Mobile System & Telecom Group
Research Activities

University of Jyväskylä
IT- Faculty
Prof. Timo Hämäläinen
JYU Key Figures

JYUnited SCIENCE.
Since 1863.

2,500
STAFF TOTAL

800
RESEARCHERS

700
TEACHERS

3,300
PUBLICATIONS

1,800
OPEN ACCESS

204 M€
FUNDING

72 M€
SUPPLEMENTARY

4
CENTRES OF EXCELLENCE

3
ACADEMY PROFESSORS '2018

https://www.jyu.fi/tilastot/fi/qap/tutkinnot
JYUnited SCIENCE.
Since 1863.

83 researchers
48 teachers
2243 undergraduate students
142 doctoral students
263 publications '2016
23 open access

166 staff in total '2016
2358 students in total '2017

IT Faculty

INFORMATION SYSTEMS SCIENCE

MATHEMATICAL INFORMATION TECHNOLOGY

CYBER SECURITY

COGNITIVE AND EDUCATIONAL TECHNOLOGY

https://www.jyu.fi/it/en/research
MSTG- Research Group

Members of the group:

- Professors: T. Hämäläinen and T. Ristaniemi
- Post Docs/Docents: A. Viinikainen, Z. Chang, M. Zolotukhin, A. Costin, A. Sayenko, D. Petrov
- Several PhD. and MSc. students involved to the research activities and projects all the time
- The group has achieved a significant position in the IT Faculty’s research and PhD&MSc. trainer
- Produced +50 PhD dissertations and +200 Master theses since year 2000.
Goals of the research:

- Group's activities focuses on the resource management on both wired and wireless telecommunication systems (technology developments with the industry and standardization work).

- Developing methods for monitoring and analysing network traffic (issues like QoS, security etc.)

- Mobility and resource management, and optimization of the limited network resources, the link and system-level performance etc.


- Above issues are researched in Software Defined Networks (SDN)
Research Results

• Tens of common research projects with companies and other universities:
  – Developed anomaly detection methods for different kind of attacks (zero day, Denial-of-Service, Man-in-the-Middle, Compromised-Key, Sniffer etc.)
  – Developed Virtual Resource Allocation methods in SDN- based Cellular Network
  – Developed Adaptive Access and Relay Link Resource Allocation Methods
  – Developed Energy-efficiency methods for the multi-flow transmission
  – Developed network simulator WINSE: WiMAX NS-2 Extension
    • Performance analysis of the 4/5G networks (cell size optimization, optimal relay deployment)
  – Results contribute to standardization (IEEE, 3GPP and IETF)

• Publishing activity:
  – + 100 journal papers
  – + 300 conference papers
  – Patent contributions with the companies

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

- “IoTLi- business growth from IoT”, participants: Etteplan, Metsä Group, AGCO/Valtra, Vapo, Ficonic Solutions, city of Jyväskylä
- "Lipa, mobility and services in IP networks", participants: Metso Paper, Ixonos, Cynetkey, Resolute and Elisa.
- “Tiepal, Mobile service development to Open IMS service platform, participants: Anvia, Arena Interactive, Digita, Kilosoft, Metso Paper
- Laila, ”Service management in multi-access networks”, participants: Nokia, Digita, SysopenDigia, Arena Partners, and WTS.
- NGNAP, ”Development and use of next generation network architecture in process automation industry”, participants: Metso Paper, Telia Sonera, Liqum.
- "WIMALE Phase I (IEEE 802.16 development)”, participant: Nokia RD
- "WIMALE Phase II (IEEE 802.16 development ”, participant: Nokia RD
- "WINSE", participant: Nokia RD
- "End to End QoS and IMS “, JKL Innovation
- "Imola, IMS and Mobile services“, participants: Vaasan Läänin puhelin, Digia, Digita, KOAS, JYY.
- "WINSE- extension (WiMAX development)“, participant: Nokia Siemens NBetwork,
- "Tiepal, new mobile services and management in Open IMS“, participants: Vaasan Läänin puhelin, Digita, ArenaInteractive, Kilosoft, KOAS, JYY..
- "ISSM- Intelligent Systems for Security Management”, participants: Ixonos, TUT.
- Alomo, open source project, participant: JKL Innovation.
Some Ongoing Research Topics:

Network resource management:
- Virtual Resource Allocation in SDN-based Cellular Network
- Adaptive Access and Relay Link Resource Allocation Methods
- Energy-efficiency methods for the multi-flow transmission


Networking security:
- Mitigation of DoS attacks in SDN cloud environments
- Detection of saturation attacks against SDN controller
- Collaborative filtering for multi-stage attack prediction
- Detection of malicious data exfiltration over DNS tunnels
- Mobile device malware analysis (Android etc.)

If you are interested in development of the future networks and services in our national/international projects, contact us!

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