Virtual ID Routing

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Motivation

- Goal: Scalable routing architecture for mobile computing
- Traditional id such as IP address embeds topology information, so moving a node involves reassigning its id.
- Idea: ROFL, Using flat node identifier and DHT to enable mobility. (VRR, Caesar ‘06)
- Problem: Neighbors in DHT are not necessarily physical neighbors in topology. Routing efficiency and thus scalability

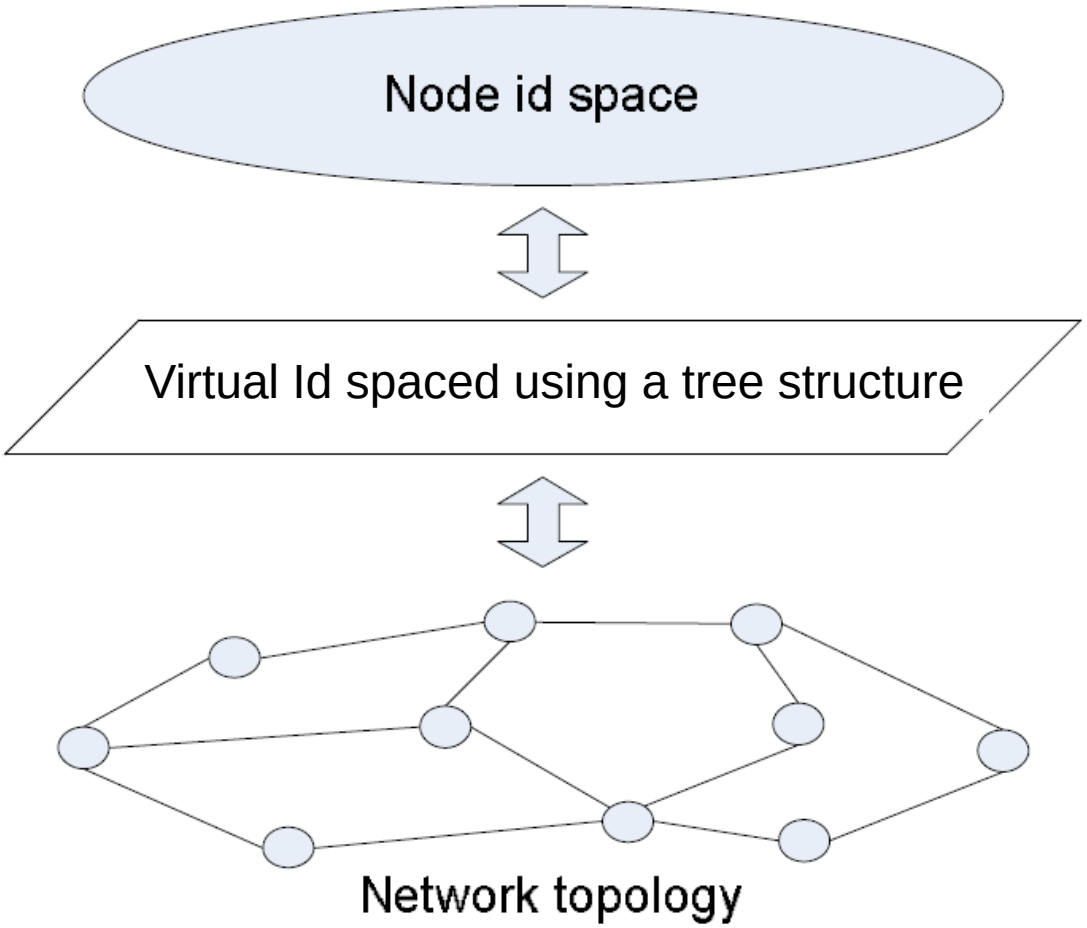
Virtual Id Routing – Key ideas

- Maintain location-independent flat id design for node and applications
- Introduce dynamically assigned virtual id reflecting topology to help routing efficiency, thus scalability
  - Virtual id space is structured, e.g. Kademlia Tree, routing is based on virtual id.
  - Desired property: Nodes closes to each other in virtual id space are also close in physical topology

