
BT exact TECHNOLOGIES
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Euro6IX
IPv6:The New Internet
ECIJA & ASOCIADOS
ABOGADOS
Derecho Audiovisual, Propiedad Intelectual y Nuevas Tecnologías
ERICSSON
The Pan-European IPv6 IX Backbone
Towards deployment of IPv6
in Telcos / ISPs
dit UPM
Telefónica
Telefónica Investigación y Desarrollo
University of Southampton
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Berlin, 14th December 2004
PT Inovação
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WIND
TELSCOM
Euro6IX
IPv6:The New Internet
Information Society Technologies

# Euro6IX: The Concept

- How to pronounce it: forget IX and read 6 (“SIX”)
- Build a large, scalable and native IPv6 Backbone of Traffic Exchanges, with connectivity across Europe and other IPv4/v6 Exchangers
- In order to promote and allow other players to trial v6 and port/develop key applications and services
- In order to break the chicken and egg issue !
- Gain REAL IPv6 experience, in a real world with not just research users, involving Telcos/ISPs/ASPs, among others: Allow new players into our trials
- Bring IPv6 into a production transit service

# Euro6IX Goal

- Support the fast introduction of IPv6 in Europe.
- Main Steps:
  - Network design & deployment
  - Research on network advanced services
  - Development of applications validated by user groups & international trials
  - Active dissemination:
    - participation in events/conferences/papers
    - contributions to standards
    - project web site

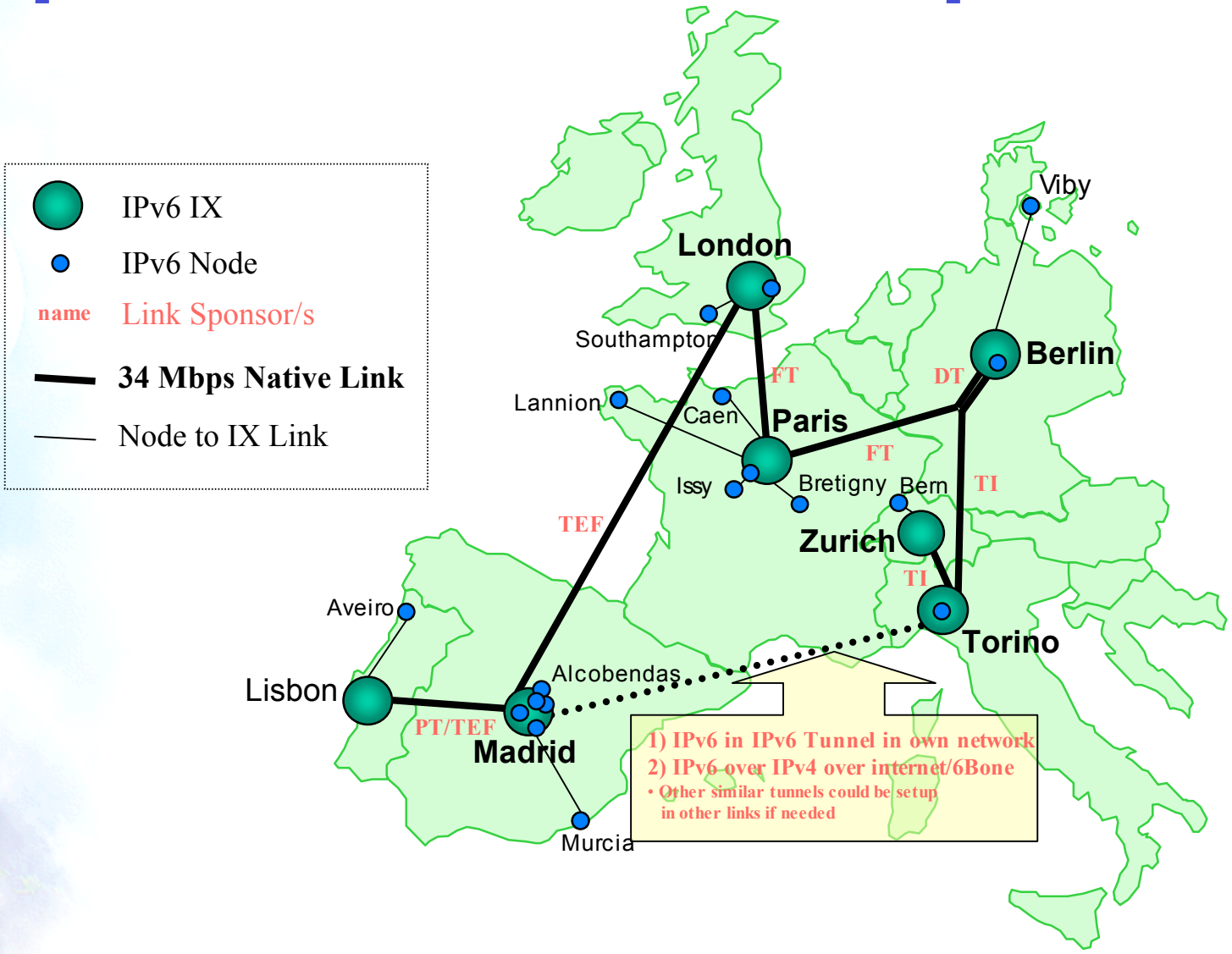
# Objectives

1. Research an appropriate architecture, to design and deploy the first Pan-European non-commercial IPv6 Internet Exchange Network.
2. Use this infrastructure to research, test and validate IPv6-based applications & services.
3. Open the network to specific User Groups for its validation in trials.
4. Dissemination, liaison and coordination with clusters, fora, standards organizations (e.g. IETF, RIPE) and third parties.

