JYVÄSKYLÄN YLIOPISTO

University of Jyväskylä

Research activities and projects

Prof. Timo Hämäläinen
timo.t.hamalainen@jyu.fi

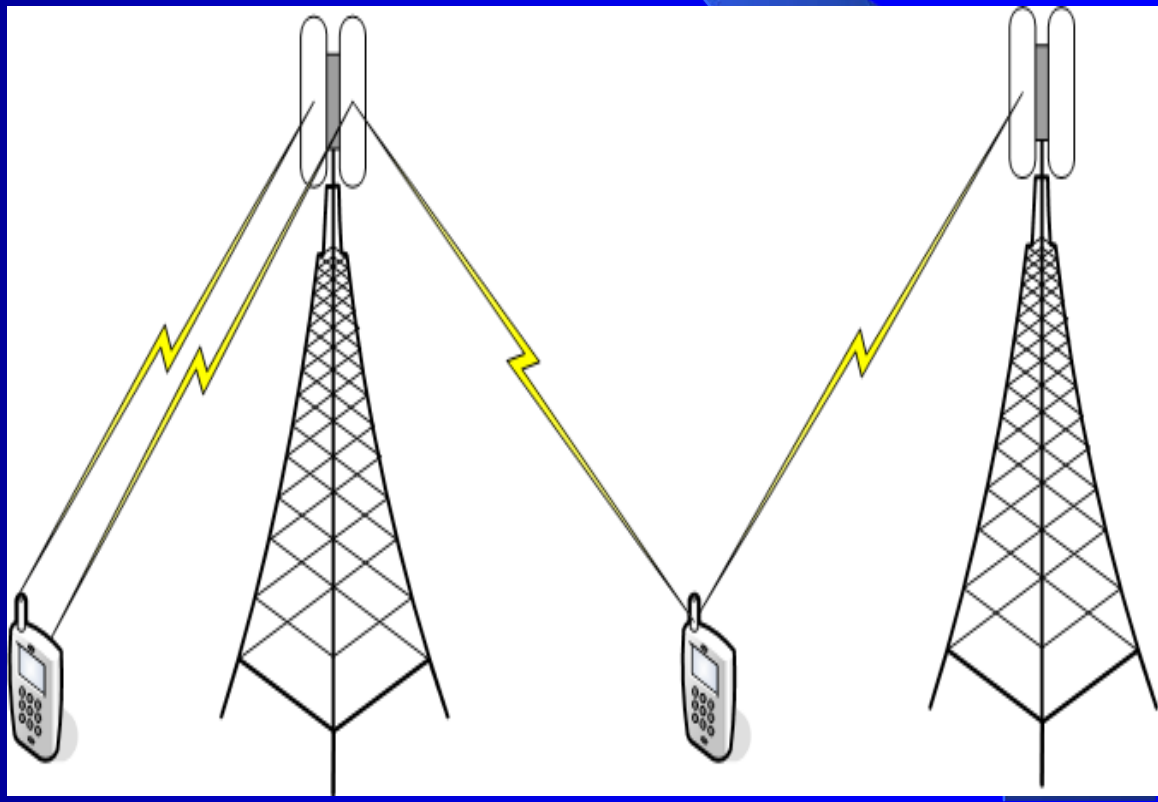
University of Jyväskylä
Faculty of Information Technology
Department of Mathematical Information technology

JyMoRe – Project

- Mobility research funded by Nokia Siemens Networks
- JYU site team currently consists of five Ph.D. students
- Collaboration is done with NSN sites in Finland, Poland and Great Britain
- Research topics include resource management solutions for future HSDPA and next generation networks

