

Future Internet WP3: Results from Information Networking

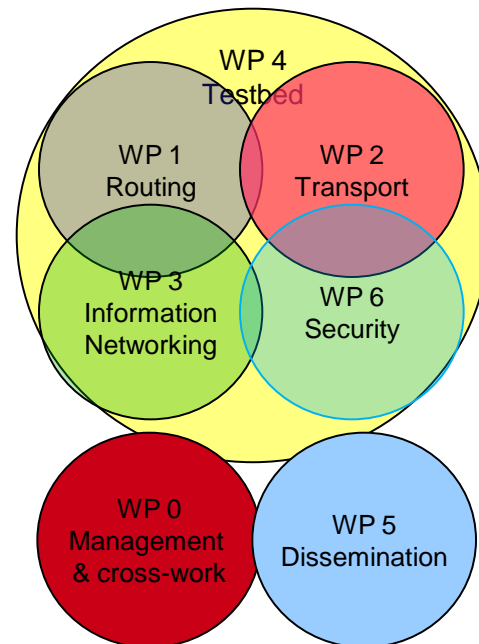
Jussi Kangasharju, University of Helsinki

Tivit Future Internet Program 2008 - 2013

Vision: Future Internet = a mission critical backbone of global information society

Mission: Enhance the Internet technology and ecology as a *platform for innovation* while providing strong governance over the use of the network resources and information

4 yr Strategic Research Agenda: www.futureinternet.fi



Phase 2 Partners (6/2009 – 3/2011):

CSC – IT Center for Science, Cybercube, F-Secure, Ericsson, Nokia, Nokia Siemens Networks, Stonesoft, TeliaSonera Finland, Aalto University, Universities of Helsinki, Jyväskylä and Turku, Tampere University of Technology, VTT Technical Research Centre of Finland, Tivit

Three Revolutions

- First revolution: **Connecting wires**
 - Telephone network
- Second revolution: **Connecting hosts**
 - Original Internet
- Third revolution: **Connecting information**
 - Information-centric networking, a.k.a. information networking, a.k.a. data-oriented networking, ...

Observations

- Most Internet use today is information-centric
 - Web, peer-to-peer, ...
- Original Internet not very good for that
 - Designed for a different purpose
- Problematic for content providers and users
- How to build an information-centric network?
- What needs to be changed and how?

Information Networking Vision

- Global information dissemination architecture

Content providers:

- Commercial
- Users
- Other

Content consumers:

- Humans
- Machines

Remember:
Benefits both
content providers
AND users

Key Challenges

- Storage:
 - How should information be represented?
 - Encoding techniques, etc.
- Dissemination:
 - How should content move around the network?
 - Caching, content distribution, etc.
- Access:
 - How do users express what they want?
 - Naming, etc.

