Ad-hoc Technology in Future IP based Mobile Communication Systems

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acticom mobile networks

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Content

- Required Research
- Ad-hoc Testbed
- Expected Results and Time Frame
For different network types with different device classes the solution for routing strategies differ dramatically.
Auto-Configuration

• Assignment and release of IP addresses
  – omnipresent related protocols can not deployed in ad-hoc networks (DHCP)
  – dynamic default routes for bridging into fixed networks

• Link Connectivity
  – before IP connectivity link status has to be available
  – determine deterioration of link status versus out of range
Integrating Ad-hoc and Backbone

• Ad-hoc networks need to be integrated with existing infrastructure
  – Middleware systems like Microsoft .NET
  – Concepts for setting up secure, spontaneous collaborations of ad-hoc nodes
  – Automatically configuration for meaningful access to backbone servers (not merely IP)
  – Study traffic characteristics in such concepts
Making Ad-hoc Networks Meaningful

• Ad-hoc networks will carry new types of applications (e.g., sensor networks)
• Access to such applications has different semantics, e.g., addressing
  – Concepts for coupling ad-hoc/sensor networks with existing IP networks
  – Make non-standard address semantics accessible to IP networks (e.g., “any one temperature sensor in the bedroom”)
  – Default toolbox for distributed applications (e.g., peer-to-peer networks) in ad-hoc networks (handling impact of wireless and mobility)
  – Testbed to be developed
QoS - H.26L Video Streams

- Investigation of video sequences
- Sophisticated source model for simulations
- Video services have tightest QoS requirements

- TML 9.7 software
- First results for reference video sequences (akiyo, etc)
- Movies, sport, news for different quality levels
- Wireless adapted data rates (QCIF/CIF)
IEEE802.11a and Hiperlan2 are based on 5GHz technology
- OFDM + Multi-Modulation
- Data rate depends on distance between sender and receiver
- Range is a function of the antenna concept
- Measurement of IEEE802.11a interface cards started (office, outdoor, mall)
- Channel models will be generated for simulation purposes
Medium Access Control

- Omnipresent Techniques such as IEEE802.11a/b have some well known disadvantages for ad-hoc networks (RTS/CTS)
- Approach:
  - Tuning the RTS/CTS scheme
  - Usage of SDMA capability
  - New (ad-hoc aware) MAC scheme
    - OFDM/CDMA/SDMA
    - Power aware (passive antenna concepts)
Passive antenna concept for ad-hoc

- Reduce the blocking area
- Power saving with passive antenna concept
- Combination with space-time processing
Ad-hoc Testbed

- First simple ad-hoc test-bed
- Based on IEEE802.11b technology
  - 11Mbit/s
  - PRISM2 Chip Set
- Provision of real time video services
  - H.261, 64kbit/s, CIF
  - Ophone software
- Link quality aware routing
Ad-hoc Testbed

Real time video services for ad-hoc networks

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Ad-hoc Testbed - Insights

- successfully demonstrated at Marriott Hotel in Munich with one video flow over three hops
- high variance in transmission delay resulting in medium quality
- well known RTS/CTS problem occurred
  
  Li, Blake, De Cuoto, Lee, Moris MIT

Capacity of ad-hoc wireless networks
  
  Proc MobiCom 2001, Rome
### Expected Results and Time Frame

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<tr>
<th>ID</th>
<th>Task</th>
<th>Q1 02</th>
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**Notes:**
- Q1 02: Jan, Feb, Mar
- Q2 02: Apr, Mai, Jun
- Q3 02: Jul, Aug, Sep
- Q4 02: Okt, Nov, Dez
- Q1 03: Jan, Feb
- Q2 03: Mar, Apr
- Q3 03: Mai, Jun
- Q4 03: Jul, Aug, Sep, Okt, Nov, Dez
Thank you for your attention!

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