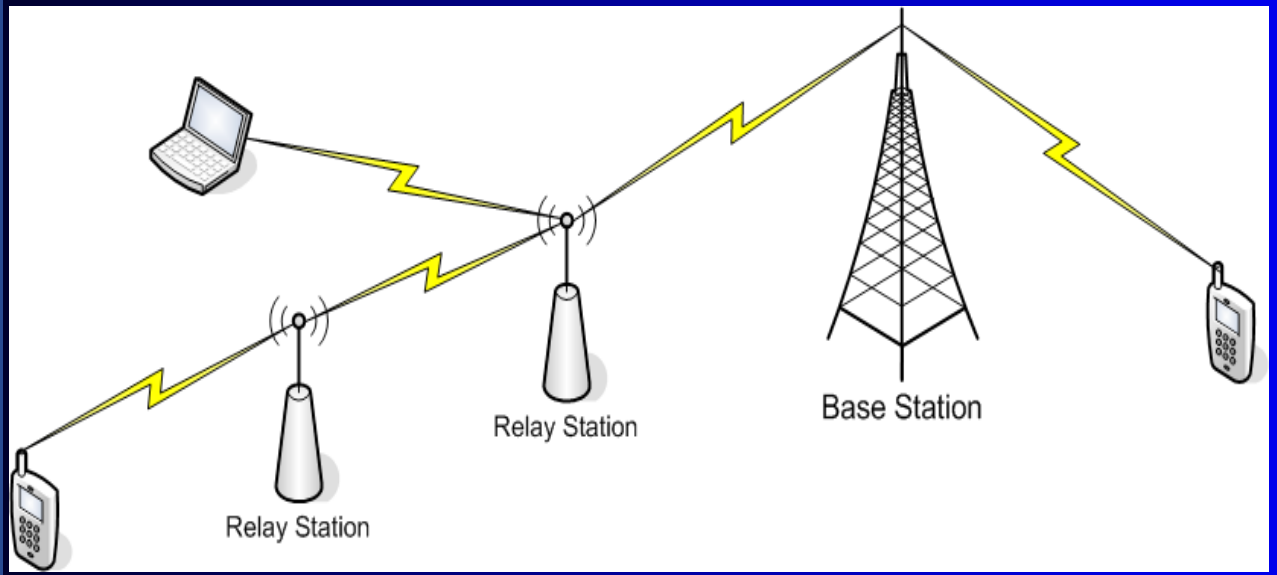
JyMoRe – Research

- High-Speed Downlink Packet Access (HSDPA)
  - Multi-cell DL transmission schemes
  - DL air radio resource management
- Research conducted by means of network simulations
- Main programming language in the simulator is C++



