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CSC435/Spring 2019 **FINAL PROJECT ASSIGNMENT** Prof. Z. Zhang

**Project Description**

**Objective** - This project is to let students to write a simulation program using a software package – Network Simulator 2 (NS2). In doing so, students will get hands-on experiences and insight knowledge as of how different wireless ad hoc routing protocols work. Comparing simulation results to the theory of the major ad hoc routing protocols.

**Project requirements**

1. Study some of the major ad hoc routing protocols (DSDV, DSR, AODV). Understand how they work and what are the strength and weakness of each protocol.
2. Give a limited area of 500 m by 500m with walls on all sides ( a public square). There are 10 mobile nodes in the area. A mobile node can only walk one step at a time. A step can be toward north, south, east or west. All nodes walk in synchronized style and each step is 0.5 meter.
3. There are two random walk models as describe below, (1) Pure Random Walk (PRW) – where each node walks a step equal like toward all the directions. (2) Weighted Random Work (WRW) or Biased Random Work (BRW) – where a node most likely (a weight factor) walks a step toward the destination.

Given the initial network profile below with the following data and channel capacities:

* Data flow: From node 1 to node 10
* Packet size: 500 bytes/packet
* Packet Interval: 0.005 ms
* Channel capacity: IEEE 802.11
* Data protocol: UDP

1. Consider two simulation scenarios, (1) All 10 start at the center of the square and wonder around without a particular destination in 1000 step. (2) All nodes enter the square from one end (through two entries, 5 nodes each in a group enter from one entry. Node1 and node10 must be in different groups) and exit from the opposite end. Simulation stops when either or both node1 and node10 exit the square.
2. Write a simulation program using NS2 to simulate three different wireless routing protocols (DSDV, DSR and AODV) under these scenarios.

The program will generate data to measure these network performance factors,

1. Network throughput – the average number of packets per second sent by node 1 and received by node 10.
2. Data drop rate – the average number of packets dropped by the network
3. Overhead cost – total number of control messages (Non-data traffics).
4. Location data for each node to capture the node footprints.

**Requirements 1- 4 is given from the perl\_script.pl script file. How to run the command is located at the bottom of the perl script file in comments**

1. The random walk configuration stated in (2) and (4) may not be a very good model, can you suggest any changes (why and how they improve the study).

**For the random walk configuration model in 2) , if you start the endpoints at 0,0 and 500,500 as opposite ends, then the only way to check if its out of bounds for scenario 2 would be if either x or y coordinates goes out of bounds for node 0 or 9 or both. But the program is unable to generate negative point destinations and points higher than the set square size which is 500 by 500 or it will give an error. For my solution, I set the square size to 1000 by 1000 and then constructed an inner square which is technically 500 by 500 but since I increased the outer square size to 1000 by 1000, the inner square endpoints would need to be increased as well so the new endpoints would be 250,250 and 750,750. So now, I can generate points lower than 250 and higher than 750 and can go out of bounds without throwing an error. For 4), I could not come with a better suggestion but I would consider more scenarios to better test how the wireless ad hoc protocol compete with each other.**

**Project Deliverables and Presentation**

1. Each team needs to present their study in the class.
2. Each team needs to submit a project report including they study, simulation program, data files and presentation materials.

Conclusion

Based on the data results generated from the trace file, the best wireless ad hoc protocol is DSR due to having higher overhead and throughput values. However, results may vary based on different types of scenarios and in my opinion, there is no good or bad wireless protocol but more like which one should be considered in certain scenarios