
# Faculty of Information Technology
# Department of Mathematical Information Technology

***"MIT - Computer Engineering, Computer Science, and Software Engineering with Mathematical Flavor"***

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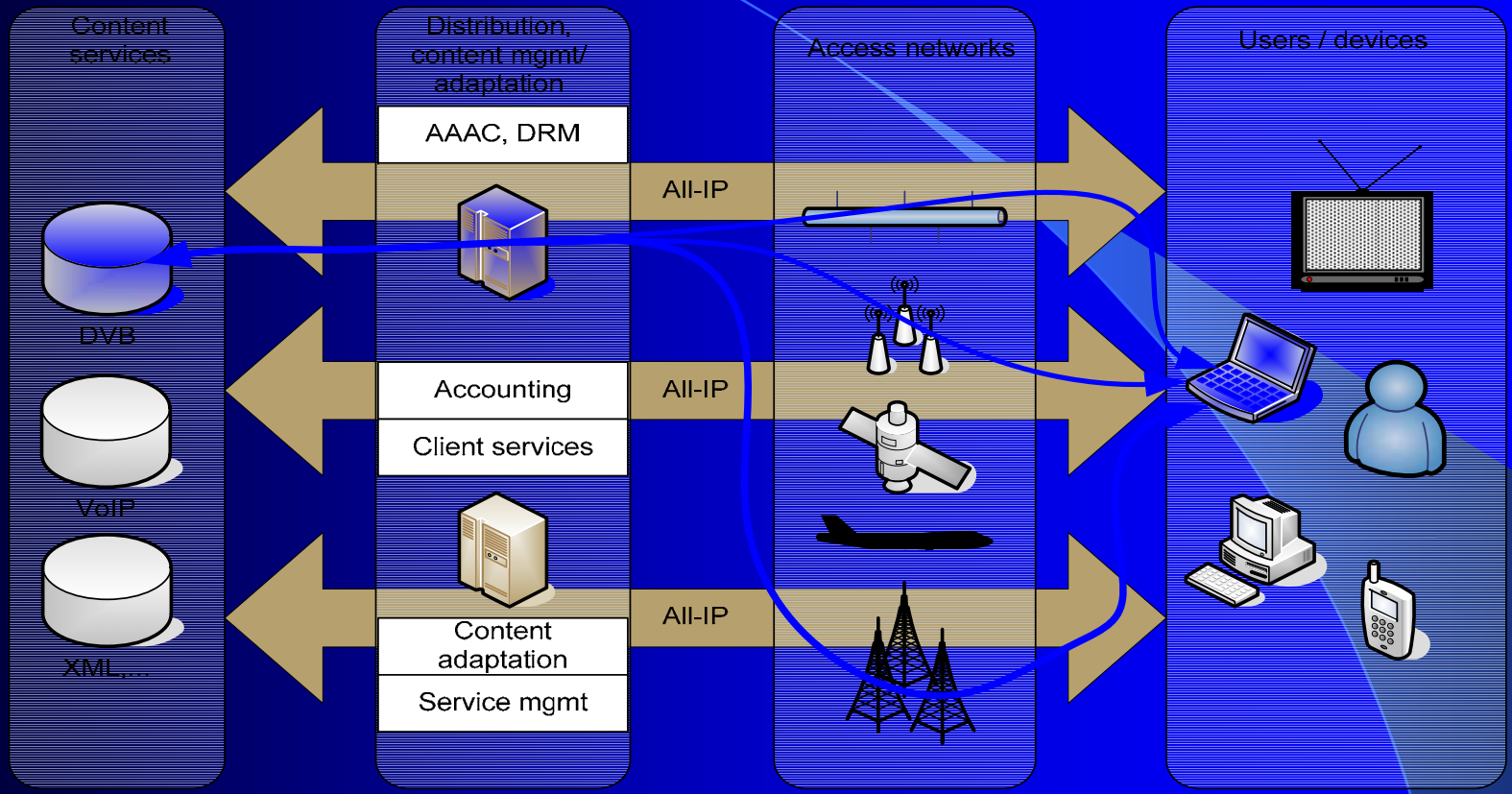
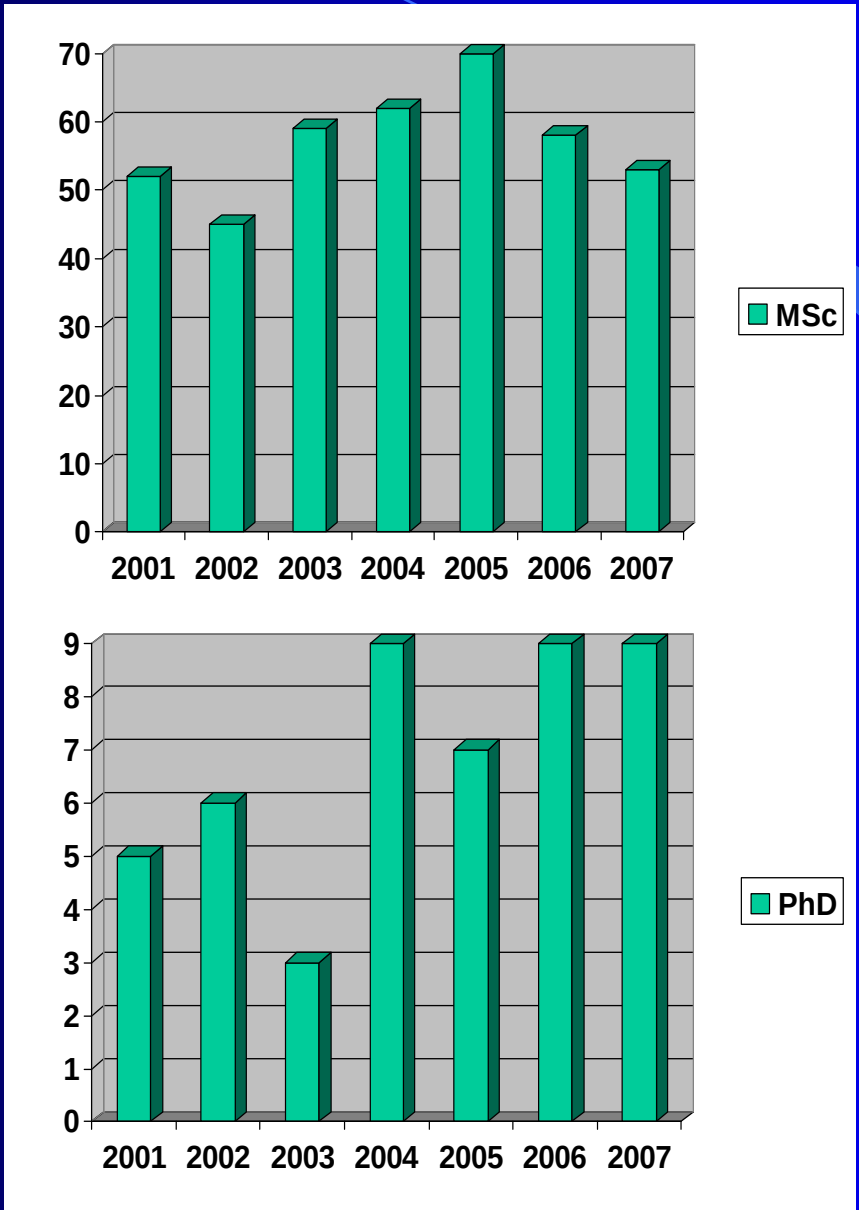
# MIT Activities



