

## CONVINcE

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Project ID: C2013/2-1

Start Date: 1 September 2014

Closure date: 28 February 2017

### Partners:

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EXFO, Finland  
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Lund University, Sweden  
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Orange, France  
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### Project Website

<https://www.celticplus.eu/project-convince/>

<http://convince.wp.tem-tsp.eu/>

## Consumption Optimization in Video Networks

CONVINcE addresses the challenge of reducing the power consumption in IP-based video networks with an end-to-end approach, from the Head End where contents are encoded and streamed to the terminals where they are consumed, embracing the Content Delivery Networks (CDN) and the core and access networks. Energy saving is a key challenge for the European Union and the CONVINcE project contributes to win this challenge. CONVINcE helps the European industry to develop new solutions and products reducing the energy footprint of video delivery networks. The double effect gained is to reduce the energy consumption in Europe and to boost the competitiveness of the European industry in the area addressed by the CONVINcE project.

### Main focus

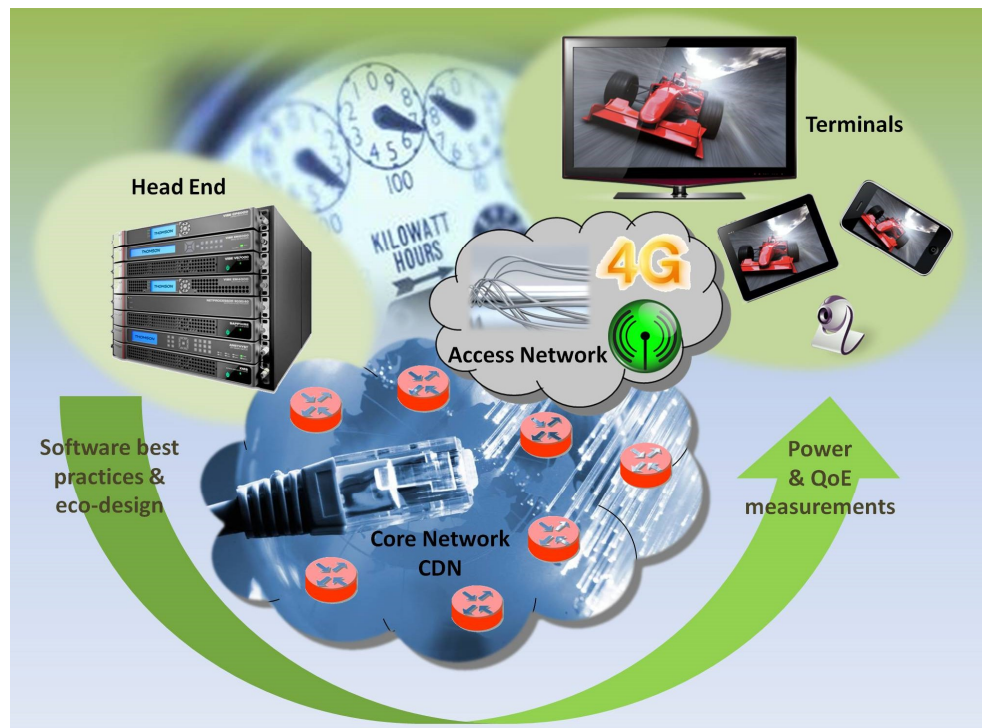
The ICT carbon footprint is expected to exceed carbon footprint of air travel by a factor of two before 2020 and Internet traffic is definitively driven by video. Furthermore, should people not be convinced of the necessity to reduce carbon dioxide emission, they will need to react to the

economic aspect of the problem coming from the increase of the price of electricity.

Optimizing and reducing the end-to-end power consumption in IP-based video distribution networks from the Head End to the terminal is the main focus of the project. Some results on the Head End and terminals may however be applied to traditional broadcast networks (terrestrial, satellite and cable) as well.

The project addresses a wide range of areas and technologies encompassing the following components and functionalities:

- ◆ Video encoding and transcoding,
- ◆ Adaptive bit streaming,
- ◆ Core/metro networks,
- ◆ Access networks, 4G
- ◆ Content Delivery Networks (CDN),
- ◆ Routing protocols,
- ◆ Software Defined Networks (SDN),
- ◆ Set Top Boxes (STB),
- ◆ Fixed and mobile terminals.



In order to correctly address its main focus, the project will also have to run some transversal activities, which are software best practices & eco-design as well as power and Quality of Experience (QoE) measurements.

## Approach

CONVINcE addresses the challenge of reducing the power consumption in IP-based video networks with an end-to-end approach, from the Head End to the terminals, also considering the core and access networks. The partners' efforts will concentrate on architectures, hardware and software design, protocols and basic technologies in the devices. In parallel to these activities focused on optimizing the power consumption in each part of the system, the project will run transversal activities on "Software best practices & Eco-design" and "Power & QoE measurements". The project also considers the use of new technologies recently suggested for energy savings in the form of Software Defined Networking (SDN) associated with Network Function Virtualization (NFV).

The CONVINcE project is built on three strong pillars (so-called workpackages) investigating power saving in the Head End, in the networks and in the terminals. In order to ensure an end-to-end approach for energy saving, another workpackage is fully dedicat-

ed to system architecture, power optimization & related business cases. Results coming from these four workpackages are providing input to a fifth workpackage in charge of building demonstrators and developing new tools for QoE and power measurements. Finally, results of the project are disseminated and exploited through standardization, publication and demonstration activities.

Three architectural solutions are studied in the project: non-cloud-based architecture, edge-cloud based architecture and SDN/NFV based architecture. The goal is to compare energy consumption in these three approaches and then deduce recommendations.

Based on this approach, it is expected that the project answers fundamental questions regarding the end-to-end energy saving while guaranteeing to the end-user similar QoE with different architectures.

## Main results

Project's results will be visible through demonstrators targeting tests where the conclusions will be made public to disseminate the best practices in the domain. It is also the intention of the project to push the expected results to standardization bodies. The main result of the project is the optimization of the energy consumption when delivering and consuming

video over IP-based networks. The efforts are based on hardware and software architectures (in particular on emerging paradigms such as edge-cloud), protocols, basic technologies in the devices as well as measurement tools with a constant care to reduce the end-to-end consumption.

The CONVINcE project addresses the following areas and technologies: Video encoding/transcoding, adaptive bit streaming, core/metro networks, access networks, CDN, edge-cloud, SDN/NFV, routing protocols, fixed and mobile terminals, software best practices & eco-design, power & Quality of Experience measurements.

Other important results are the optimization of products and routing protocols as well as new architectures supporting the reduction of energy consumption. New and improved QoE & power measurement tools making possible efficient trade-offs between these two parameters will be also proposed.

## Impact

The business impact of the project is mainly in form of new products, protocols and services designed from the beginning with aggressive power-reduction targets, contributing thus to the common energy reduction goal set by the European Commission. It is also expected that CONVINcE enables the creation of partnerships among the participants and accelerate joint solutions offers. The reduction of the consumption of network equipment is a differentiating factor that the European industrials and SMEs will be able to use the technical excellence of the solutions emerging from the results of the CONVINcE project.

Other important results expected from CONVINcE are scientific publications and reports. Important IEEE and ACM journals and conferences are targeted for the dissemination of the future results. An alternate source of dissemination will be in form of open workshops and public demonstrations for presenting the prototypes developed by the CONVINcE partners.

Last but not least, CONVINcE partners are expecting to push results of the project to standardization bodies such as 3GPP, IETF, ITU-T, ETSI, ISO, IEC, VQEG, DVB and MPEG.

## About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new „Smart Connected World“ paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organizations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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