

IPv6 Multimedia Adaptive applications in the Framework of the MIND project

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Outline

- The MIND consortium
- MIND's Work Package 6
- Key concepts which WP6 deals with
- Mobility Management
- Adaptive applications
- Some preliminary results
- Conclusions and future work

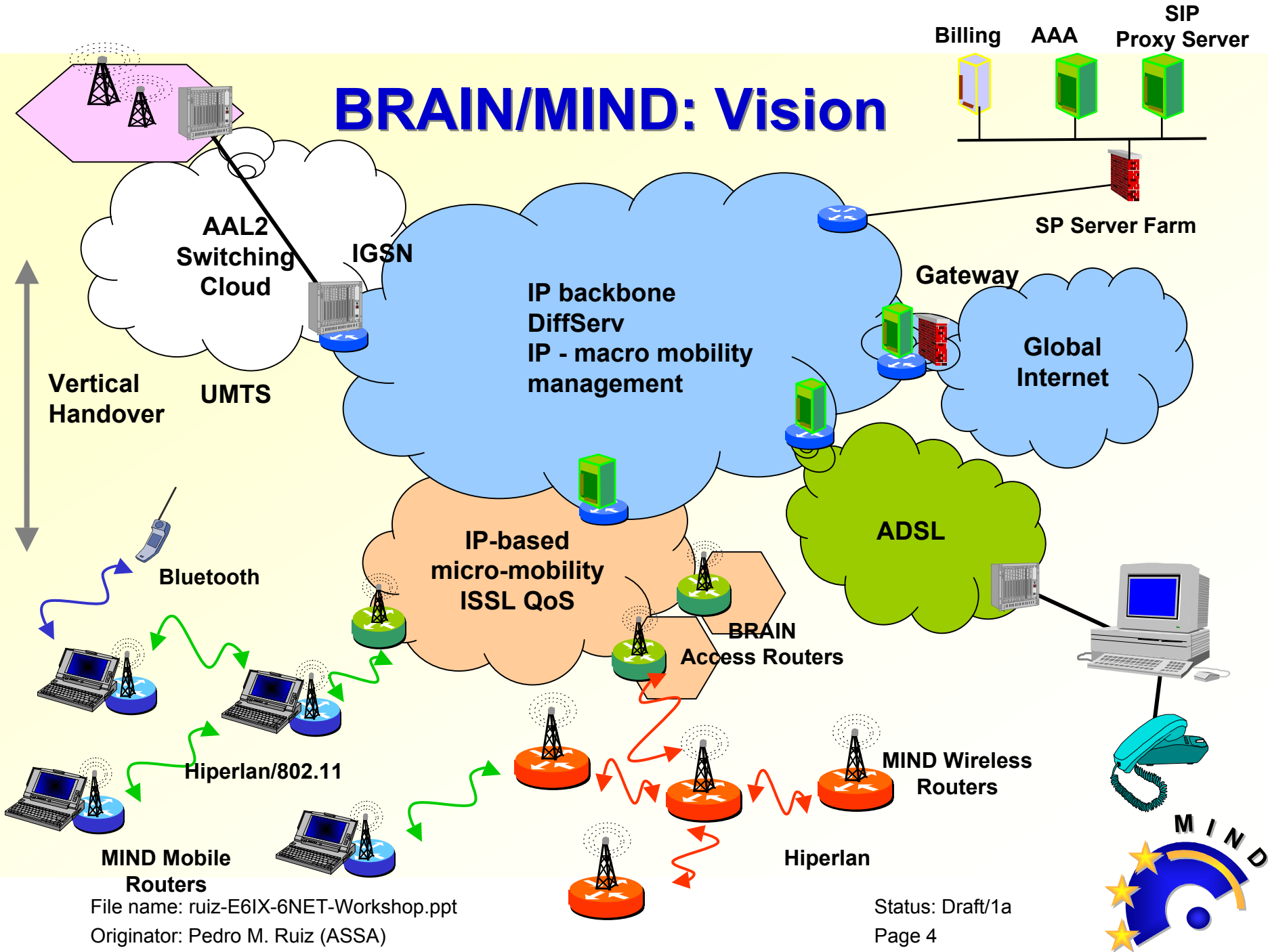


EU MIND Project

- EU IST Programme
- Jun01 - Nov02
- Operators
- Manufacturers
- University/SME
- Follow on from BRAIN



