

PRESS KIT

4EVER-2 PROJECT



CONCERNING

4EVER-2

From 2012 to 2015, the collaborative project 4EVER was designed to advance French research on standardization of HEVC and the UHD-TV format. With the same objectives, nine industrial and academic French partners are starting the 4EVER-2 project, the direct extension to 4EVER. This collaborative project is funded by the French government, 2 competitiveness clusters (Cap Digital and Images&Réseaux) and territorial authorities around Paris and in Brittany ("Conseil Régional d'Ile-de-France" and "Conseil Régional de Bretagne").
More about the 4EVER project: www.4ever-project.com



FROM 4EVER... TO 4EVER-2

Thanks to the successful 4EVER project that focused on the improvement of the video quality of experience, the work continues with 4EVER-2.

The 4EVER-2 project aims to define and validate the television of the future, thanks to the success of innovations emerging from 4EVER, for « High-Fidelity Television ».

SUMMARY OF THE 4EVER PROJECT

The 4EVER project was a consortium of nine industrial and academic French partners (Orange, ATEME, Technicolor, France Télévisions, Globecast, TeamCast, Highlands Technologies Solutions, INSA-IETR and Télécom ParisTech), running from June 2012 to May 2015. It was supported by funding from the French government and the "Conseil Régional de Bretagne", and supported by poles "Images&Réseaux", "Cap Digital" and "Solutions Communicantes Sécurisées". 4EVER introduced the validation of the new coding standard MPEG-HEVC (High Efficiency Video Coding). 4EVER partners also worked on the definition of the future format « Ultra High Definition Television » (UHD-TV).

All this work had a single aim: offer the end-user a real improvement in the video Quality of Experience. It has been proved successful, in particular through an HEVC HD live chain in a real-world environment, in June 2013 at the French Open Roland-Garros tennis tournament: this event was then the world's first operational end-to-end HEVC chain.

The studies conducted by the partners on the UHD-TV format (recording UHD-TV sequences, subjective perception tests, ...) have also allowed 4EVER to quickly gain a position on the international stage: active contributions to international standardization efforts such as DVB (Digital Video Broadcast), ITU (International Telecommunication Union) and MPEG (Motion Picture Expert Group), with results disseminated in multiple exhibitions and conferences (NAB, IBC, SMPTE, ..).

DEVELOP A TRULY INNOVATIVE AND SUSTAINABLE TV STANDARD

Today, the nine project partners of 4EVER-2 wish to continue and complete the UHD-TV work initiated in the original 4EVER. The main issue is to develop technologies that will enable the distribution of audiovisual content improving the video quality of experience. It will contribute to define, via international standardization committees, a UHD-TV format Phase 2 « High Fidelity » adapted to the specificities of digital television services and their evolution.

To achieve this objective, the 4EVER-2 project partners will study the gain in perceived video quality with « Ultra High Definition » future formats such as HDR (High Dynamic Range), HFR (High Frame Rate), and WCG (Wide Color Gamut).

They will evaluate the various technologies proposed to encode and distribute these formats. The multichannel audio and 3D will be integrated into joint assessments of audio and video in order to achieve a real increase in audiovisual quality. Regularly throughout the two years of the project (June 2015 - May 2017), the 4EVER-2 partners will work to implement end to end solutions with sports or premium cultural events.

The ultimate goal of this project is to develop technologies to validate a complete live production chain: distribution and reception of UHD-TV format Phase 2 content.

SUMMARY

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SUMMARY OF THE 4EVER* PROJECT

Initiated in 2012 following the 13th FUI (Unique Interministerial Fund) call for projects), the French 4EVER project ("for Enhanced Video Experience") gathered nine industrial and academic partners*, seeking to bring a real improvement in the quality of video experience.

The objective of this project was to enable everyone to enjoy at home, in a cinema (for live event broadcasts) or when mobile an enhanced quality of experience, all while controlling the impact on the technical production and dissemination chains.

