

Mobile Peer-to-Peer

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Team

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Aim of the team

Mobile and wireless systems can especially benefit from the self-organizing characteristics of P2P systems, e.g., with respect to robustness, however the heterogeneity and dynamicity of those systems also poses severe challenges to P2P concepts. Moreover exploiting mobile systems features, new applications for P2P systems are opened such as location based services. The degree of controllability as an operator requirement versa self organization has to be considered as another important challenge for mobile P2P approaches.

This focus group is going to elaborate on whether the current state of the art in P2P solutions is sufficient for mobile systems and discusses open research issues as well as emerging application classes.

Mobile P2P Applications

Near term (2-3 years)

- Location based services: Presence -> IM on phone
- Shared work spaces (location and cotext based)
- Searching for people
- Large amount of data: access data that is stored on the mobile phone
- Gaming (weak super peer archit.)
- Video sharing

Mobile P2P Applications

Mid term (5 years)

- Sensor networks
 - Problem: annonymity of collected data
- Direct phone blogging
- Car to car communication/telematics
 - Taxis serving as super peers and main information (sensor) source
 - Car parking
- Mesh networks to push out the last mile
- Infrastructure saving
 - network management
 - Conference calling
 - VoP2P

Long term

- Fully decentralized billing and DRM for content sharing

What is Mobile Peer-to-Peer?

- Mobile devices (resource limitations and heterogeneity)
- P2P and mobile ad hoc networks
- Key based routing -> wireless systems
- Heterogeneous environment: wireless and wireline OR pure ad hoc
- Support the mobility of a user
- Last mile types of applications (heterogeneity)
- Intelligence in mobile systems to the edges; infrastructure less environment

Barriers

- Legal aspects
 - Allowed to resell data rate
 - Personal information (sensors)
 - DRM
- Privacy
 - Who gets to track you?
- Who is the provider? Who is responsible for the system? Who fixes a problem? Wireless makes it worse – the provider to be the intermediary to create trust

Challenges of Mobile P2P

- Mobile device constraints (power, Sockets, SDK, data on mobile device, resource restrictions, memory, windows mobile > symbian)
- Data rate constraints
- High churn rates, high mobility
 - Select peers based on traffic, proximity
- Heterogeneous systems/devices
 - How to make use of heterogeneity
 - (why) are super peer infrastructures the better solution?
- Routing in MANETS
 - Intermittent connectivity
 - Least cost routing
 - Best communication path
- Network management/mobility management supported by mobile P2P
- QoS, Carrier gradeness

Challenges of Mobile P2P

- Security model
 - Restricting application access to resources (data, network, CPU, content)
 - Authentication
 - Only for applications with persistent side effects
- Billing
- Cooperation & Trust
 - Incentive systems
 - What if you get paid for being a super user
 - Reputation systems
- Device coupling: association management, key exchange
- Trustworthiness against QoS
 - Use reputation to structure systems for critical services?

Challenges of Mobile P2P

- P2P interworking/integration
 - Integration of different algorithms/versions (protocol level)
 - Integration of different meta data schemas in a decentralized way
 - How to guide the user to use a common schema
 - standardization is probably not the way that this would work – nobody will adhere to one ontology
 - maybe we cannot do it without infrastructure

Challenges of Mobile P2P

- Bootstrapping
 - How to distribute the software if not being able to download?
 - Viral approach – controllable? Trust?
- Test strategies for P2P
 - New design methodologies for P2P software on mobile phones?
 - How to test the software?
 - We need real testbeds
- Heterogeneous devices -> API for programmers on heterogeneous devices

Why mobile P2P?

- Save infrastructure cost
 - Configuration
 - Maintenance
- Traffic reduction (upload only for requested content)
- User feeling: user decides what to 'upload'
- No infrastructure in place
- Instant information access: no upload

- Bandwidth sharing

- Could we live without any infrastructure? – probably not: GSM roaming, huge data bases
- Does pure P2P make sense at all? – the end user does not care; applications just have to be easy to use

- Enabling technology if there is no infrastructure to work with similar features as with infrastructure