BRAIN/MIND: Vision

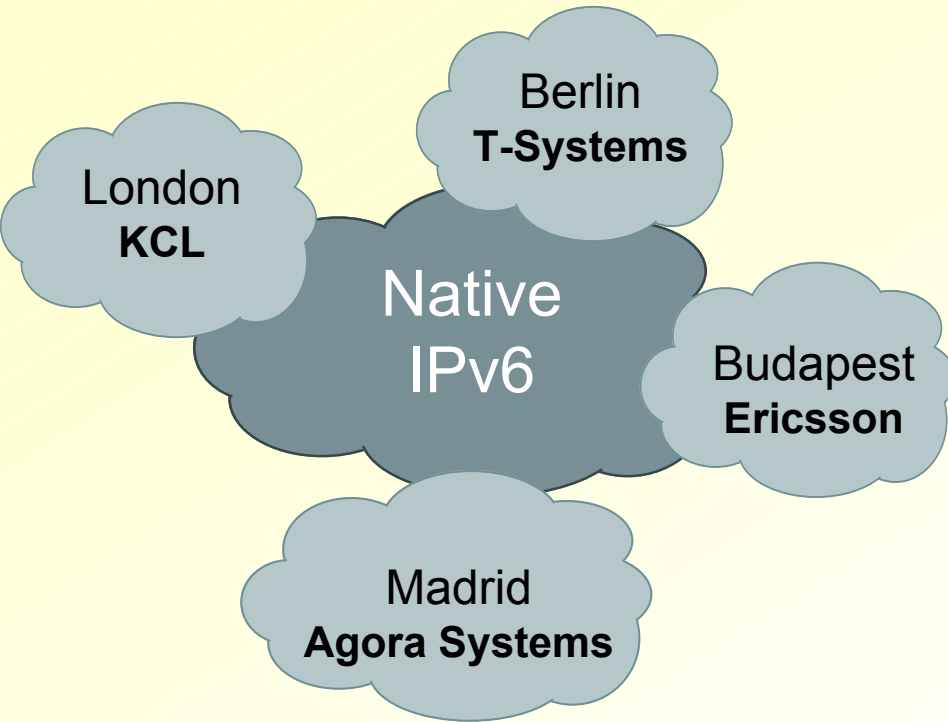


What is MIND WP6 about?

- Trials of the most interesting concepts coming from BRAIN
- IPv6 is a key element for our trials
- Some of the most important key concepts are:
 - IPv6 for interconnection of the testbeds
 - Vertical handover in many flavours
 - Micro-mobility comparison (BCMP, HMIP, etc)
 - QoS for mobility scenarios
 - Service level concepts (Content adaptation, adaptive applications, user-perceived QoS, etc)



IPv6 Testbed Interconnection

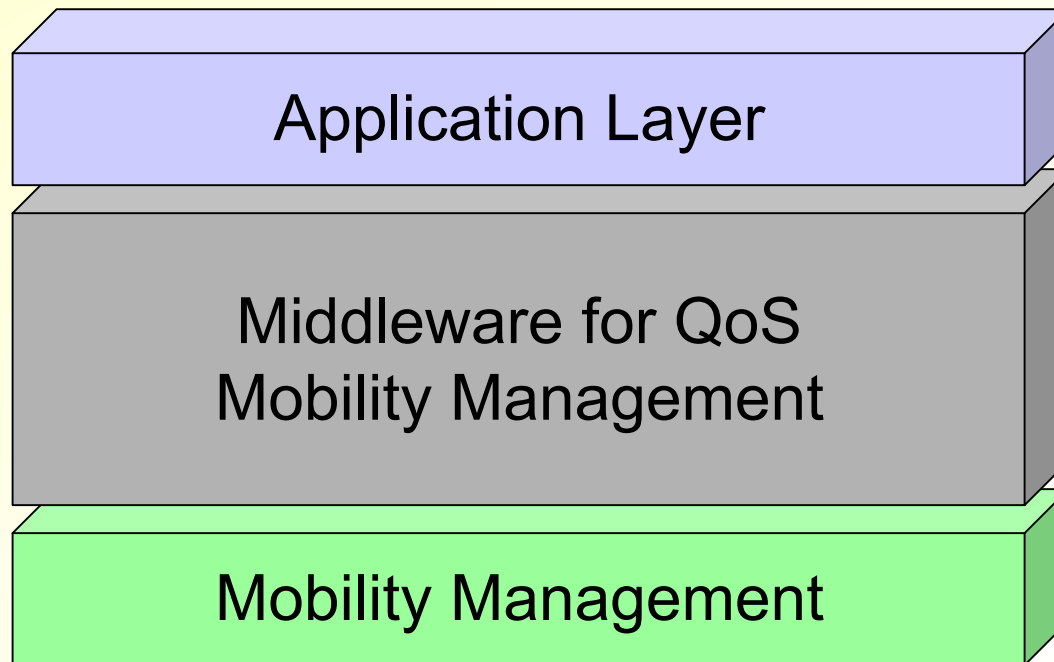


- At least two sites
- Demonstrate
 - Macromobility
 - Micromobility
 - Vertical handover UMTS/GPRS
 - End to end QoS
- Connectivity to be decided
 - 6Bone (not native ☹)
 - Other IST project
 - Private ISDN connections