For the last three years, the consortium has conducted research on high technology for the introduction of Ultra High Definition on TV services, both on the image format (UHD-TV) and on video coding standard aspects (HEVC).

IMPROVED IMAGE DEFINITION

Initially, the 4EVER team* sought to have improved image definition, with a resolution four times greater than HD TV, thanks to UHD-TV Phase 1 (aka "4K"). To do this many experiments and evaluations were carried out allowing 4EVER to actively contribute to the standardization of the TV of the future with the production of high quality content.

IMPROVING DATA DISSEMINATION TECHNIQUES

With more than fifty contributions to standardization organizations, the 4EVER team has cooperated extensively to the standardization of the new HEVC (High Efficiency Video Coding) video coding standard. Standardized by the ITU in January 2013, HEVC can halve the transmission rate of coded video with no loss of visual quality.

Four months after the standardization of HEVC, during the "Roland Garros" French tennis Open tournament, the 4EVER partners* demonstrated the first live end-to-end operational MPEG HEVC chain with the development of prototype real time encoders and decoders on TVs and tablets.

4EVER* has also demonstrated that the adoption of HEVC will increase the number of IPTV subscribers eligible to receive HD TV, and allow dissemination of UHD-TV Phase 1 via satellite and terrestrial platforms (DTT).

BETTER IMAGES WITH BETTER MOVEMENT, BETTER COLORS AND BETTER CONTRAST

4EVER partners* then focused their work on UHD-TV Phase 2 showing visual enhancements for users of TV services through the following technologies:

- HDR (High Dynamic Range) for more natural contrast when a scene contains areas of high and / or low light.
- HFR (High Frame Rate) for an optimal view of object movement in a scene (more fluid motion) and a better rendering of moving object details (decrease blur).
- WCG (Wide Color Gamut) to adapt the color space used in broadcasting with the features of screens for color rendering. The objective here is to display natural colors in order to arrive at more realistic content.

With these efforts, 4EVER* has affirmed its status as a global player in the quality of video experience.

The benefits have been many, and a number of powerful moments occurred during the three years of the project: "Roland Garros" 2013 (first HEVC HD operational broadcast chain), "InternationalPrize" Trophy Images&Réseaux 2013 « Loading the Future », exhibitions at NAB2014 in Las Vegas (first implementations of DASH adaptive streaming in a browser for HTML5 – with

SUMMARY OF THE 4EVER* PROJECT

OTT broadcast UHD TV) and IBC 2014 in Amsterdam (first stand at this show capable of uniting demonstrations of the 4 components of UHD phases 1 and 2: 4K , HDR, HFR, WCG).

The adventure ended with an unprecedented experiment on May 29 2015 at the headquarters of France Télévisions: the live broadcast of had UHD-TV signal produced at Roland-Garros on a movie screen in 4K and at 50 frames per second.

Today the original project 4EVER* finishes, however research continues with 4EVER-2 to develop and master the coming standards that will combine all the dimensions of UHD-TV Phase 2.

*The 4EVER consortium was composed of nine partners: Orange, France Télévisions, Technicolor, ATEME, Globecast, Teamcast, Highlands Technologies Solutions, INSA - IETR et Télécom ParisTech

ROLAND GARROS ULTRA-HD, LIVE TO THE CINEMA THROUGH HEVC CODEC

During 4EVER project final review, held all day on May 29 2015 at the headquarters of France Télévisions, a new experiment was carried out: the live broadcast of had UHD-TV signal produced at Roland-Garros on a movie screen.

Production of UHD-TV picture was provided by France Télévisions, encoding contribution using compression technology HEVC was the work of ATEME and transportation was operated by Globecast satellite. At France Télévisions headquarters, the satellite demodulation was provided by Teamcast, HEVC decoding jointly by INSA-IETR and Telecom ParisTech and 4K cinema projection at 50 frames/second with the help of Barco*.

