Mobile System and Telecom Group
Research Activities

Prof. Timo Hämäläinen
Email: timo.t.hamalainen@jyu.fi
Tel: +35840772470
Research activities

• Mobile system and telecom group's activities focuses on the resource management on both wired and wireless telecommunication systems.

• The important object of the study is resource management and optimization of the limited network resources, for example quality of service, pricing and the link and system-level performance.

• Other related research subjects are focusing on networking security and user and service management methods of the future networks.

• Mobile system and telecom group's research focuses on the latest technology developments in the industry through standardization work.

• Group started in 1999 and it has achieved a significant position in the MIT department's research and PhD trainer.
Research activities

• **Research topics:**
  – QoS monitoring and management solutions for wireless and wired networks
  – Mobility and resource management, and network planning

• **Members of the group:**
  – Professor: T. Hämäläinen
  – Post Docs: A. Sayenko and A. Viinikainen
  – PhD students:
    • V. Hytönen
    • D. Petrov
    • J. Kellokoski
    • P. Gonchukov
    • A. Juvonen
    • M. Zolotukhin
    • O. Puchko
    • S. Sriyananda
  – 8 MSc students

• **Collaborators:**
  – FiDiPro A. Averbuch (Jyu/Tel Aviv)
  – Prof. A. Garnaev (St. Petersburg, Russia)
  – Prof. J. Blackledge (DIT, Ireland)

• **Main goals of the research:**
  – Developing novel mobility management and handovers mechanisms
  – Developing methods for monitoring and analysing network traffic (QoS, security etc.)
  – Enhancing performance of wireless networks; HSDPA, LTE, IEEE 802.16 etc.
Research results

• **Main results obtained until now:**
  – Developed network simulator WINSE: WiMAX NS-2 Extension
    • IEEE 802.16 MAC performance optimization
    • Performance analysis of the IEEE 802.16 ARQ/HARQ mechanism
  – Developed multi-cell transmission schemes for HSDPA networks: High-Speed Single-Frequency Network (HS-SFN) and multiflow
  – Developed vertical handover decision maker for the mobile terminals
  – Results contribute to standardization (IEEE, 3GPP and IETF)

• **Publishing activity (2007-2013):**
  – 1 book and 8 journal papers
  – ~50 conference papers
  – 4 patent contributions with Nokia Siemens Networks

• **Completed MSc and PhD theses (2007-2011):**
  – 12 PhD theses
  – 30 MSc theses

• **Invited talks and given conference presentations:**
  – Several presentations in IEEE’s and ACM’s conferences
Research projects

- Several common research projects with companies (2007->):

  - "End to End QoS and IMS", JKL Innovation, 10/07-5/08.
  - "Lipa, mobility and services in IP networks", participants: Metso Paper, Ixonos, Cynetkey, Resolute and Elisa. 1/11-12/02.
**JyMoRe – Project**

- With Nokia Siemens Networks
- Project lifespan 1.1.2008 –>
- Research topics:
  - Resource management solutions for future HSDPA and next generation networks
  - Multi-cell DL transmission schemes
  - DL air radio resource management
  - Research conducted by means of network simulations
- Results contribute to 3GPP and IEEE standardization
Lipa - Project
Mobility management and services in IP networks

• With companies: Cassidian, Datame, Resolute, Cynetkey and Metso Paper
• Research topics:
  – Always Best Connected (ABC): bringing intelligence to the network selection on behalf of the User and Service. Aspects like: link selection algorithm accompanied with parameters and profiles.
  – User authentication in IP networks with new and existing devices
  – Cloud computing and ABC, what are the requirements from ABC part?
  – Further development of Location Based Services
ISSM (Intelligent Systems for Security Management) - project

- With companies: Ixonos and TUT
- Research topics:
  - Anomaly detection for web servers
  - Performance monitoring
  - Intrusion prevention system evaluation, vulnerability protection
  - Secure web server architectures

Applications Have Changed – Firewalls Have Not!

- Ports ≠ Applications
- IP Addresses ≠ Users
Tiepal- project

• With companies: Anvia, Arena Interactive, Digita, Kilosoft, Metso Paper):
  – Mobile service development to Open IMS service platform
  – Development of location based services (LBS)
  – Management of the end user devices and mobile services
  – Accounting and charging in heterogeneous access networks
If you are interested in development of future networks and services in our international projects, don't hesitate to contact us!

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