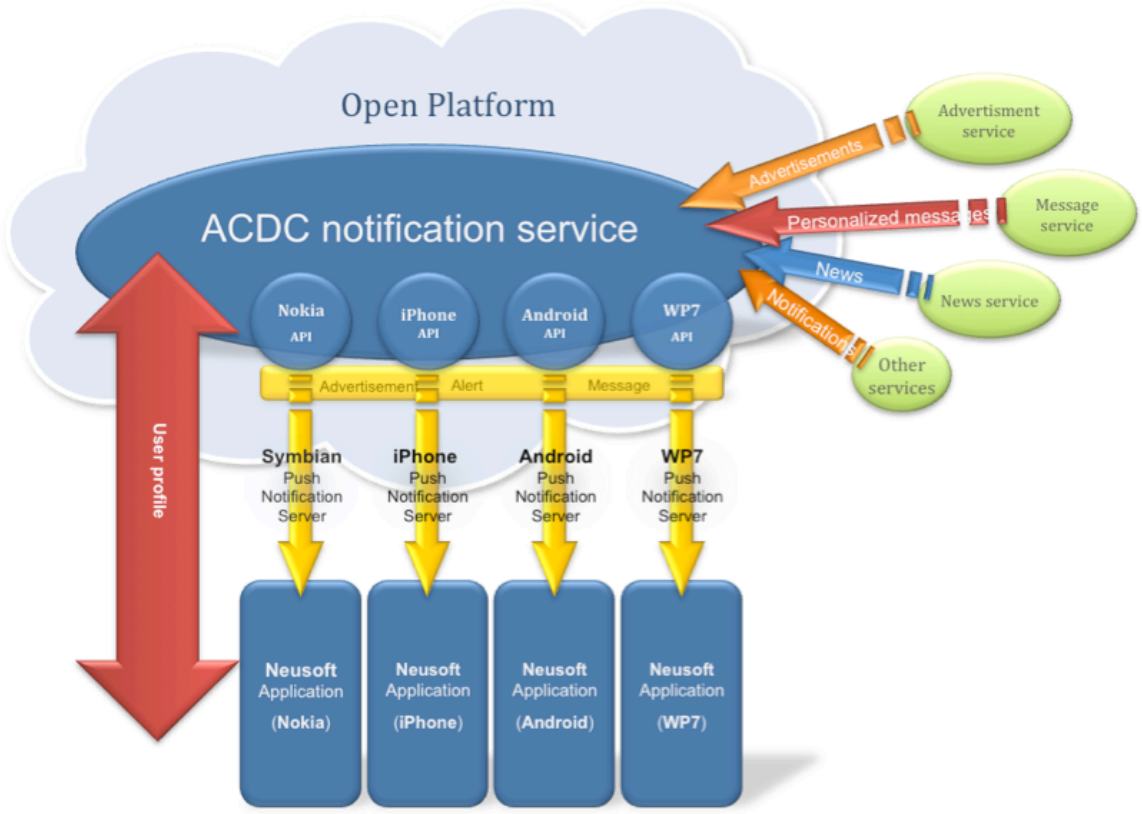
ACDC project NEWSLETTER N° 2

Notifications from the cloud

Neusoft Mobile Solutions has developed cloud based ACDC notification system in the ACDC project. In the following article, technology, market relevance and connections to cloud and TV services are explained in more detail.

The system is based on the push notification technology. Like the name suggested, technology is used to push content on the end user's mobile device. Before push technology device was capable only to pull content, which is insufficient in many ways. Still the pull technology is needed because the pushed data amount is very limited. Push notification can be seen as wakeup call or service initiation for the applications on the mobile device. Currently all the major mobile phone platforms, such as iOS, Symbian, Android and Windows Phone, are supporting the push notification technology. However, the implementation and the supported features will vary on the different platforms.

As already stated, that push technology is existing technology and in itself doesn't provide anything new. In the ACDC project we have built novelty to the standard push technology with utilizing cloud services in a new ways.