France Télévisions, via its production division ("filière production") and FTVEN ("France Télévisions Editions Numériques"), ensured the UHD-TV capture of Roland-Garros central court during the tournament fortnight.

Movie theaters offer regular event broadcasts of cultural content: shows, concerts, operas. These events are delivered by satellite to the networks of relevant theaters and generally suffer from highly compressed HD definition. But since 2014, the renewal of the first generation of digital cinema projectors sees the large rooms being equipped with 4K HFR projectors, capable of playing Ultra HD programs at 50 and 60 frames per second.

This success will feed future 4EVER-2 work related to UDH live distribution towards movie theaters.

** World-class technology company Barco, designs and develops projectors for film and imaging and visualization products for different professional markets, entertainment and business, health, industry and government, control room, defense and aerospace.*

THE 4EVER-2 PROJECT

The French 4EVER project aiming to bring a real improvement of the quality of television experience was completed in May 2015.

The project's main objective was to assess jointly the interest of the new HEVC video compression standard, developed by MPEG and the ITU, and the definition of new uses of television, thanks to the end-to-end chain introduction, from image shooting to transmission and restitution.

The results of the 4EVER project helped to highlight the weak gain in terms of perceived quality provided by merely increasing the spatial resolution ("4K") and to demonstrate the potential of HDR and HFR dimensions.

Due to these conclusive results, it became essential for 4EVER partners to continue the work undertaken, in order to control the next standard that will combine all of the UHD dimensions.

So from June 2015 to May 2017, the consortium will work within the 4EVER-2 project to define and validate the future of television, but also to bring the innovations emerging from 4EVER for a "High Fidelity Television".

In a first time, the consortium will contribute to the standardization of a UHD-TV format ("High Fidelity"), adapted to the specificities of digital TV services and allowing to achieve a real gap in quality of experience.

The project partners have the will to propose a real improvement in the quality of video experience, while aiming at a complete live production chain, distribution and reception of UHD-TV format Phase 2 content. To achieve these objectives the consortium will develop different axes:

- More HDR studies and evaluations, particularly on the gain in quality that can be achieved based on the maximum luminance exploited.
- Development of test methods for the joint evaluation of gain in quality for television content combining 4K, HFR, HDR and WCG.
- The evaluation of HEVC codec under the new format settings, with tools to optimize their encoding performance, and the development of a real-time encoder for livebroadcast of UHD Phase 2 content.
- Experimenting end-to-end chains, which will gradually integrate all dimensions needed for a real gain, in order to demonstrate UHD-TV benefits on high resonance events.
- The evaluation of the mutual impact of UHD-TV video and 3D audio, in terms of feeling of immersion through experimentations.

The 4EVER-2 consortium is recognized and is used to effective cooperative work thanks to the previous 4EVER project. Also, it has complementary skills across the entire delivery chain, allowing to develop these new technologies by providing shooting, by conducting tests and by disseminating their results during professional exhibitions; conferences or forums.

PARTNERS 4EVER-2 PROJECT

The 4EVER-2 project gathers nine industrial and academic partners, recognized in international standardization bodies, each of them with complementary skills throughout the distribution chain.

ATEME is a global leader in professional video encoding solutions, supporting all formats, from mobile to Ultra High Definition. The HEVC technology is central to ATEME strategy. Its objective, by joining the 4EVER and 4EVER-2 projects, is to integrate HEVC standard support in all of its "High fidelity" encoding solutions: contribution, live and file distribution.

TeamCast main activity is the provision of "OEM" technology for terrestrial digital broadcast network infrastructure (DTT) and satellite broadcasting (DTH). The 4EVER-2 project will allow TeamCast to, among other things, operationally validate the technological basis of second generation DTT.

HTS specializes in creating innovative solutions for the film industry. The company seeks new trends and new usages introduced by digital cinema with 2 product lines: CineActive™ and YouActive™. For 4EVER-2 project, HTS will help assess extended color equipment.

