

Hybrid Television

Use Cases and Business Models proposed by the H2B2VS project

A position paper for the Fourth W3C Web and TV Workshop

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Abstract

This paper addresses the Use Cases and Business Models generated by the Celtic-PLUS H2B2VS project.

After a brief presentation of the project and its challenges, the different classes of Use Cases identified by H2B2VS are introduced. Business Models are then detailed and an association between the Use Cases and the Business Models is proposed.

Introduction

Broadcast networks and the current video compression standards have a limited capacity that does not allow considering easily the introduction of new services such as 3D or Ultra-HD which are bandwidth-demanding, even with new compression standards. Their limited capacity is an obstacle to adding new services associated with the broadcast programs. The lack of interactivity on this kind of networks is also an important problem for the development of new services.

Broadband networks are suffering as well from a limited bandwidth and difficulties to guarantee the Quality of Service. However, the interaction provided by these networks is necessary for the implementation of added-value services.

The Celtic-Plus H2B2VS¹ project proposes an hybrid solution to cope with the problem of limited bandwidth on both networks by using the Broadcast network to transmit the main information and the Broadband network to transmit the additional information which can be personalized and even interactive.

The H2B2VS project

Started in January 2013 for a duration of 33 months, H2B2VS is a Eureka Celtic-Plus project. It aims at investigating the hybrid distribution of TV programs and services over Broadcast and Broadband networks. The technology used for the contents compression is the future video coding standard: High Efficient Video Codec (HEVC).

Coordinated by Thomson Video Networks, the consortium has 21 partners. The project is partially funded by Finland, France, Spain, Switzerland and Turkey.

The project is organized around five Work Packages (WP). The goal of the first one is to study Uses Cases and Business Models. WP2 is dealing with the technologies to be adapted in order to allow HEVC hybrid distribution. All these technologies are integrated in WP3 to build demonstrators which are used by WP4 in public demonstrations as a basis for the communication of the project. The deployment of a hybrid solution as proposed by H2B2VS will not be a success without contribution to standards. One of the major outcomes of WP4 is also its contribution to the relevant standardization bodies. Last Work Package, WP5, is fully dedicated to the management of the project.

¹ H2B2VS stands for « HEVC Hybrid Broadcast Broadband Video Services ». For more information, please, visit: <http://h2b2vs.epfl.ch/>

Challenges

One of the major technical challenges the project has to face is the difference in the Quality of Service encountered on these two types of networks. On Broadcast networks, all parameters are fully controlled by the operator. In contrast, on Broadband networks based on IP technology, parameters such as delay or jitter may be not fully mastered, if not on a managed network (e.g. Internet).

Synchronization between the two networks is also a key issue to be solved. H2B2VS is very active in standardization bodies – mainly MPEG and DVB – aiming at finding a consensus for the synchronization of the Broadcast and Broadband networks, consensus which would favour the introduction of new hybrid services.

Use cases

In the first year of its life, the project defined Use Cases and Business Models where the use of the hybrid and HEVC technologies would lead to new services. The result was the definition of four classes of Use Cases:

- Picture quality improvement: Basically, the Broadcast network carries an HD program and additional data is sent over the Broadband network to allow the display of an enhanced picture. Several enhancements are proposed. Most obvious are those which allow the display of 4K or 3D pictures. However, studies done by the project are targeting also High Frame Rate (HFR), High Dynamic Range (HDR) and Wide Gamut. Where relevant, scalable approaches are considered.
- Customized TV: The Broadband network is used to increase the experience of the end user watching a basic broadcast program. Trick modes close to those available for Video on Demand or additional audio services² are some examples. Programme personalization is also envisaged: The end user would be able, for instance, to choose the end of a drama among several scenarios³ or to select in a Formula 1 race the car the picture comes from⁴. Personalized advertising conveyed by the Broadband network and inserted in broadcast programs is an interesting Use Case because it would allow targeting the advertising as it is done today on the Web. Educative applications for disabled or young people who are stuck in hospitals during long periods are also falling into this class of Use Cases.
- Picture in Picture & 2nd screen: Several Use Cases are dealing with the display of alternate/additional contents conveyed by the Broadband network, either on the main screen or on the companion screen. The end user can follow-up another programme coming through the Broadband network and displayed in a “Picture In Picture” (PIP) way, without the need for a second tuner. The PIP picture can also be the sign language translation of the main programme coming through the Broadcast network. Second view social sharing and alternate content to the main programme are of course Use Cases that are envisaged by the project. Live betting is also considered in this class of Use Cases. While watching a main broadcast programme – typically a horse race – the end user can bet through the Broadband network.
- Network improvements: It is also envisaged to use the Broadband network to relieve the Broadcast network. For example, when a severe outage occurs on a satellite reception, the Broadband network can take over to ensure an uninterrupted TV service. To cope with the problem of spectrum scarcity on terrestrial networks, it can be envisaged to off-load the terrestrial network by transmitting programmes with a low audience on the Broadband network, on the basis of dynamic audience measurements⁵.