Overall architecture of the notification system

Editor – Patrick Blandin, Centre Henri Tudor, Luxembourg

The starting point is that we have a generic client application for the each mobile platform. Generic clients' functionality can be extended depending on the current use case scenario. On the server side we have cloud-based service which is capable for sending notifications to one-to-many devices or platforms. However, the service side is extended in a new way regarding the user profile. The user profile information is stored in Open Platform (more info on Cam4Home ITEA project & platform is available at: http://openplatform.cam4home.fi/documentation) and not on the push server. User profile can contain much more than just basic information of the user. Profile can contain use preferences or information about different kinds of media (videos, pictures, web content) which user has consumed.

Traditionally the push messages have been sent to certain persons or users registered to certain service. In many case, especially from advertisement point of view, this is not versatile enough. In our solution we can take advantage of user profile information. Let's take for an example a TV channel. TV channel offers a mobile application which utilizes our notification solution and it's linked to open platform. The mobile application can contain for example features like program guide, previews and news. There exist thousands of registered users and advertiser wants to send targeted advertisement to specific users. Now the advertiser needs only to specify the target keywords for example cooking for the advertisement campaign. The notification services will send the notification containing advertisement only for people who have consumed cooking programs or they have in their preferences something related to food or cooking. Linking the user profile to the notification service will automatise the targeted advertising. This will naturally boost the advertisement campaign. Also the user experience of the TV channels mobile services will increase because users get only advertisements which they are likely to be interested in.
The above-mentioned scenario was just one example, but from the business wise it is the most important. Advertisements are the most important income source for the TV channels. However, there is no need to limit the notification for advertisements use only. TV channel itself could use the notification solution for sending news on messages related to certain programs based on the user profile. For example if the tomorrows Top chef is delayed because of the ice hockey game notification can be send to people who have watched Top chef before. This kind of new services will increase TV watcher loyalty to TV channel or attract new watchers to the TV channel.
…And in the end more watchers means more advertiser will be interested in the TV channel.

Lauri Lehti - Neusoft, Finland

MPEG DASH standard

Thomson Video Networks has been involved in the standardization of MPEG DASH following several ISO/IEC JTC1/SC29/WG11 meetings. This work has been concluded by the ratification of ISO/IEC 23009-1 standard (Dynamic adaptive streaming over HTTP (DASH) – Part 1: Media presentation description and segment formats), beginning of 2012. Then in a second step whereas first implementations of the standard were ongoing, standardization work has continued with following parts:

- Part 2 – Conformance and Reference Software
- Part 3 – Implementation Guidelines
- Part 4 – Format independent segment encryption and authentication

All these activities have a common target to ensure quick and efficient adoption of the standard by the industry.
In parallel, Thomson Video Networks joined the first group of companies that founded the DASH Promoter group. This group of content provider, network operator, end customer device and SW and encoder vendors aims at organizing promotional events and defining operation points to ensure proper interoperability.

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The first feedbacks on market adoption for this new standard are very encouraging and we can anticipate in the coming years a reduction of the market fragmentation we have today in the video streaming arena. The first MPEG DASH Demo Thomson made during NAB 2012 was done in coordination with MPEG DASH Promoter group activities.

Olivier Dumas – Thomson Video Networks, France

MPEG DASH (Dynamic Adaptive Streaming over HTTP) is an ISO Standard (ISO/IEC 23009), ISO/IEC 23009-1 (part1), which was finalized by early 2012. As the name suggests, DASH is a standard for adaptive streaming over HTTP that has the potential to become a unified standard (one set of produced files would play on all DASH-compatible devices), and to replace existing proprietary technologies like Microsoft Smooth Streaming, Adobe Dynamic Streaming, and Apple HTTP Live Streaming (HLS).

The previously mentioned DASH working group has industry support from a range of companies, with contributors including critical stakeholders like Apple, Adobe, Microsoft, Netflix, Qualcomm, and many others.

ACDC project demonstrators to be shown at ITEA and ARTEMIS Co-summit 2012

Demo N°	*Title*	*ITEA2 Symposium*	*Poster for ITEA2 symposium*	*Final Review*	*Demo Leader*	*Partners*
1	Broadcast Content Delivery	yes	yes	yes	**BCE**	**Basari Mobile** **TVN** **VTT**
2	Non linear Content Delivery	yes	yes	yes	**BULL**	**AGMLab** **HPC Project** **IT ParisTech** **Kewego** **NDS** **University of Oulu**
3	HbbTV Cloud services	Ppt slides	no	yes	**SOFIA**	**Neusoft** **University of Oulu**
4	Semantic gaming recommendations	yes	yes	yes	**VTT**	**Henri Tudor** **Sanoma** **University of Oulu** **VTT**