MIND deals with handovers at different layers

- Complexity is moved from the application to the middleware

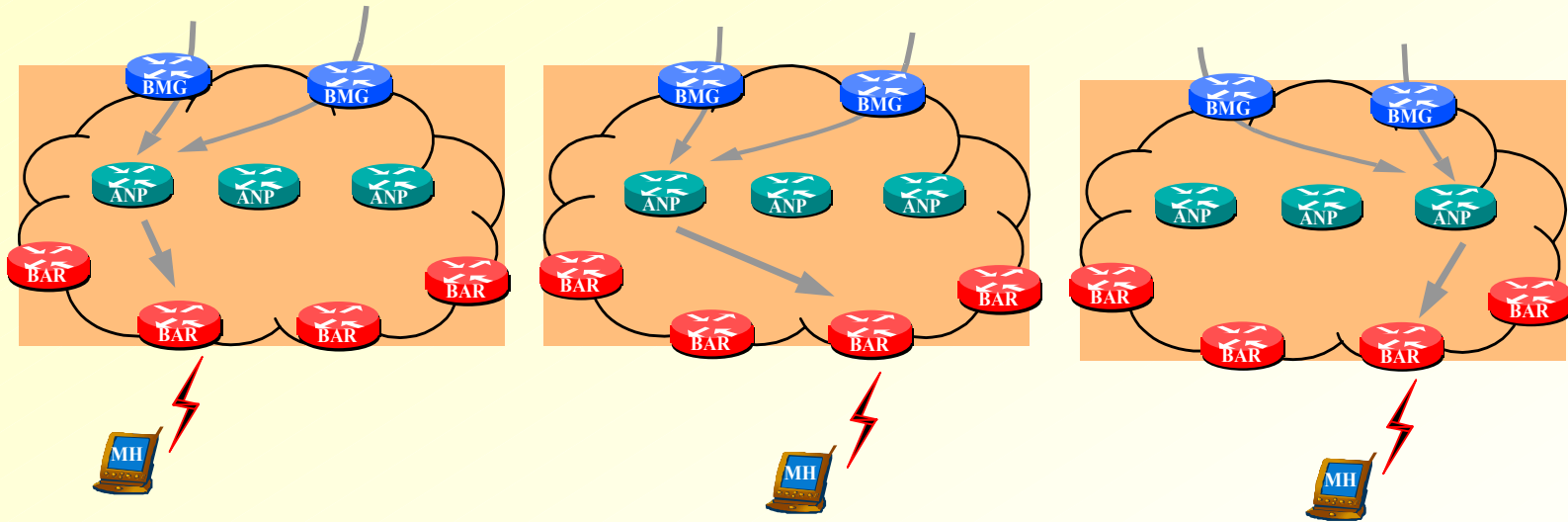


Mobility Management

- Macro-mobility solutions (MIPv6) does not offer enough performance for some kinds of applications
- Micro-mobility solutions are needed:
 - HMIPv6
 - Cellular IPv6
 - BCMPv6
- These approaches are complementary
- In BRAIN the BCMP protocol for micro-mobility support was designed



BRAIN Candidate Mobility Protocol

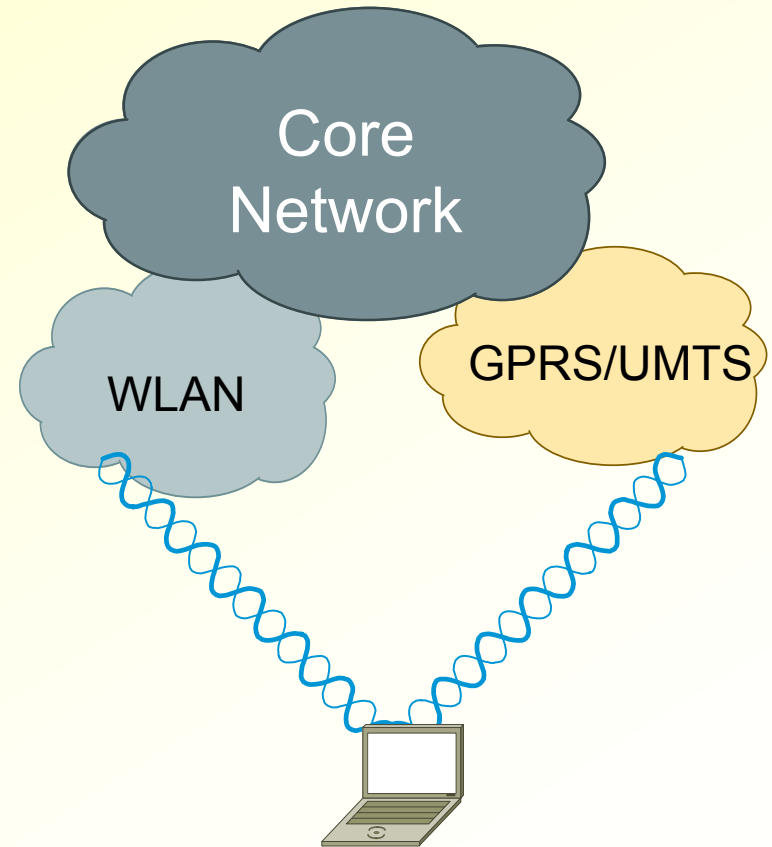


- **Access Routers (ARs)** are located at the access network edge and offer IP connectivity, default router to the Mobile Hosts (MHs) that they serve
- **Anchor Points (ANPs)** are located 'inside' the access network, own & allocate addresses, authenticate users, maintain user records, tunnel packets to Access Routers
- **Mobility Gateways (MGs)** standard border routers (no mobility specific functionalities), distributing traffic to correct ANPs.



