

Ad-hoc Technology in Future IP based Mobile Communication Systems

Frank Fitzek

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WWRF - Phoenix – 7/8 march 2002



Martin Reisslein 
Arizona State University

Adam Wolisz 
Technical University Berlin

Holger Boche 
Heinrich Hertz Institut

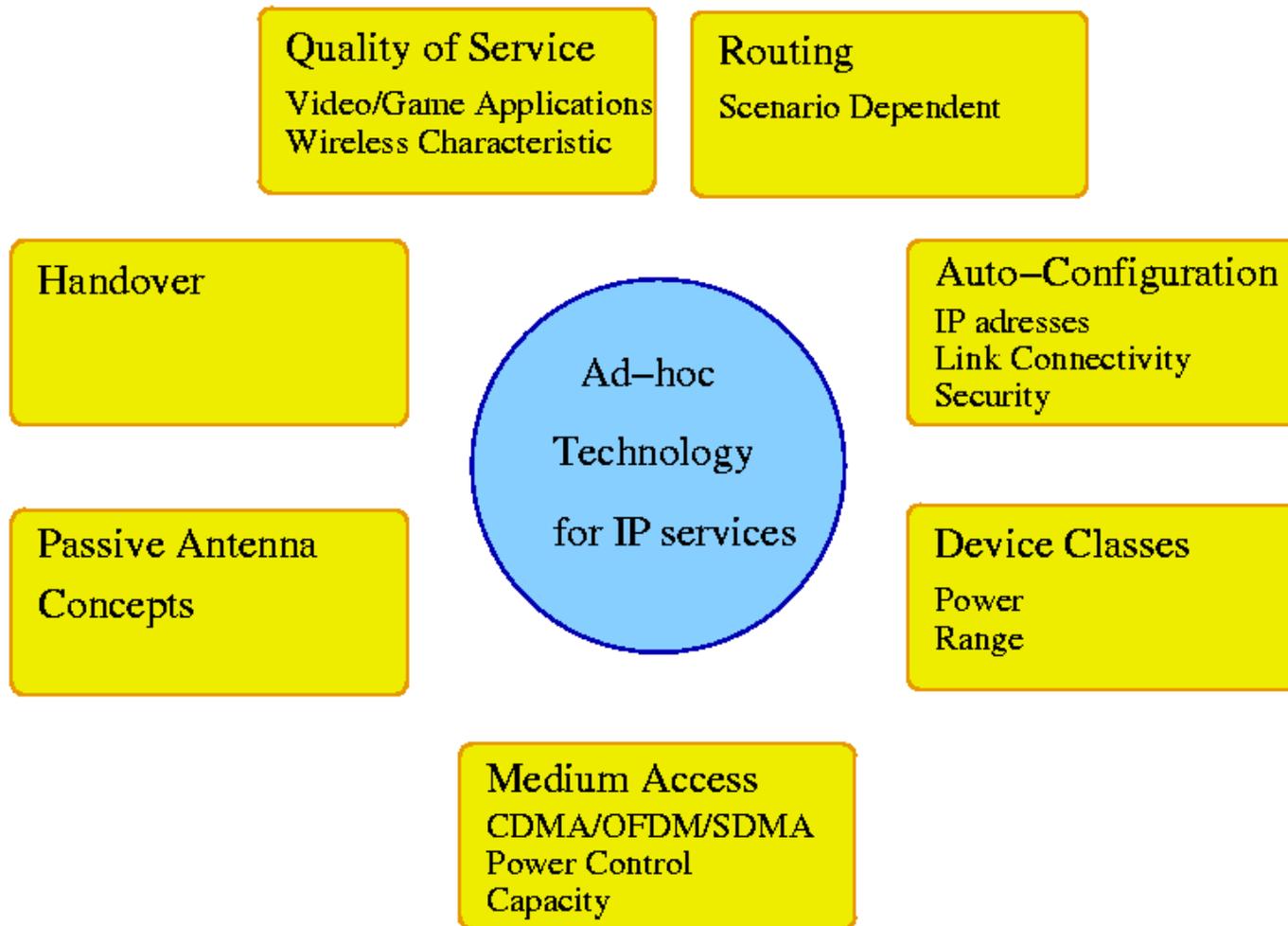
Content

- Required Research
- Ad-hoc Testbed
- Expected Results and Time Frame

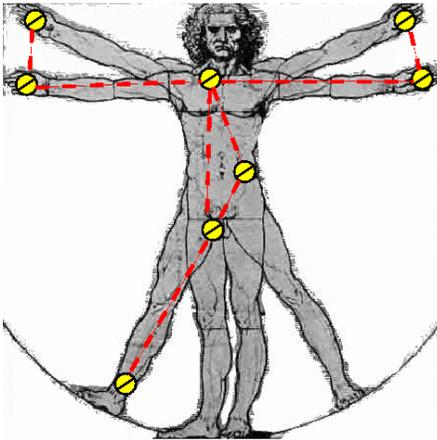


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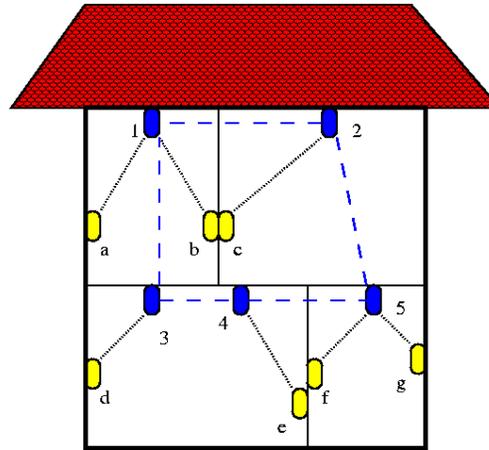
Required Research