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ACDC-NextMedia International Workshop - report

A common workshop between project ACDC & NextMedia Finnish programme was organised on 3rd April 2012, at VTT, Vuorimiehentie 3, Espoo, Finland.
The theme of the Workshop was defined around « Cloud, Semantic and Service Computing Technologies for Media and Entertainment »
The emergence of cloud, semantic and service computing technologies is strongly affecting the business models and ICT infrastructure of media and entertainment industry. The joint international workshop of the ITEA2-ACDC (European collaborative project) and NextMedia (Finnish national research programme) includes interesting presentations on topics relevant in the on-going technological and business model transformation of media and entertainment sector.

Workshop schedule & programme:

10.00 – 10:10 Workshop Introduction
Daniel Pakkala, VTT, Finland
10.10 - 10.30 ACDC a Virtual Approach to Video Delivery
Patrick Schwartz, Thomson Video Networks, France
10.30 - 10.50 Next Media: Transforming the Media Experience onto Digital Platforms
Eskoensio Pipatti, Sanoma News Oy, Finland
10.50 - 11.20 Movie2me ACDC
Sascha Quillet, BCE/RTL, Luxembourg
11.20 - 11.40 eReading as Part of Media Business
Kristiina Markkula, Finnmedia (The Federation of the Finnish Media Industry), Finland
11.40 – 12.00 Content Based Content Recommendation for the Movie Domain on the Cloud using CAM4Home Services
Serra Sinem Tekiroglu, AGMlab, Turkey
12.00 - 13.00 Lunch Break
13:00 – 13:30 Semantic Recommendations in Web Gaming
Kenneth Falck, Sanoma News Oy, Finland, Timo Hintsa, VTT, Finland
13.30 – 13:50 Event Management
Janne Saarela, Profium Oy, Finland, Caj Södergård, VTT, Finland
13.50 – 14:20 Advanced 3D Video Processing for Cloud Infrastructures
Raffaele Gaetano, Institut Telecom, France
14.20 - 14.50 Coffee Break
14.50 – 15:10 The New Anatomy of Local News - Faster, Better, Cheaper
Janne Kaijärvi, HS Kaupunkilehdet / Sanoma News Oy, Finland
15.10 – 15:35 ACDC Cloud Experience: Building a Distributed Infrastructure for Optimized Video Delivery
Etienne Walter,Bull, France, Claudine Pelegrin-Bomel, Bull, France
15.35 - 16.00 Cloud Services in Hybrid TV Concept

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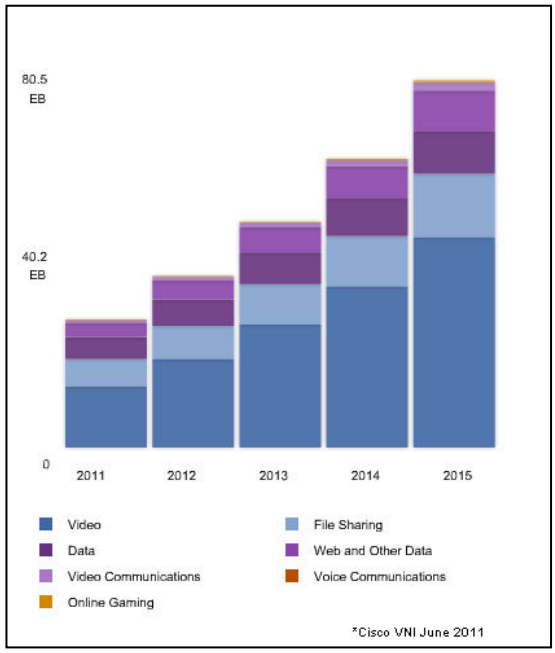
Mika Kanerva, Sofia Digital Oy, Finland
16:00 End of the workshop

Building blocks for an efficient video delivery

The present article provides a synthesis of the presentation done during ACDC / NextMedia Workshop in Espoo (Finland); its aim is to present our current approach in ACDC, specifically in WP2 and MUC2, to define and build the adapted infrastructure for tomorrow services delivery.