# Consortium Members (17)

- Telcos/ISPs (7):
  - Telecom Italia LAB (WP2 leader), Telefónica I+D (WP3 leader and project coordinator), Airtel-Vodafone, British Telecom Exact, T-Nova (Deutsche Telecom), France Telecom RD, Portugal Telecom Inovação
- Industrial (2):
  - 6WIND, Ericsson Telebit
- Universities (3):
  - Technical University of Madrid (WP4 leader), University of Southampton, University of Murcia
- Research, System Integrators and Consultancy (3):
  - Consulintel (WP1 leader and project coordinator), Telscom (WP5 leader), novaGnet systems
- Others (2):
  - Écija & Asociados Abogados, Eurocontrol

# Updated Network Map



# Euro6IX QoS Activities

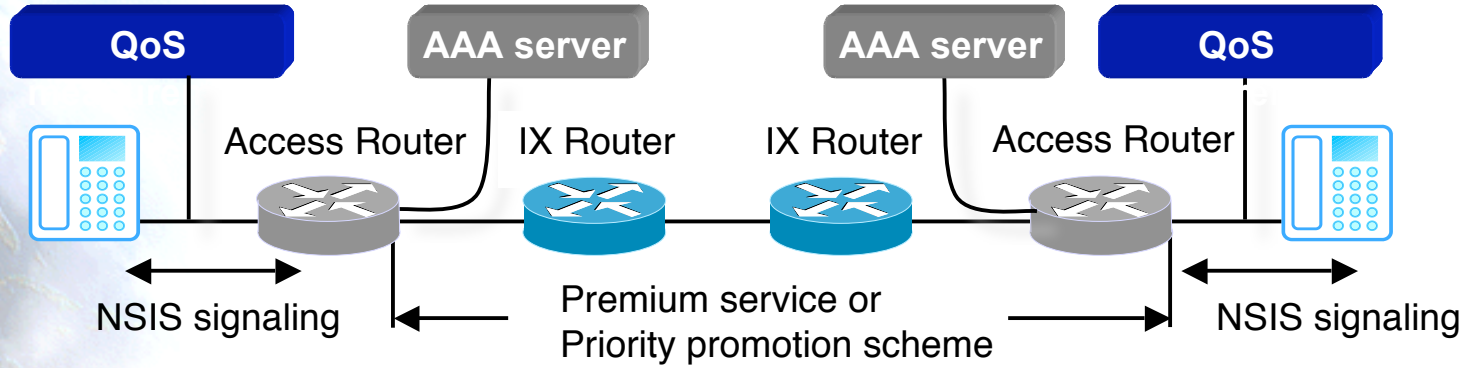
- Different QoS activities are done within WP4
  - QoS Premium Service Deployment
  - End-system based admission control enhanced SIP

# Euro6IX Premium Service

- Several partners implemented Premium QoS Service
  - LON6IX
  - LIS6IX
  - MAD6IX
  - BER6IX
- Premium service support recommended for SIP VoIP tests and other real-time communications
- Premium QoS service is Diffserv based
  - Best-effort traffic (DSCP = 0)
  - Premium traffic (DSCP = 46)

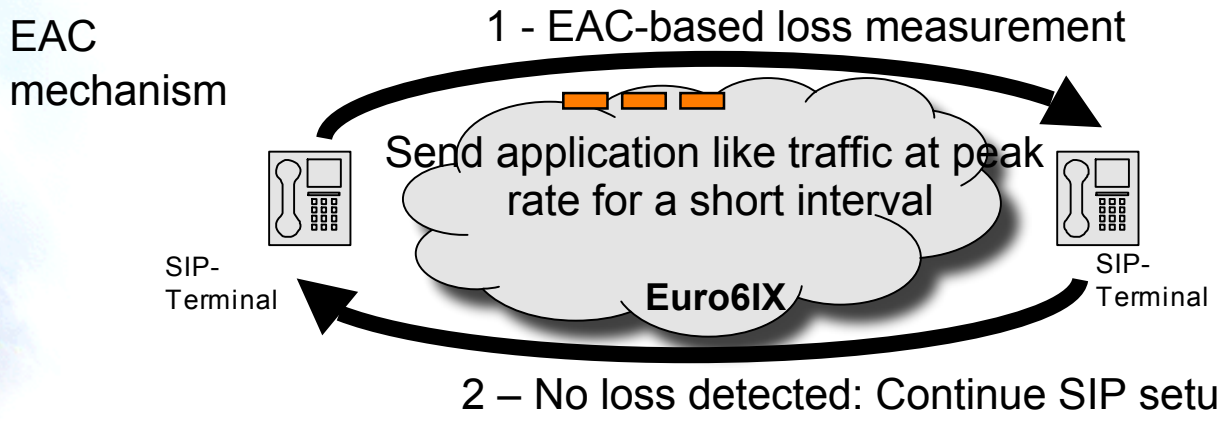
# End-system based admission control enhanced SIP

- EAC activity is done under WP4 with the following goals:
  - Roll out the Euro6IX Premium service
  - Specify and test a SIP client using Euro6IX Premium service and end-system based admission control
  - Specify & test Euro6IX bandwidth on demand service
  - Enhance the bandwidth on demand service by AAA
  - Setup operational Euro6IX QoS measurement system



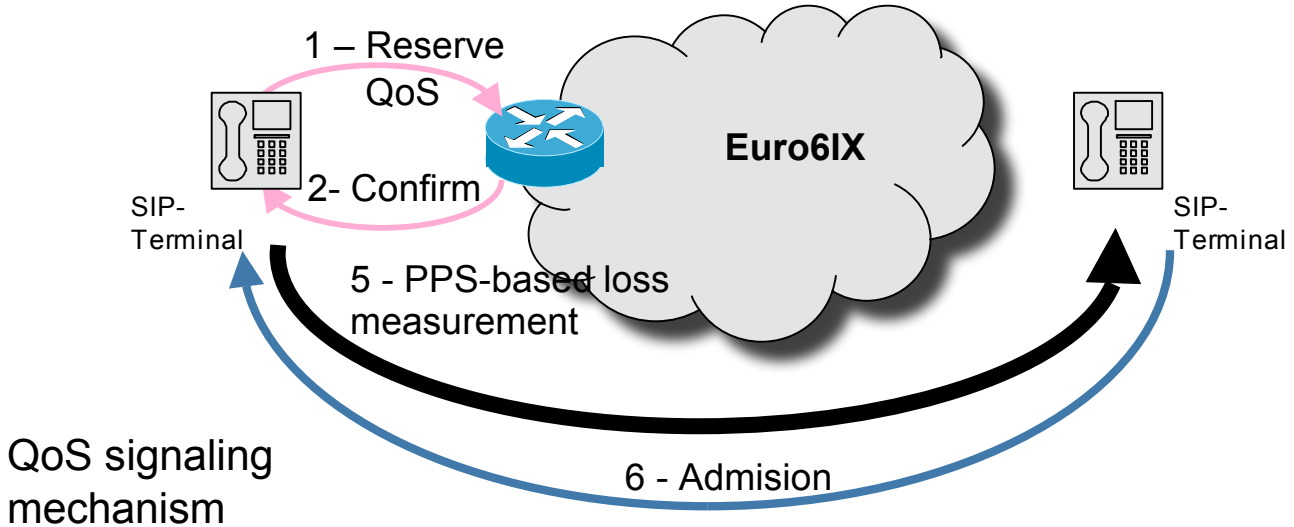
# QoS specification: EAC

- End-system based admission control
  - Measure performance for an application like flow with highest sending rate of application
  - No loss detected: admit call
  - End-system support required only
  - Implemented for a SIP client
  - Tests between several partners



