



Peer-to-Peer Knowledge Exchange in Mobile Adhoc Networks

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Overview

1. Motivation
2. Challenges
3. SHARK - Mobile Knowledge Exchange
4. Outlook



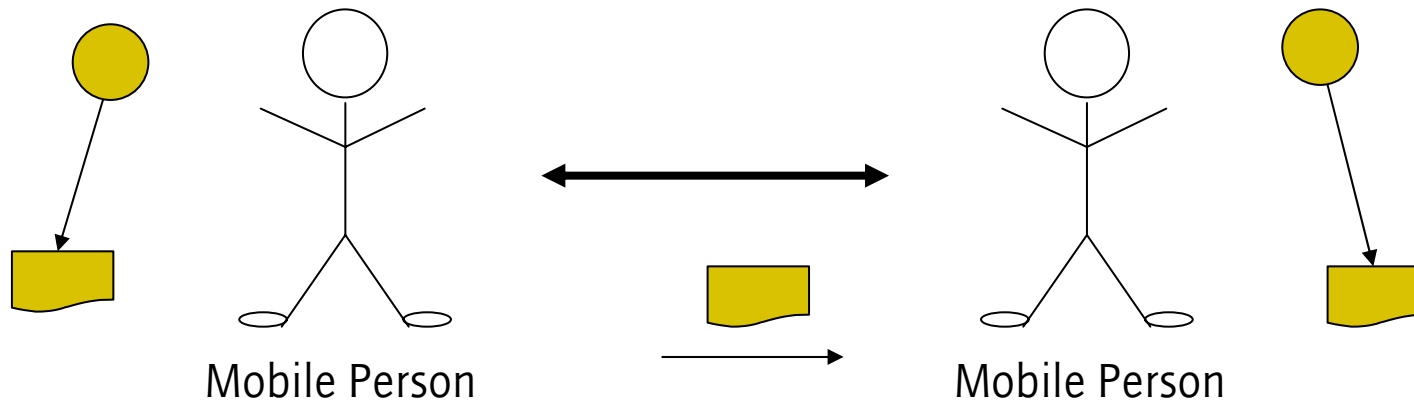
Ad hoc Information Exchange

2 „I agree.“

1 „Interesting!“

3 „There’s a movie about it. Would like to see more information about it?“

4 „Yes, please.“



5 „Cool! I’d like to buy it ...“

We would like to automate this interaction: Project Shark



Challenges

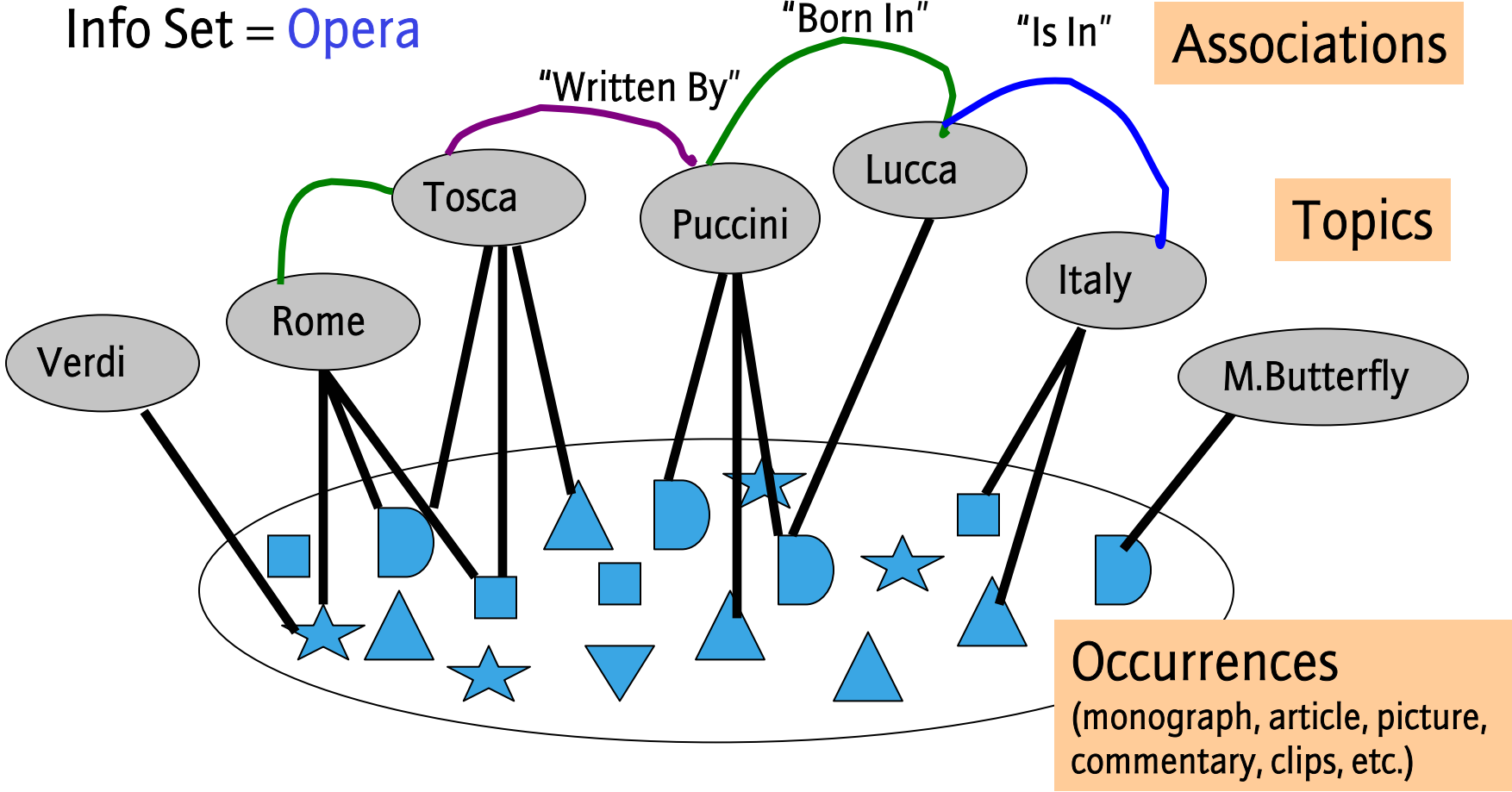
1. Specify interests → topic maps
2. Compare interests → topic map matching
3. Check authorization → security mechanisms and policies
4. Peer-to-peer exchange → exchange protocol
5. Accounting → payment and incentives

... pretty much typical P2P questions ...
+ integrated into middleware platform for resource-constrained mobile computers in ad hoc networks



1 Topic Map Example

Info Set = Opera





Why Topic Maps ?

Topic Maps ... (from ISO 13250)

