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Floating Content: Infrastructure-less Information Sharing in Urban Environments

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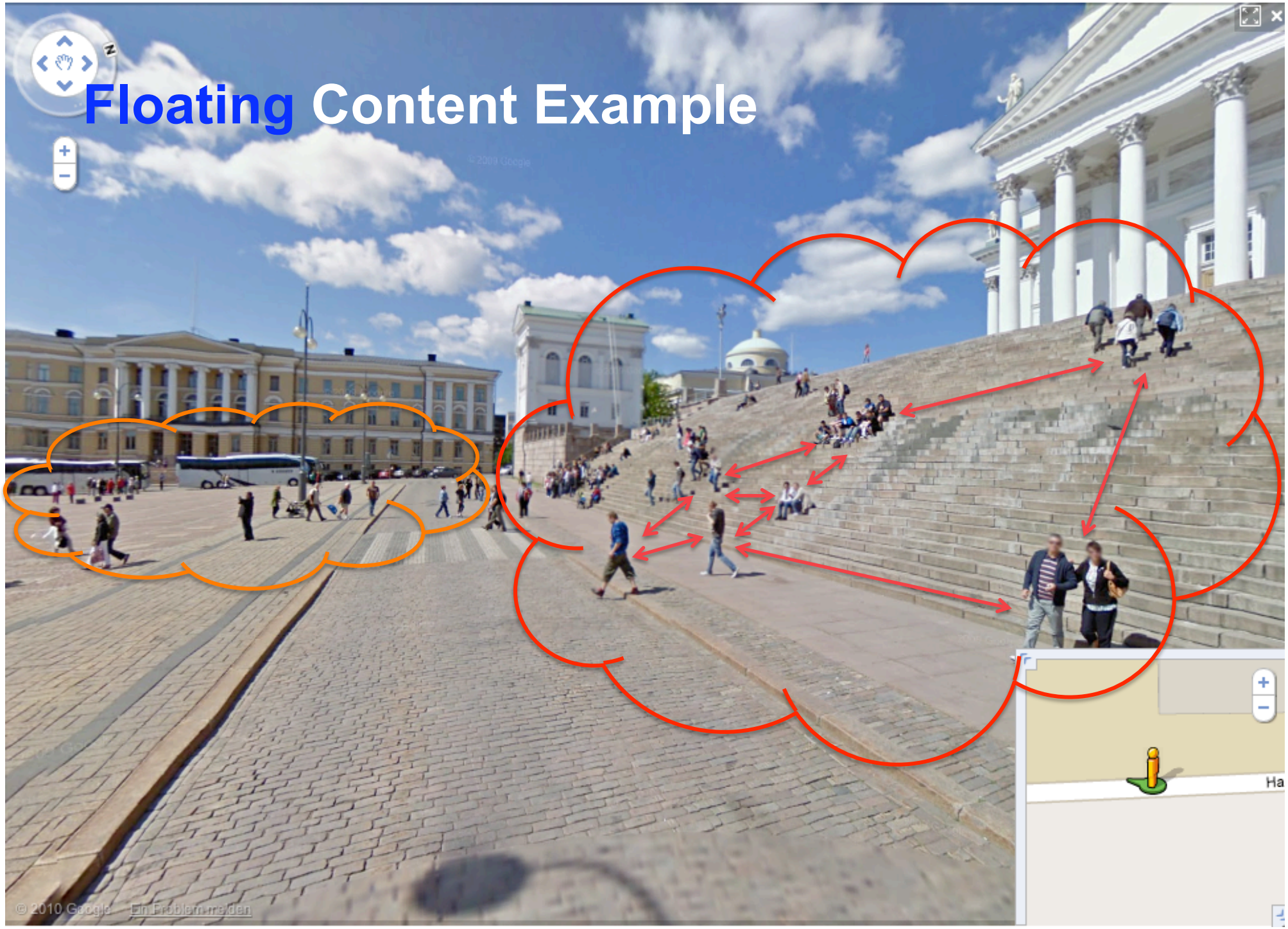
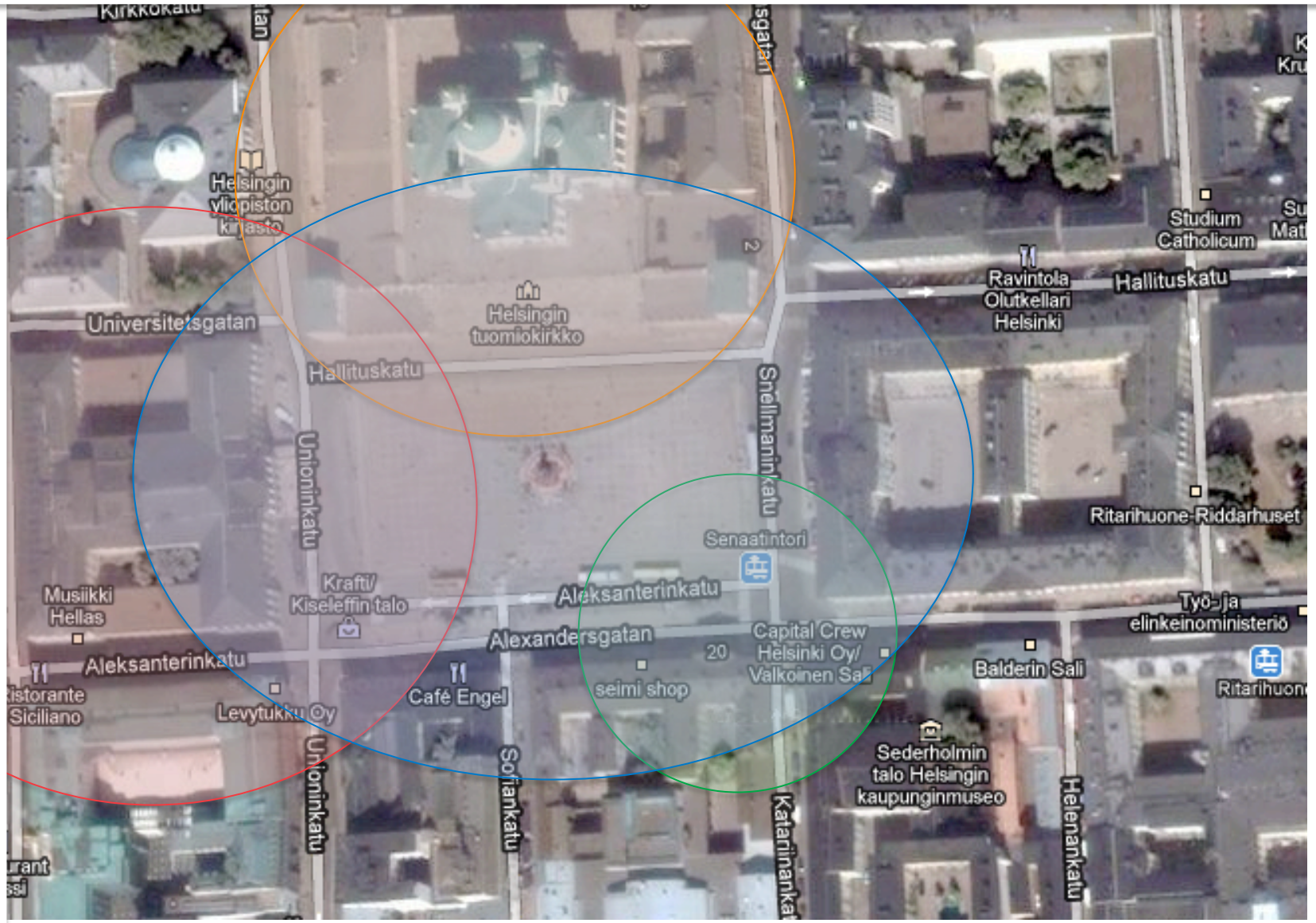
Infrastructure-less Content Sharing…