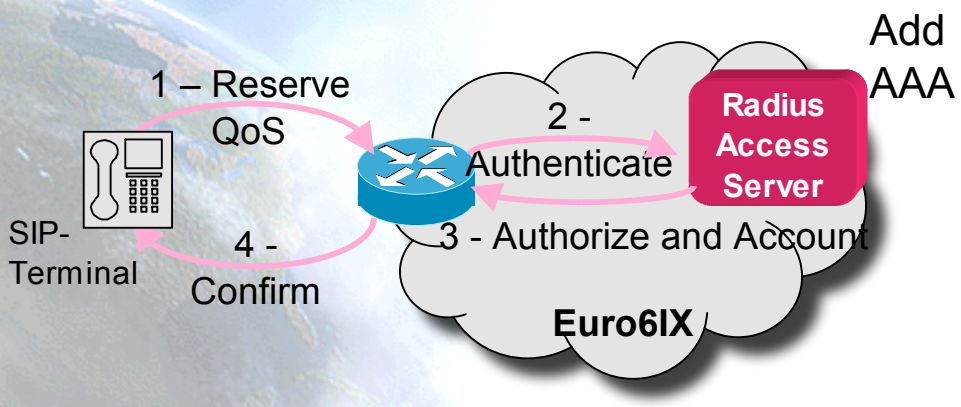
# QoS specification: Signaling

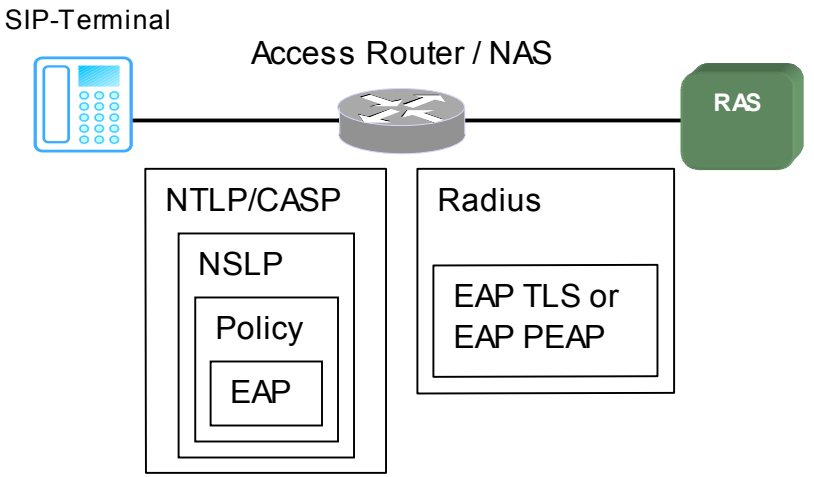
- Protect against QoS misuse (I):
  - On demand QoS access only
  - Specify signaling for Access Router and SIP client
  - Uses latest IETF NSIS drafts – feedback from practice will be given



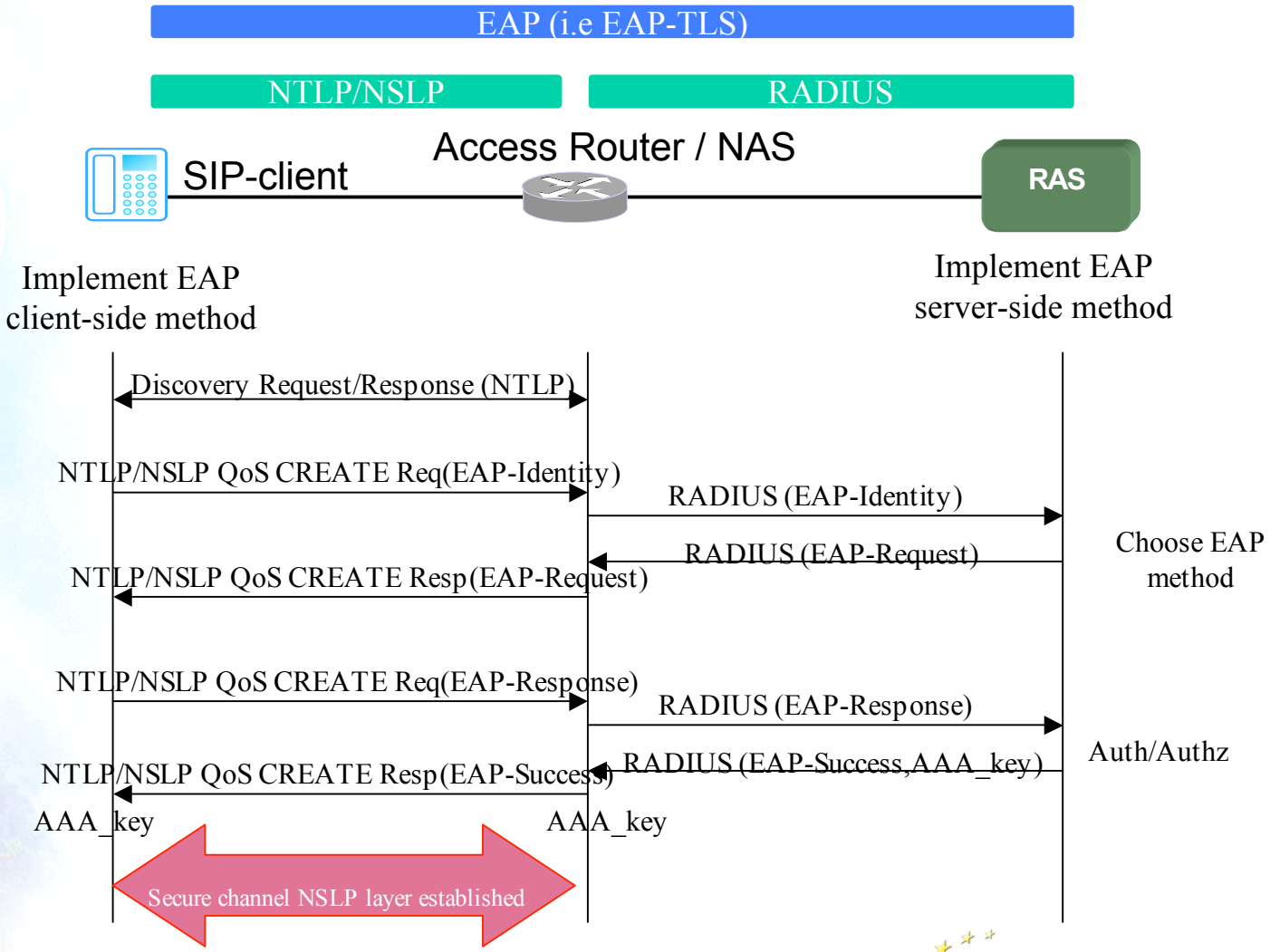
# QoS specification: AAA (I)