Overall Approach

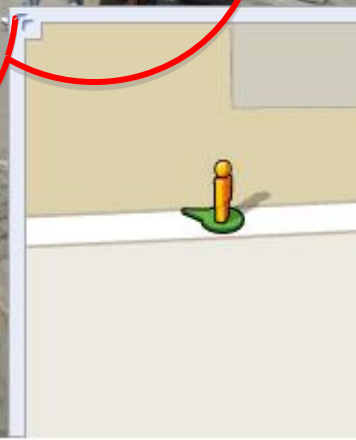
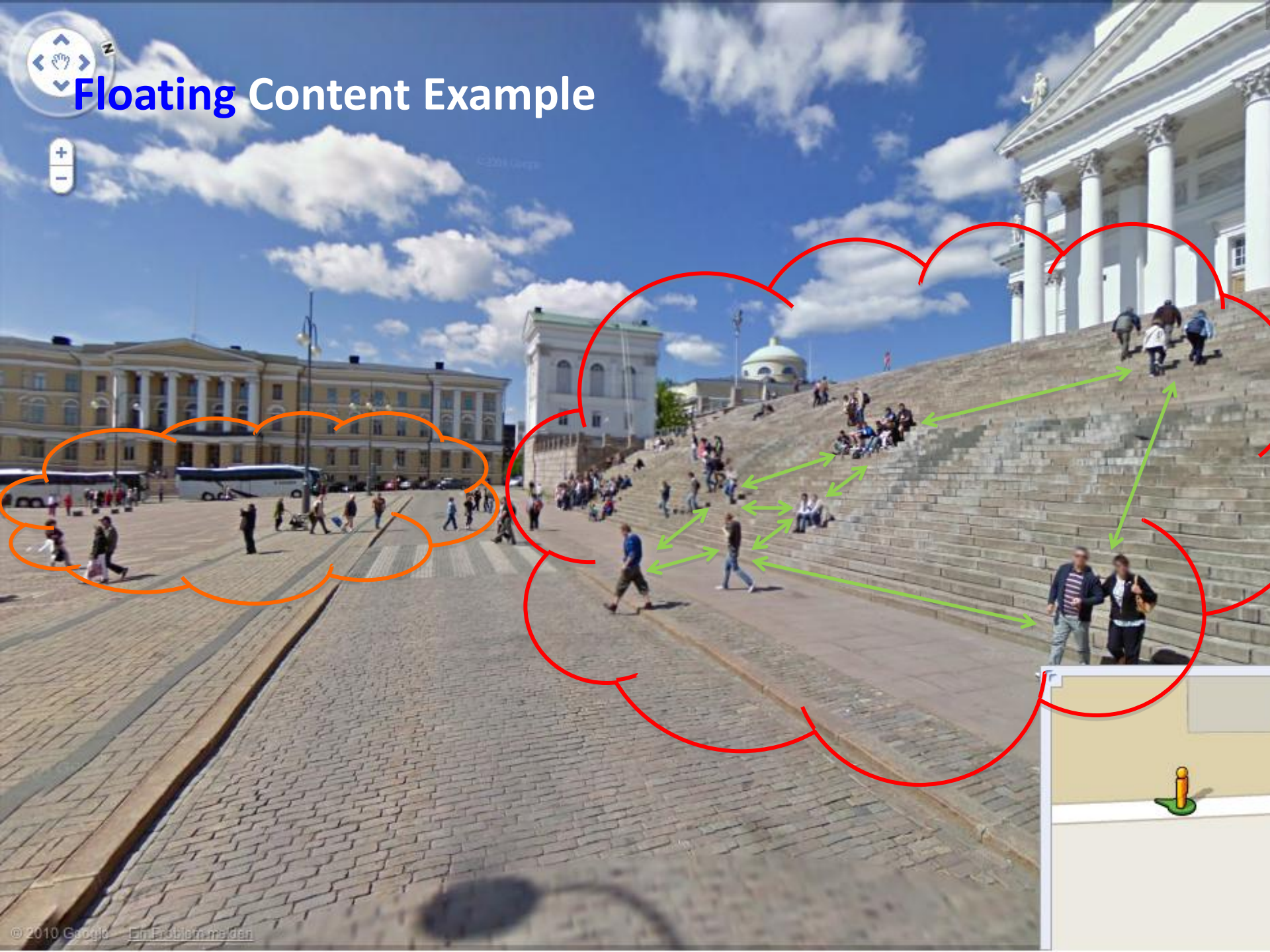
- Long term research work
- Focus mostly on papers, some prototypes
 - Over 40 papers published
 - Including at IEEE Infocom and IEEE PerCom
- Topics explored:
 - P2P Video-on-Demand
 - BitTorrent streaming
 - P2PSIP and DHTs
 - Parallel content retrieval and authentication
 - Prototypes for information-centric networking
 - Floating content (see next slides)

Floating Content

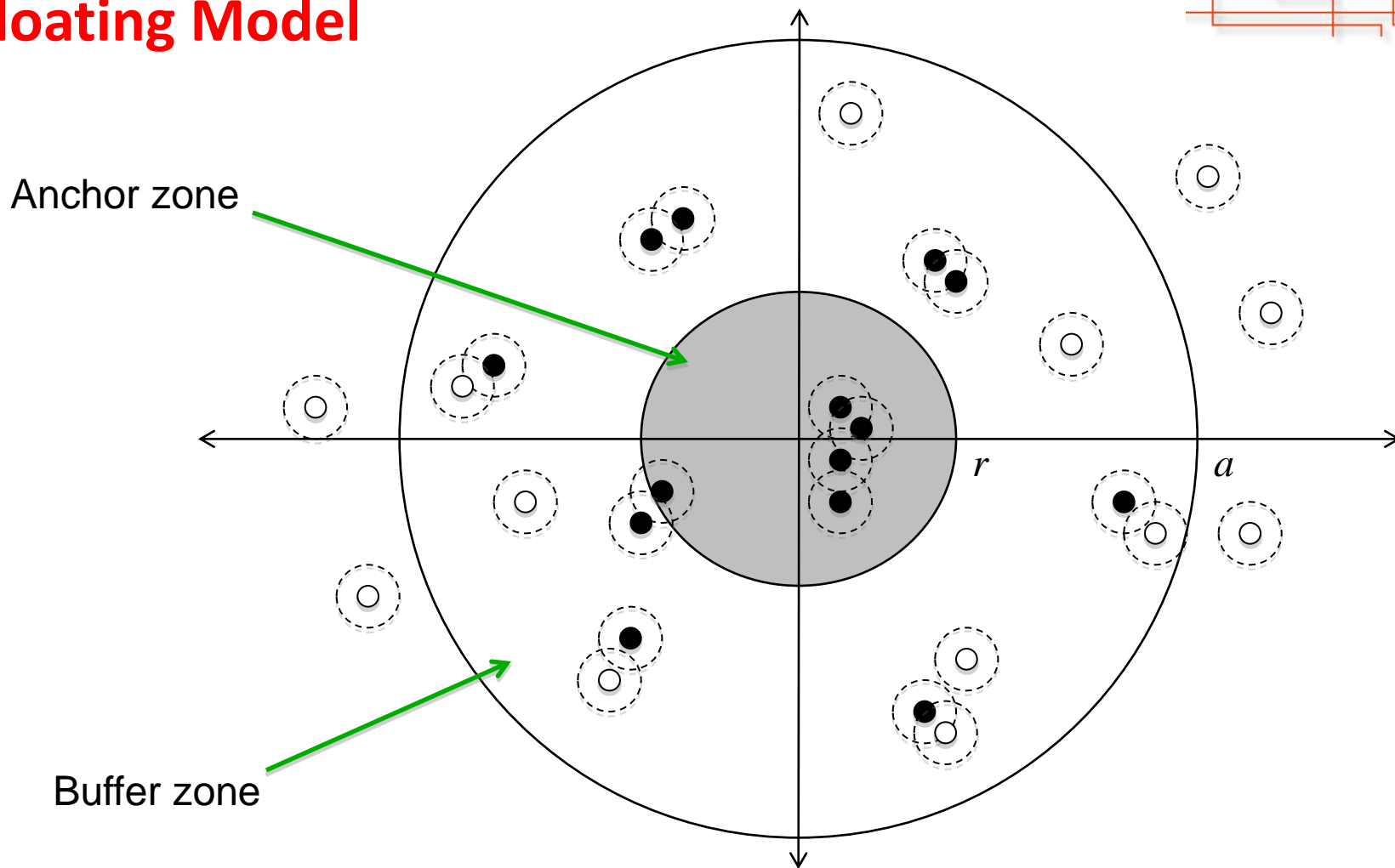
- Ad-hoc local social network-style information sharing:
Digital graffiti w/o servers and infrastructure
- Leaves notes, comments, stories, etc. in places
- Define reach (area of interest) and lifetime
- Leverage delay-tolerant ad-hoc communication between mobile devices for information replication &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



