

## COMP9332 Network Routing and Switching

### Solution of Self-assessed Tutorial for Geographic Routing

**Q1.** Geographically, the shortest path between the source and destination is the straight line (assuming a flat terrain) connecting them. Does Greedy Forwarding lead to such shortest paths? Why or why not?

**A1.** Not necessarily. Greedy Forwarding attempts to find a path that minimizes the number of hops, even if it means taking a slight detour from the straight line between the source and the destination.

**Q2.** For a given communication, the source is located at (0,0) and the destination at (15,0). There are four other nodes at the following locations:

N1 at (2,0)

N2 at  $(5/\sqrt{2}, 5/\sqrt{2})$

N3 at (6,0), and

N4 at (10,0)

For a radio range of 5 units, what would be the path taken by a packet if Greedy Forwarding is used?

**A2.** Source - N2-N3-N4-Destination

**Q3.** There are four wireless nodes, A, B, C, and D, scattered around a field. Each node has a wireless range of 100 meters. Assume that node B is going to forward a packet to node A. For which of the following location combinations (x and y coordinates are shown in parenthesis next to the node IDs) B is going to face a VOID?

a) A=(10,120), B=(10,0), C=(-60,0), D=(80,0)

b) A=(10,120), B=(10,0), C=(-50,0), D=(70,0)

**A3.** Both a) and b)

**Q4.** There are four wireless nodes, A, B, C, D, and E, located at (100,120), (100,0), (30,0), (170,0), and (30,-5), respectively. Each node has a wireless range of 100 meters. Assume that node B is going to forward a packet to node A. For the next-hop forwarding, will basic geographic routing (Greedy Mode) work, or B needs to switch to the Perimeter Mode (explain your answer)?

**A4.** No, basic Greedy Mode will fail because B faces a void. B will switch to the Perimeter Mode.

**Q5.** For the previous question, if B switches to the Perimeter Mode, what would be the next hop (which node B will forward the packet to)? Explain your answer.

**A5.** B will forward the packet to C (BC is the first edge counter-clockwise around BA).