# Department of MIT

- Staff
  - 10 Full professors
  - 5 Senior Lecturers
  - 7 Assistant professors
  - 5 Lecturers and assistants
  - 10 Senior researchers
  - 20 Research students
  - 15 Research assistants
- ~ 600 M.Sc. students
- ~ 60 Ph.D. students
- Annual budget ca. 4 M€

# M.Sc. and Ph.D. degrees



# The fields of research and teaching are:

- **Mobile system (CE&SE)**

  Profs. T. Hämäläinen, J. Joutsensalo, and T. Ristaniemi

  - Signal processing for wireless communication and radio resource management
  - Network management and QoS
  - Mobility management
  - Peer-to-Peer Computing

- **Simulation and optimization (Math&CS)**

  Profs. R. Mäkinen, P. Neittaanmäki, and T. Tiihonen

  - Computational mathematics and fluid dynamics and mechanics
  - Mesh adaptation and a posteriori error estimates
  - Multi-objective optimization
  - Multidisciplinary PDE- constrained optimization

- **Software and computational engineering (CS, SE)**

  Profs. T. Kärkkäinen and T. Rossi

  - Signal and Image Processing
  - Neural Computing and Data Mining
  - Methods and tools for software development

- **Education and Technology**

  Prof. T. Kärkkäinen

  - IT teacher education
  - Web based and virtual learning environments

# Mobile System Group

## Professors T. Hämäläinen, J. Joutsensalo, and T. Ristaniemi

M.Sc. Students:

- + 100 M.Sc Theses supervised by the group

Doctoral students:

- 12 Doctoral Dissertations supervised by the group

# MSG's Research areas

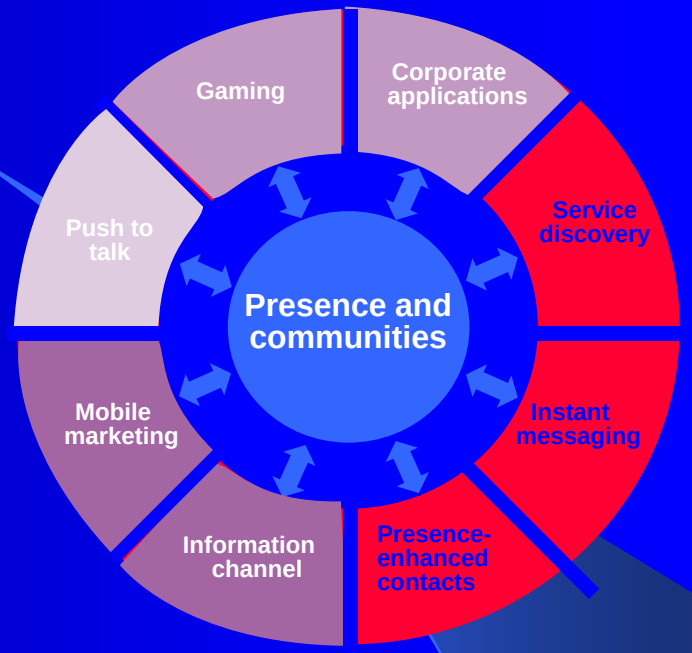
## Media push


## OMA PoC

## Instant messaging

## Mobile meeting


## Video sharing




## Interactive games

# MSG's Research areas

- Signal processing for wireless communication
  - Interference cancellation
  - Channel parameter estimation
- Radio resource management and network planning
  - UMTS, WCDMA, Utran LTE, WiMAX
- Quality of Service (QoS)
  - Revenue-based scheduling
  - PHY and MAC issues for 802.16 networks
  - VoIP, IPTV and VoD QoS issues
- Network management
  - Large laboratory network (services like IMS, IPTV)
  - E2E network monitoring and management issues