- Protect against QoS misuse (II):
  - Introduce policy: only subscribers get access to the QoS service
  - Integrate QoS service access and AAA platform
  - Architecture agreed, specification pending



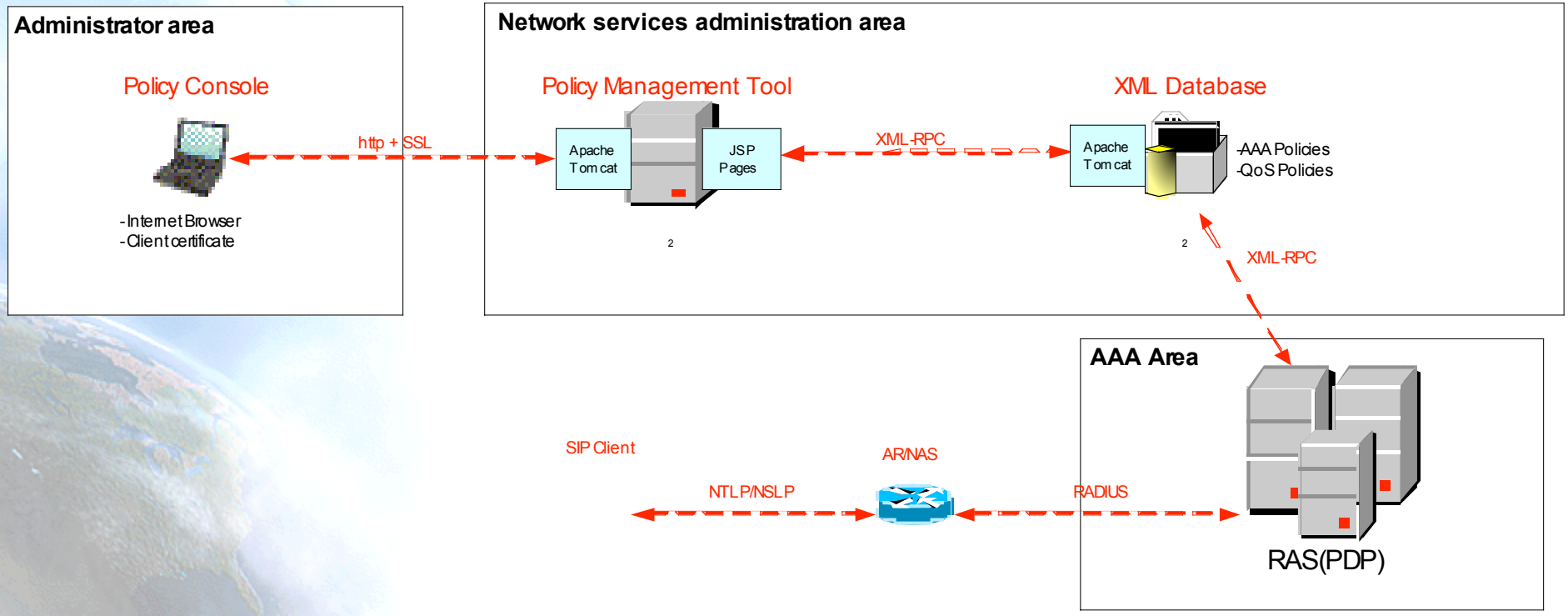
# QoS specification: AAA (II)



# QoS specification: AAA (III)

- SIP client implements EAP method (client side) for authentication
- RAS (free-RADIUS server) implement EAP method (server side)
- EAP packets are transported between SIP client and AR/NAS by using NTLP/NSLP
- EAP packets are transported between AR/NAS client and RAS by using NTLP/NSLP
- NSLP implementation in AR must recover EAP packets and include them a RADIUS packets (possible implementation by using a modified HostAP software)
- Authentication can be used initially by using EAP-TLS as EAP method.
- EAP-TLS method can use UMU PKIv6 certificates

# QoS specification: AAA and Policies



# Main relations to WP4 Goals

- Combines an application with a network service
- Interaction with other WP4 subactivities (AAA)
- Trials support
- IX relation:
  - QoS support for VoIP is an important feature of NGN networks
  - End-to-end support of a single QoS architecture is an important feature of NGN networks
  - Protection against misuse is crucial if value added services are to be introduced in a commercial NGN

# Results and future work

- Y3 results / Y4 plans
  - Premium service is supported by PTIN, Telefónica, T-Systems and Consulintel. Tilab started tests
  - SIP client with end-system based admission control specified and tested across Euro6IX
  - End-to-end bandwidth on demand service specified, implementation pending
  - AAA architecture specified, detailed specification pending
  - Stepwise tests and improved demonstration of end-to-end QoS architecture with availability of new features