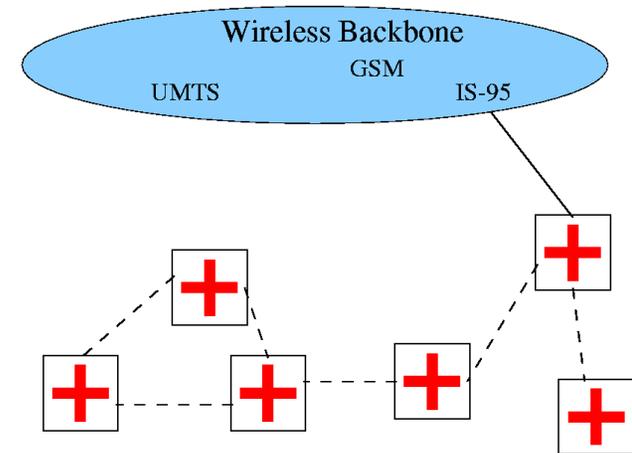
Routing



Body Network



eHome



Mobile Internet

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



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TKN

**Telecommunication
Networks Group**

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

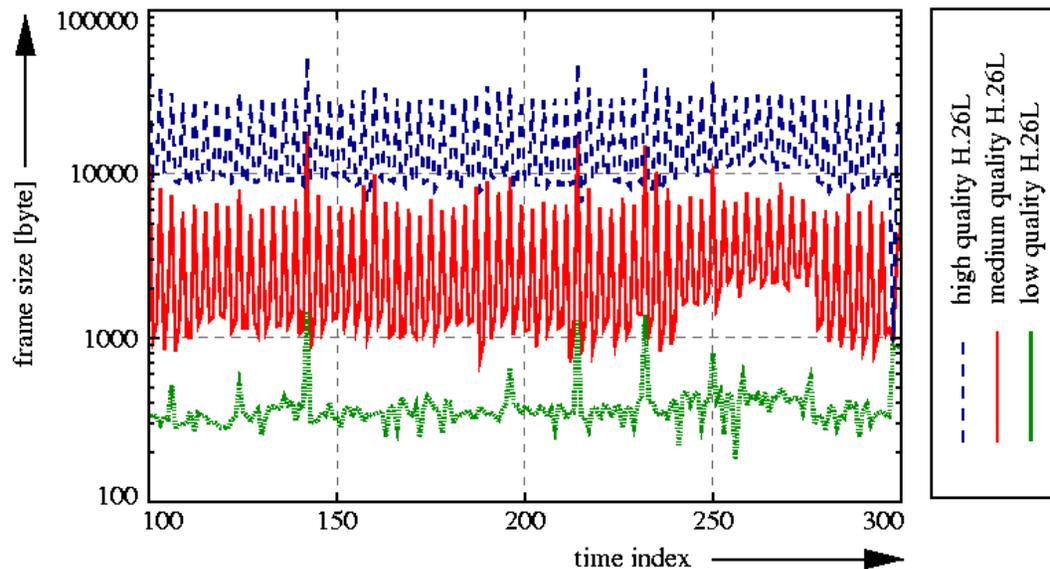


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QoS - H.26L Video Streams

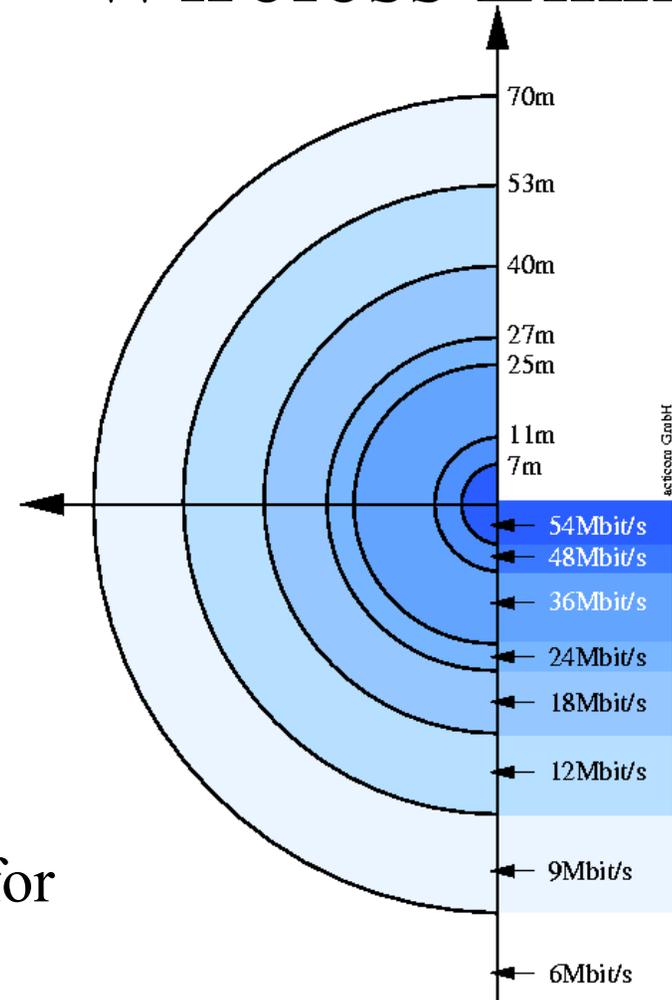
- Investigation of video sequences
- Sophisticated source model for simulations