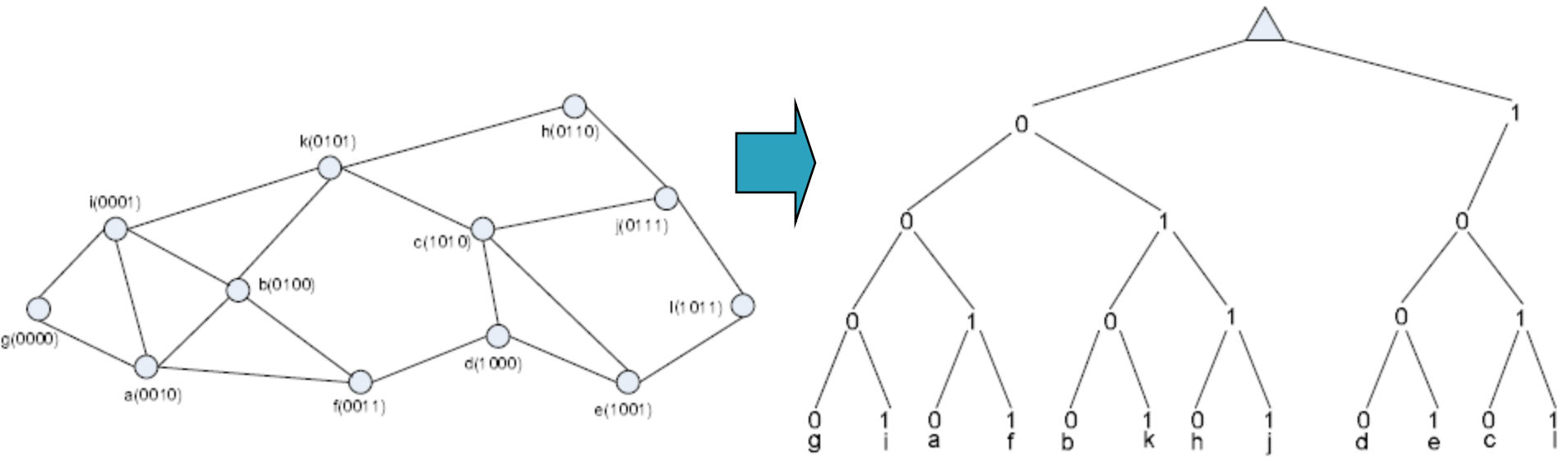
Key ideas

Flat physical Id space with location specific virtual id

1. Virtual Id assignment
2. Routing in virtual id space
3. Physical id to virtual id mapping



Virtual id assignment



Physical topology

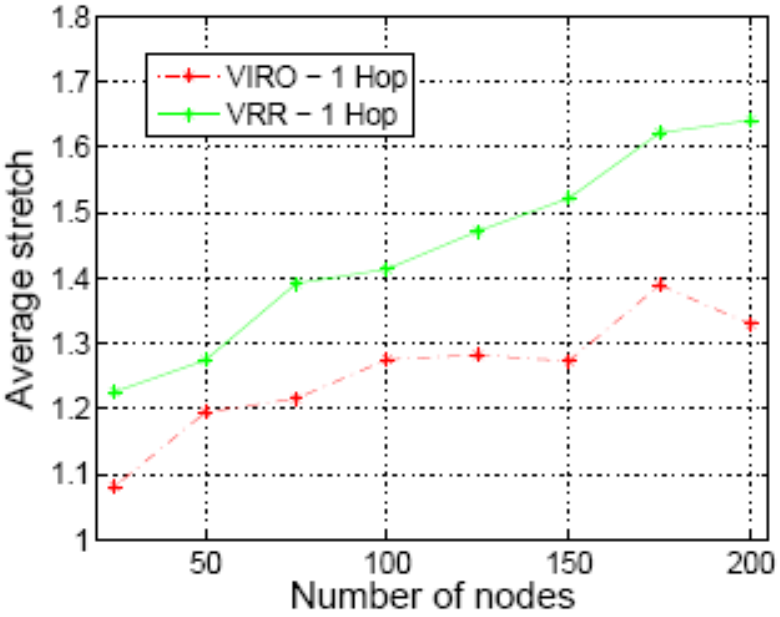
Virtual Id space

Routing and Mapping

- Routing in virtual id space
  - Inspired by Kademlia DHT; this design greatly simplifies routing
  - From virtual node A to LCA(A, B), then from LCA(A, B) to B
  - No single point of failure
  - Using local short-cuts table to help efficiency
- Look-up virtual id using physical id
  - Hierarchical rendezvous points
  - Combined mapping and forwarding

Evaluation and Conclusion

- Observations
  - Routing stretch increase slowly with the number of nodes in the topology, indication good scalability
  - Over-performs VRR
- Summary
  - Flat id enable seamless mobility
  - DHT allows utilizing topology specific virtual id to achieve scalibility



Future work

- Better virtual id re-assignment for robust routing in mobility scenario
- More simulation results using Omnet++

Thank you!

Questions?