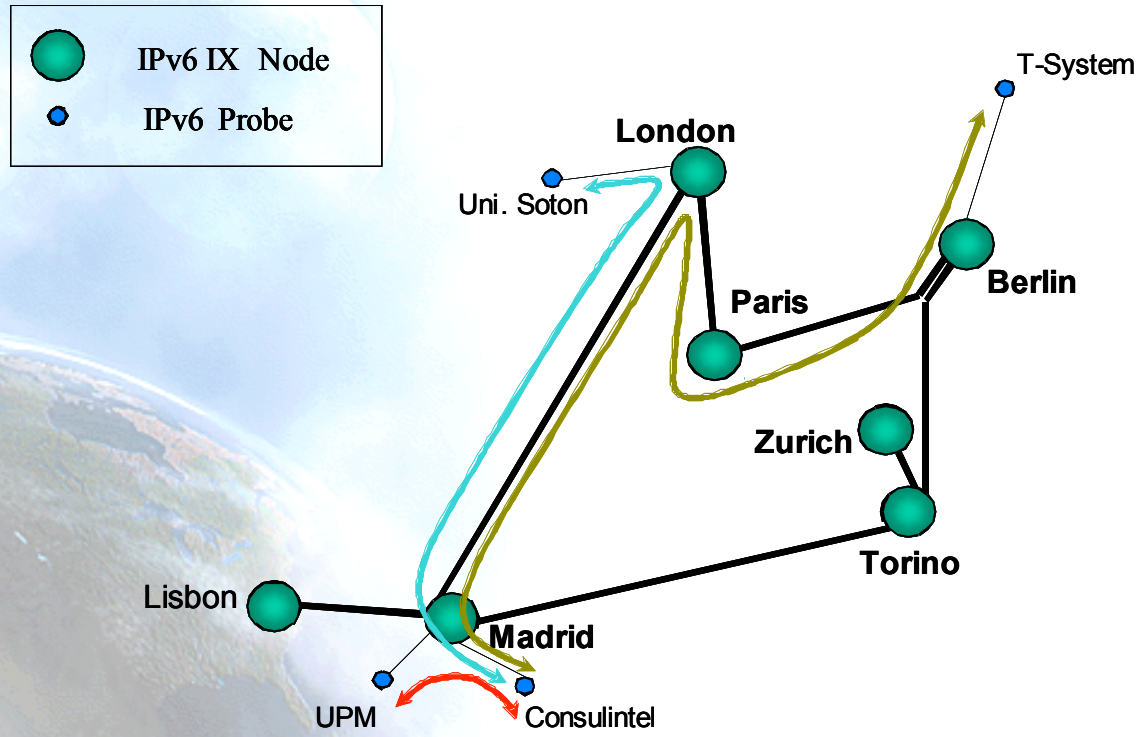
# QoS Measurements Activity

- Activity carried out in collaborative work between Euro6IX and 6QM IST projects with the following objectives
- From Euro6IX side:
  - QoS Measurements sub-activity focuses on the verification of the QoS (Premium Service) deployed on the network
  - By using the OpenIMP IPv6 measurement system developed, the QoS on the network can be measured in order to obtain QoS objective results
- From 6QM side:
  - Test the OpenIMP system in a real scenario with different types of users in order to detect bugs on the system and to identify possible improvements

# Partners involved

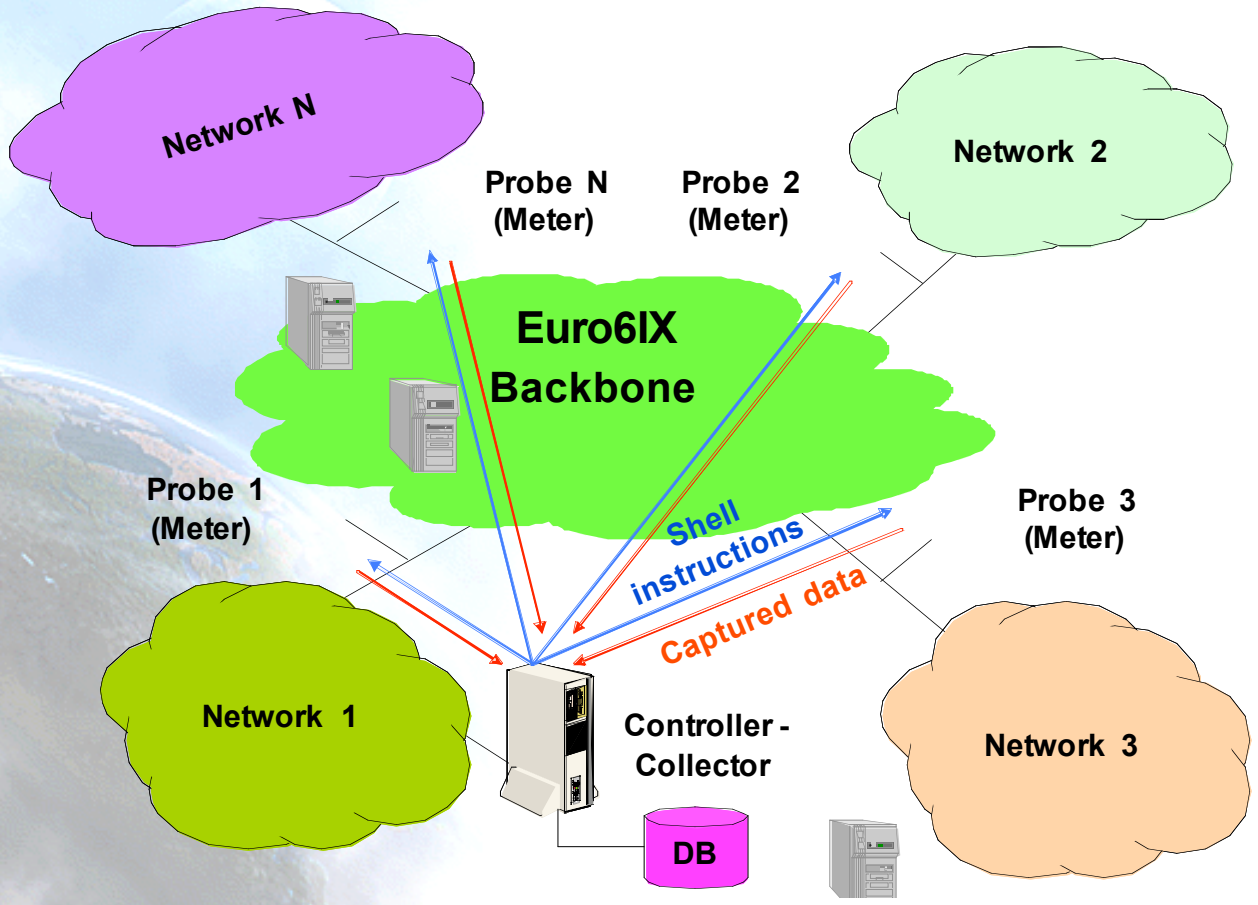
- From Euro6IX
  - University of Southampton (UK)
  - T-Systems located (Germany)
  - Univ. Politécnica de Madrid (Spain)
- From 6QM
  - Consulintel (Spain)

