

High-definition television to go

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New video compression technology and transmission/reception equipment means Europe is ready for commercially deploying multi-channel HDTV over terrestrial, satellite, cable or IPTV digital links.

The EUREKA ITEA software Cluster HD4U project has demonstrated that high-definition television (HDTV) is commercially viable over digital terrestrial (DTT), satellite and Broadband TV (IPTV) networks. While new MPEG4-AVC compression techniques can halve the bandwidth required for HDTV, fully exploiting the system also requires that pre- and post-processing modules are available to optimise the complete chain from content creation to end-user. HD4U has shown that all the necessary

HDTV offers resolutions five times better than standard television and provides home image quality and format close to cinema experience. It offers a new way of producing content and it requires fewer cameras, using a single camera to cover a complete tennis stadium, rather than three.

However, attempts to introduce analogue HDTV a decade ago showed problems in exploiting the system commercially. "We used earlier experiences to introduce digital HDTV to Europe," explains Patrick Schwartz, HD4U project coordinator, from Thomson in France. "At the beginning of HD4U, HDTV content was almost ready and the first LCD screens were becoming commercially accessible at a reasonable price. Missing were all the products between the studio content and the display – encoding, set-top boxes and even affordable transmission links."

"The main objective of HD4U was to demonstrate that HDTV was viable for different transmission media. The most important technologies developed were MPEG4-AVC video compression to reduce the bit rate of the channel transmitted to the end user, together with the pre- and post-processing techniques allowing quality improvement – such as post-processing to increase the final quality of user experience with LCD screens."

Demonstrating deployment feasibility

Thomson started HD4U to show the feasibility of commercially using HDTV. "We are involved in the complete end-to-end system except displays – although we have some licences for LCD screens – and were keen to show deployment of HDTV is now possible," says Schwartz. Partners included equipment manufacturers and DTT, satellite and IPTV operators. A university acted as a human visual model and assessed HDTV video quality, a very important element to prove that quality was good enough for the end user.

Work with the University of Nantes defined a human visual model and an objective quality algorithm to measure broadcast experience quality, based on assessments by a panel of 20 people to establish objective criteria. As a result of the project, the university has been able to create a spin-off working on measurement and test tools.

As a direct result of this EUREKA project, HDTV is now ready for use in many European countries over DTT, satellite, cable and IPTV links. EURO1080 Belgian satellite TV operator has chosen MPEG4-AVC for satellite transmission with four HDTV channels commercially launched using technology developed in HD4U. French broadcaster TF1, in close collaboration with the HD Forum, has convinced the French audiovisual authority to adopt HDTV for DTT; three free-to-air HDTV channels will be transmitted in one multiplex from mid 2008 and a fourth channel will

probably be added once technology allows transmission of more channels. And IPTV operator Maxisat in Finland has also shown that 93% of its subscribers can receive HDTV at home using ADSL2 networks with MPEG4-AVC technology.

"EUREKA labelling made it possible to obtain funding from the various partner countries to develop the necessary tools and products," says Schwartz. "Moreover it allowed us to work closely with complementary partners in the complete chain. If we had done the project by ourselves, it would only have been possible to try our encoder with our set-top box and existing LCD screens, without improving these products or getting feedback from the operators themselves. We worked here with Philips and its set-top box to check interoperability but also improve the quality of their LCD screens. This collaborative approach was very useful to build a complete system and check possible deployment."

"In addition, EUREKA is easier than the EU Framework Programme for pre-competitive projects because it is longer term and enables R&D for prototypes and to demonstrate and validate systems and their commercial feasibility." Moreover, being part of the ITEA Cluster increased project visibility to external audiences. HD4U was presented to 400 or 500 people and took part in the HDTV symposium at ITEA Forum in Paris in 2006.

Impressive quality improvements

HD4U developed a high-definition video encoder, improved picture quality and ensured the interoperability with receivers. Demonstrations showed impressive improvements in quality are available with the new MPEG4-AVC video-compression technology.

Other important improvements affected the modulation and transmission technologies. A DVB-S2 standard was developed to reduce satellite

bandwidth and IPTV encapsulation, enabling HDTV to be sent over broadband IPTV networks such as ADSL2. These new technologies were needed to increase the number of HDTV channels transmitted – the target with MPEG4-AVC was to reduce bandwidth by a factor of two.

HD4U also provided industrial partners with the opportunity to develop prototypes for encoding, modulation, IP encapsulation, set-top boxes and LCD screens and deploy commercial products a year after the end of the project. This includes a second-generation MPEG4-AVC encoder that targets a 50% gain in compression compared with MPEG2, making it possible to increase the number of channels transmitted over a DTT network from three to four.

Source: EUREKA

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