



H2B2VS

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Project Website

www.celticplus.eu/project-h2b2vs

<http://h2b2vs.epfl.ch/>

HEVC Hybrid Broadcast Broadband Video Services

H2B2VS provided close to market solutions for hybrid distribution of TV programs and services. The main video is broadcast as before and enriched with targeted services over the Broadband network (the Internet). The technology used for the contents compression is the new video compression standard: High Efficient Video Codec (HEVC).

Main focus

Up to now, broadcast and broadband networks were separate worlds in the video consumption business. Some initiatives such as HbbTV (Hybrid Broadcast Broadband TV) have built a bridge between both worlds, but its application is almost limited to provide links over the broadcast channel to content providers' applications such as catch-up TV services. When it comes to reality, the user is using either one network or the other! H2B2VS allows now to exploit all the potential of real hybrid networks by implementing efficient synchronization mechanisms and using the new video coding standard: High Efficiency Video Coding (HEVC). H2B2VS hybrid network solution enables value added services with an optimum bandwidth usage in each network.

To address hybrid distribution, the project uses the same approach: A basic video is sent over the broadcast network and additional video or data is streamed on the Internet.

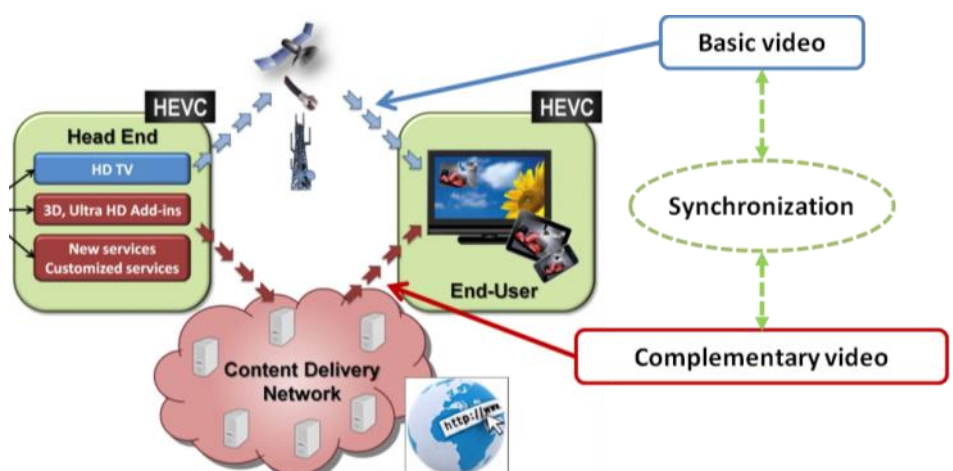
Approach

H2B2VS was built around three "main pillars" in order to make possible practical demonstrations, to contribute to standardization bodies and to disseminate project results in scientific publications. These three pillars are:

- ◆ The definition of the hybrid Broadcast Broadband architecture and its associated use cases,
- ◆ The study of the impact of the hybrid distribution on future technologies,
- ◆ The development of demonstrators to promote the main use cases identified by the project.

The second pillar covered also the development or the adaptation of the following technologies to hybrid distribution:

- ◆ HEVC video encoding/decoding,



- ◆ Content transport and synchronization between Broadband and Broadcast networks,
- ◆ Content Delivery Network (CDN) supporting hybrid delivery,
- ◆ Hybrid terminals,
- ◆ End to end content protection on hybrid networks.

From the beginning of the project, a strong focus on standardization was maintained so that project results could be actually used by the industry.

Achieved results

The project followed an end-user oriented approach, studying about twenty use cases and experimenting ten of them. Several different types of scenarios were addressed by the project.

Picture quality improvement is one of them: 4K pictures can now be displayed by the TV set using a High Definition program broadcast by the terrestrial network and using an enhancement layer sent over the Internet.

The life of handicapped persons can also be improved by H2B2VS technology: Deaf people can receive through the Internet a sign language video of a programme sent over the broadcast channel; the TV set then displays this translation in an inset window that can

be activated only for this user.

Other scenarios are addressing the improvement of the Quality of Experience when failures are encountered on a broadcast network: For instance, when experiencing bad satellite receiving conditions, the hybrid receiver automatically and seamlessly switches to the same program streamed over the Internet.

H2B2VS partners did not stop at developing a technology and test it. They were also very active in standardization: They proposed the "Timed External Media Information" (TEMI) synchronization mechanism to MPEG. TEMI enables to synchronize streams received over different networks with different delays. MPEG standardized this solution and H2B2VS partners stimulated the adoption of TEMI by DVB (Digital Video Broadcasting) and HbbTV.

A few figures to characterize the work done by H2B2VS partners:

- ◆ 10 new products were developed and 9 products were improved, using project's results,
- ◆ 4 patents were filed,
- ◆ 11 Open Source pieces of software were developed or improved,

◆ 27 papers were published in main journals or conferences proceedings.

◆ H2B2VS participated to 9 national or international events

Impact

The project demonstrated its results on the occasion of several national and international events. The last and more important one was IBC 2015 where H2B2VS partners showcased project's result on a booth in the "Future Zone" ([see the H2B2VS project video](#)). It captured the interest of TV broadcasters and networks operators. Several partners are in contact with customers to deploy the technology developed by the project.

One major outcome of the project is the presence of the TEMI timeline in the last release of HbbTV specification (V2.0). It will facilitate the deployment of the services proposed by the project as all the tools to develop "full hybrid" HbbTV applications will be available.

In the very next months after the end of the project, H2B2VS results will appear in several products such as professional video encoders, watermarking equipment, end-to-end content protection systems or hybrid Set Top Boxes.

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 organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

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