# Segments Tested




- Four probes were deployed
- Three backbone segments were measured
  - Madrid-Madrid
  - Madrid-London
  - Madrid-Berlin
- The objective was to know QoS parameters for best-effort traffic.
  - One-way delay (owd)
  - OWD standard deviation (jitter)
  - Packet loss rate
  - Bandwidth

# Components Deployment

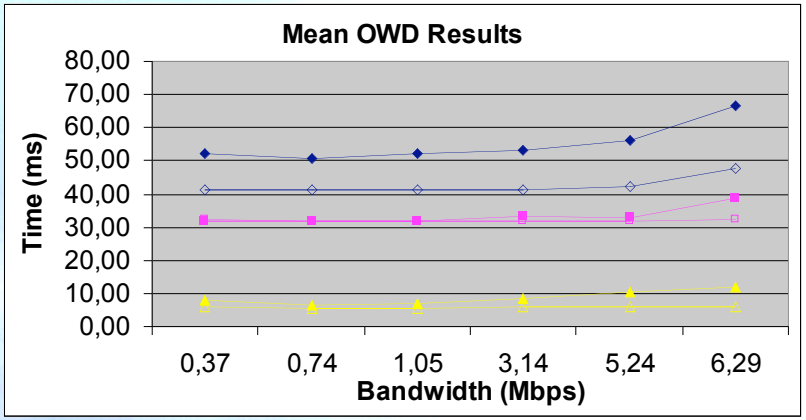


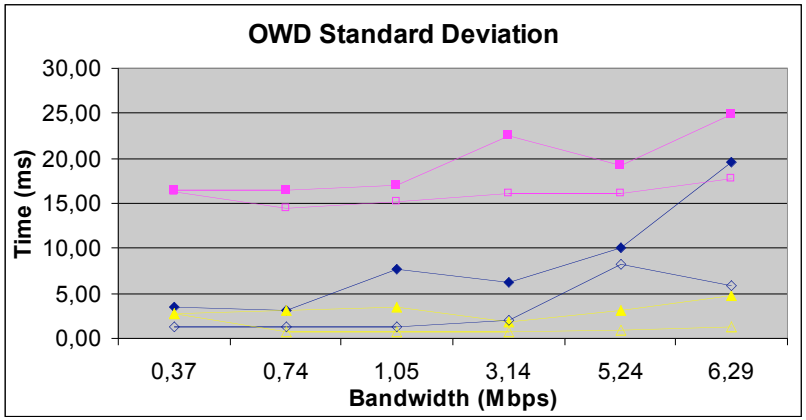

- The components were deployed as follows
- Probes
  - Consulintel
  - UPM
  - T-Systems
  - U. Southampton
- Controller
  - Consulintel

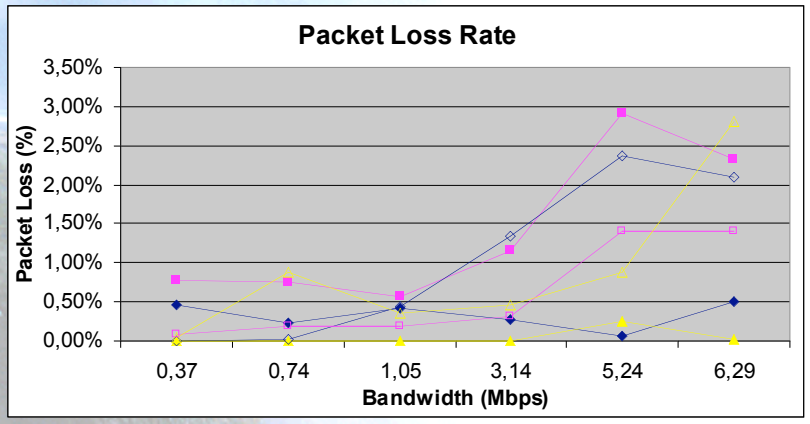
# Traffic measured

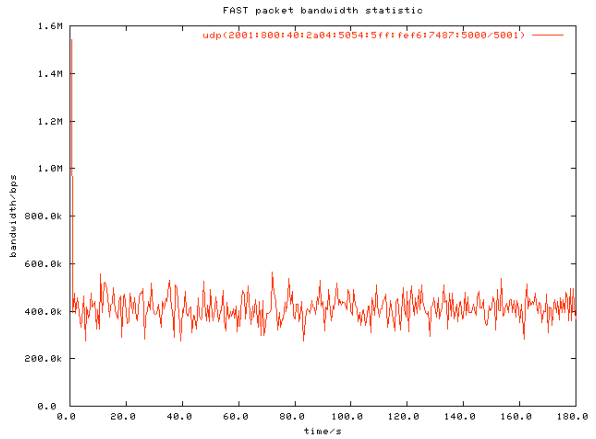
- For each network segments the following set of traffic class has been evaluated:
  - Real traffic
    - Video streaming with no special DSCP. Usual QoS
    - VoIP traffic with special DSCP. QoS Premium Service
  - Artificial traffic:
    - Active UDP traffic at different bit rates generated by the probes involved in the measurements