- Ad-hoc local social network-style information sharing: Digital graffiti w/o servers and infrastructure
- Leaves notes, comments, stories, etc. in places
- Define reach (area of interest) and lifetime
- Leverage delay-tolerant ad-hoc communication between mobile devices for information replication & acquisition
  - Could borrow content channels from PodNet

…in Urban Environments?!

- Location privacy
- Content “privacy”
- Connectivity (to infrastructure)
- Geographic validity
- Temporal validity
- User identification


Floating Content Example
© 2010 Google
Ein Problem melden



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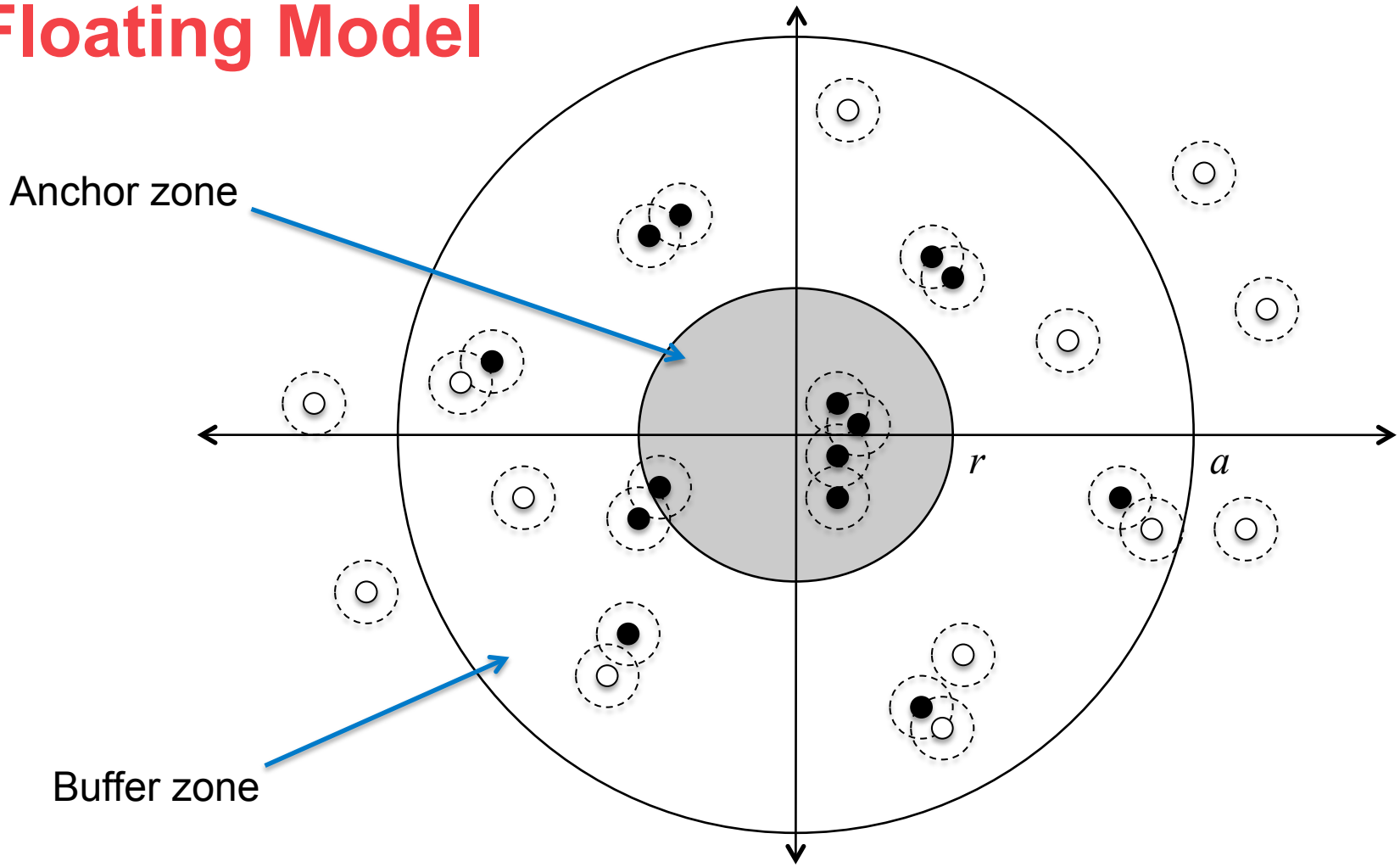
Floating Model