JyMoRe – Research

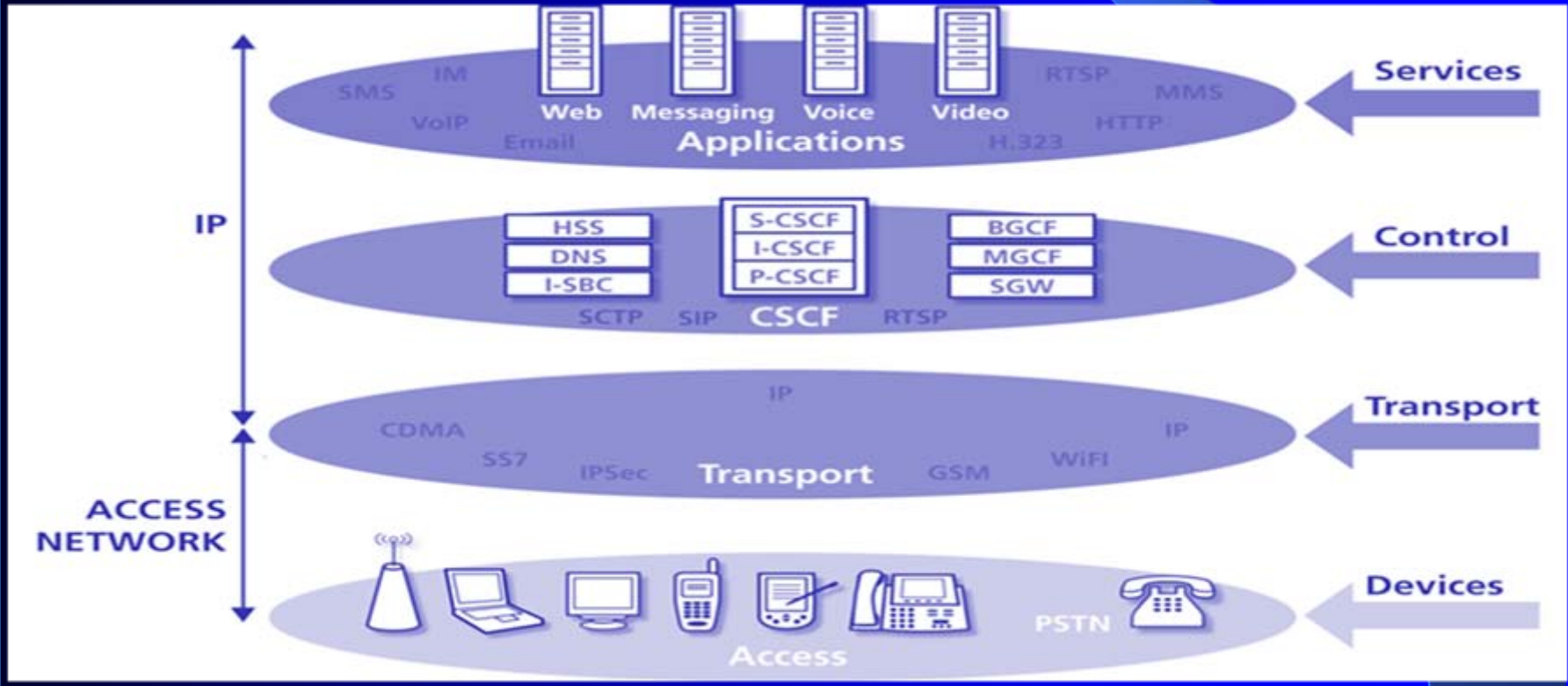
- IEEE 802.16 WiMAX
  - Multihop relay networking
  - Mobility management and handovers
- Main tool used is NS-2 network simulator and its extensions developed by the JyMoRe team
- Gathered information applicable also for development of Long Term Evolution (LTE)



