EECE5698: Wireless Sensor Networks (and the Internet of Things)

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Homework 2

Due: April 3, 2016

In this assignment we are going to use ns-2 to study the average delay and average dissipated energy using directed diffusion routing in the IEEE 802.11 network. The main purpose of this experiment is to evaluate the delay and energy consumption of two-phase pull routing protocol.

Construct a simulation scenario with ($n = 49$) static nodes with varying sender and a single receiver. Choose directed diffusion routing protocol and set the delay to be 30μ s. Dimension of the terrain is 560×560 and the sensor nodes: node 1, node 2, node 3, ..., node 8, node 9, ..., node 49 are located at ($X = 40, Y = 40$), ($X = 120, Y = 40$), ($X = 200, Y = 40$), ..., ($X = 40, Y = 120$), ($X = 120, Y = 120$), ..., ($X = 520, Y = 520$), respectively. Configure node 25 as the sink and randomly pick the sources from the remaining nodes. Vary your number of sources as such 1, 5, 10, 15 and 20 sources. Starting time for sources is 0.4 seconds and for the sink is 1.1 seconds and stopping time for sources/sink to be 50 seconds.

Set the radio energy model such that initial energy is 1000 J, the idle power dissipation is 35 mW, receive power 350 mW and transmit power 660 mW. Average delay measures the average one-way latency observed between transmitting an event and receiving it at each sink. Average dissipated energy measures the ratio of total dissipated energy per node in the network to the number of distinct events seen by sinks.

For each random number of sources $\{1, 5, 10, 15, 20\}$ run the experiment with the parameters as above for 10 times with varying seed value. Compute average delay and average dissipated energy.

a. Plot average delay versus number of sources and comment on your result.

b. Plot average dissipated energy versus number of sources and comment on your result.

   hint: Locate the direct diffusion related codes in the ns-2.3\tcl\diffusion3. Use the antenna and physical layer configuration as given in the example of ns-2 tcl codes. Keep the set up for the antennas to be centered in each nodes and 1.5 meters above them. And for physical layer use similar configuration as the 914 MHz Lucent WaveLAN DSSS radio interface.

Submission guideline: Your submission should consists of ONE zip archive of the followings:

    i. ns script, which should be documented with a comment every few lines explaining what is happening in your code.

    ii. scripts for computing the average delay and average dissipated energy.

    iii. pdf file with the plots and your own interpretation about the plots.

The zipped file name should be **LASTName_FIRSTName_hwk2.zip**. Please send the zipped file to tadayon.s@husky.neu.edu. The email subject should be **EECE5698_hwk2_submission**.