RECOMMENDATION ITU-R BT.1687

Video bit-rate reduction for real-time distribution* of large-screen digital imagery applications for presentation in a theatrical environment

(Question ITU-R 15/6)

(2004)

The ITU Radiocommunication Assembly,

considering

a) that it is desirable that large-screen digital imagery (LSDI) programme distribution and presentation should preserve the creative intent and the picture quality available on the distribution master[1], as far as the envisaged programme presentation conditions allow;

b) that Recommendation ITU-R BT.1680 recommends digital image systems that meet the requirements of LSDI applications for presentation in a theatrical environment and should be used for distribution of those applications;

c) that, in the distribution of LSDI applications, it is necessary to apply bit-rate reduction to programme signals, in order to conserve bit rate and thus reduce transmission time and cost, without however adversely affecting programme quality as perceived by the viewer;

d) that the human visual system has a much higher resolution for luminance details than for colour details;

e) that the ISO/IEC JTC 1/SC 29/WG 11 has performed and documented extensive studies on the bit rate required to provide virtually transparent video compression[2] with various compression algorithms and various image systems[3];

f) that those tests have confirmed that MPEG-2 encoding at MP@HL with an optimized encoder[4] at 20 Mbit/s is virtually transparent to source quality for the image systems indicated in Recommendation ITU-R BT.1680 at a picture rate of 25 or 30 Hz, progressive or interlaced;

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* ITU defines “distribution” as follows: “To carry television programmes when no further post-production processing is expected”.

1 The term “distribution master” is used here to denote the programme master that is obtained from the original finished master after it has been tailored (in content and in quality) to the distribution medium.

2 ITU defines “transparent bit-rate reduction” as “A BRR process that does not affect the subjective quality of sound or picture sequences”.

3 See for instance Document ISO/IEC JTC 1/SC 29/WG 11 – MPEG2003/N6231, December 2003, Waikoloa – Report of The Formal Verification Tests on AVC (ISO/IEC 14496-10 – ITU-T Rec. H.264).

4 The term “optimized encoder” is used here to denote an MPEG-2-compliant encoder implemented in hardware and incorporating advanced solutions, that is optimized with respect to the MPEG-2 TM5 “reference model” encoder, which is implemented in software and was adopted by the ISO/IEC JTC 1/SC 29/WG 11 as a performance benchmark.

g) that MPEG-2 video compression is widely available and used today, and it complies with the ITU patent policy;

h) that several countries are currently implementing services for the presentation of LSDI programmes in a theatrical environment or plan to implement them in the near future,

recommends

1 that early implementations of LSDI applications intended for presentation in a theatrical environment should use a digital baseband video signal that conforms to Recommendation ITU-R BT.1680 at the input and output interfaces of the LSDI distribution chain;

2 that, in view of the higher resolution of the human visual system to luminance than to colour details, the 4:2:0 video encoding or preferably the 4:2:2 video encoding should be used for the distribution of LSDI programmes for their theatrical presentation;

3 that, since the LSDI programme signal will not normally undergo further creative image post-processing after its distribution, the use of interframe bit-rate reduction should be preferred for the distribution of LSDI programmes for their theatrical presentation, since it provides a higher compression efficiency than intraframe coding; it is recognized that, when local programme insertion (EDL or play list) is required, intraframe coding is preferable, and that the minimum video bit-rate value may be higher;

4 that since the bit-rate reduction used in the distribution channel should be virtually transparent to the quality on the distribution master under the envisaged presentation conditions, the use of MPEG-2 interframe bit-rate reduction at MP@HL (HiQ) and at a minimum video net bit rate of the order of 20 Mbit/s should be preferred in the short term, for real-time distribution of LSDI programmes for their theatrical presentation. The use of encoding at 4:2:2 @ HL will require a higher bit rate;

5 that the possibility should be analysed, in due time, to use even more efficient compression codecs that may emerge in the future, when they will comply with the ITU patent policy and will be thoroughly tested, widely available and preferably interoperable with MPEG-2 codecs.