IEEE
Advancing Technology for Humanity

Tiepal- project

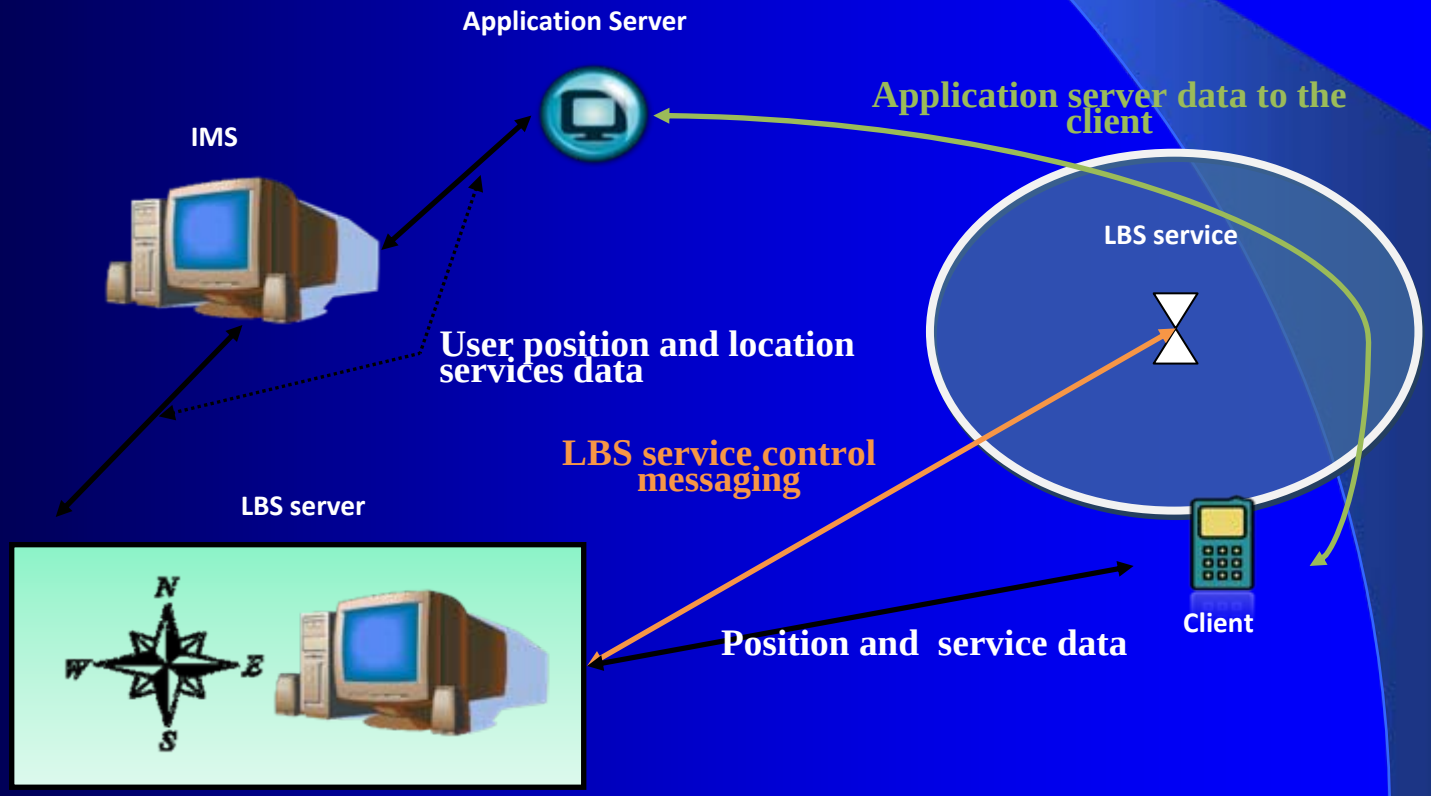
- Tiepal- project funded by Tekes and companies Anvia, Arena Interactive, Digita, Kilosoft, Metso Paper):
  - Mobile service development to Open IMS service platform
- Tiepal team currently consists of 1 Ph.D. student and 4 M.Sc. students
- Currently working on location based services (LBS)
  - Management of the end user devices and mobile services
  - Accounting and charging in heterogeneous access networks



General IP Multimedia Subsystem (IMS) architecture layers

Tiepal - Location Based Service

- Service platform of client, server and IMS application server
- Can do mobile adverticing, task execution and services related to your location history
- In client (N900) user can see other users, services, and communicate with them and execute tasks that are related to sertain position
- Server side admin can create tasks, service and see users position (with some limitations). Task creation supports XML parsing so tasks can come from other systems too.
- IMS application server is used to understand user's behaviour in greater detail and it can provide personalised location services
- Implementations are based on stardard protocols and API's

