The Co-Chairs and members of MPEG's video subgroup and the JVT at the NATAS Emmy award ceremony in January 2009, with the paired awards presented to ISO/IEC MPEG and ITU-T VCEG: (from left) ***Jens-Rainer Ohm, Gary J. Sullivan, Thomas Wiegand*** *and* ***Ajay Luthra.***

Photo credit: Marc Bryan-Brown Photography.

And the Emmy goes to ... The MPEG story

by Jens-Rainer Ohm and Gary J. Sullivan, Co-Chairs of the Video sub-group of ISO/IEC JTC 1/SC 29/WG 11, Coding of moving pictures and audio

The ISO/IEC Moving Picture Experts Group, or MPEG as it is most commonly known, recently celebrated its 20th anniversary. Part of joint technical committee ISO/IEC JTC 1, *Information technology*, subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, it has, since the beginning, been at the leading edge of defining digital media standards for consumer and professional applications.

With filename extensions like .mp3, .mpg, and .mp4 in everyday use, and MPEG features advertised for equipment in every consumer electronics shop, it can be said that most people in the world know the acronym "MPEG" better than they know the meaning behind it.

Tremendous market adoption

The most recent MPEG video coding standard – MPEG-4 Advanced video coding (AVC) – has been the subject of especially newsworthy events. Embodied in the International Standard ISO/IEC 14496-10, and the International Telecommunication Union

(ITU)-T Recommendation H.264, the AVC standard is the most advanced video compression standard of today. There is no doubt that it has found tremendous market adoption since being first defined in 2003.

The AVC standard was designed in a collaborative team known as the Joint Video Team (JVT), made up of experts from the ISO/IEC Moving Pictures Experts Group and the ITU-T Video Coding Experts Group (VCEG). It has already found widespread application in, for example, high definition (HD) disc storage (such as Blu-ray disc), broadcast (DVB-x2), camera capture (AVCHD), mobile devices (such as 3GPP multimedia phones) and hand-held video players (such as the iPod), videoconferencing systems, and video services on the Internet (such as Adobe's Flash, Apple's QuickTime, Google's YouTube and Gmail video chat).

"High profile" awards

The importance of the AVC standard is reflected by two Emmy awards that were recently received for its development:

A 2008 Primetime Emmy Engineering Award was given to JVT. The Academy of Television Arts and Sciences acclaimed the development of the AVC "high profile" – which has extended the reach of high quality video from mobile telephones right through to high definition television (HDTV) – as being among the "developments in engineering that are either so extensive an improvement on existing methods or so innovative in nature that they materially affect the transmission, recording or reception of television". The award was presented to the JVT at a ceremony in Hollywood in Los Angeles, USA, in August 2008.

The Primetime Emmy was followed a few months later by 2007-2008 Technology and Engineering Emmy Awards for both ISO/IEC MPEG and ITU-T VCEG, by the US National Academy of Television Arts and Sciences (NATAS). The award ceremony was held as part of the International CES[1] trade show in Las Vegas, USA, in January 2009.

It is unprecedented that a technology receives both types of engineering Emmy awards – an indication of the technical excellence of the standard. The JVT partnership with ITU-T VCEG is a compelling example of ISO/IEC MPEG's collaboration with other organizations for international standardization work.

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Further, these recent awards add to a previous Emmy awarded in 1996 for the development of the MPEG-1, MPEG-2, and JPEG standards (compression coding associated with still photography, video CD, MP3, digital TV and DVD).

The next chapter

Recently, new amendments to AVC were defined that extend the design to support highly efficient scalable video coding (SVC) and multi-view video coding (MVC). SVC adds the capability to decode video of various spatial, temporal and quality resolutions from subsets of the same encoded data stream, while MVC enables efficient joint compression of multiple cameras capturing the same scene from different perspectives for applications such as 3-D video.

It is very clear that the demand for video applications with higher resolution and higher quality is continually increasing. Technology evolution will soon make possible the capture and display of video material with a quantum leap forward in quality (increasing the spatial resolution, frame rate, colour fidelity and amplitude precision).

The next generation of ultra-HD (UHD) contents and devices, such as the very high resolution "4Kx2K" displays for home cinema applications and digital cameras, are already appearing on the horizon. Lightweight HD resolutions such as 720p[2] or even beyond will be introduced in the mobile applications sector.

"The importance of the AVC standard is reflected by two Emmy awards."

However, even cable networks are already finding it difficult to carry large quantities of HD resolution video economically to end users. Further data rate increases will put still more pressure on delivery networks. A new generation of video compression technology – one that has sufficiently higher

1) International Consumer Electronics Show, organized annually by the Consumer Electronics Association, USA.

2) Progressive scan display with vertical resolution of 720 pixels,

About the authors

Jens-Rainer Ohm and Gary J. Sullivan are Co-Chairs of MPEG's video sub-group within ISO/IEC JTC 1/SC 29's working group WG 11, *Coding of moving pictures and audio*, and the Joint Video Team (JVT). Professor Ohm holds the Chair position at the Institute for Communications Engineering at RWTH Aachen University, Germany.

Dr. Sullivan is also the Rapporteur of the ITU-T Video Coding Experts Group (VCEG), and is a video/image technology architect at Microsoft Corporation.

compression capability than the existing AVC standard in its best consumer application configuration (the "high profile") – is fast becoming needed.

A new study has recently begun on the feasibility of developing such a high-performance video coding (HVC) standard, marking the beginning of the next chapter in the story of MPEG's video technology innovation.

Moving to a new vision

Another important tendency with an urgent need for new standardization efforts is the emergence of 3-D services and devices. Beyond conventional stereo (with simple encoding of left and right eye video frame views), an advanced user experience without viewing fatigue will require adjustment of the depth perception depending on viewing preferences, display type, size and positioning. High quality auto-stereoscopic displays are expected to enter the consumer market within the next few years.

Since it is difficult to directly provide all the necessary information for an immersive viewing experience due to constraints in capture, production and transmission technologies, a new format is needed to enable the generation of many high-quality views from a limited amount of input data. MPEG's vision is a new 3-D video (3DV) format to enable both advanced stereoscopic display processing and improved support for auto-stereoscopic N-view (multi) displays, as well as interoperable 3-D services.

MPEG's video compression work has not come to an end with the development of the AVC standard. In fact, to satisfy the expanding needs of its broad constituency and to explore new opportunities for additional applications, MPEG will continue developing new standards into the foreseeable future.