Analyzing Renaming Algorithms for MANET

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Objective

• To come up with efficient new algorithms for doing renaming in mobile ad hoc networks (MANET).
• MANET- a collaborative group of mobile nodes with wireless communication links.
Objective(2)

• Renaming Problem- nodes begin with ids chosen from a large name space and are to choose new, unique, ids that are from a smaller name space. (Attiya, 1990)

• One Application – the automatic dynamic assignment of IP addresses to nodes (Vaidya, 2002)
Adapting a Renaming Algorithm for MANETs

• Simple Uniqueness Algorithm (Attiya, 1990)
  - required name space of size $N = (n-t/2)(t+1)$
  - keeps names unknown in vector (i.e., ordered set)

• To adapt this algorithm for MANETs:
  - broadcasting throughout the entire network, achieved simply (but inefficiently) with flooding
  - issue of node failures vs. partitions
Studying the Behavior with a Simulator

- TAMUSim
  - algorithm-level simulator for MANET algorithms
  - currently under development in Welch’s research group
  - designed to facilitate understanding qualitative, not quantitative, behavior of algorithms
  - help develop correctness proofs
  - automate the construction of possible counter-examples
Simulation Results

- Nodes with starting id’s before new id is chosen
- Number of messages is dependant upon the number of nodes.
- Update messages are sent to both nodes that share an deleted edge, but what happens to the algorithm?
Simulation Results (2)

- Nodes with ending id’s after choosing a new id
- New names distinct from each other (Attiya, 1990)
- Use of short names reduces complexity of messages (Attiya, 1990)
Conclusions and Future Work

- Flooding is too inefficient
- May need radically different approach to deal with MANETs, and tie it in with applications
- For future work:
  - develop and prove correct a renaming algorithm that works efficiently in MANETs
  - enhancements to the simulator:
    - implement node mobility
    - implement dynamic automation for simulations