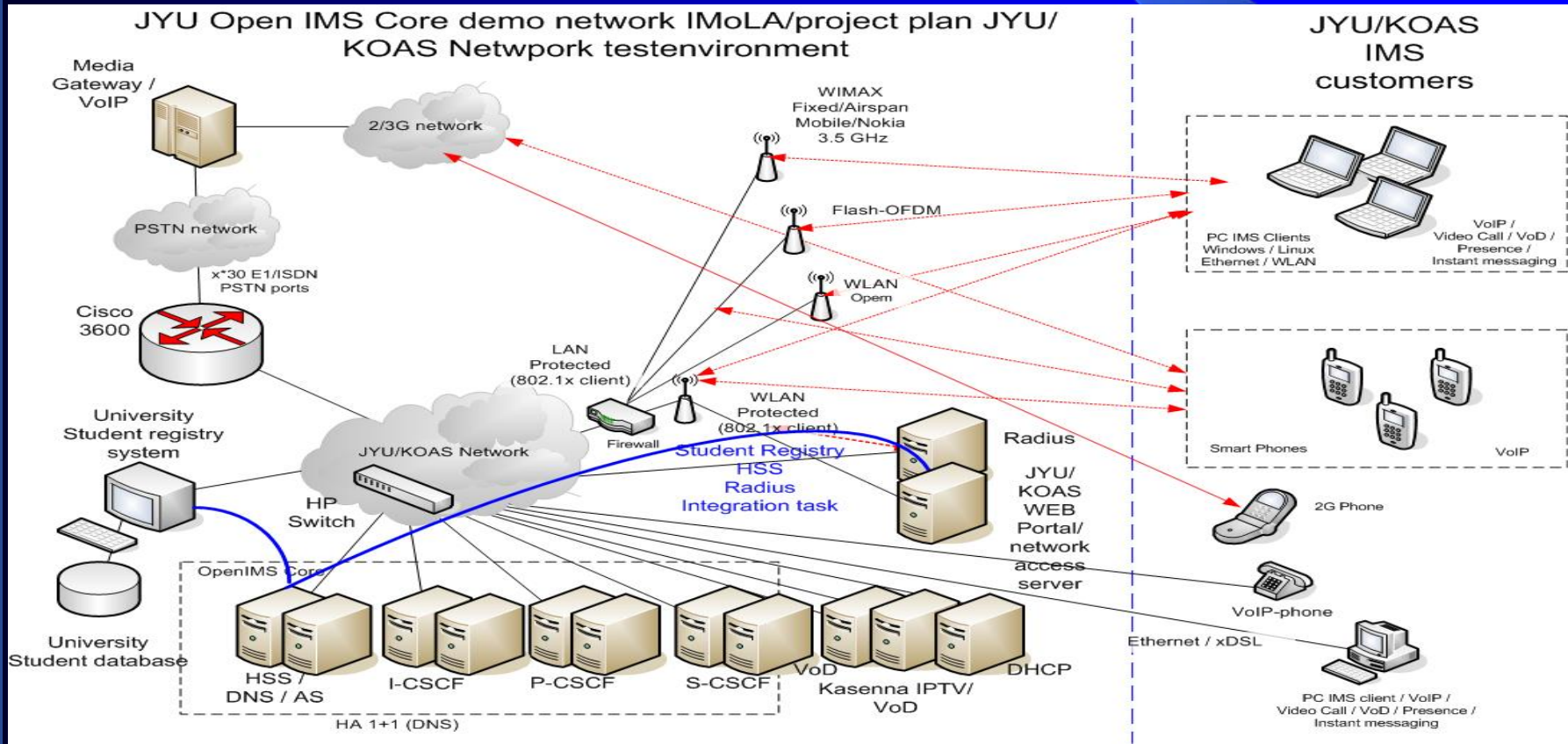


Tiepal - Research

- Performance of IMS network as compared to Session Initiation Protocol (SIP)
  - IMS performance evaluation and analysis
    - Corporate and Community size Open IMS performance study
  - Call and Messaging Performance Comparison Between IMS and SIP Networks
    - performance in case of roaming user
- User identification in mobile systems: studied as a part of networks like IMS and all kinds of mobile devices and environments
  - what could be the easiest way to reliable identify the user
- Location Based Services (LBS) as a part of all-IP networks
  - Location Based Service architecture in all-IP systems
  - What kind of data mining methods can be utilized to analyze spatial data
  - User privacy in LBS
  - Advanced location based services
- Next Generation Networks architecture study
  - Evolved Packed Core utilization in Jyväskylä University Campus
  - Mobililty management in heterogenious networks
  - Vertical handovers between cellular, WLAN and WiMax networks