Vertical handover trials

- There are three types of vertical handover
 - No coupling
 - Loose coupling
 - Tight coupling
- Only some of them will be tested in WP6 testbeds
- The bandwidth may suddenly suffer abrupt changes

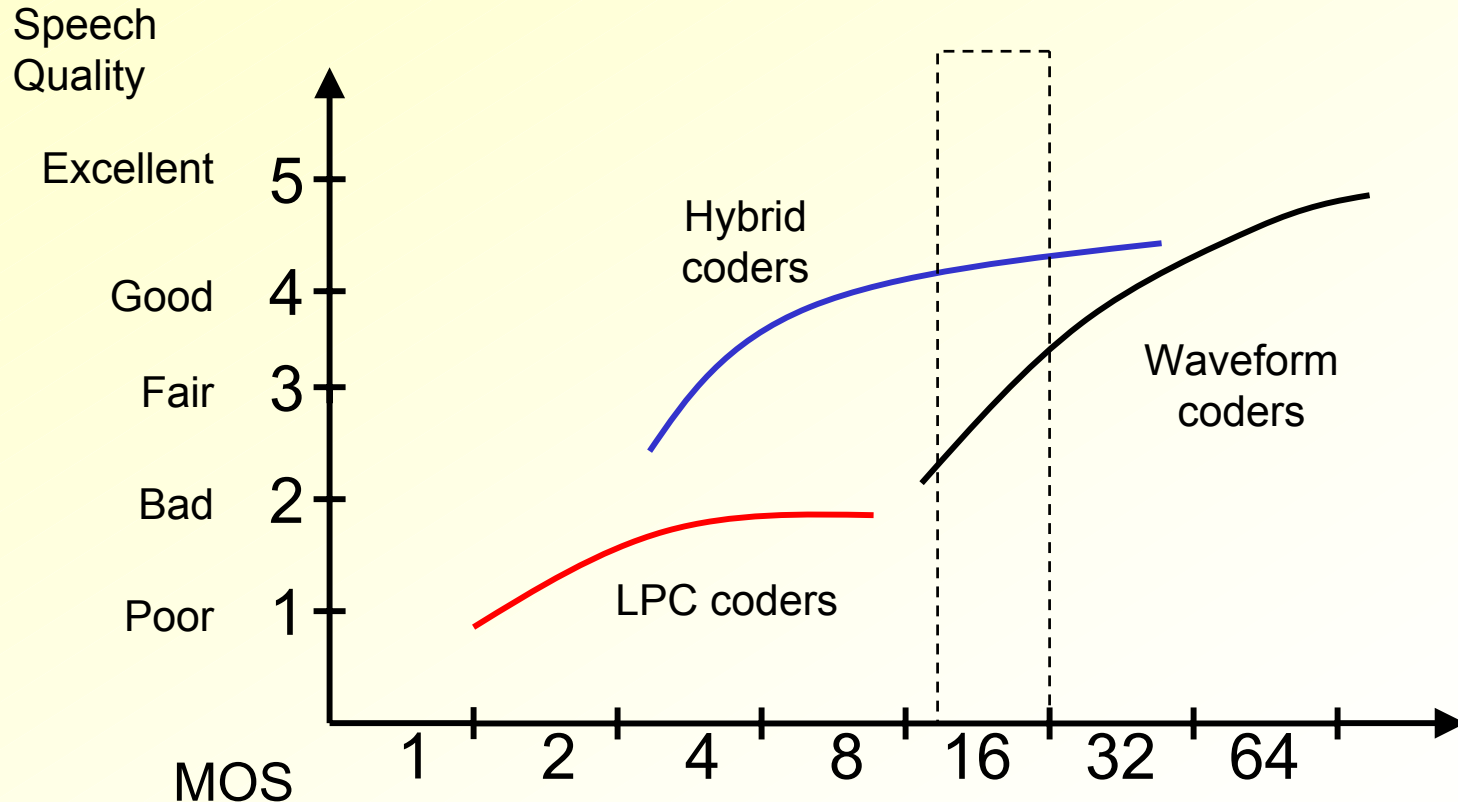


Drivers for adaptive applications

- A complete E2E QoS solution requires local resource management as well
- Terminals are heterogeneous and media adaptation capabilities are required
- In wireless environments network conditions are not always under control
- User-perceived QoS can be improved making the application to adapt to the current conditions
 - Network conditions
 - QoS violations
 - Not enough local resources (eg. CPU, Memory, etc.)