- Video services have tightest QoS requirements



- 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)

QoS - Wireless Link

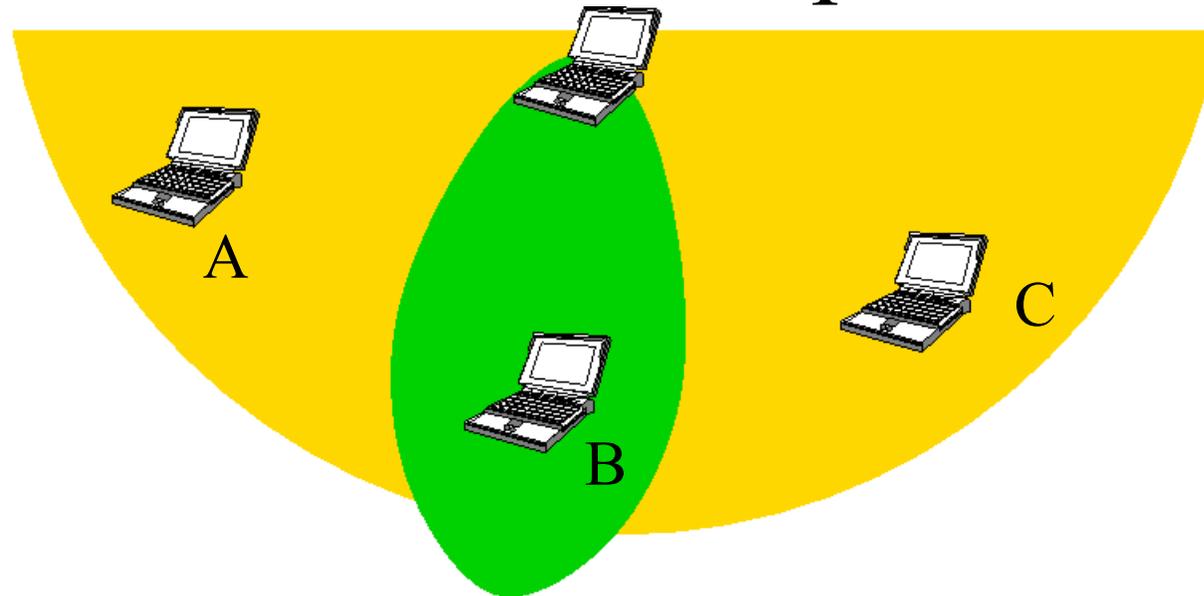
- IEEE802.11a and Hiperlan2 are based on 5GHz technology
- OFDM + Multi-Modulation
- Data rate depends on distance between sender and receiver
- Range is a function of the antenna concept
- Measurement of IEEE802.11a interface cards started (office, outdoor, mall)
- Channel models will be generated for 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



