

# Project Information



## Rethinking the Use of Broadband access for Experience-optimized Networks and Services

The objective of RUBENS is to define and evaluate an enhanced broadband access infrastructure that offers personalized Quality-of-Experience in a flexible and scalable way for a large variety of applications, delivery models and devices.

The main problem to solve is: how can operators deal with the increased consumption of personalized and long tail content (e.g. Internet TV) and the ever increasing triple-play bandwidth requirements (e.g. transition to HDTV) in an economically sound way?

### Main focus

Broadband access networks stand at a key crossroad in their history. Similar to the experience of consuming “as you wish/when you wish” Internet content, the move from analogue TV delivery towards IPTV promises to enable personalized consumption of media, both in terms of the available range of content and consumption timing. A key question that both

service and network providers have at this point is how this widening range of (mostly multimedia-driven) services can be combined with a “carrier-grade” network infrastructure in a flexible, scalable and economically viable way.

The objective of RUBENS is to define and validate an access network architecture that takes the service requirements and evolutions in the access network into account, and delivers a novel environment to boost the service delivery opportunities in a cost-effective and dynamic way.

### Approach

The founding principle for the RUBENS network architecture is the change in paradigm from the current static access infrastructure into a more dynamic organization of the network, combined with access network functionalities embedded close to the end-user. This evolution arises from the need to limit the amount of “per end-user/per service” streams in the



# RUBENS

Project ID: CP5-020

Start Date: 1 February 2008

Closure date: 31 January 2010

### Partners:

Alcatel-Lucent Bell, Belgium

BT, UK

Deutsche Telekom AG, Germany

France Telecom R&D, France

IBBT - Ghent University, Belgium

KPN, The Netherlands

Telefónica I+D, Spain

TNO (ICT), The Netherlands

University of Zaragoza, Spain

### Co-ordinator:

Steven Van den Berghe

Alcatel-Lucent Bell, Belgium

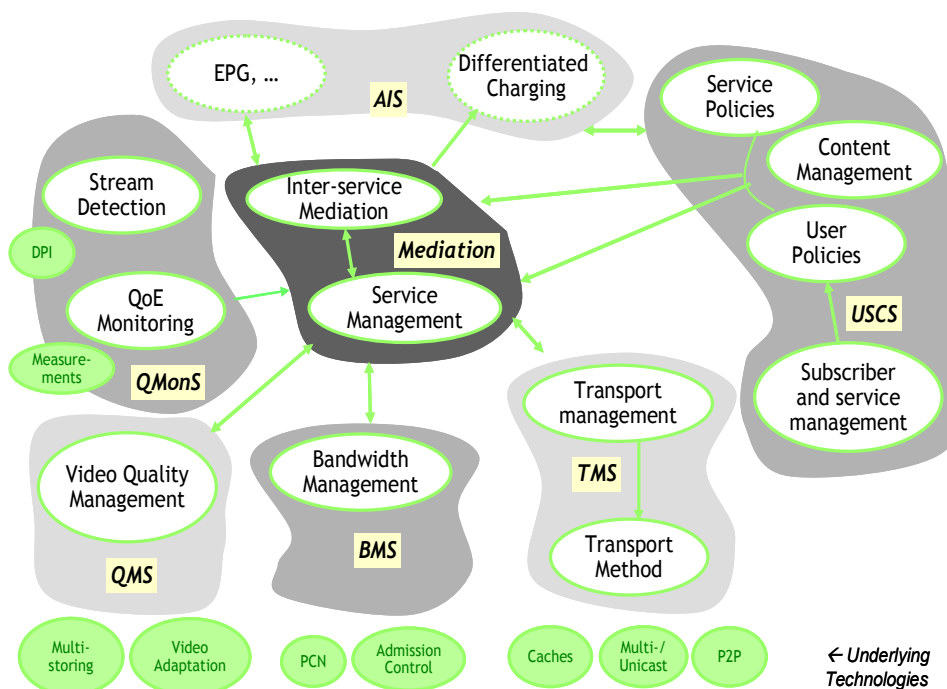
E-mail:

steven.van\_den\_berghe@alcatel-lucent.be

### Project Websites

[www.celtic-initiative.org/projects/rubens](http://www.celtic-initiative.org/projects/rubens)

<http://wiki-rubens.celtic-initiative.org>



← Underlying Technologies

aggregation to deliver future multimedia content in a scalable way. Besides the technical work, a key design principle must be the business viability of an open environment for future QoE ecosystems and multiple actors (such as content providers, network providers etc) in the ecosystem.

The specific project goal is to transform the organization of the access and aggregation network. Access networks cannot solely act as passive bit-pipes in the future media delivery chain, as the increasing personalized consumption of media will cause significant bandwidth problems. The target RUBENS network increases the role of access network equipment in the content delivery chain to have a more cost-effective and scalable solution for multimedia delivery over fixed broadband access.

## Main results

The goal of the project has been translated into a coherent set of techniques that optimize the user experience dynamically, by finding an optimal co-operation between the network and applications.

The RUBENS architecture (see picture) combines adaptability in the content delivery with an increased flexibility in the network. The approach mixes QoS techniques such as "Measurement-based Congestion Notification" with end-to-end admission control, variable bitrate encoding and net-

work-based adaptive streaming (using buffering and "deadline/forecast"-driven selection of what to transmit in each hop instead of just pushing video streams). This mixture allows to have a collaborative/multi-layer organization of the scarce network resources to optimize the delivery. Each of these layers also has parameters that can be tuned to handle network congestion (e.g. forecasting longer beforehand to allow to better optimize the network load, or lowering video quality).

However, we do not only consider video streaming as one service, but also as a plurality of applications. Indeed, current services such as live sport broadcast and feature-movie VoD, future forms of personalized TV (e.g. profile-based), and differently marketed services (for instance pre-paid wholesale VoD) all have different requirements for QoE. In case of congestion, RUBENS makes an intelligent intersection between network, subscriber and content-related policy to mitigate the resource shortage.

The project has evaluated these aspects at an architectural (evaluating if the co-existence of the technology theoretically fits with the pre-defined RUBENS use cases) and practical level (through simulations on the behaviour of individual aspects, and a demonstrator functionally integrating proof-of-concepts of the core features).

## Impact

The RUBENS project brings together 9 key European players out of 6 countries in a collaborative research project, to pave the way for future broadband services.

Future multimedia content will come from various places across the global Internet, but all will have to pass through the access and edge network. The access and edge network hence represents a unique position to provide generic value-added services, which improves the role of the network access provider in the value chain. With the largest European providers and the market leader for triple-play in the same consortium, RUBENS is well placed to introduce the resulting new product solutions into the market.

## About Celtic

Celtic is a European research and development programme, designed to strengthen Europe's competitiveness in telecommunications through short and medium term collaborative R&D projects. Celtic is currently the only European R&D programme fully dedicated to end-to-end telecommunication solutions.

**Timeframe:** 8 years, from 2004 to 2011

**Clusterbudget:** in the range of 1 billion euro, shared between governments and private participants

**Participants:** small, medium and large companies from telecommunications industry, universities, research institutes, and local authorities from all 35 Eureka countries.

## Celtic Office

c/o Eurescom, Wieblinger Weg 19/4,

69123 Heidelberg, Germany

Phone: +49 6221 989 405, e-mail: office@celtic-initiative.org

www.celtic-initiative.org

