Project Results

Developing the Full HD broadcast chain

From professional broadcast studio to consumer home TV

The HDTVNext project has developed all the technologies required for the complete end-to-end broadcasting chain – from professional TV studios and broadcasting equipment to consumer TVs – to handle next-generation 'Full HD' high-definition TV signals. This technology meets the needs of broadcast and broadband Internet TV applications as well as enabling HD access through home networks and allowing HD video on demand. Commercial exploitation is starting.

High definition television (HDTV) is now widely available across Europe, although there is some confusion about the different formats involved to match terrestrial, satellite and broadband Internet channels. HDTVNext focused on the Full HD 1080 progressive (1080p) format which provides a 1080-line by 1920-column image at 50 images a second. Its objective was to reduce the remaining discrepancies between all the elements in the chain to ensure Full HD maturity in acquisition, distribution and user access.

Extensive market analysis showed the 1080p 50Hz format was technically-achievable for the end-to-end chain and provided the highest definition that the eye of the average viewer can see. However, while consumer TVs were already able to handle the Full HD format, other elements of the chain, particularly the encoders in the TV studios and decoders in the transmission circuits, were not. Moreover, many professional recording studios were

unable to handle 50 pictures a second.

COHERENT AND FLEXIBLE STRUCTURE

HDTVNext defined a coherent end-to-end structure using the 1080p 50Hz format that was flexible enough to handle programmes from different sources and scalable to heterogeneous bandwidth capacity. It was also necessary to increase the bandwidth capacity to 3 Gb/s at the content production level and to ensure interoperability and backward compatibility with existing terminals able to handle HD contents while allowing real-time 1080p 50Hz HD processing.

Key advances included:
- Encoding and decoding algorithms for chips in the front and end of the chain supporting the H.264/MPEG-4 – or advanced video coding (AVC) – video-compression standard;
- Automatically-generated contents and user-generated contents superimposable over the normal video flow;
- A professional TV camera able to acquire Full HD format signals at 50 images a second; and
- Interactive application.

All these elements are now available in Full HD, enabling professional studios, broadcasters and domestic users to interact using the same HD format. In addition, HDTVNext developed audio digital-signal-processing (DSP) rendering algorithms and scalable video coding (SVC) intellectual property for backward compatibility with lower resolution formats.

Specific technical advances included audio DSP rendering to enable the adaptation of sound environments for different rooms. This enables a system to learn the topology of a room and adapt the sound output accordingly.

Another innovation was an SVC decoder that makes use of a totally new concept in co-operative algorithms for video

HDTVNext
(ITEA 2 ~ 07005)

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■ **Partners**
Activa Multimedia
Barco
DS2
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   Systems
Maxisat
Mobilera
NXP Semiconductors
ON2
Pace France
Philips Innovative Applications
Robotiker-Tecnalia
Telefónica I+D
Thales Communications
Thomson Video Networks
Technicolor
Trinnov Audio
UAB
VITEC

■ **Countries involved**
Belgium
Finland
France
Spain
Turkey

■ **Project start**
April 2008

■ **Project end**
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compressions. This permits automatic adjustment of the decoder to available bandwidth – for example, if there are WiFi restrictions or bad lines, the decoder will use only part of the format, ensuring there is no interruption in the signal flow despite degradation in the connection.

HDTVNext developed and validated a smart cross-conversion platform between Digital Cinema and HDTV content . This allows feeding VoD HD servers with quality-controlled cinema contents. Another application includes projection of live HDTV contents (sports, concerts...) in cinema theatres by using high quality DCI-compliant cinema projector.

RAPID EXPLOITATION ENCOURAGED
The main business impacts of HDTVNext are extensive with a major effort put into encouraging rapid exploitation of the results. Some 15 different products are emerging – from automatic content creation for regional broadcasters, to video transcoders, power-line communications (PLC) extenders, wireless transmissions,

security, HD video on demand, broadband TV transcoders, SVC decoders, H264 encoders, set-top boxes, TV interactivity, JPEG2000 decoders, cameras, user-generated contents, widgets, acoustic adaptation, interactive platform and HD conversion. Specific applications include:

- Automatic content creation that is already being used for weather forecasts on Catalonian channels in Spain;
- The first Full HD professional cameras worldwide that are now on the market following demonstration for football matches in Barcelona; and
- The first SVC-capable decoder – essential for US broadcasters – which will be available at the beginning of 2011.

The technology selected is securing the investment choices made by the industries involved, while comforting users in their TV investments. Encouraging wide adoption of the Full HD format is also less confusing for users – and opens the way to a coherent approach for 3D TV.

Major project outcomes

DISSEMINATION
- 13 scientific conferences
- 10 presentations/demos at events
- 3 articles
- Organisation of one common workshop

EXPLOITATION
All industrial and SME partners are developing new products out of the HDTVNext results: 19 in total. Several of these products are jointly developed through specific business agreements. Examples are:
- Deployment of HD delivery in a nationwide over-the-top IPTV for STB/PC (Maxisat)
- First worldwide MPEG4-SVC decoder in high definition (NXP & Pace)
- HD capturing camera in 1080p 50Hz & end2end video-on-demand platform (Thomson video netwrorks)
- Commercial prototype of JPEG2000 decoders for Defence and Security (Thales)
- 3G SDI encoder/decoder (JPEG2000) product and Skyline Dataminer and NBMS commercial release from Barco
- IPTV widget for TV channels & cross-platform UGC services in TV channel (Telefonica)
- MPEG4-AVC video encoder products (Hantro82770/8290 from ON2 and VMC 7440 from Vitec)
- Multi-format decoders (Hantro G-series from ON2)

STANDARDISATION
- 5 contributions on ITU-H 222 / DVB-AVC, ISO15444-1, 802.11 and DLNA

PATENTS
- 3 new patents on SVC and AVC decoding