

# PROJECT RESULTS

## CA111

Launch of Ultra-High Definition TV expected by 2018 and mass rollout by 2020  
[UltraHD-4U]

**Ultra-high definition TV (UHDTV), synonymous with digital-cinema quality in the home, brings a full cinematic experience to residential viewers. With this attractive consumer offering in mind, the UltraHD-4U project and its project consortium, comprising partners from across the value chain – from content creation and home displays, to integrated-circuit vendors and academics active in standardisation – researched and developed the necessary elements needed to make UHDTV a reality.**

Television viewers with their high-resolution flat-screen TVs are just getting used to the clarity and detail of high-definition (HD) television. However, hardware and content suppliers continue to delight and entice consumers with greater higher levels of 'immersiveness' through increasingly better TV reception and resolution (higher number of pixels), especially for screens that are 50-inches and larger. Hence the attraction for ultra-high definition TV (UHDTV), also called 4K.

### Delivering an immersive TV experience

The UltraHD-4U project aimed at studying and setting up an end-to-end 4K UHDTV chain (broadband and/or broadcast) for use residentially by consumers and at dedicated show-points. This is commercial quality, audio-visual content normally found in a 'digital' theatre equipped with the latest 4K-rendering and broadband-communication technologies for receiving and processing high-resolution, high-quality digital content. A fast-moving state-of-the-art drove the project to promptly address most of the functions around real-time UHD Main10. Importantly, this also includes 'high dynamic range' (HDR), a video technique that heightens a picture's dynamic range – the contrast between the brightest whites and the darkest blacks – and 'wide colour gamut' (WCG), a colour space that offers a wide colour range by using pure spectral primary colours.

Main project activities included investigating, developing or implementing the following key components and features:

- System architecture for UHDTV;
- High-efficiency video coding codecs (a codec is hardware or computer code capable of encoding or decoding a digital data stream or signal);
- Advanced features, such as deep colour, colour space and resolution, high dynamic range, higher frame-rate and high-speed connectivity;
- A new, high-bit-rate, high-definition multimedia interface (or HDMI, an all-digital audio/video interface between a set-top box or DVD player, and a digital TV set, for example);

- Interoperability and backward compatibility with deployed HDTV infrastructure, required distribution bandwidth and audio;
- UHDTV-frame-compatible 3DTV with a display technology that works with or without special glasses;
- UHD in professional applications, such as medical and display;
- Use cases and five demonstrators, together with experiments to assess different aspects of the demonstrators.

### A well-equipped project consortium

The UltraHD-4U project consortium took into account digital TV's fast technological pace, as well as its own keen desire to involve leading European field-experts to participate and contribute to a common vision on UHDTV's evolution. This called for a considerable amount of commitment, organisation and expertise. Appropriately, partners range from creators of content for home consumption, and academics active in the standardisation, to global leaders in the manufacturing and distribution of chips, encoding devices, set-top box and displays.

Project partners also played a significant role in major standardisation bodies, technical forums and trade shows, with more 180 public presentations and articles. In addition, more than 14 UHD-related product prototypes or technologies were developed, underscoring the huge impact UltraHD-4U has on project partners as they expand their intellectual property rights' (IPR ) portfolio while ensuring they are well-prepared for market ramp-up.

### Focus, synergies and infrastructure

UltraHD-4U provides novel possibilities for industry, as well as, public and private research institutions. Importantly, collaboration between partners and specialists ensures a much deeper and comprehensive approach. The development of new content formats, and capture, coding and rendering technologies, together with IC's used in consumer devices, will be crucial to industry partners, content producers and distributors

## PROJECT CONTRIBUTES TO

- ✓ Communication
- ✓ Energy efficiency
- ✓ Digital lifestyle
- ✓ Design technology

## PARTNERS

Alioscopy  
 Arçelik  
 ARTE  
 Barco  
 Binocle  
 Hispasat  
 mediAVentures  
 Pace (now ARRIS)  
 RTVE  
 Sapec  
 STM  
 Technicolor Connected Home Rennes (TCHR)  
 Technicolor R&D France (TRDF)  
 Thomson Video Networks (now Harmonic)  
 University of Nantes/IRCCyN  
 Vitec

## COUNTRIES INVOLVED

- Belgium
- France
- Spain
- Turkey

## PROJECT LEADER

Issa Rakhodai  
 Pace France

## KEY PROJECT DATES

April 1, 2013 - March 30, 2016

in maintaining Europe's position beyond the HDTV transition. They will also play an important role in preparing and expediting European and worldwide deployment of UHD TV. This project is expected to create focus and synergies between consortium partners, enabling European contributions to solutions in the way of components and systems, but also user benefits and business models.

This project will also help reduce implementation time by ensuring that at least part of the chain is ready to be integrated, while providing European universities and other research institutions with opportunities to establish the right level and quality of research in the field of networked media that will be really crucial to Europe in a global context.

The new infrastructure will help to further expand research and training at universities in the field of UHD media technologies. Moreover, this project will enable research institutions to valorise elements of their research, both directly (via technology licensing) or indirectly (via spin-off ventures), thus accelerating the required technology transfer.

### Energy conscious

When defining HDR and WCG, the project paid particular attention to energy-saving. For instance, the MaxFALL (frame average light level) and MaxCLL (content light level) features allow a display device to adapt the luminance, thus rendering both to its capacity and its recommended power-consumption limitations. The projector supplier has also planned to assess potential power-savings associated with HDR through laser dimming. In addition, this supplier is also investigating the impact of lower energy in the various WCG modes.

### Growing interest and demand

Crucially, availability of native-UHD content is an important driver of this new technology, and important events are good generators of such material. A case in point was the 2016 Brazil Olympics where Olympic Broadcasting Services and Japan's NHK distributed UHD coverage to cable, satellite, telco providers and other partners. This will further help promote and spread the use of UHD.

In addition, over 14 product prototypes or technologies have been developed along the UHD value-chain. This confirms the huge impact of UltraHD-4U on project partners in their IPR building and dissemination, and their drive to be well prepared for the market ramp-up.

Furthermore, a crucial survey among some 500 video-service providers and content producers concluded that 96% of them believe that a majority of consumers and operators will adopt UHD TV by 2020; and 88% of total respondents said they will launch UHD TV content by 2020. Notably, 78% believe consumers are willing to pay 10-30% more for their subscription for access to UHD TV content.

Comparing the global UHD market forecast in 2013 with that in 2016, we see that meeting the key annual-shipment 'threshold' of 100m UHD TV sets was initially foreseen to happen in 2023. However, in 2016 it was expected to take place in 2019, with around 50% shipping to Asia-Pacific, 25% to Europe and 20% to North America. However, due to lack of available UHD content, not all these UHD TV sets will be showing a native-UHD stream, but mostly converting the HD stream into UHD, internally.

A study by Research & Markets, published in early 2018, says that there will be acceleration in the adoption of 4K technologies, with compound average growth rates (CAGR) of some 20% in value by 2022. This study also states that growth will come from a 'surge' in the adoption of 4K projectors and 4K cameras in the media and entertainment industry; increasing per capita income; and improvements in the standard of living.

Finally, according to a new report by Grand View Research published in June 2017, the global 4K TV market is expected to reach US\$ 380.9 billion by 2025. This is excellent news for consumers and the global television industry alike.