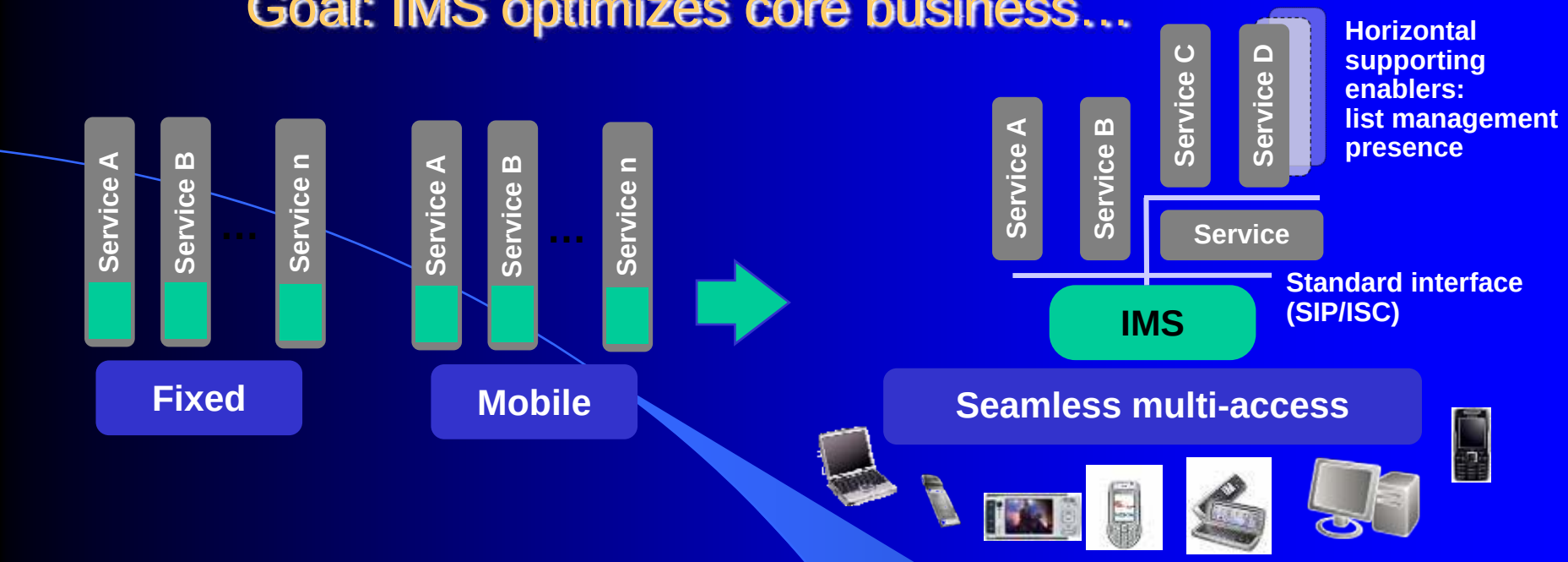
# Case: LaiLa and Imola projects

- The research topics of the Laila project included (ended 6/2008):
  - QoS Scheduling
  - IP Performance monitoring and management in heterogeneous access networks
  - Charging in heterogeneous access networks
  - Video and audio content adaptation
  - IPTV, VoD and VoIP are the main applications considered in above topics

- Imola project (6/2008-12/2009) continues LaiLa's actvities
  - Management of the end user devices and new mobile services
  - Open IMS environment
  - Jyu wide pilot environment