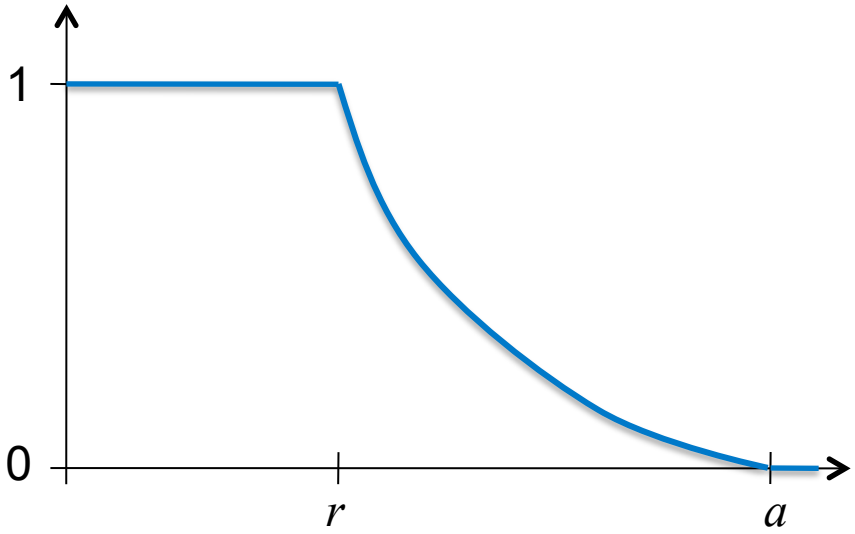
Replication & Deletion

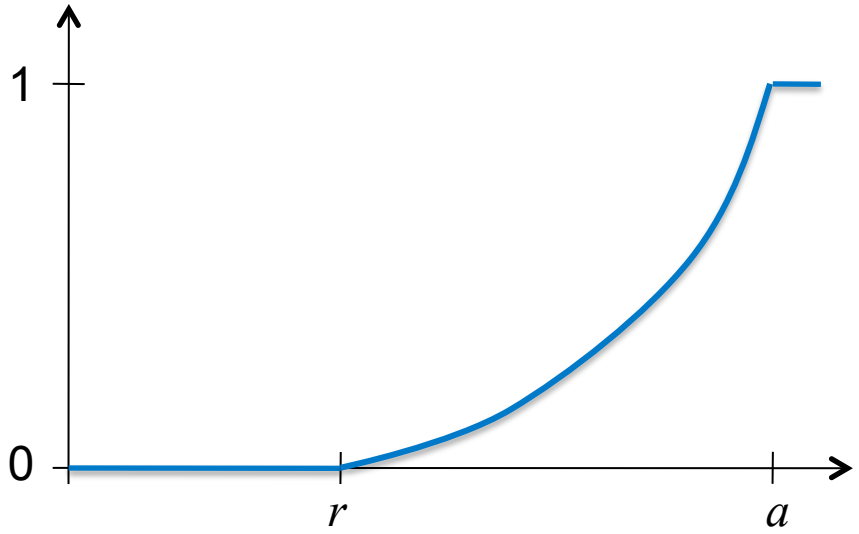
Replication

- f(d) from anchor point
- r, a for priority scheduling