- "... **link topics together** in such a way as to enable navigation between them."
- "... **filter an information set** to create views adapted to specific users or purposes."
- "... enable **multiple, concurrent views** of sets of information objects."
- "... facilitate the creation of **topic-oriented user interfaces** that provide the effect of merging unstructured information bases with structured ones."



2

Representation and Matching of Topic Maps

- > Topic Maps (ISO/IEC 13250)
 - > generic support for annotation of documents
- > XML Representation of Topic Maps
 - > XTM 1.0
- > Matching of XML documents
 - > open question
 - > computing intensive
- > Mobile devices
 - > limited storage and processing capabilities



3

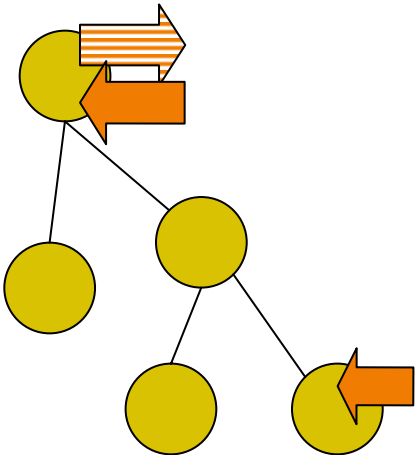
Security

- > Ad hoc networks: no central security infrastructure
 - > access decisions based on trust
- > Propagation of trust
 - > transitive
- > Networks of trust
 - > establish trusted communities
 - > size of trust database ?
 - > trust lifetime ?