# Results



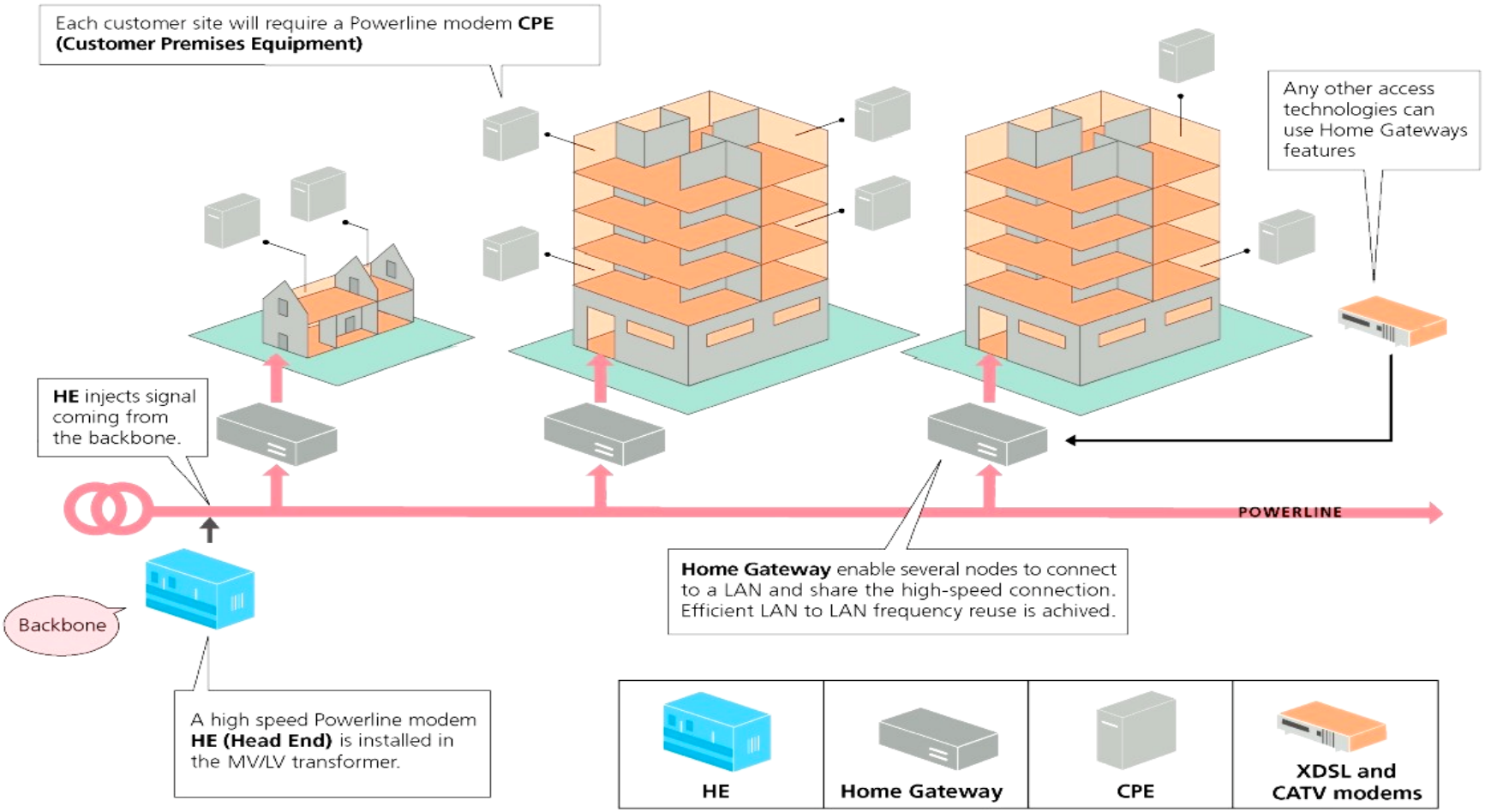




- From the Euro6IX side, very useful results have been obtained to know the real QoS deployment.
- They are not public, but some graphs can be presented