A tremendous growth of the Internet Traffic, pushed by video delivery

As the internet is more and more easily available everywhere – through mobile or landline networks – and the the video usage becoming more and more common, the bandwidth usage is increasing with a tremendous rate:



According to Cisco VNI study, from June 2011, currently representing over 50% of consumer Internet traffic, the video traffic is to reach 62% by end 2015, and even 90% if we consider all forms of video (TV, VoD, Internet and P2P).

Another interesting figure shows the scale of video usage: It is estimated that each day, about 864 thousand hours of video are uploaded on Youtube video servers.

While the usage is growing exponentially, the complexity also is growing, with more and more contents types, more and more devices and usages. Last years appeared for instance new protocols able to cope with varying bandwidth, such as Apple's HTTP Live Streaming (HLS), Adobe with Flash-based Dynamic Streaming, and Microsoft with Smooth Streaming for Silverlight , ….

Such growth show a critical need for efficient video deliver over IP solutions, able to cope with such a challenging future.

Technical stakes

Technical stakes are high and numerous; We shall limit here to three key stakes:

Hardware evolution

Quite obviously, video processing needs processing capacity. And here, in ACDC, we need this capacity for many purposes: for video encoding (up to the delivery video format), semantic analysis and metadata extraction, and also to generate multiview 3D video.

Clearly, we may leverage on the huge progress done on GPU architecture; these architecture, pushed by the gaming market and the 3D visualisation, provide high video processing capacity for a limited price.

This is a quite challenging perspective, but currently it appears that – for the three key GPU providers (AMD, Intel and Nvidia) – the architectures are not published; this implies to use specific libraries or SDK (OpenCL, MS DirectCompute, Nvidia Cuda …). And furthermore, virtualisations hypervisors are today not able to manage GPU resources. For those reasons, GPU haven't been integrated in or ACDC prototype realisation.

About video encoding

One obvious constraint, while dealing with video delivery, is the ability to deliver video at the precise moment the delivery is awaited. Basically, this implies either that the video is previously encoded, with a format adapted to the user's device, or that an almost real time encoding can be performed at delivery time: each solution has some benefits and some drawbacks :

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- Video pre-encoding: video may be transcoded to various formats before viewer asks for video delivery. This is adapted for a limited quantity (depending on pre-encoding & storage capacity & costs)
- On-the-fly video encoding: video can be transcoded on-demand to be adapted to the format demanded by the viewer's device. May require more expensive processing resources, but is adapted to the huge amount of user generated content.

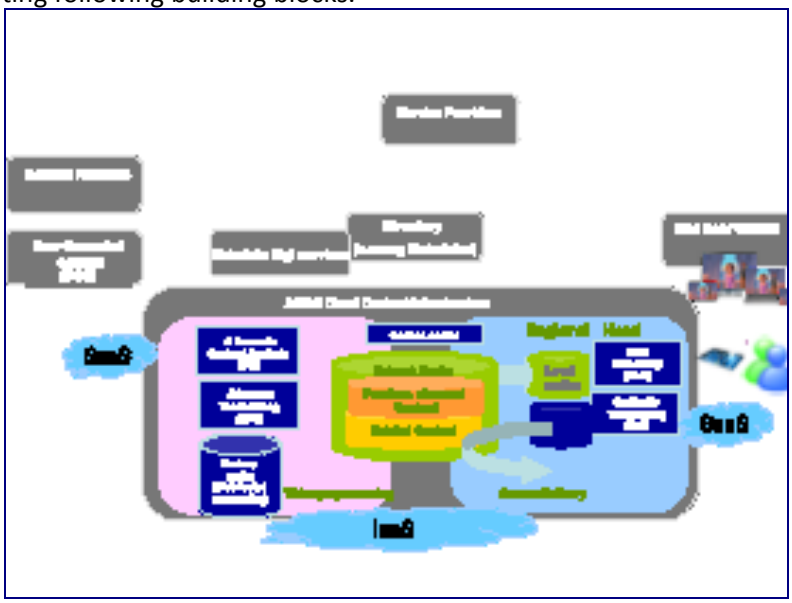
Distributed architecture

- The last stake here is about the distributed nature of video delivery service : video delivery is fundamentally a distributed service : Content providers may be at several point, and the video users may be everywhere, worldwide. And, also, we have to consider following points:
- The video transcoding requires storage capacity near the processing units
- Efficient video delivery requires storage capacity not far from the delivery point (user willing to watch video)
- data storage capacity should be
- highly scalable to store these transcoded videos and avoid useless re-encoding
- distributed and replicated in order to be ready in regional delivery heads, near the end-users
- According to usage, the right mix have to be found between pre-encoding and on-the-fly encoding
- The storage, transcoding capacity and streaming capacity located in regional delivery points represent in fact the Content Delivery Network, which can be either managed by a telco operator (then also called "managed CDN") or outside a telco operator network ((also called then Over The Top (OTT) CDN).

