CDA 6508   Ad Hoc Networks
Open books and notes

Name ————————————————- SSN ————————————————-

1. (30 pts) Describe the difference between following pairs of related concepts/algorithms

   - (4 pts) Piconets and scatternets in Bluetooth

   - (4 pts) Sensing range and communication range

   - (4 pts) Static node priority and dynamic node priority

   - (9 pts) source-dependent MPR and source-independent MPR, which one tends to generate a smaller CDS, and why?

   - (9 pts) BIP (broadcast incremental power) and its extension in MANETs using directional antennas, which one tends to be more energy-efficient, and why?

2. (20 pts) Given four points A=(2,5), B=(3, 3), C=(6,2), and D=(1,1) in a sensing area $[0..7, 0..7]$,

   - Draw the corresponding Voronoi diagram.

   - Describe how diagram is drawn.

   - Plot the corresponding Delauney triangulation and again describe the procedure.

3. (20 pts) Refer to question (2) for the same problem. Suppose the transmission range of each node comes from the following choices: $1.2, 2.3, 4.1, 5, 6.3, 7, 8.4, 10, 13$, and 13.5,

   - Determine the maximum uniform transmission range with an unconnected network. Describe how the result is obtained.

   - Determine the minimum uniform transmission range with a fully connected network (i.e., points are pair-wise connected). Again, describe how the result is obtained.

4. Suppose we use the static priority (such as node id) in Tian and Georganas' protocol. That is, node can "withdraw" even if its sensing range is covered by nodes with higher ids. Consider a sensor network with eight points: A=(2,4), B=(3,3), C=(5,4), D=(4,3), E=(2,2), F=(4,5), G=(4,4), and H=(3,4) with uniform sensing range of 4. The node ids are 1, 2, 3, 4, 5, 6, 7, 8 for $B, G, D, A, C, E, G, G, H$, respectively.

   - Plot the corresponding network on a 2-plane showing the sensing area of each node.

   - Which points can "withdraw" without losing sensing coverage?

- Suppose two algorithms are used: one withdraws in a sequential way and the other in a parallel way. Will the result be the same for any network? If your answer is yes, provide a proof; otherwise, provide a counter example.