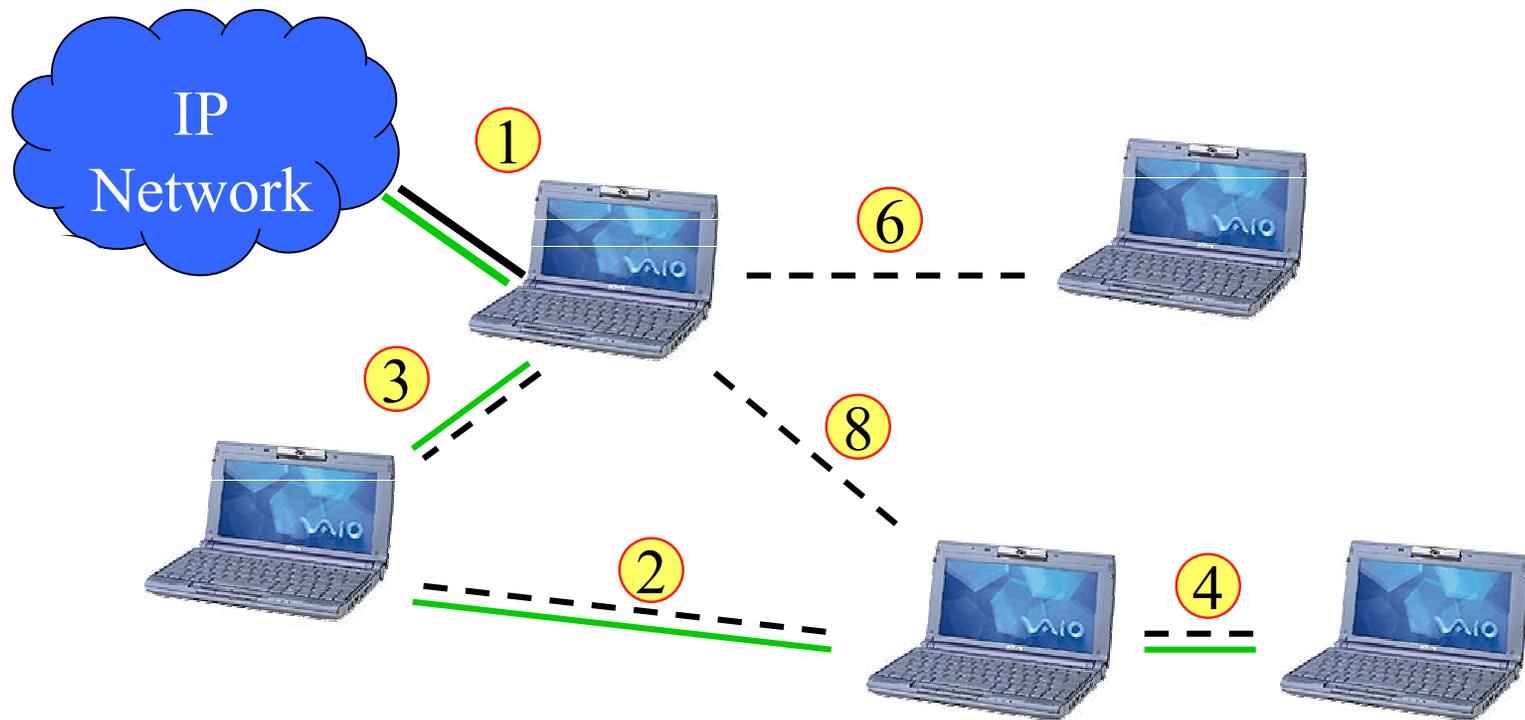
- Reduce the blocking area
- Power saving with passive antenna concept
- Combination with space-time processing

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



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Expected Results and Time Frame

ID	Task	Q1 02			Q2 02			Q3 02			Q4 02			Q1 03			Q2 03			Q3 03			Q4 03		
		Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
1	Testbed	◆—————◆																							
2	Video Measurement	◆—————◆																							
3	Link Measurement							◆—————◆																	
4	Auto-Configuration							◆—————◆																	
5	Routing							◆—————◆																	
6	Medium Access Control							◆—————◆																	



Thank you for your attention!

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