Our ACDC proposal

The following proposal leverage on work done in ACDC WP2, for instance for MUC 2.

Considering the stakes described in previous part, we propose, with ACDC, to build an infrastructure integrating following building blocks.



Storage may be performed at several level :

- on content provider's site for origin content, either for User Generated Content and for more private content.
- within a Hadoop file system – adapted for parallel processing – while being pre-processed
- within a cloud storage system, leveraging on OpenStack Storage, allowing an easy replication , and therefore an easy data distribution: OpenStack Storage can implement a replication loop, with replicated instances within each the regional heads.

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- within regional delivery buffers & file system (in CDN), before end-user delivery (and potentially following on-the-fly encoding)

Processing infrastructure, combines

- a SaaS (Software as a Service) approach : Services can be performed on demand, either pushed by the service provider or pulled by the end-user video delivery demand.
- an IaaS (Infrastructure as a Service) approach: resources can be allocated and de-allocated – for gloal and regional tasks - according to the current workload
- These processing resources can be either
- distributed, dedicated to video delivery, and therefore allocated to a regional head, constituting the CDN
- centralized, and for instance dedicated to pre-processing and semantic content analysis.

Real world system would also require additional tools, for instance

- to define and manage adapted data replication policies,
- DRM system

these points haven't been addressed withing ACDC project; they should be realized on demand or may be addressed by further projects.

As a conclusion, we can stress the fact that media delivery over IP, such as IP TV, is a disruptive force, with usage and technical revolutions still going on.

We hope the hybrid strategy proposed here, combining central (& push) together with a distributed (& pull) approaches shall contribute to build an adapted ecosystem permitting key actors such as service providers to face tomorrow's challenges.

Etienne WALTER, with Claudine PELEGRIN
and Victor KAHALE – Bull, France

ACDC Project publication within ITEA Magazine N° 12 – April 2012

Project showcase • ACDC

Pulling TV adaptability out of the cloud

ITEA 2 project ACDC is exploiting cloud computing to develop a virtual infrastructure for the adaptation of digital TV signals for more cost-effective distribution of multimedia programming. Broadcasters and network operators will be able to buy services as required rather than having to invest in dedicated equipment, while end users will have access to a wider range of programming on an open platform.

ACDC
ITEA 2 09008

Patrick Schwartz
Project leader,
Thomson Video Networks

Partners
AGMLab Information Technologies
Basari Mobile
Bull
Centre de Recherche Public - Henri Tudor
HPC Project
Institut Telecom
KEWEGO
NDS Technologies
Neusoft Mobile Solutions
RESONATE-MP4
RTL BCE
Sanoma News
Sofia Digital
Thomson Video Networks
University of Oulu
VTT Technical Research Center

Countries involved
Finland
France
Luxembourg
Turkey

Project start
June 2010

Project end
November 2012

Website
www.acdc-itea.org

Increasing interchange of digital multimedia means TV broadcasters and operators need to scale their infrastructure to adapt content and distribute programmes. Each broadcaster and operator has to buy its own dedicated infrastructure to encode, process and deliver content for its specific networks and end users. Cloud computing offers an investment alternative, especially for the many feeds that do not need to be encoded in real time. Films, documentaries and even news reports can easily be encoded offline.

"For such contents we can imagine a new business model which will make it possible to mutualise the cost of the infrastructure for the operators by providing pay-per-use encoding, decoding or transcoding services, rather than having their own infrastructures," says Patrick Schwartz, project leader for Thomson Video Networks. "Thanks to cloud-computing infrastructure, broadcasters can ask for transcoding of content and customise delivery to the end user."