² Audio quality improvement or multi-languages

³ “Programme personalization” Use Case

⁴ “Multi-camera” Use Case

Regional variations of a national programme carried by the Broadband network can also be a good solution to optimize the use of the satellite or terrestrial spectrum.

Business Models

During the studies of the Use Cases described above, six different Business Models emerged to describe the way the services can be financed:

- Services paid by the end user,
- Services sponsored by commercials,
- Services sponsored by Public Authorities,
- Services paid by the Broadcast network operator,
- Services paid by the TV channel,
- Services paid by the bouquet operator,

These Business Models are detailed on the following figures. The “Service Provider” is kept on purpose as an independent entity. It may however be part of the Broadcast or Broadband network operator or of TV channels or a subcontractor paid by one of these companies.

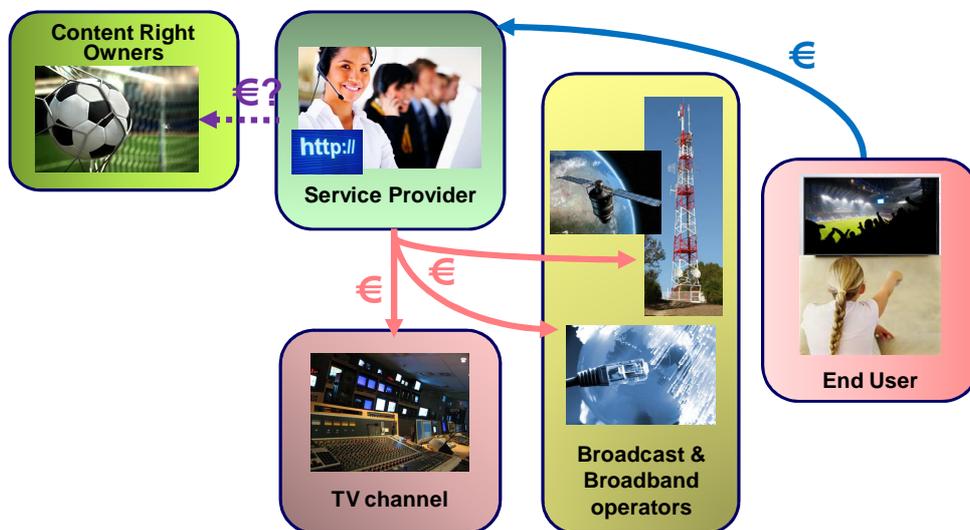


Figure 1 - Services paid by the end user

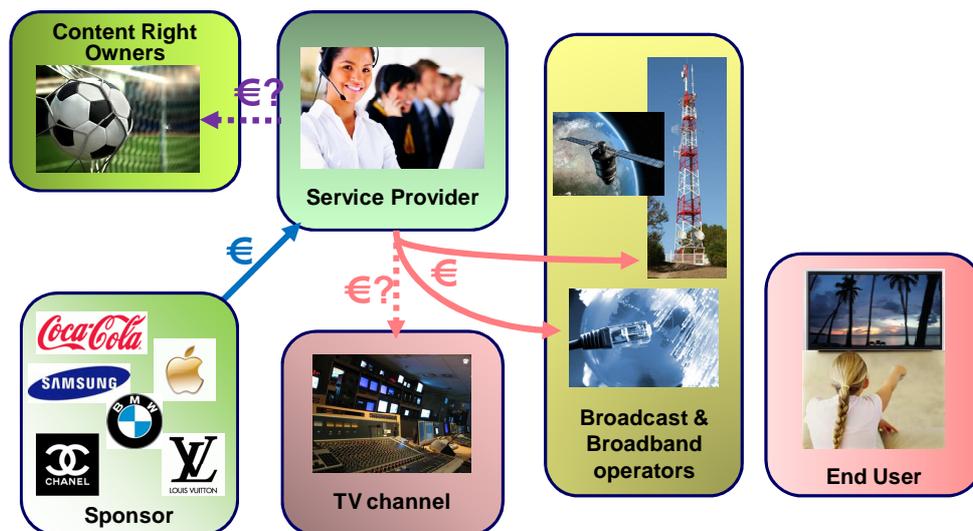


Figure 2 - Services sponsored by commercials

⁵ “Smart Broadcast” Use Case

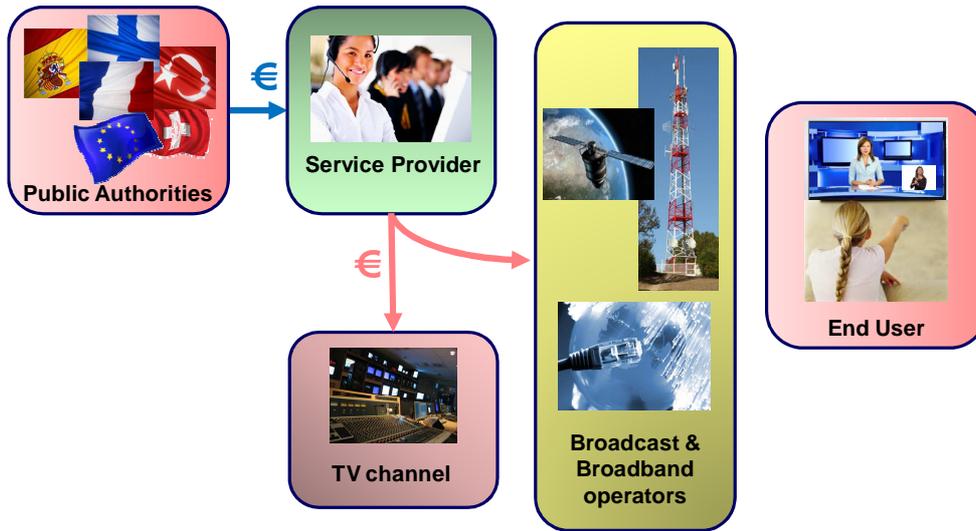


Figure 3 - Services sponsored by Public Authorities

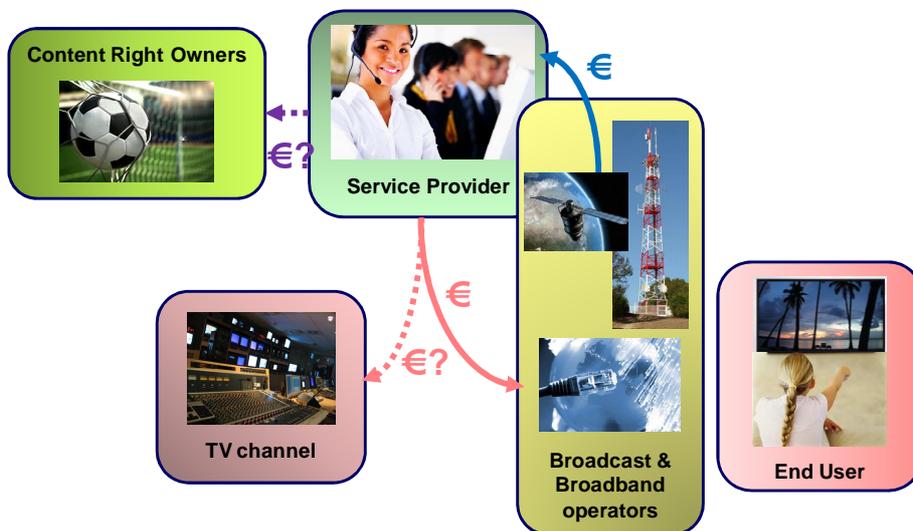


Figure 4 - Services paid by the Broadcast Network Operator

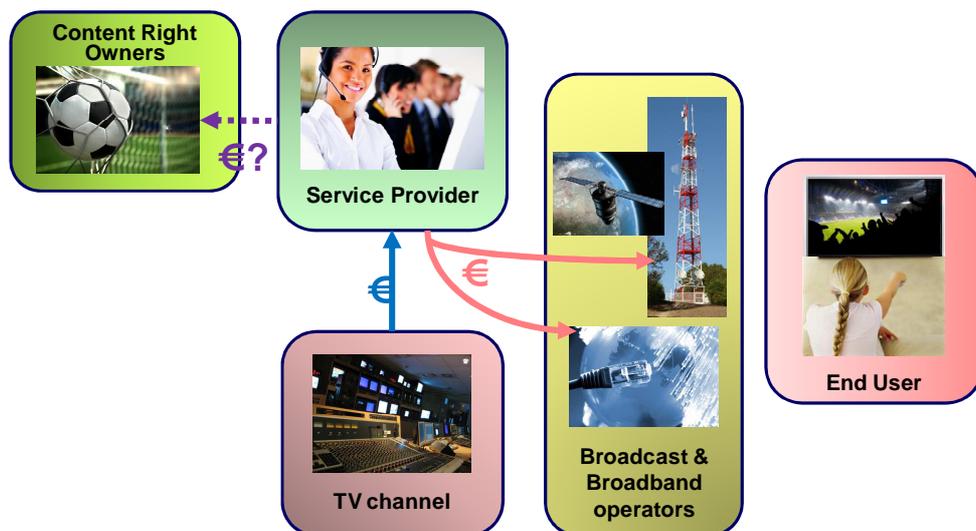


Figure 5 - Services paid by the TV channel

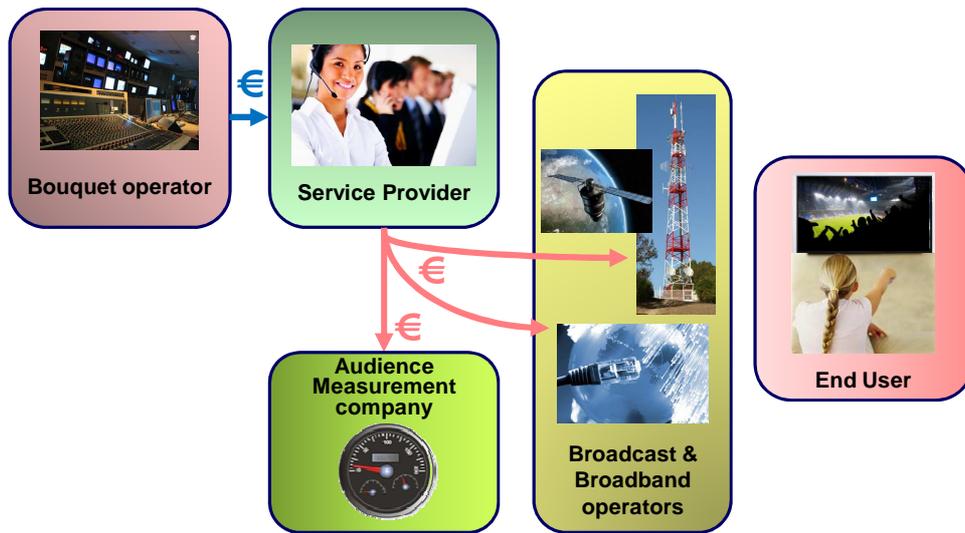


Figure 6 - Services paid by the bouquet operator

This overview of the Business Cases is an early release of the project. The matching between the Use Cases and the Business Models is still under discussion inside the H2B2VS consortium. The following table is thus an early outcome and any feedback - especially from the different actors shown in the figures above - is welcome!

Service	Paid by the End User	Sponsored by Commercials	Sponsored by Public Authorities	Paid by Broadcast Network Operator	Paid by TV channel	Paid by Bouquet Operator
Picture quality improvement	Yes	?			?	?
Additional audio services (quality improvement)	Yes				Yes	?
Trick Modes	Yes	?			Yes	Yes
Multi-camera & Program personalization	Yes	?			?	
Follow-up of another program	Yes					
Live betting	Yes	?				
Alternate/additional content	Yes	?			Yes	
Uninterrupted TV service by switchover or FEC	Yes	?		?	?	?
Personalized advertising		Yes				
Sign language	?	?	Yes		Yes *	
2 nd view social sharing, HEVC social TV		Yes			?	
Educative application for disabled or ill people		Yes	Yes			
Additional audio services (Regional languages)	?		?			
Regional variation of a national program			?		?	
Smart Broadcast Network				?		Yes

* Required by law in some countries