# 6QM-6POWER
# Collaborative Test-bed

# Typical PLC Network Topology



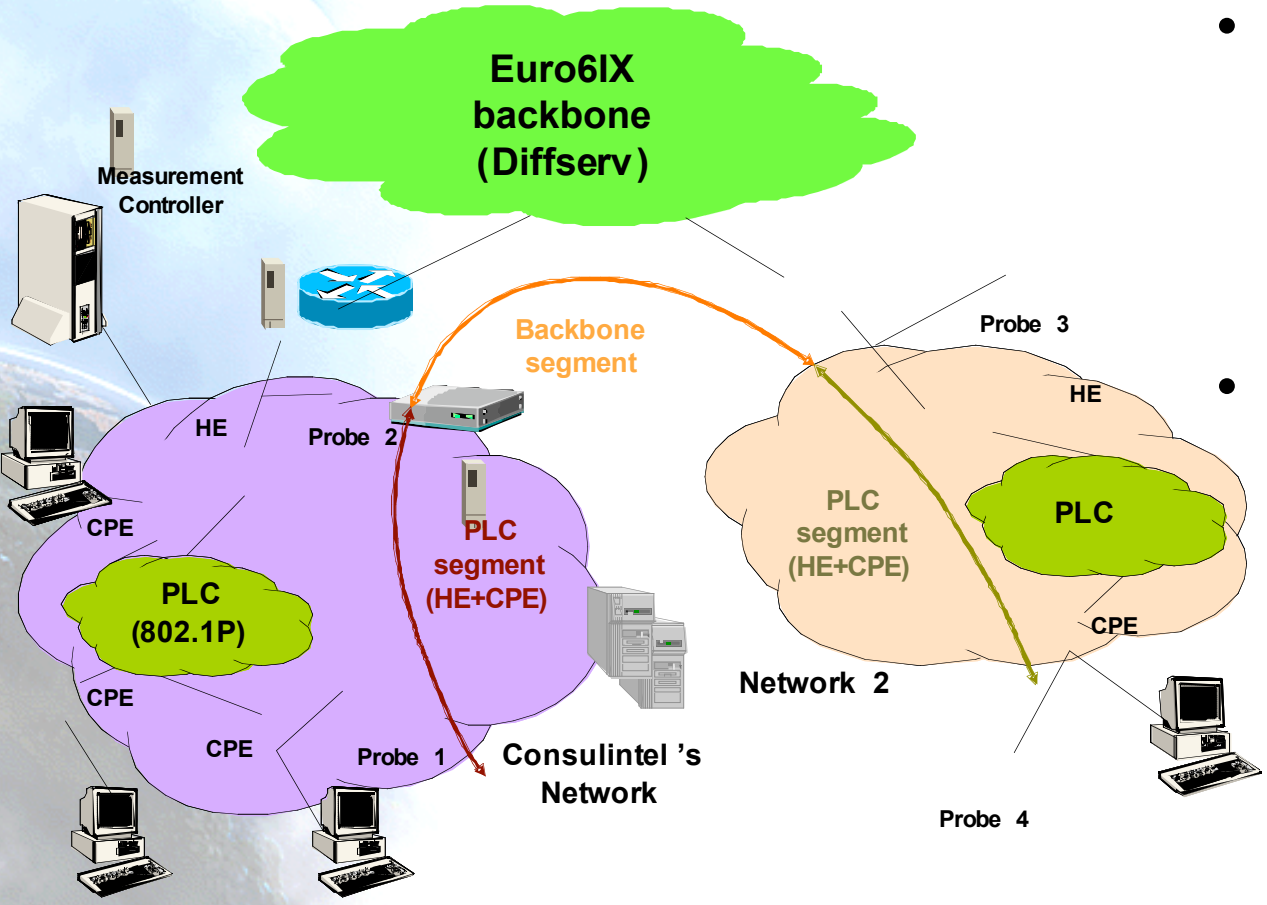
# Objectives

- Test-bed carried out during M25 (October 2004) and M26 (November 2004)
- From 6POWER side:
  - To characterize the general working of CPE/HE within the PLC network in terms of packet loss, delays, etc. when no 802.1P QoS is setup
  - To characterize the working of CPE/HE within the PLC network in terms of packet loss, delays, etc. when 802.1p QoS is setup
  - To check that the mapping between diffserv QoS and 802.1p has the expected behavior
- From 6QM side:
  - Test the OpenIMP system in a real access network. xDSL has not yet native IPv6 support, so PLC networks is a good alternative as access network

# Partners Involved

- From 6POWER
  - Univ. of Murcia (Spain)
- From 6QM
  - Consulintel (Spain)

# Test-bed Topology

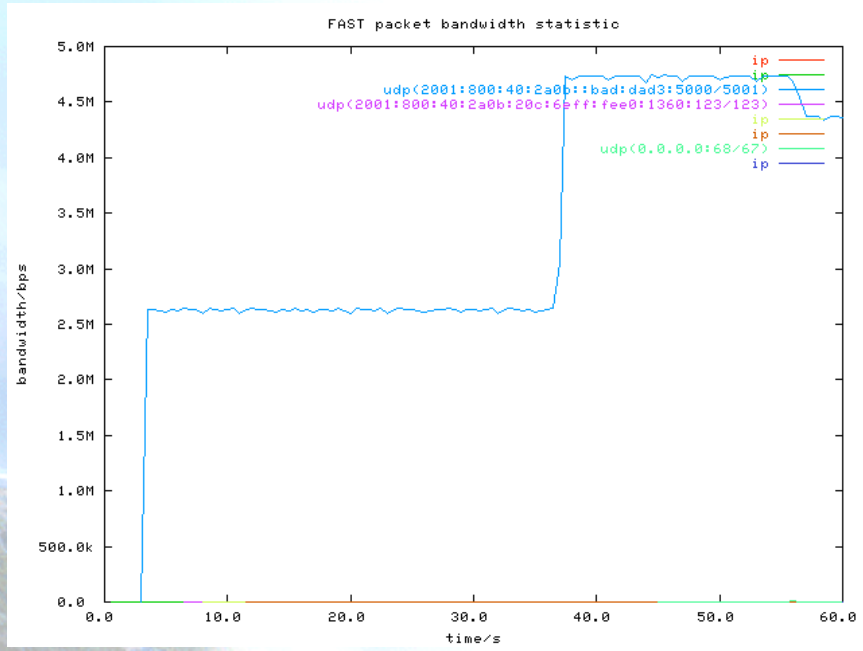


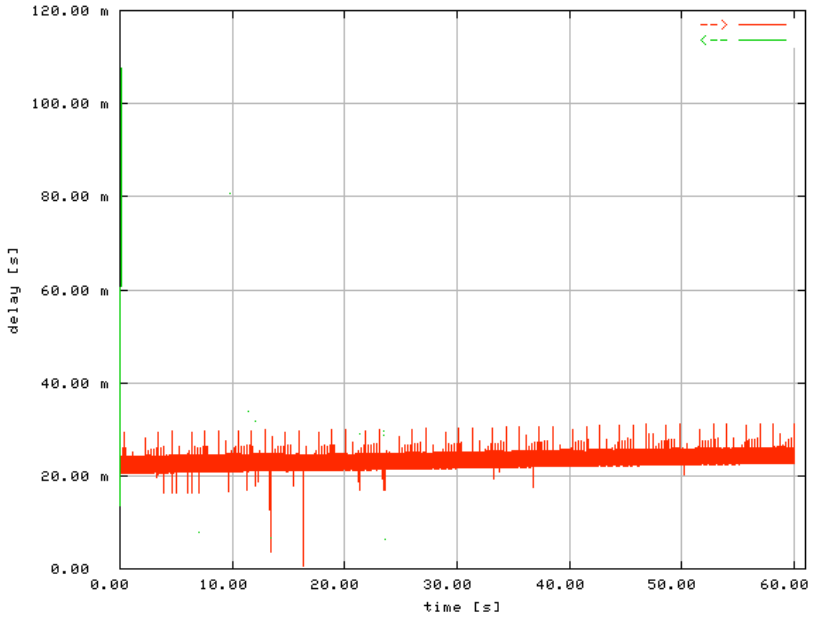

- Deployment to make measurements along different segments
- Measurements to know
  - owd
  - jitter
  - packet loss
  - Traffic shaping

# Traffic Measured

- For each network segments the following set of traffic class has been evaluated:
  - Real traffic
    - Video streaming with no special DSCP. Usual QoS.
    - VoIP traffic with special DSCP. QoS Premium Service.
  - Artificial traffic:
    - Active UDP traffic at different bit rates generated by the probes involved in the measurements.

# Results




- From the 6POWER side, very useful results have been obtained to know the behavior of PLC devices.
- Only measurements without QoS have been made. It is foreseen made during M28 measurements with QoS

# Thanks !

## Contact:

- Jordi Palet (Consulintel):
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- Madrid 2005 IPv6 Summit, soon more info at:

  http://www.ipv6-es.com