- 2 PhD students, 6 MSc students and 2 BSc students are involved

# Goal: IMS optimizes core business…

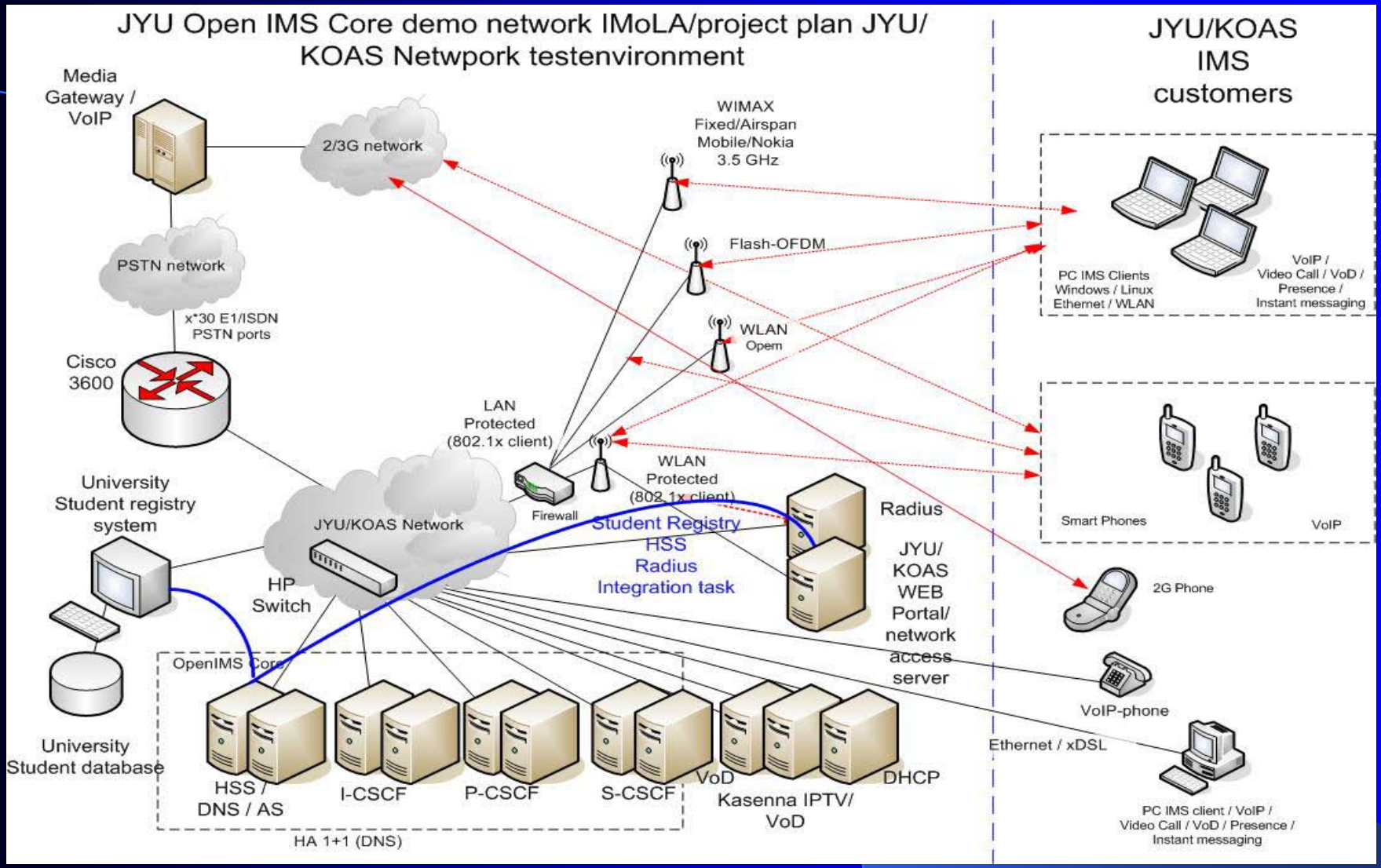



OPEX and CAPEX savings made by moving from vertically implemented services towards common session control

**Common functionalities include:**

- Authentication
- Authorization
- Routing
- Roaming
- Charging
- Network interoperation
- Terminal configuration