Orange is one of the leading telecommunications operators in the world. In March 2015, the Group presented its new strategic plan "Essentiels2020" which aims to put the needs of its customers at the center of its strategy so that they can fully benefit from the digital world and the power of its high-speed broadband networks. Thus, Orange continues in the 4EVER-2 collaborative research project, its work around the 2D video format that aims to deliver a new TV experience combining realism and immersion, while controlling the impact on the operational chain of TV services distribution.

France Télévisions, an audiovisual public service broadcaster offering a comprehensive program through five national television channels, multiplies advances to accelerate the presence of public service content on all communication networks and on all screens. Through 4EVER-2, France Télévisions commits its "Innovation & development" division, already involved in the 4EVER project, to content creation and to quality of experience. But it also incorporates its "production" division, which will enable the project partners to validate their technologies with operational capabilities during field production.

Globecast is specialized in contribution services, media management and distribution for professional broadcasting. For 4EVER-2 project, Globecast adapts contribution services to the needs of event content producers (introduction of UHD-TV, but also use of IP networks).

AMPVisualTV specializes in television coverage and provides services throughout the production of live programs or in live conditions. The arrival of AMPVisualTV on 4EVER-2 project will consolidate the "production and control" element in the complete end-to-end audiovisual chain.

INSA-Rennes is an engineering school but also a research center. Laboratory IETR (Institute of Electronics and Telecommunication of Rennes) is attached to "INSA" and carries out research for the 4EVER-2 project around video decoding area.

Telecom ParisTech is a French public engineering school, with general interest in the field of information communication technologies. For 4EVER-2 project, Telecom ParisTech, through its open-source "GPAC" platform, provides a set of technologies for R & D in the field of digital television.

RESEARCH AREAS

HIGH EFFICIENCY VIDEO CODING (HEVC)

Recent technological advances enable shooting and displaying video sequences with UHD-TV quality, nevertheless, internet and broadcast networks don't always provide suitable bitrate. This is why it is important to improve data broadcasting technologies, in particular thanks to HEVC which allows halving the transmission rate to achieve a given quality.

HEVC is a new video coding standard which is going to replace current MPEG-4 Advanced Video Coding (AVC). This is the result of a work that international experts carried out in the context of a joint committee between MPEG (ISO) and ITU (International Telecommunication Union). This technology allows to provide image quality equivalent to that of MPEG4-AVC, but with better data compression, (generally half of the bitrate), thus facilitating the dissemination of UHD-TV images.

In January 2013, when it became an official standard, HEVC has been submitted to subjective evaluation, which proved that it provides a compression gain of around 50 % for 720p and of 60 % for 1080p, compared to MPEG-4 AVC coding, with the same configuration and for an equivalent quality.

ULTRA HIGH DEFINITION-TV

Ultra High Definition TV is the next natural and logical step after High Definition. This new format not only allows an improved spatial resolution, but also better image definition through an improvement of colors, contrast and also an increase of temporal frequency.

THE SPACIAL RESOLUTION

Spatial definition measures the sharpness and the precision of images depending on the number of displayed pixels. By increasing this pixel density, UHD-TV reaches a sharper, more detailed image with an improved texture.

WIDE COLOR GAMUT (WCG)

Color definition is represented by a gamut, i.e. the range of colors that a device can display, print or save. A camera or a screen can't perfectly reproduce all colors which are perceptible by the human eye because, although all possible hues are displayable, all of saturations are not. UHD-TV allows better color rendering, by improving color grading to obtain more realistic result.

HIGH DYNAMIC RANGE (HDR)

The dynamic range of an image defines the sensitivity levels for every color hue, including contrast levels which are quite poor in digital video at the moment. Current HD TV suffers from a lack of details in the dark areas if one part of the image is much brighter.

HIGH FRAME RATE (HFR)

The HFR improves the temporal resolution by increasing the number of frames per second. On television today, HD broadcast is done at 50 interlaced frames per second, that is to say 25 full resolution pictures per second. HFR is envisaged on video at 100, 200 or 300 images per second.

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