- 1 within anchor zone

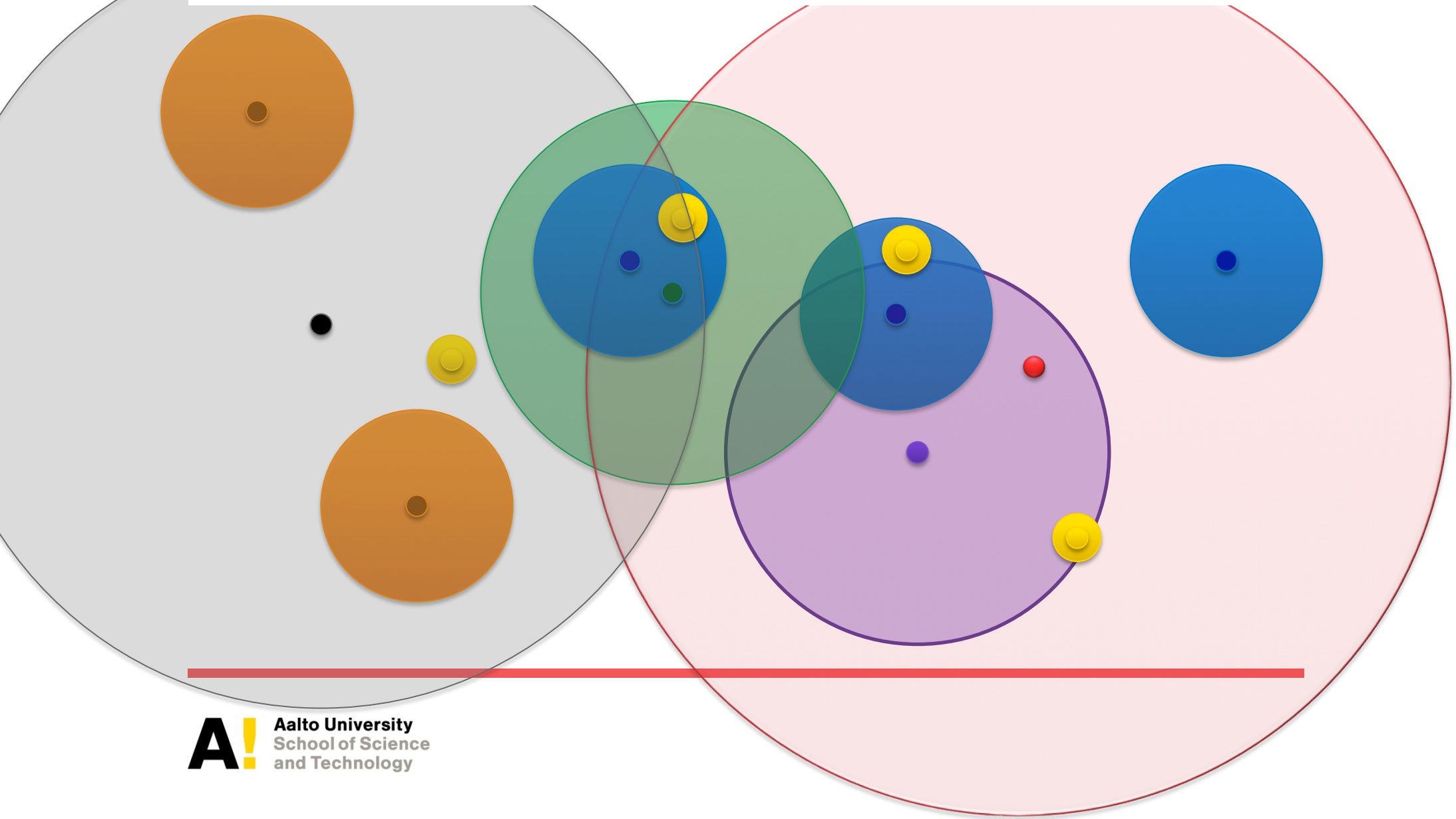
Deletion

- Only if buffer space needed
- f(d) from anchor point
- r, a as tie breakers
- TTL-based deletion