User-perceived Audio Quality



Source: IP Telephony, Olivier Hersent et al.



Video Quality vs. Bandwidth

10 FPS, SQCIF both
for MJPEG and
H.263

1190 Kbps

300 Kbps

210 Kbps

140 Kbps

70 Kbps

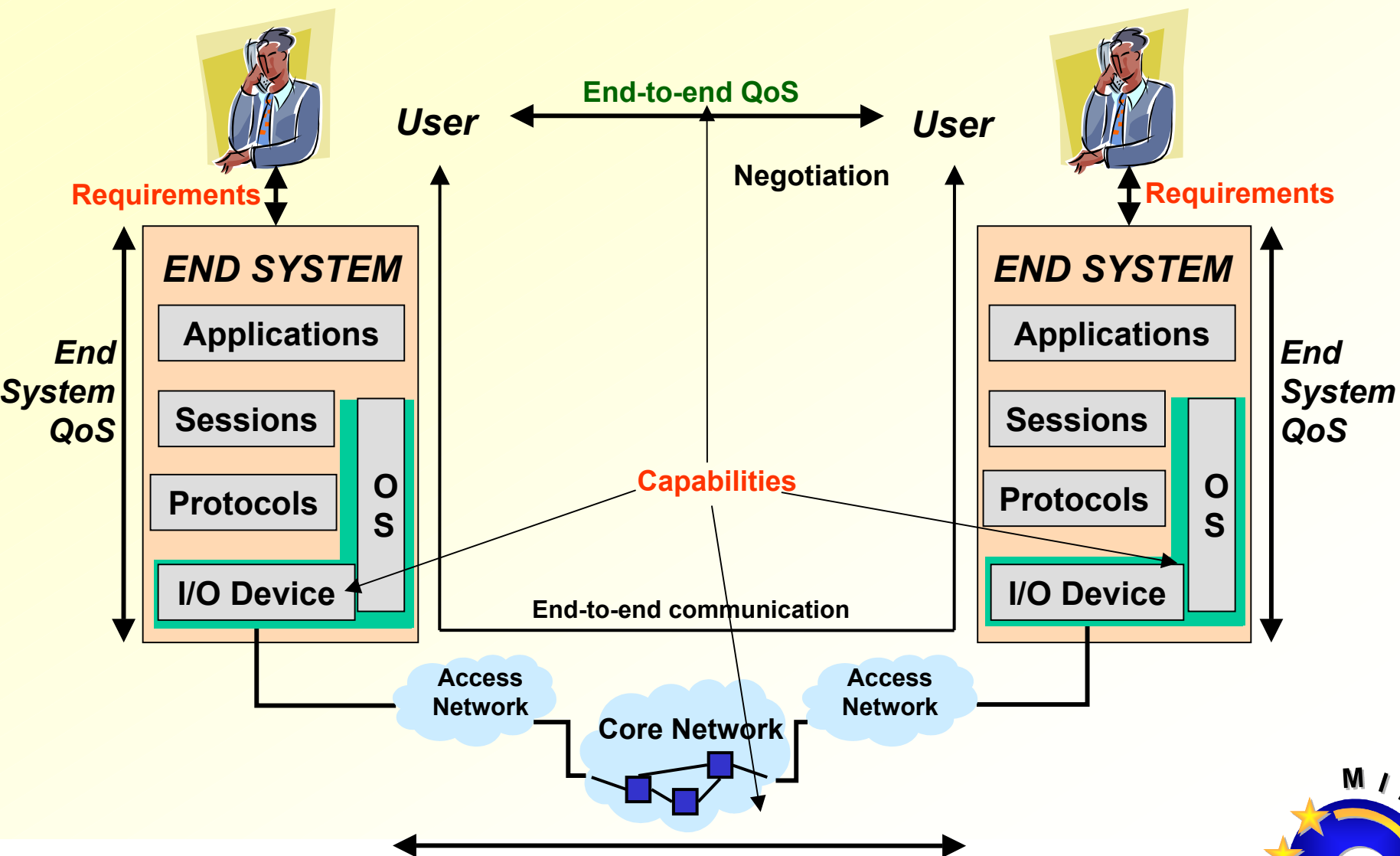
50 Kbps

30 Kbps

**Non-linear
user
perception**

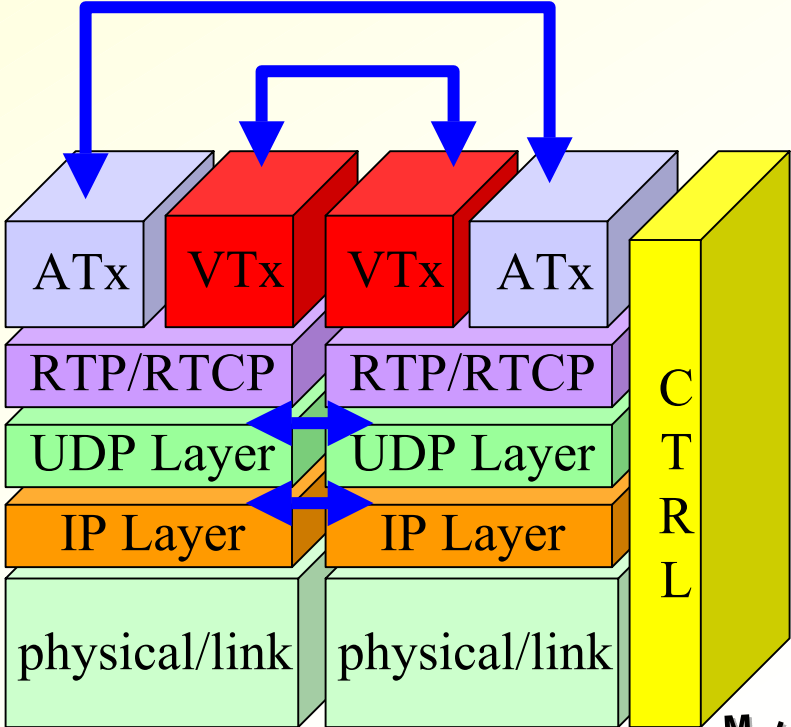
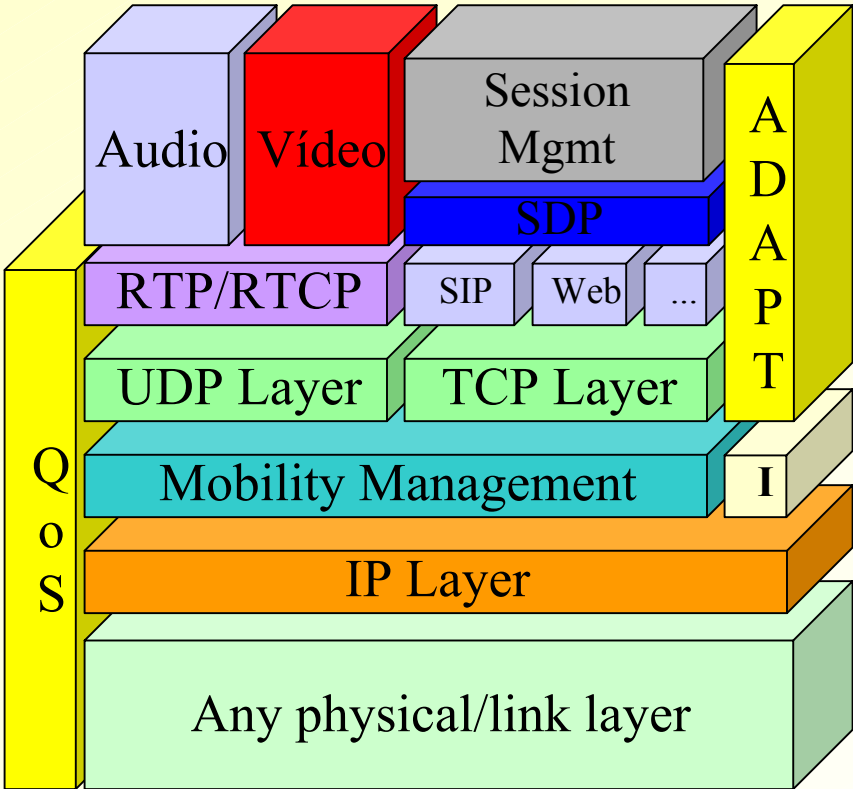