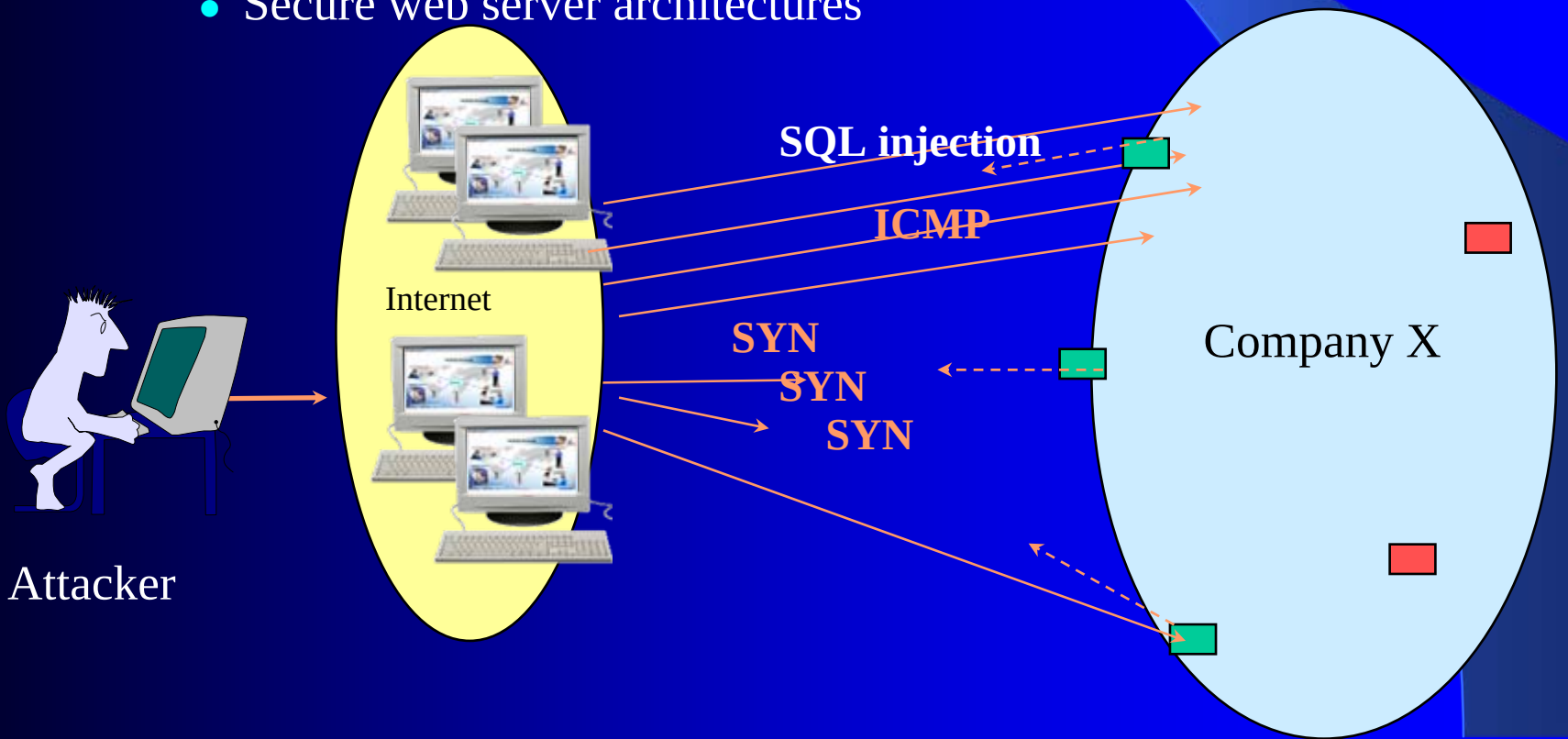
IMOLA- project

- Imola- project ended 2009, Tiepal- project continues these activities:
  - QoS management solutions
  - IP Performance monitoring and management in heterogeneous access networks
  - Open IMS environment developed
  - Video and audio content adaptation with IPTV, VoD, VoIP etc. applications



ISSM- project

- ISSM (Intelligent Systems for Security Management) project funded by Tekes and Ixonos
- ISSM team currently consists of 1 Ph.D. student and 2 M.Sc. students
- Data mining for communication networks
  - Anomaly detection for web servers
  - Detection of sophisticated (day-zero) attacks
  - Performance monitoring
  - Intrusion prevention system evaluation, vulnerability protection
  - Secure web server architectures



If you are interested in development of future networks and services in our international projects, don't hesitate to contact us

Timo Hämäläinen
timo.t.hamalainen@jyu.fi
Agora, AgoraC 335.2