Content spread and prioritization

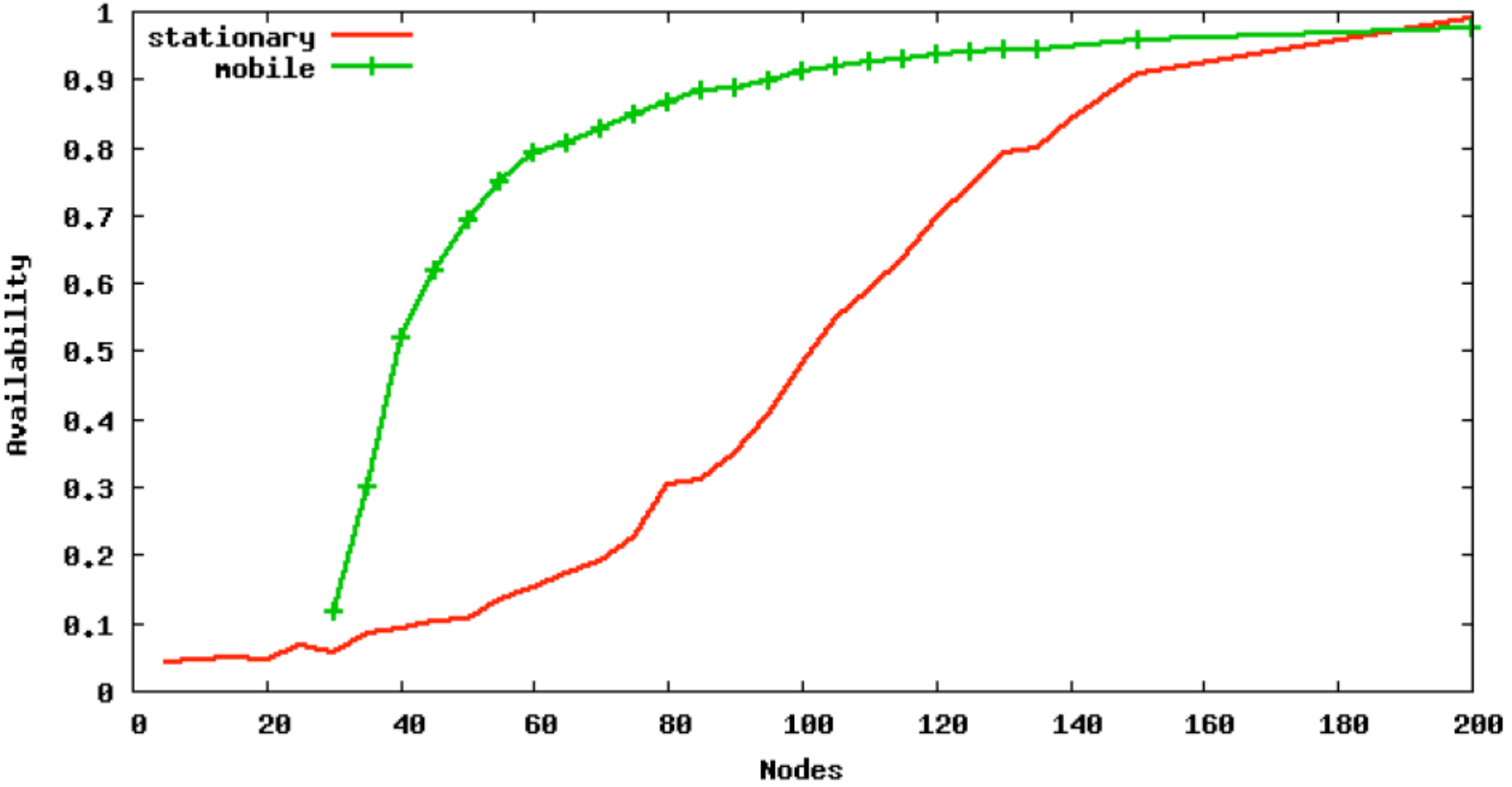


Some Simulation Findings

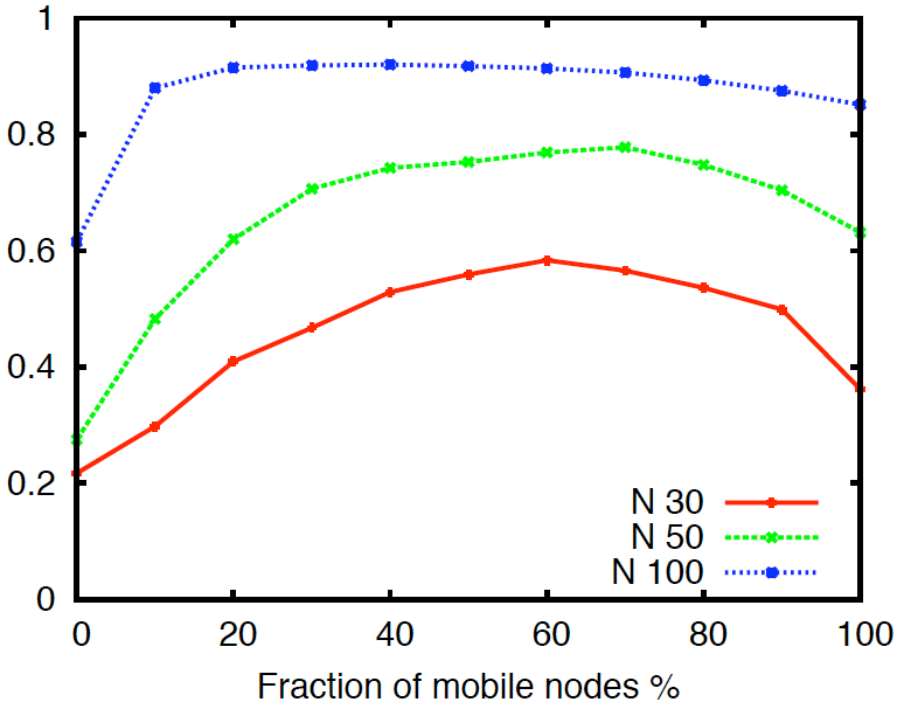
- ONE Simulator: 2000 x 2000m simulation area
- Variables
  - Radio range: l
  - Number of nodes: density