NEW BUSINESS MODELS AND VALUE CHAINS

ACDC investigated and experimented with new business models and value chains based on cloud-computing infrastructures combined with contextual semantic information for new services. Use of mutualised infrastructures drastically changes the business model from a capital-cost to an operating-cost basis, reducing the initial capital investment costs, meeting the growing demand for live and file transcoding services, while encouraging the arrival of newcomers to the digital-content delivery business.

The main technological challenges were:

- Leveraging cloud computing for multimedia content management;
- Enabling automatic metadata generation and collection of multimedia contents; and
- Developing a service platform based on a software-as-a-service model, allowing use of hosted contents and semantic information for contextual services.

Major innovations include automatic and scalable content processing for content input, adaptation and storage. The resulting open platform will enable service providers and network operators to aggregate multimedia content, adapt it and deliver it in the correct format for different network topologies and devices.

ACDC involves three layers altogether:

1. The cloud layer for sharing infrastructure;
2. The service platform allowing implementation of software as a service for the different processes, such as transcoding; and.
3. An application layer meeting the different implementation requirements.

The service platform establishes an extension to an existing open platform developed in the ITEA CAM4HOME project with new functionalities. For example, users wanting to receive a specific video or item of music can use a recognition service with personalisation based on semantic technology in a similar way to CAM4HOME but with new semantic functionality. Both Finnish and Turkish partners worked on the semantic requirements for recommendations. In addition VTT, Finland has been particularly in charge of the design and implementation of the service platform and user aware services.

This project also makes it possible to take advantage of a new generation of graphical processing units(GPUs) which prove to be much more efficient for some video-encoding algorithms. Institut Telecom studied two advanced video algorithms, comparing their hybrid and multi-core implementations to know which is better in what circumstance.

MANY TYPES OF APPLICATION ENVISAGED

Applications are legion. A typical use case involved media and communications services specialist Broadcasting Center Europe (BCE) – a subsidiary of RTL – and Thomson Video Networks. The principle was to retrieve programme content in a file-based work flow – for example a film from Hollywood on high speed data links. The content is retrieved by BCE and sent to the cloud where the transcoding process takes place. The broadcaster can then retrieve the file, which has been adapted according to the characteristics of its relevant distribution network.

BCE is installing lots of systems like this for exchanges with FremantleMedia, Hollywood and European broadcasters; it is also used for example in sharing news over the European News Exchange (ENEX). The Movie2Me system – BCE's high-speed content distribution tool – offers a low cost, secure Internet-based global tapeless file distribution system ingesting contents in the Cloud where transcoding services are processed and implemented on Thomson Video Networks VS7000 Unified Platform.

ACDC offers a mix of specially developed software and new infrastructure. For example some of the Thomson Video Networks use cases exploit unified platforms VIBE VS7000, located inside the cloud for process services such as transport and encoding. Other use cases involved software running on existing hardware such as the Bull high performance computer cluster used for many ITEA projects. Several project partners are testing new algorithms using GPUs inside this infrastructure.

"We can already see exploitation starting," says Schwartz. This includes BCE's file-based workflow, a unified platform from Thomson Video Networks which has been installed in several operator locations for web TV applications, and Bull's deployment of cloud solutions to enable on-the-fly adaptation and streaming of IPTV content towards end users.

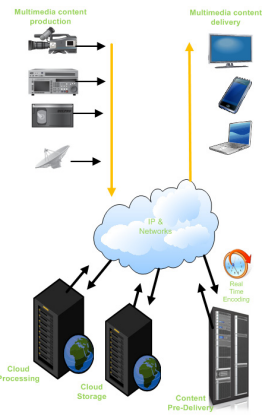
DEVELOPING A GLOBAL LEAD IN A COMPETITIVE MARKET

Cloud computing is global, so the market is highly competitive with similar solutions emerging in the USA. However Europe still has a lead. "The main difference is that in this project we have semantic services with recommendations on top of the cloud services," points out Schwartz. "We also have some new systems such as the HADOOP system and OpenStack Object Storage used by Bull, HPC project and University of Oulu for this project prototypes.".."

The ACDC approach involves distributed processing and offers a new way to address IPTV and web TV applications. It also enables distributed solutions based over several nodes. The final demonstrator involves a ViBE VS7000 transcoder in Rennes in France, a link to BCE in Luxemburg with programme contents coming from Hollywood, and all this controlled from Finland.

