



ITU-T Kaleidoscope Conference Innovations in NGN

EuQoS: End-to-End QoS over Heterogeneous Networks

María Ángeles Callejo Rodríguez
Telefónica I + D
macr@tid.es



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Motivation

- Current QoS provisioning approach is mainly based on overprovisioning, but this option is not flexible for meeting new applications/services requirements
- **End-to-end QoS** is a mandatory requirement to enhance **QoE** for new multimedia applications
 - Important: the Home Gateway should be also considered as the initiator and/or terminator of the communication.
- Current status:
 - E2E guaranteed QoS solutions are not available
 - The local solutions are technology dependent
 - QoS must be usually manually configured



In today's networks the end users do not really perceived the QoS as a real operator service

Our Proposal

- To build a new network service → ***Advanced Connectivity on Demand***
 - To provide E2e differentiated connectivity based on e2e QoS guarantees for specific users' flows
 - The QoS is a User's choice → Neutral environment
 - The user can choose between a set of e2e CoSs in any access technology

... Telcos can leverage the value of the connectivity even when the customer is using third party applications from Internet

Design Principles

- To allow the users to select the QoS for each application (meeting **Net Neutrality requirement**)
 - The main goal is to design a QoS on demand framework
 - This framework can be used by the end user (for Internet applications), operator (for Triple Play services) and by other service providers
 - **To take advance of third party applications**
- To define a network technology independent layer able to synchronise intra and inter domain processes
- To specify open interfaces
 - To use the system with any application
 - To integrate new network technologies

