01NQQOC - Operations research: Theory and Applications to Networking

Lab 3- Greedy heuristic

1) (mandatory) Propose and implement a greedy heuristic algorithm for the solution of the LTD problem. Test your algorithm against a randomly generated topology with the same number of edges. Consider a uniform traffic scenario, in which the traffic that is sent from source s to destination d is modelled by a uniform random variable in the range [0:4], i.e., *tsd* = Uniform[0,4]. Note: to test topologies, you have to route traffic and compute the maximum flow on links *fmax* (your objective function). Consider several values of N and Delta;

   For example:

   - *fmax(N)* for Delta=1,2,4
   - *fmax(Delta)* for N=20,30,40

   Suggestion: to estimate *fmax* repeat the experiment several times and plot the average values.

2) (Mandatory) Repeat some of previous experiments, in the case in which traffic exchanged between node pair may belong to two different classes:

   Low traffic: *tsd*=Uniform[0, 3]

   High traffic: *tsd* =Uniform[5,15].

   In particular, consider the case for which 10% of traffic demands belong to the high-traffic class (e.g., every traffic demand is HT with probability 0.1 amd LT with a probability 0.9).

3) (Highly recommended) For the case Delta=4, develop and implement a new greedy heuristic algorithm, in which the topology is a bidirectional Manhattan and nodes are smartly placed on it (how?)

4) (Recommended) Improve the performance of your solution (point 3) defining and possibly implementing a simple local-search algorithm. What is a reasonable move?