  - Size of anchor zones r
  - Initial mobility models: static nodes, random waypoint
- Metrics

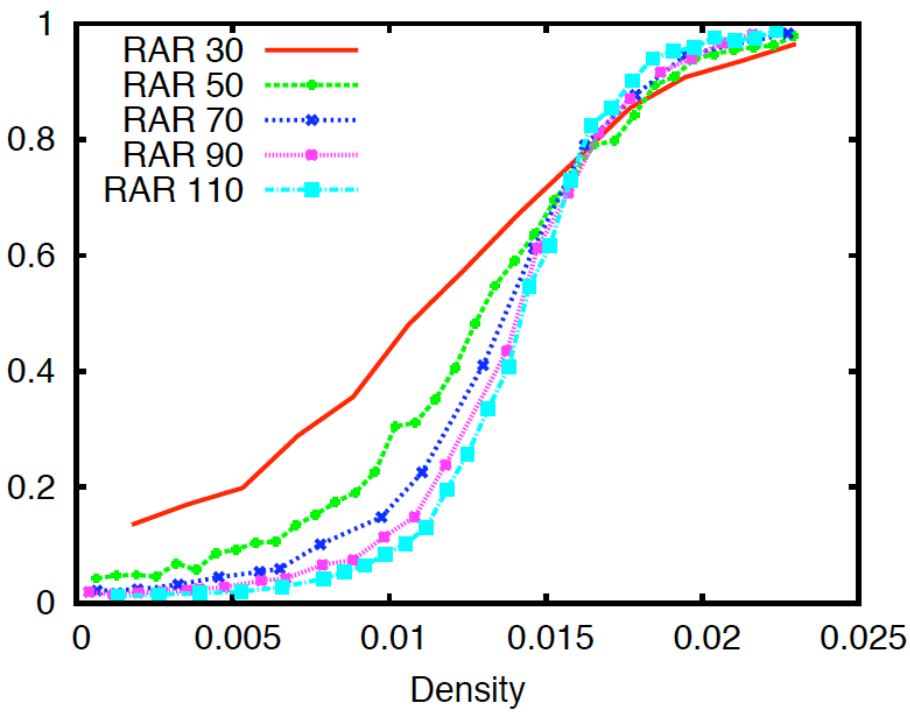
$$RAR := \frac{l}{r} \qquad Availability := \frac{\#\,nodes\ in\ the\ anchor\ zone\ with\ item}{\#\,total\ nodes\ in\ the\ anchor\ zone}$$

