Simulating Last Encounter Routing at Large Scale
Henri Dubois-Ferriere (LCAV/EPFL), Matt Grossglauser (AT&T Labs, NJ, USA), Martin Vetterli (LCAV/EPFL)

Background

• LER (Last Encounter Routing) [1] is a class of location services and routing algorithms for mobile adhoc networks. (Recently introduced by Grossglauser & Vetterli.)
• Definition: A routing algorithm is a LER algorithm when the next-hop decision depends only on:
  a) The time and location of that node’s last encounter, and,
  b) auxiliary information carried by the packet.
• Two early instances of this class are EASE (Exponential Age Search) and GREASE (Greedy Ease).
• Key assumptions of EASE & GREASE: a) nodes have GPS, b) a geographic routing service is available.
• Nodes keep a database of the time and location of their last encounters with all other nodes.
• A packet “consults” the database of the nodes that forward it; this successively refines the estimate of the destination’s location.
• As it advances toward destination, packet gets estimates that are increasingly recent, and therefore precise.

Algorithm

anchor := closest anchor around the source
While (Not at dest) do
  geographically_route_to_anchor;
  Search the nodes around anchor in increasing order of distance till a new_anchor is found
  with age <= anchor_age/2;
  anchor := new_anchor;
  anchor_age := age of new_anchor
Done

Objectives

Scale up the simulations by 1-2 orders of magnitude (from 1'000 to at least 100'000 nodes) in order to:
• Verify if the “nice” performance observed at small scales (1'000 nodes) holds
• Gain insight on the asymptotic behavior of the algorithm.
• Breakdown the overall cost into its constituent parts (successive phases/anchors)

Experiment

• Topology: Discrete Torus
• Unit node density
• Initial node distribution is uniform
• Mobility Process: Random walk of unit variance
• Homogeneous mobility process
• Warmup : move nodes according to mobility process and populate their databases with encounters. Runs until 50% encounter ratio is attained.
• Nodes are neighbors when they are on the same lattice node.
• Geographic routing algorithm: nearest-neighbor with loop detection and backtracking
• 100'000 nodes

References