ACDC worked with earlier ITEA projects such as CAM4HOME, with the Artemis SMECY project on GPU implementation and with the national NextMedia project in Finland. A follow up ITEA project on content protection, bandwidth management and use of cloud computing for distribution management will also start soon.

MORE INFORMATION:
www.acdc-itea.org



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ACDC Project article disseminated towards French cluster ''images and networks'' (published at http://blog.images-et-reseaux.com/la-television-dans-le-nuage-avec-acdc/04/2012/)

LA TÉLÉVISION DANS LE NUAGE AVEC ACDC

Le projet ACDC réunit pas moins de 16 partenaires de quatre pays différents autour d'une même ambition : utiliser le cloud computing pour proposer une approche virtuelle de la distribution de contenus audiovisuels.

« La demande pour de nouveaux contenus augmente sans cesse, et pour tous types de terminaux : télévisions, smartphones ou tablettes. Ce qui impose de générer toujours plus de flux vidéo. Chaque opérateur ou diffuseur de télévision doit adapter les formats aux différents types d'écrans, de réseaux et de modes de distribution comme par exemple le streaming« , explique Patrick Schwartz, chef de projet pour Thomson Vidée Networks.

« Notre idée, c'est de mutualiser les équipements et de proposer les fonctions d'encodage et transcodage sous forme de service. ACDC fournit des ressources pour traiter les contenus à la demande et stocker les fichiers prêts pour la diffusion. Les films, les documentaires, les séries et la publicité peuvent être codés à la demande et mis à disposition dans le cloud. »

ACDC propose donc un changement radical de modèle de diffusion, avec un service « *pay per use* » aux avantages évidents : il couvre toute la gamme des formats utilisés et il offre une souplesse maximale. Par exemple, il permettra de faire face à un surcroît ponctuel de la demande, ou il facilitera l'émergence de nouveaux acteurs proposant des contenus ciblés.

L'autre dimension du projet ACDC concerne directement l'utilisateur final : *« ACDC propose également une plateforme de services basée sur les technologies sémantiques. Cette plateforme profite de la connaissance de tous les contenus prétraités à disposition pour émettre des recommandations aux utilisateurs en fonction de leurs préférences, du type de terminal qu'ils utilisent, ou de leurs habitudes de navigation. Chacun consommera ce qui l'intéresse, à la demande. »*

Lorsqu'il a commencé à germer dans la tête de ses initiateurs, en 2009, le projet ACDC pouvait paraître futuriste. Il n'en est plus de même, aujourd'hui : *« On voit apparaître ce type de services pour les contenus autoproduits, mais pas encore pour de la qualité professionnelle. ACDC est capable de traiter des contenus en haute définition et à haut débit. L'évolution des marchés nous conforte dans notre idée de départ, même s'il faudra un certain temps pour convaincre les opérateurs et diffuseurs de télévision. »*

Le projet n'est pas encore terminé qu'il se profile un prolongement. Le projet ICARE, également emmené par Thomson Video Networks et labellisé Images & Réseaux, profitera des avancées réalisées par ACDC pour compléter l'édifice par d'autres briques, telles que la protection des contenus et une gestion plus fine des bandes passantes.

ACDC en bref

Projet du programme ITEA2. Démarrage : juin 2010. Fin du projet : Novembre 2012. Il réunit 16 partenaires situés en Finlande, France, Luxembourg et Turquie : AGMLab Information Technologies, Basari Mobile, Bull, Centre de Recherche Public – Henri Tudor, HPC Project, Institut Telecom, KEWEGO, NDS Technologies, Neusoft Mobile Solutions, RESONATE-MP4, RTL BCE, Sanoma News, Sofia Digital, Thomson Video Networks, University of Oulu, VTT Technical Research Center.

Voir le site ITEA/ACDC

http://blog.images-et-reseaux.com/la-television-dans-le-nuage-avec-acdc/04/2012

ACDC Project news and forthcoming Milestones

The ITEA and ARTEMIS Co-summit 2012 will be held on TUESDAY 30 & WEDNESDAY 31 OCTOBER 2012, at the CNIT Paris La Défense in Paris, France.

ACDC project will present a set of 4 demos there.

ACDC Final Project Review will be organised on November 21st at BCE (RTL Group) partner premises, Luxembourg (the 20th of November will be for rehearsal between project partners, second day will be for reviewing the project with reviewers and ITEA 2 Office board representatives)