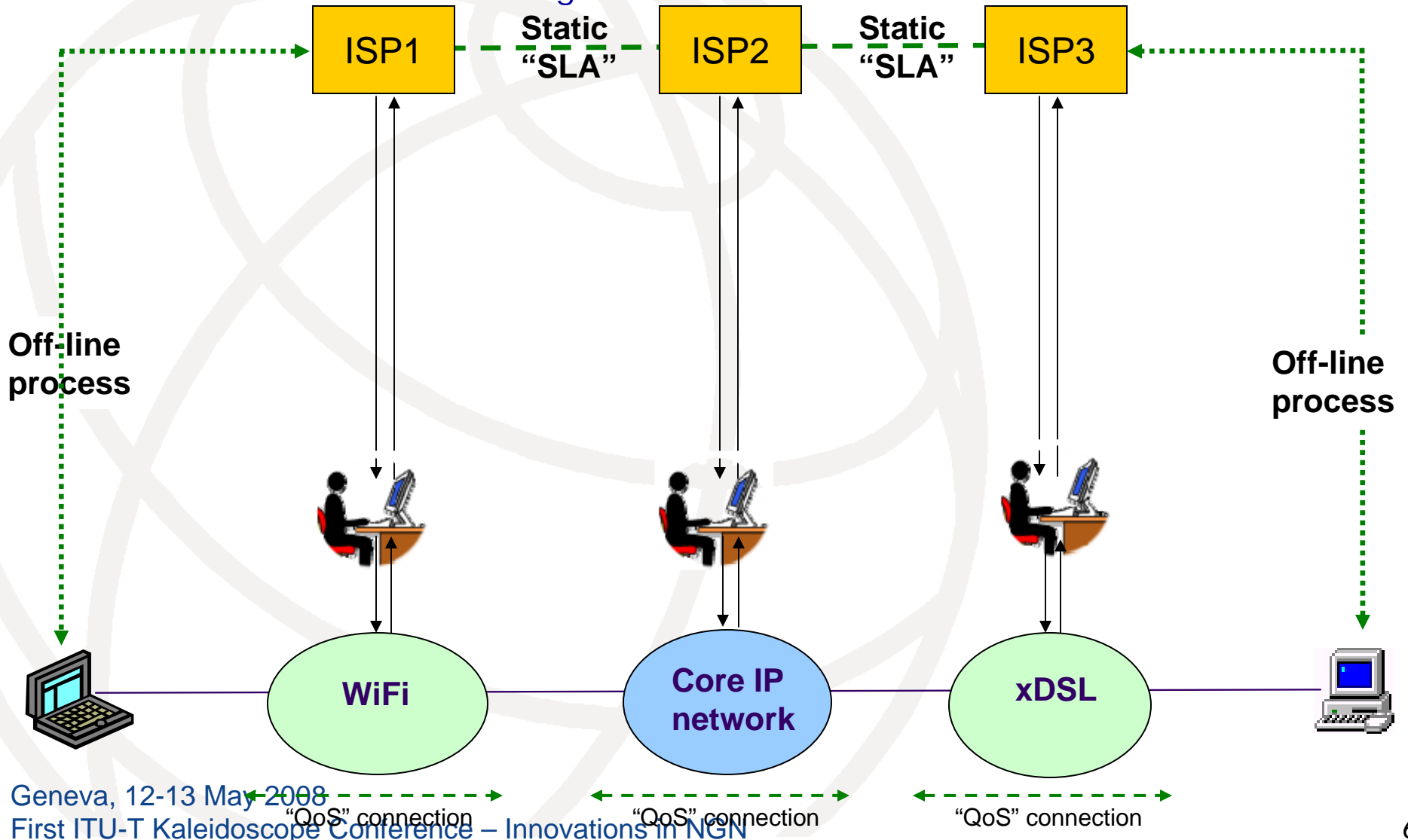


***To build an Innovation Friendly Framework
to provide end-to-end QoS network services***