QoS is more than Nw. Layer QoS



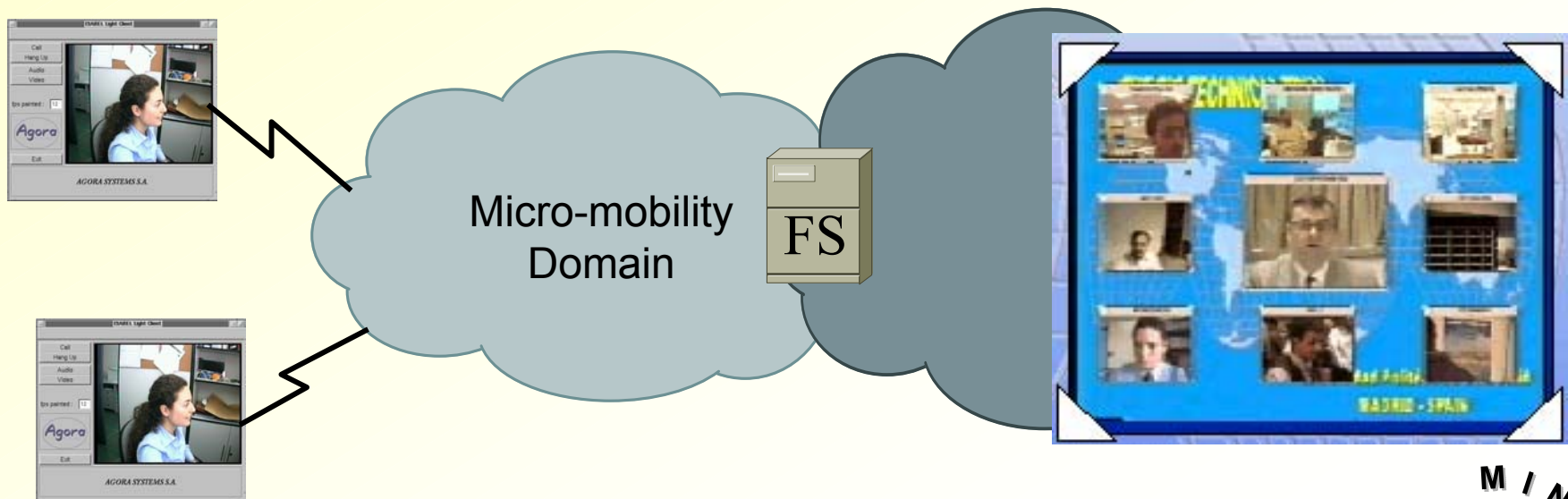
Architecture for ISABEL-lite-v6

- QoS wrapper and BCMP Interfaces



ISABELv6 combined scenarios

- Interoperation between ISABELv6 and ISABEL-lite is expected
 - Only minor interaction models need to be sorted out