Mobile (RWP) vs. Stationary Nodes

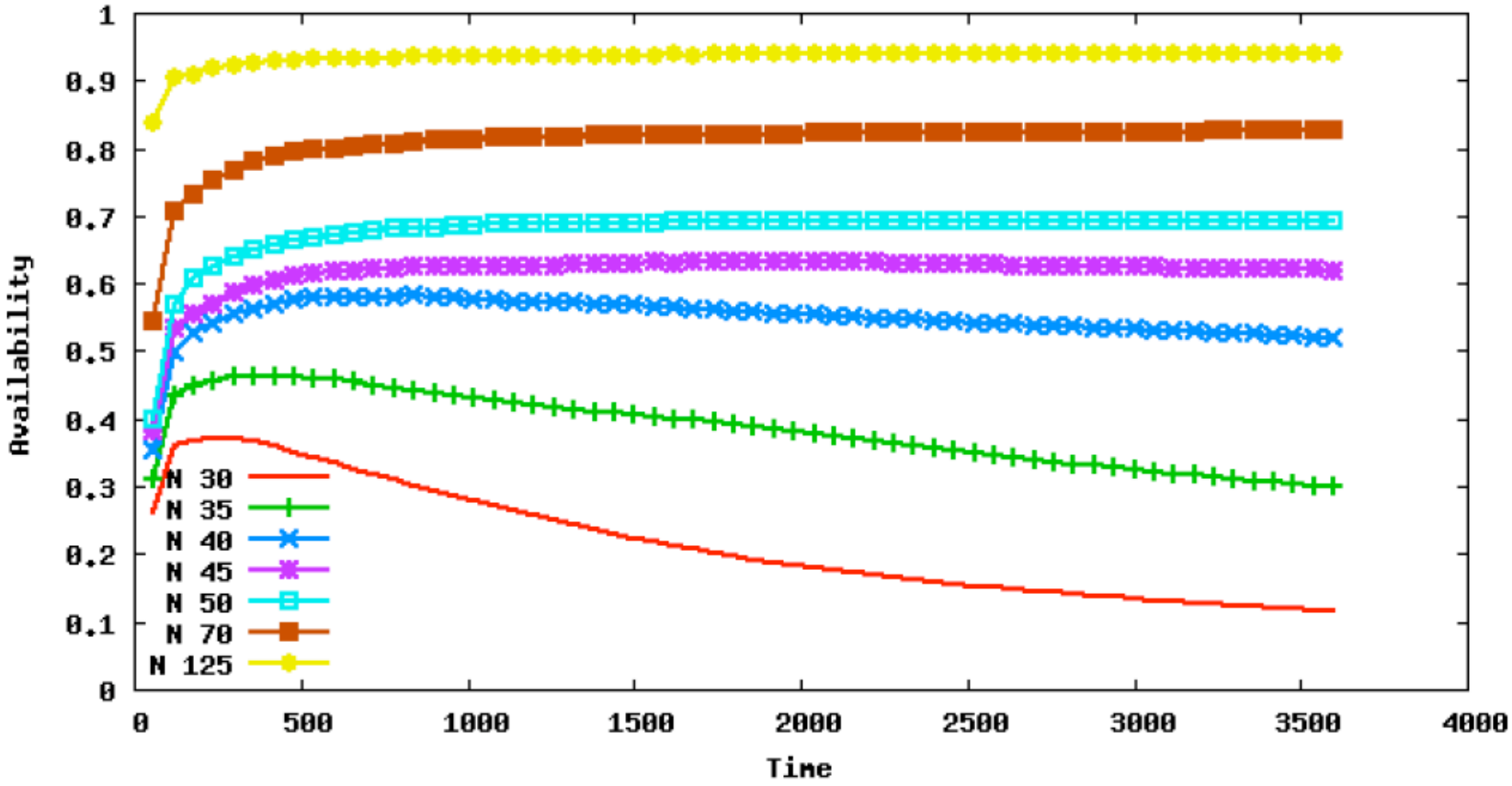


Impact of mobility and stationary density





Memory: Availability over Time



Some Conclusions

- Simple, yet appealing geo cooperation model
- Workable already for modestly dense scenarios
  - Simulations do not disagree with theoretical modeling
- Some built-in DoS protection and garbage collection
- API and content sharing applications tbd.
- Probabilistic operation and user acceptance?

Present & Future Work

- Theoretical foundations
- More extensive simulation studies
  - Impact of location fuzziness
  - More diverse mobility models
  - Varied offered load, resource sharing
- Implementation