Algorithms for Radio Networks

Geometric Routing

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Position Based Routing

- **Routing target:**
  - geometric position
  - not a network address

- **Idea**
  - send message to the neighbor closest to the target node (greedy strategy)

- **Advantages**
  - only local decisions
  - no routing tables
  - scalable
Prerequisites

- Each node knows its position (e.g. GPS)
- Positions of neighbors are known (beacon messages)
- Target position is known (location service)
First Approaches

- Routing in packet radio networks
- Greedy strategies:
  - MFR: Most Forwarding within Radius  [Takagi, Kleinrock 1984]
  - NFP: Nearest with Forwarding Progress  [Hou, Li 1986]
PBR in Radio Networks

- Combination of greedy routing and recovery strategy
- Recovery from local minima (right hand rule)
  - Example: GPSR [Karp, Kung 2000]
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Lower Bound

- Lower bound for position based routing [Kuhn et al. 2002]:

\[ \text{Time: } \Omega(d^2) \]

- \( d \) = length of shortest path
- \( \text{time} = \# \text{hops}, \text{traffic} = \# \text{messages} \)
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