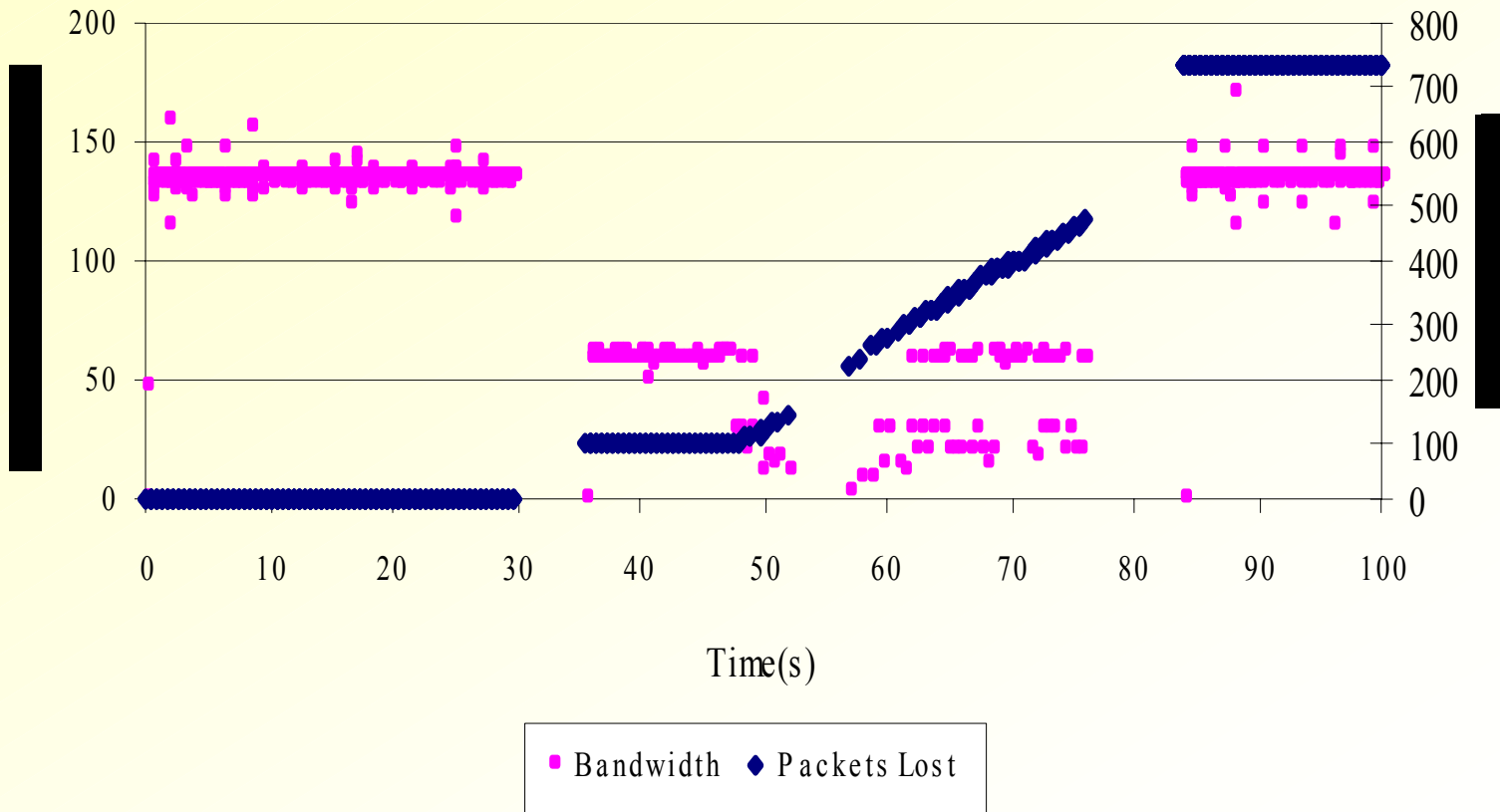
Results

- We've just started to perform trials
- Concept applied to different scenarios
 - Vertical handover
 - Macro-mobility scenario
 - Ad hoc networks
- Interim results are quite promising



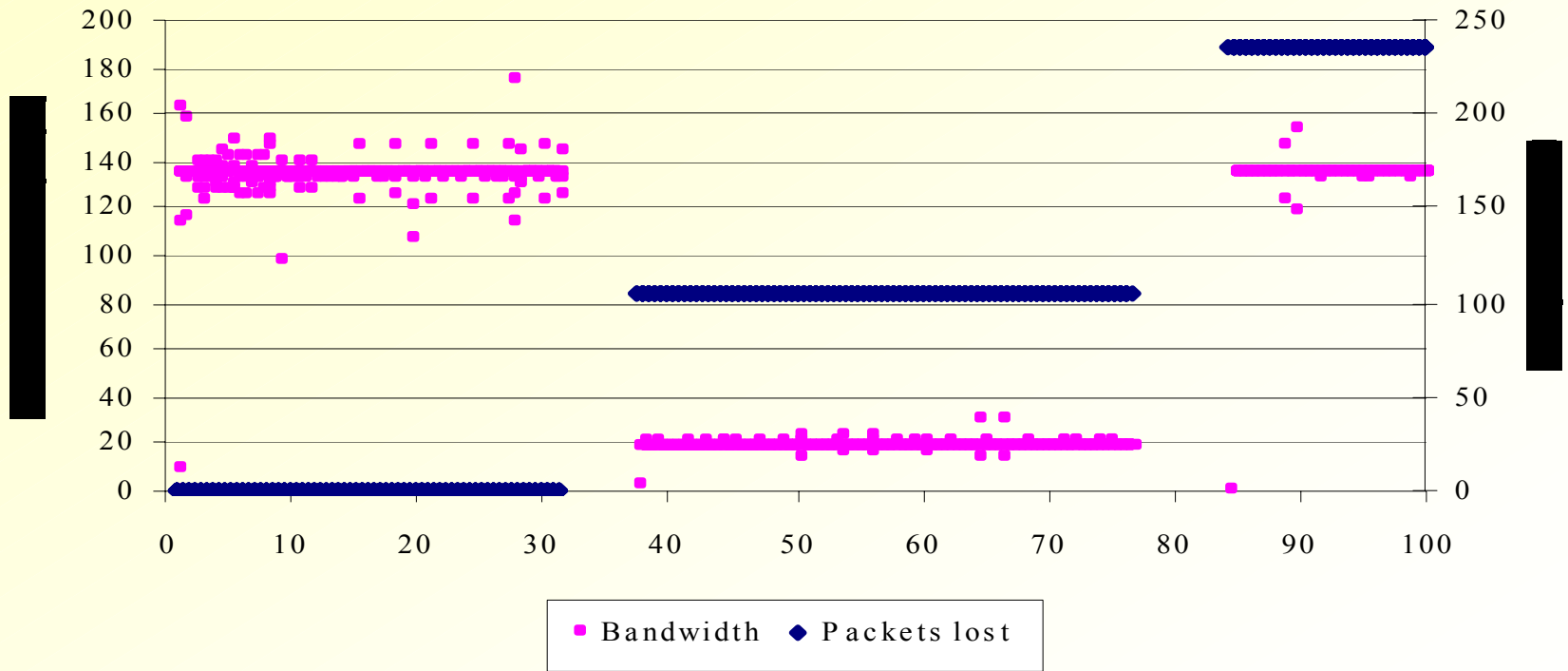
Handover scenario (No adaptation)

Normal behaviour (Bandwidth & Packets lost)



Handover scenario (Adaptation)

Adaptive behaviour (Bandwidth & Packets lost)



Conclusions and future work

- Many of the contributions from BRAIN are to be tested in MIND's WP6 having IPv6 as a requirement
- Initial tests make us expect very promising results (e.g. Terminal adaptation)
- Most of WP6 work is now focused on:
 - Interconnection of local testbeds
 - Extension of ISABEL-lite with QoS and mobility interfaces
 - Extensive testing of the different concepts



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