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MobySpace: Mobility Pattern Space Routing for DTNs
Jérémie Leguay\textsuperscript{1,2}, Timur Friedman\textsuperscript{1}, Vania Conan\textsuperscript{2}

Basic concept

Problem:
- Routing is a challenge in DTNs (Delay Tolerant Networks). Regular ad-hoc routing protocols fail because the topology suffers from connectivity disruptions.

Proposition:
- We propose to use mobility patterns of nodes, i.e. regularities in nodes contacts or movements, to define their position in a virtual Euclidean space used for routing. This space is called the MobySpace.
- Each node’s position in the MobySpace (its MobyPoint) is flooded throughout the network. Other nodes use this information for routing.
- To route a bundle, a node chooses among its physical neighbors. It passes the bundle to the neighbor whose MobyPoint is closest to the destination’s.
- The MobySpace can be defined in many ways, e.g. type/number of dimensions, distance function. This poster describes preliminary work.

A MobySpace

- Let’s consider users with power-law based mobility patterns. Their frequency of visits to locations follows a power-law distribution. This behavior has often been observed in reality.
- Each dimension in the MobySpace represents a location in the physical space. Each coordinate corresponds to the probability of finding the node at that location. We assume that these probabilities are known.
- Euclidean distance is used.

Simulation results

We simulated nodes with power-law based mobility patterns ($d$, the power-law exponent). We compared MobySpace routing to:
- **Epidemic routing**: Bundles are flooded in the network. It is the optimum in terms of delays but leads to high buffer and radio utilization.
- **Opportunistic routing**: A node waits to meet the destination in order to transfer its bundle. It involves only one transmission per bundle.
- **Random routing**: At any time, a node may transfer the bundle to a neighbor chosen at random. Loops are avoided.

Preliminary simulations have shown promising results:
- **Low delays** compared to Random and Opportunistic.
- **Low route lengths** compared to Epidemic and Random.

Simulation parameters:
- 50 mobile nodes, 25 locations, pause time at each location is uniformly distributed on [5s,15s], nodes generate bundles every 30s toward each of the others during the first 500s, simulation time is 4000s.

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