Current Status

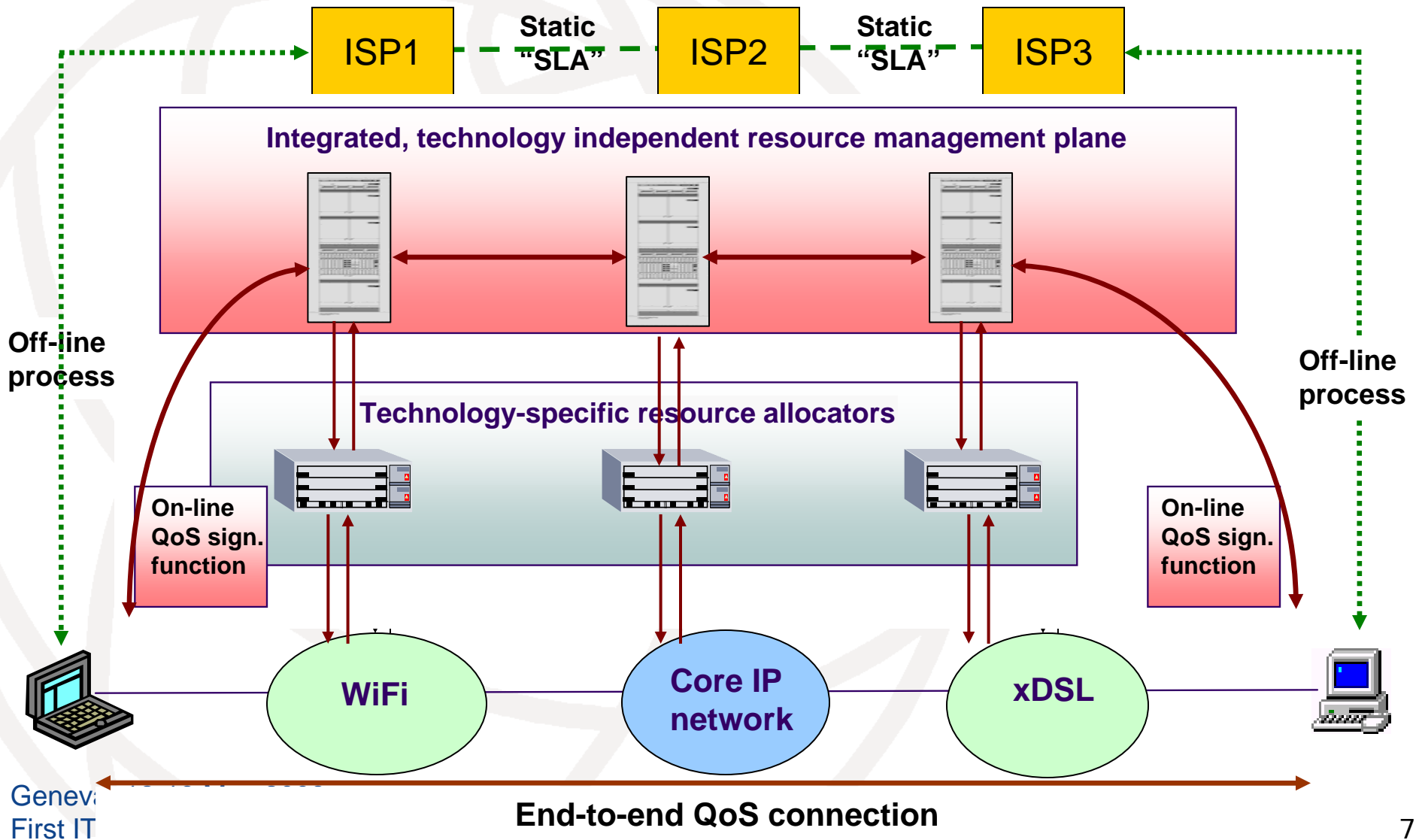
Where there is / will be soon any QoS solution, it:

- is technology dependent
- does not have end-to-end significance

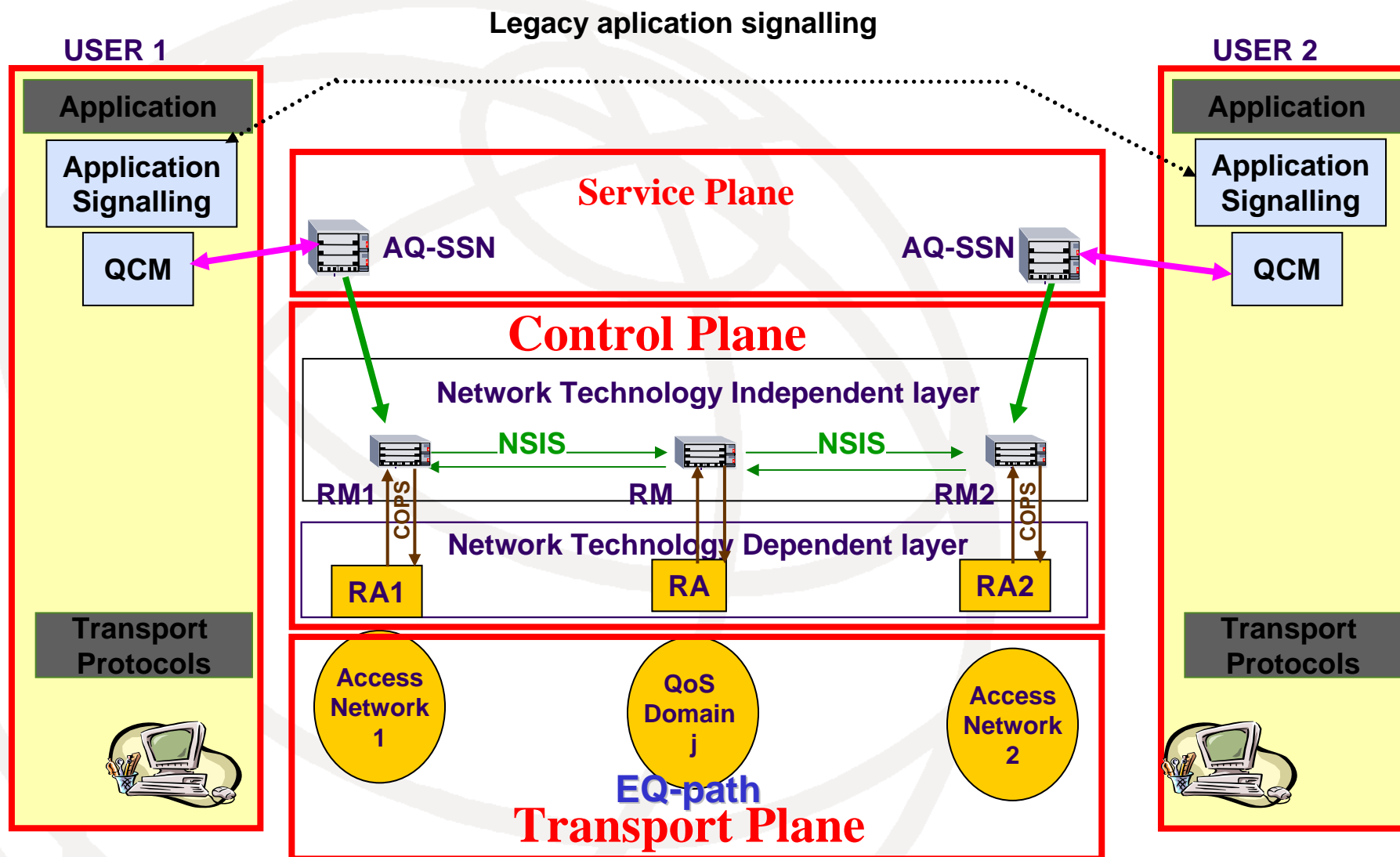


EuQoS Solution

- technology-independent layer added
- QoS signalling capabilities added to the applications (terminals)



EuQoS Deployment



Service Plane functionalities

- To offer an open interface to the end-user
→ the ***QoS on demand service***
- To manage user access to network resources (Authentication), granting services and QoS level to the requesting user (Authorization) and collecting accounting data (Accounting)
 - **Diameter** server is used as AAA Server
- Charging functions are also covered at this Plane.
- User provisioning function