4 Peer to Peer Exchange

- > Support mobile, resource-constrained devices
- > Build on ad hoc network connections
- > Protocol based on *Knowledge Ports*
 - > topic map extension
 - > *Incoming* Knowledge Port = topic wanted
 - > *Outgoing* Knowledge Port = topic offered
- > Protocol Interactions
 - > negotiation: interest / offer / accept
 - > knowledge exchange: insert / stop





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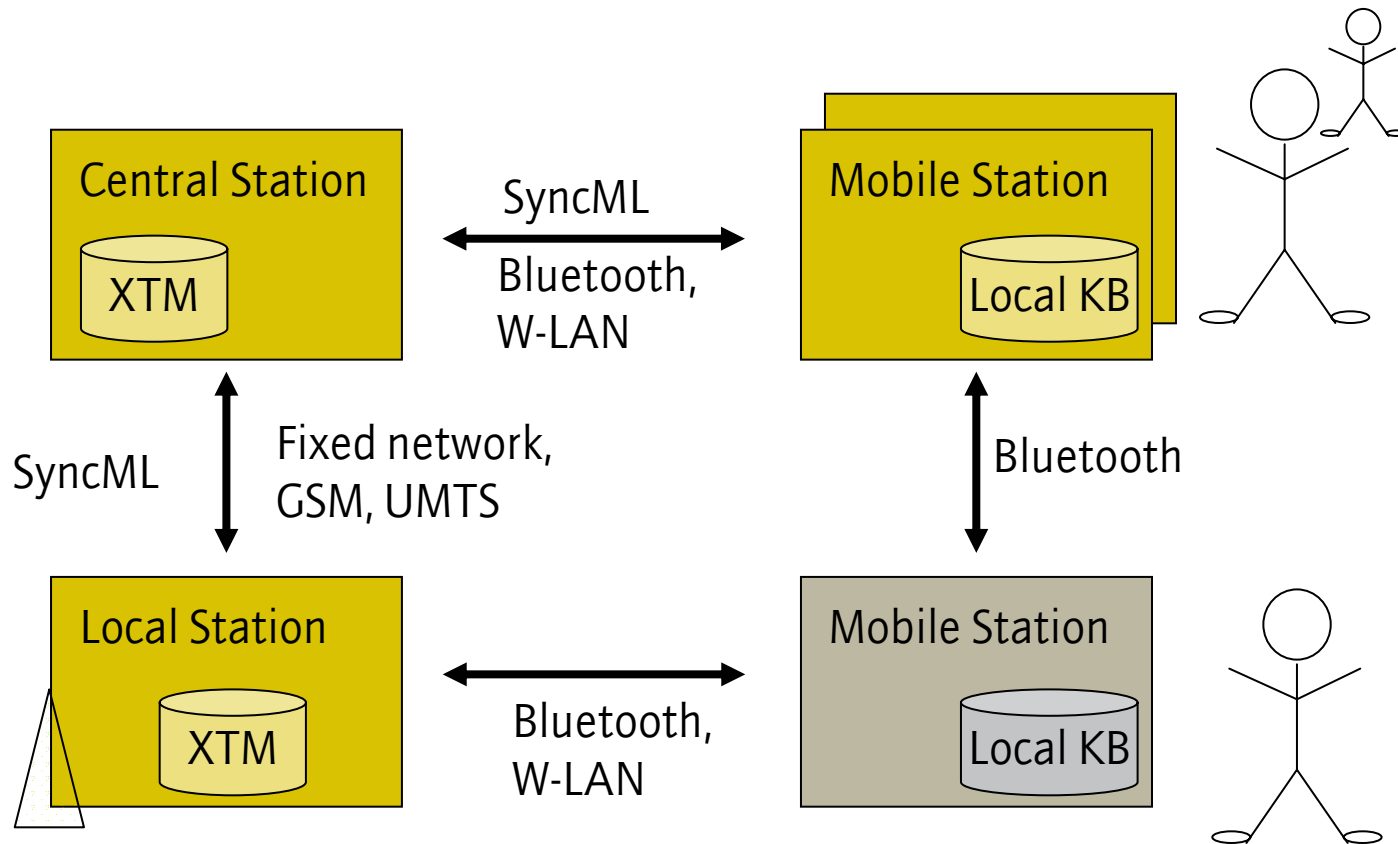
Accounting

- > Find suitable rewards / incentives
 - > why should I provide information ?
 - > what is the value of information ?
 - > does it all work with a „P2P spirit“ ?
- > How does this all work in mobile, ad hoc environments ?
 - > even more difficult than in conventional P2P networks



Shark: Components

<http://ivs.tu-berlin.de/Projekte/Shark/>





Status and Future Work

- > prototype operational
 - > Palm, Bluetooth, J2ME
- > ongoing work
 - > context awareness
 - > security
 - > accounting
- > future work
 - > monitor knowledge flows
 - > self-organising knowledge dissemination



Vielen Dank.

Fragen und Kommentare sind herzlich willkommen.

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