Floating Content Example

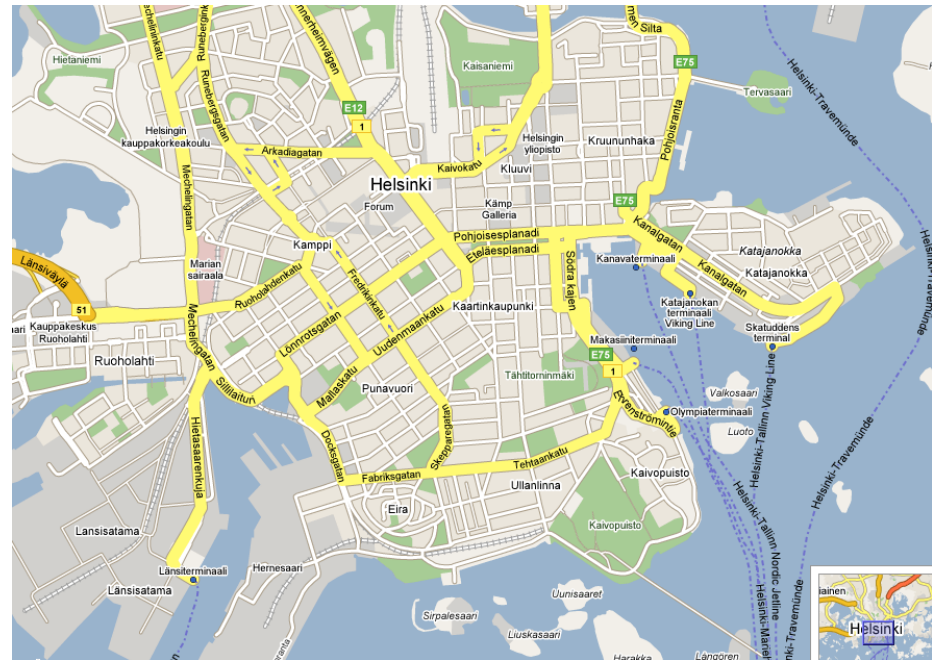


Floating Model



Simulation Environment

- ONE Simulator: 4500 x 3400m simulation area
 - Helsinki City Scenario
 - Restless nodes (tourists)
 - Moving around along shortest paths between points of interest
 - On foot, by car
 - Some trams following regular routes
 - 126, 252, 504 nodes
 - 10m, 50m radio range
 - $r = a = 200m, 500m$



Some Conclusions

- Simple, yet appealing geo cooperation model
- Workable already for modestly dense scenarios
 - Simulations agree well with theoretical modeling
- Some built-in DoS protection and garbage collection
- API and content sharing applications to come
- Probabilistic operation and user acceptance?

Present & Future Work

- Theoretical foundations about criticality criteria
 - Published at Infocom 2011
- Second round of simulations completed
 - First round: 1 MS thesis + PerCom WiP 2010
 - Second round: Full paper PerCom 2011
- More extensive simulation studies
 - Impact of location fuzziness
 - More diverse mobility models
 - Varied offered loads, resource sharing
- Implementation for Android in progress

Thank You!

Jussi.Kangasharju@cs.helsinki.fi