Control Plane functionalities

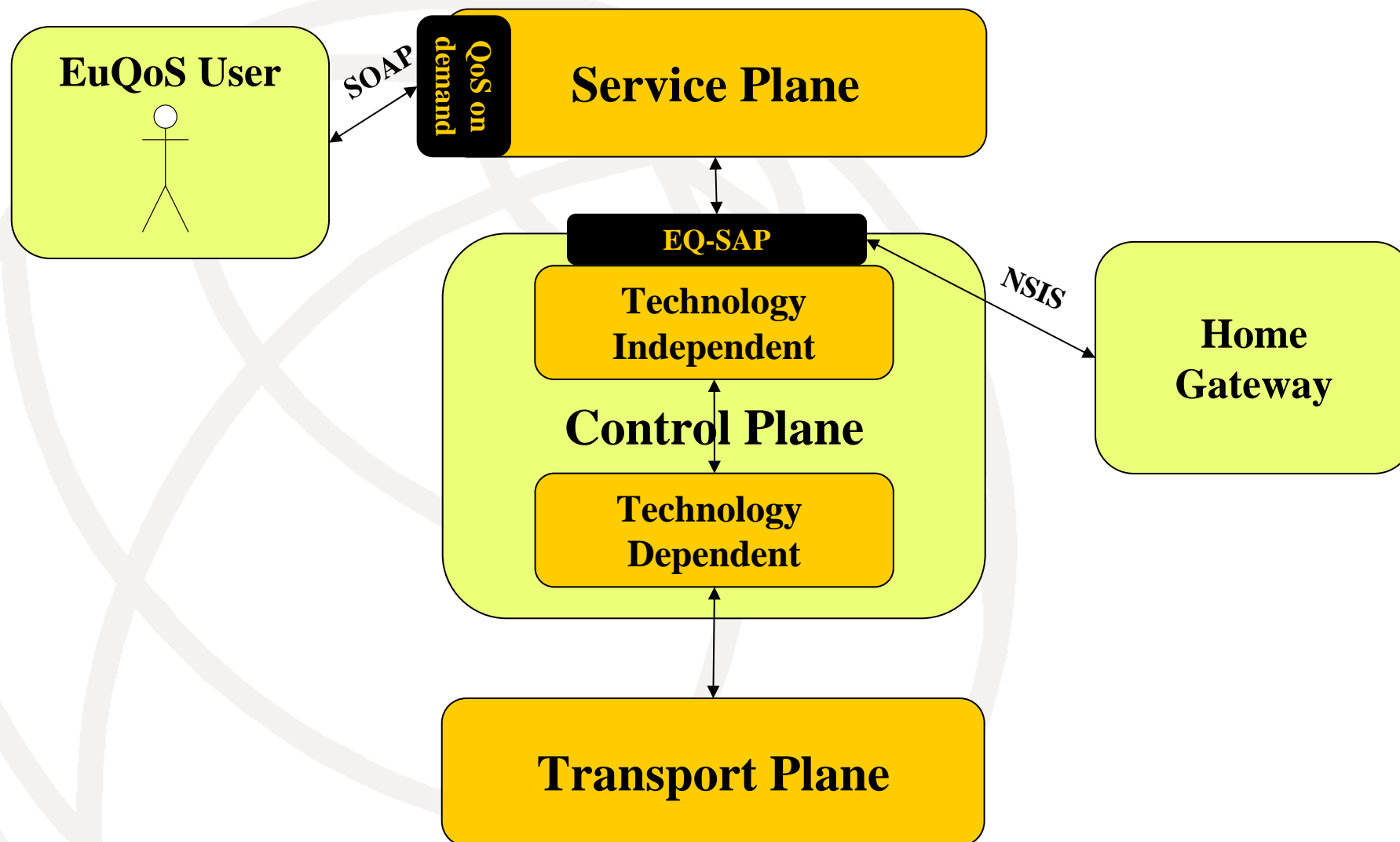
Network Technology Independent

- *EQ-SAP* interface to the service plane and to the Residential Gateway
- Resource and Admission Control
- Verification of resource availability
- Final decision Point
- Network selection
- Operator policies
- Network interdomain topology maintenance
- Network Resource maintenance

Network Technology Dependent

- QoS and Priority mapping
- Gate Control
- IP Packet Marcking and Rate Limiting Control
- Technology Dependent decision point
- Intra domain topology maintenance
- Resource control and configuration of the transport elements

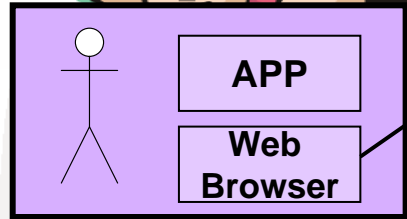
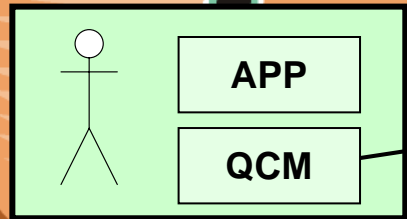
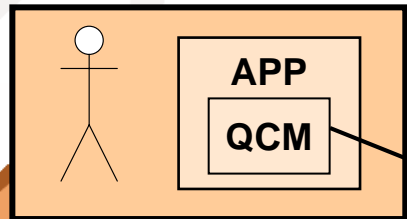
EuQoS Main Reference Points



User's view...

How can I use EuQoS?

EuQoS Clients



Flows
E2E CoS
BW



QoS Provisioning Processes

Goal to build, use and monitor the EQ-Path

- **Provisioning process** (time scale: hours/days)
 - **Loose model:** reachability per CoS is announced among different ASs using EQ-BGP.
 - Resources are provisioned per CoS in different ASs but are bound to the EQ-Paths during the invocation process
 - **Hard Model:** resources are reserved in the transit domains using EQ-Links set up as DiffServ MPLS-TE tunnels (computed using the PCE)
- **Invocation process** (launched per user request)
 - It uses the EQ-Paths by selecting the most appropriate one and by applying CAC and configuration in the different domains
- **OAM** protects from failures

Strength 1: Open architecture ...

