EECE5155: Wireless Sensor Networks and the Internet of Things
Optional Computer Laboratory Assignment 3

Given: Monday, November 23, 2020
Due: Tuesday, December 15, 2020 (11:59 PM)

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Note: This laboratory assignment is optional. If you decide to complete it, we will select your two computer lab assignments with the higher scores out of the three.

Routing in Mobile Ad-hoc Networks

Copy the provided script manet-routing.cc to the scratch folder, open it and read the description at the top. We will use this script to analyze the behavior of two different routing protocols for Mobile Ad-hoc Networks (MANETs). In particular, we will look at Optimized Link State Routing (OLSR) and Ad-hoc On-demand Distance Vector (AODV) Routing, which were briefly discussed in class. Check the Additional Reading Materials for the detailed specification of these protocols.

The network is composed by 20 mobile nodes, moving at a constant speed of 5 m/s in a 2D area defined by the rectangle with lower-left corner (x=0 m, y=0 m) and upper-right corner (x=500 m, y=500 m). Each node has a limited transmission power equal to 5 dBm. As a result, the neighbors and the best routes for each node change with time. This requires routes to be updated much more often than in classical networks with fixed routers.

In this simulation, Node 20 (source of information) transmits UDP packets to Node 1 (destination of information or sink node) at a rate of one packet every ten seconds, starting at time instant 50 seconds. This first 50 seconds are set on purpose to make sure that the nodes have had enough time to set their own routing tables, if the chosen routing protocol specifies so. To understand the behavior of the network, in addition to the terminal output, a packet tracer is installed at the source node and at the destination node and a text file with the updated locations of the nodes is generated.

For each protocol, simulate the network, understand its behavior, and reply to the following questions:

- For OLSR:
  - At what time are the routes created? (10 points)
  - What types of routing messages are exchanged between nodes? Briefly explain their contents. (10 points)
  - Are all the packets delivered? How many packets are delivered? (10 points)
  - Are there any packets that are directly transmitted from Node 20 to Node 1? How can you deduce so? (10 points)

- For AODV:
  - When are the routes created? (10 points)
  - What types of routing messages are exchanged between the nodes? Briefly explain their contents. (10 points)
  - Are all the packets delivered? How many packets are delivered? (10 points)
  - Are there any packets that are directly transmitted from Node 20 to Node 1? How can you deduce so? (10 points)

In light of the results,

- How could you increase the number of successfully delivered packets? (10 points)
- When do you think it is more convenient AODV rather than OLSR? (10 points)