIS9590 AdHoc Networks

Name_____   Student Number_____

1. **Utility-based Routing** (M. Lu and J. Wu, Social Welfare Based Routing in Ad Hoc Networks, ICPP 2006): Given a network of four nodes: S, 1, 2, and D. The corresponding links with the associated cost/reliability values are the following: (S, 1): 1/05, (1, D): 7/09, (1, 2) 2/0.6, (S, 2): 4/0.8, and (2, D): 3/0.7. (1) Find all paths from S to D.   (2) Determine the most (and least) reliable path from S to D. (3) Determine the most (and least) costly path from S to D. (4) Determine the highest (and lowest) utility path from S to D if the benefit value of the packet is 20.

2. **Coverage and Exposure Problems** (S. Meguerdichian, Coverage Problem in Wireless Ad-Hoc Sensor Networks, INFOCOM 2001): Given four points, (1, 1), (3, 5), (5, 2), and (4, 4),   in a square region with four corners (0,0), (0, 6), (6, 0), and (6, 6).   (1) Find the Voronoi diagram. (2) Find the corresponding Delaunay triangulation. (3) Determine the maximal breach path from (0, 0) to (6, 6). (4) Determine the maximal support path from (0, 0) to (6, 6).

3. **Localization Problems:**   (Z. Zhong and T. He, Achieving Range-free Localization Beyond Connectivity, SenSys 2009): (1) What is DV-Hop? How it works? (2) Please describe the differences between range-free localization and range-based localization. What are the advantages and disadvantages of each approach? (3) Given two ordered neighbor sequences {2,1,6,3} and {2,3,1,6}, how to calculate the regulated signature distance between them?

4. **Sybil Attack in Social Networks:** (N. Tran et al, Sybil-Resilient Online Content Voting, NSDI 2009): (1) What is a sybil attack in social networks? Please list some possible ways to deal with it? (2) Please describe the key idea of SumUp. What are the advantages and disadvantages of this approach? (3) What is vote envelop and why it can mitigate the impact of sybil attacks on online voting collection? (4) If C_max = 10000 and the trust network is a expander graph, what is the expected number of entry points?