



PROJECT RESULTS

High Definition TV for Europe

A coherent end-to-end system for satellite, terrestrial and broadband Internet distribution

The objectives of HD4U were to fill in the technological gaps in the high definition television (HDTV) chain – by creating a high definition video encoder, picture quality assessments and improvements, and interoperability of receivers – and to set-up an HDTV demonstrator for three types of distribution networks: satellite, terrestrial (DVB-T) and wired broadband (ADSL2+). Demonstrations showed that the impressive quality improvement offered by new MPEG4-AVC video-encoding technology compared with traditional MPEG2. Experiments in operational environments have given project partners the opportunity to master deployment of HDTV.

With HDTV being rolled out in the USA, Japan and other countries in Asia, it was crucial for some European organisations to advance quickly on the learning curve for HDTV deployment. For this reason, HD4U gathered major actors in the HDTV world with a twofold objective:

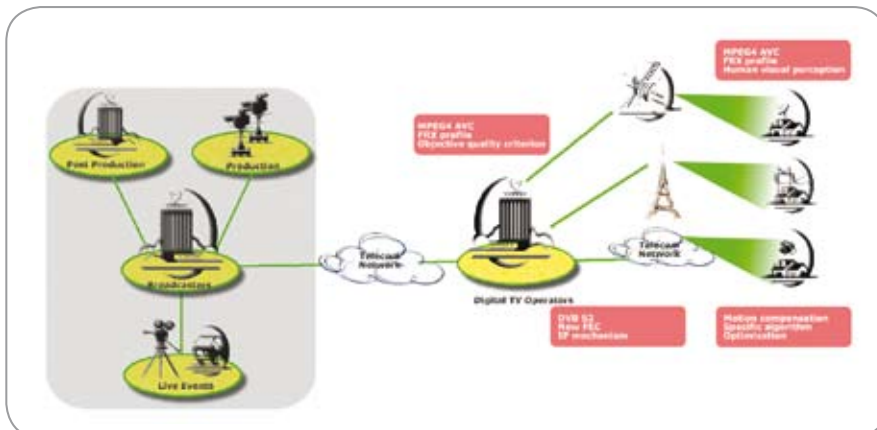
1. Fill the technological gap in the HDTV chain; and
2. Demonstrate HDTV transport and distribution over satellite, wired Internet (IP) and terrestrial broadcast networks in a real-life environment.

Launched in Europe in 2004 by Euro1080, HDTV is currently distributed over more than 30 satellite channels and is expected to move quickly towards terrestrial and IP networks. Major global sporting events, such as the 2006 Football World Cup and the upcoming Olympic Games in 2008 have stimulated HDTV production and distribution. Deployment is being pushed by tremendous consumer demand for large flat-screen TVs, which is expected to double sales of HD-compatible TV sets by 2011.

Encoding, processing and quality assessment

Key results of the project included:

- **Generic architecture for HDTV**
Elaboration of a generic end-to-end architecture for an HDTV network;



A generic architecture of HDTV

HD4U (ITEA 04027)

Partners

- Euro 1080
- Maxisat Oy
- Newtec
- Philips Belgium
- Philips France
- Philips the Netherlands
- TF1
- Thomson Grass Valley
- Thomson R&D France
- University of Nantes

Countries involved

- Belgium
- Finland
- France
- The Netherlands

Start of the project

January 2005

End of the project

December 2006



PROJECT RESULTS

- High-end video encoding**
 Specification of the requirements, features and general architecture of an efficient video-compression system, based on MPEG4-AVC technology. The most effective tools were identified and selected for this technology. Launched in 2005, a first generation HD video encoder was delivered in May 2006, and improved for public demonstrations in October 2006 and February 2007;
- Pre and post processing**
 Processing was developed to enhance video quality on current LCD flat screens. This can be added after the capture and before the display of the pictures to reduce the artefacts created by the encoding scheme and the display technology; and
- Quality assessment**
 A methodology was produced for the quality assessment of HDTV pictures, based on international recommendations – ITU standards – and the results of quality assessment on current definition pictures. Subjective assessment tests indicated the need for additional processing to obtain the same picture quality on an LCD flat screen as with traditional cathode ray tubes. HD4U elaborated a model of human vision that

helped identify objective quality criteria to give similar results to subjective evaluations.

Real HDTV distribution demonstrations

End-to-end HDTV demonstrations were made on three operational transmission networks: satellite (Euro1080), terrestrial (TF1) and ADSL2+ IPTV (Maxisat).

Highlights included:

- Euro1080 transmitted four MPEG4-AVC-encoded HDTV programmes with stereo sound on a single transponder of a Eutelsat satellite not capable of carrying even two MPEG2-encoded channels today; and
- The bit-rate of an HDTV channel on Astra 1D was reduced to 8.5 Mbps, making it possible to carry three channels on a single transponder.

Moreover, statistics show 75% of customers on a wired ADSL2+ network are located less than 2 km from the exchange and so could receive at least one HDTV channel.

In addition, the projection of an HD4U signal on a very large screen has shown astonishing good quality pictures that could be used for applications outside the consumer electronics business.

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ITEA - Information Technology for European Advancement - is an eight-year strategic pan-European programme for pre-competitive research and development in embedded and distributed software. Our work has major impact on government, academia and business.

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Major project outcomes

Dissemination

- Internal and external website
- More than 30 conferences in Europe
- Papers for Image processing, IEEE, IEC
- Participation in international (IBC 2005 and 2006, IFA 2005, NAB 2006 and ITEA symposiums) and HD (Mondial de l'automobile, Route du Rhum and ITEA workshops) events

Exploitation

- High end MPEG4-AVC encoding chip
- Evolutive architectural framework for hybrid set-top boxes (Terrestrial and IP)
- Flat screen technology improvement
- Increased value of HD broadcasting
- Evaluate in a real environment the number of HD programs on satellite and IP networks
- Definition of an assessment methodology for HD and subjective tests for HD quality
- Pre- and post-processing identification and evaluation

Standardisation

Contributions to standardisation bodies: ISO/IEC MPEG, DVB TM-AVC (metadata, sub-titling) and DVB CM-AVC, DVB-IP, DSL Forum, HD Forum (Content protection), VQEG.

Spin-off

The University of Nantes has created a spin-off proposing video quality measurement software and hardware for video encoding, storing and broadcasting/ transmission equipment.