■ ... To **End Users**

- End users have 2 interfaces: QoS on demand service and the EQ-SAP for trusted terminals
- End Users can ask the EuQoS system for QoS guarantees without changing the applications
 - In contrast to IMS, where SIP is required to interact with the P-CSCF

■ ... To **integrate new Network Technologies**

- Clear interface between NTI and NTD level
- E2E CoS are specified and used by the clients.
- The NTD depends on the underlying network technology and just needs to map the E2E CoSs to specific technology CoSs

Strength 2 & 3: Implementation of different prototypes and validation

- **4 prototypes** have been implemented
 - Integration of MPLS, UMTS, Ethernet, xDSL, WiFi and Satellite
 - QoS Provisioning processes
- The tests have been carried out with **Internet applications**, such as VoIP, on-line gaming, videoconferencing and video streaming
- **Performance tests** have shown quite promising results for a prototype
 - up to 20 sessions/s are supported with a Java based implementation

Strength 4: A new challenge for Network Providers

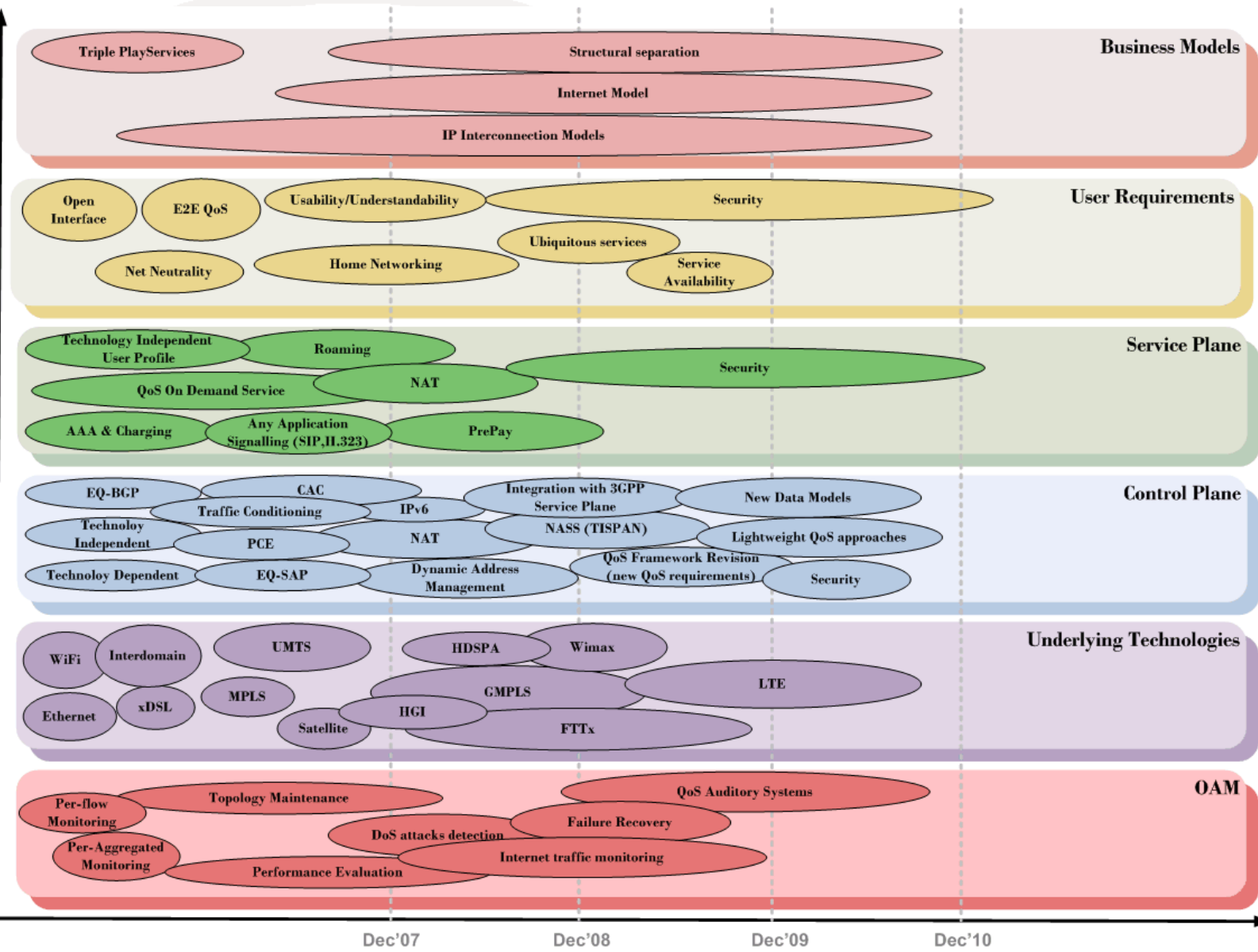


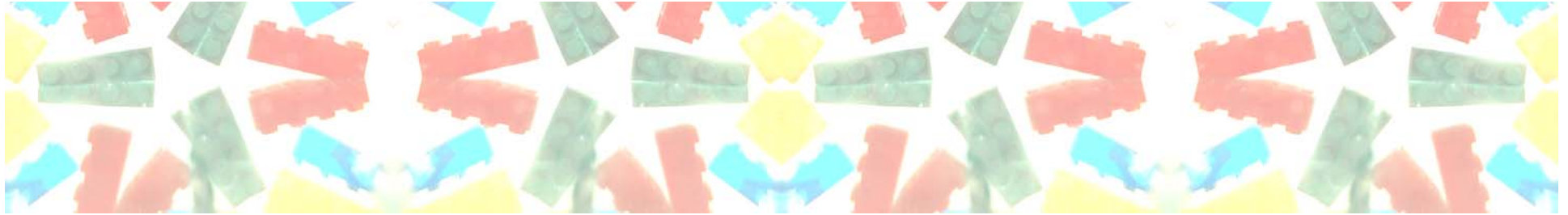
- EuQoS provides a framework to offer QoS guarantees that can be used:
 - For different Internet applications
 - With different devices, since the session request is simple
- EuQoS is an opportunity to take advantage of the new Internet applications to increase their revenues

Conclusions

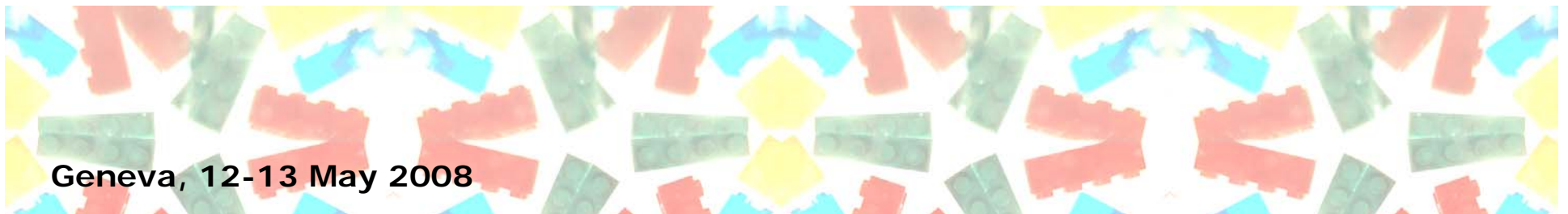
- EuQoS offers to the end user a differentiated connectivity that provides e2e QoS ...
 - ... Over heterogeneous networks ...
 - ... And meeting Net Neutrality requirement
- Following the Internet model, EuQoS main attribute is its openness to:
 - To be used with any application
 - And to integrate new technologies

Next Steps





Thank you



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