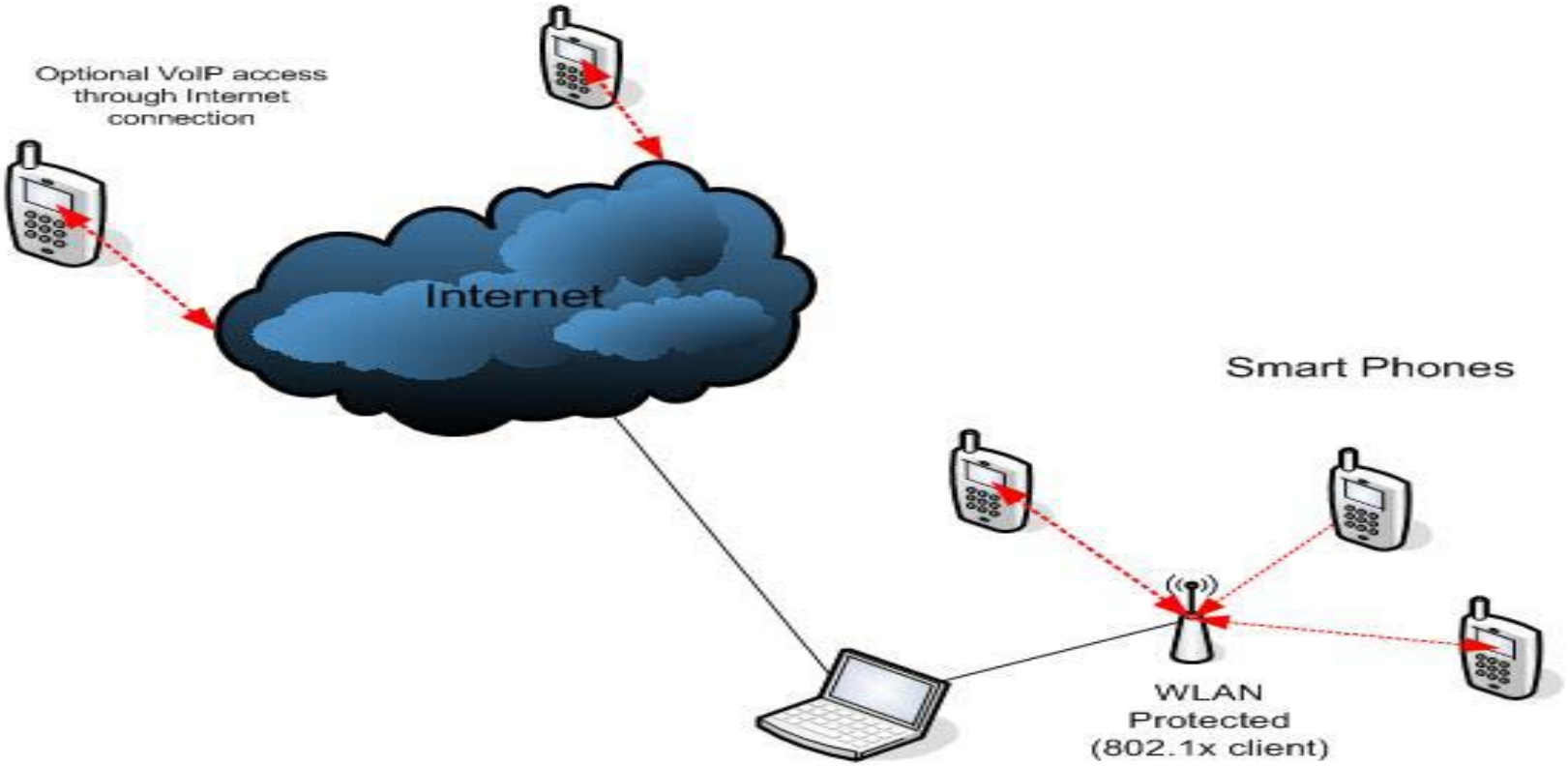
# IMS Laboratory network



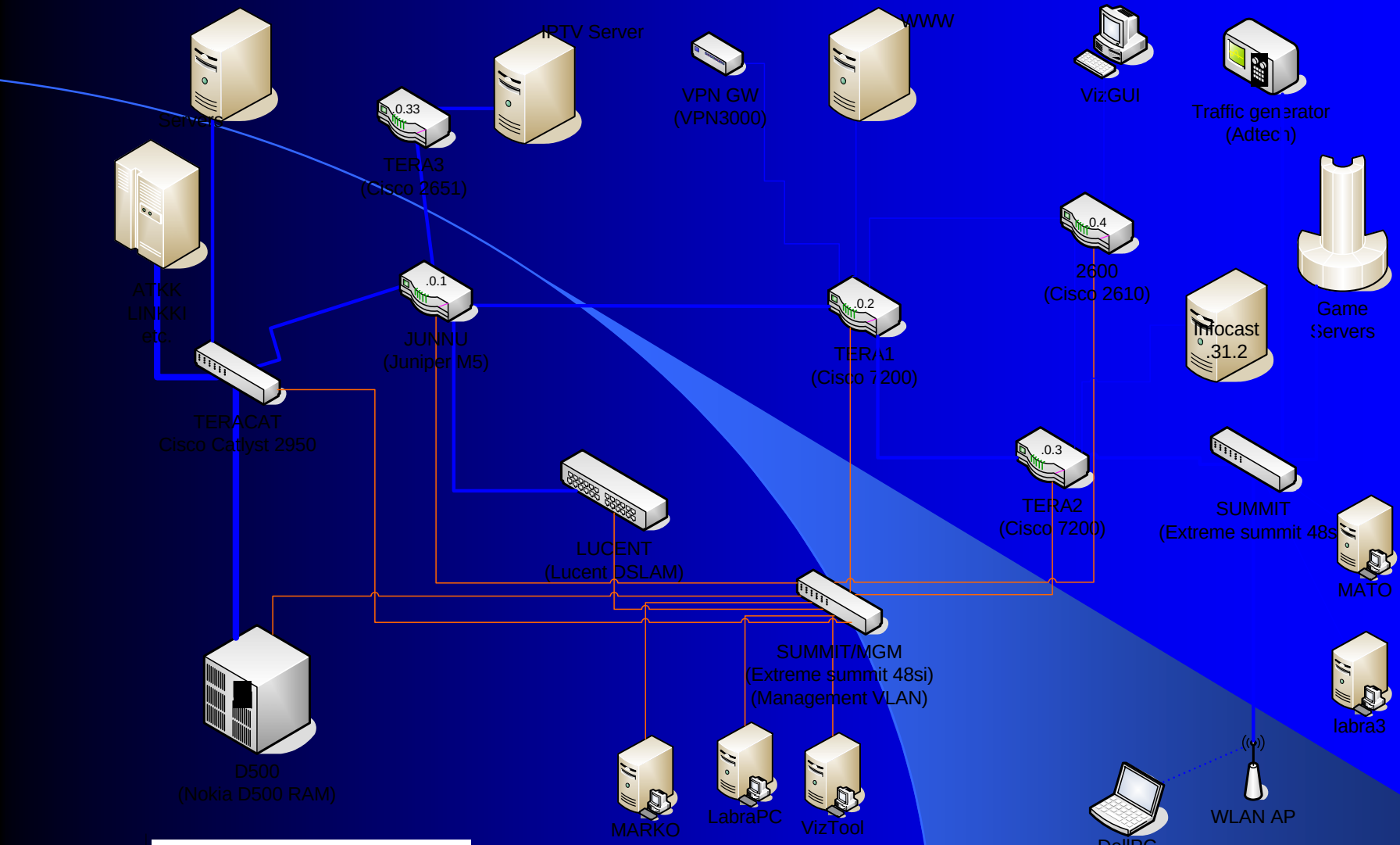
# Case:WINSE- project

- The research topics of the project includes:
  - WIMAX implementation in NS-2 simulator
  - Performance evaluation of the IEEE 802.16 ARQ mechanism
  - Optimal MAC PDU Size in IEEE 802.16
  - Impact Of Portable Device Restrictions On IEEE 802.16 Performance
  - Optimal PDU size study with QoS-enabled connections
  - Affect of BLER to other ARQ parameters
  - Hybrid ARQ (HARQ)
- Currently 3 PhD students, 2 MSc students are involved

# Mobile “Mini” Open IMS Core network for mini corps and mobile usage, IMoLA/project plan



# LAILA pilot network




Ip range: 172.16.*.*
Loopbacks: 172.16.0.* (written on the routers)
Date: 20.10.2006