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SMPTE STANDARD

for Television —

A Data Reduction Method for the MPEG-2 Video Recoding Data Set



Page 1 of 7 pages

1 Scope

This standard specifies a data reduction method for the MPEG-2 video recoding data set for SDTV as defined in SMPTE 327M. The coding information is as derived from an ISO/IEC 13818 compliant MPEG bit stream during the picture decoding process, as described in ISO/IEC 13818-2.

This data-reduced MPEG-2 recoding data set may be transported by various means defined in other SMPTE standards (see annex for further details).

2 Normative references

SMPTE 319M-2000, Television — Transporting MPEG-2 Recoding Information through 4:2:2 Component Digital Interfaces

SMPTE 327M-2000, Television — MPEG-2 Video Recoding Data Set

3 Definitions

3.1 cascading: The process where video that has once been coded (compressed) is subsequently decoded and coded once more. This cascaded step could carry on for any number of generations.

3.2 coding: The process by which an uncompressed video sequence is compressed to a bit stream that conforms to the ISO/IEC 13818-2 standard.

3.3 decoder: A compressed bit stream decoder that complies with the ISO/IEC 13818-2 standard.

3.4 macroblock: The four 8 by 8 blocks of luminance data and the corresponding blocks of chrominance data depending on the MPEG-2 profile coming from a 16 by 16 section of the luminance component of the picture as defined in ISO-IEC 13818-2.

3.5 macroblock rate information: The coding information from the ISO/IEC 13818-2 bit stream that relates to the individual macroblocks as defined in this standard

3.6 MPEG-2: The standard for the generic coding of moving pictures as defined in ISO/IEC 13818-2.

3.7 MPEG-2 video recoding data set: The data set for the representation of certain ISO/IEC 13818-2 MPEG coding information for the purpose of optimally cascading decoders and re-encoders as defined in SMPTE 327M

3.8 picture: Source, coded, or reconstructed image data as defined in ISO/13818-2

3.9 picture rate information: Coding information from the ISO/IEC 13818-2 bit stream that relates to the whole picture, with some additional information derived from sequence & GoP (Group of Pictures) headers.

4 Introduction

The principal application of this standard is to preserve the quality of the decoded MPEG-2 long GoP signals when subsequently passed through compression schemes, such as DV-based at 50 Mb/s or MPEG compression at 50 Mb/s by feeding forward previous coding decisions.

In this standard, the video recoding data set defined in SMPTE 327M is data-reduced by applying compression techniques to allow this data-reduced recoding data set to pass through systems with a limited data capacity. In contrast, the SMPTE 327M standard defines subsets of this data (reduced bandwidth indicator) to reduce the bandwidth required.

The data reduction mechanism described has the advantage of being less damaging to the resultant picture quality than the simple removal of data.

The main features of this data reduction method are as follows:

- macroblock information is transmitted in the form of an MPEG-2 video elementary stream;
- coded_block_pattern and coefficient information are removed from the bit stream;
- motion vectors are transmitted to one-quarter of their usual precision;
- the remaining bits of the motion vectors are transmitted at the end of the bit stream.

The information required in the MPEG-2 video recoding data set can be broken down into two parts. These two parts consist of the picture rate information, described in clause 5, and the macroblock rate information, described in clause 6.

SMPTE 327M defines a method for signaling reduced bandwidth operation in any particular transport mechanism using the MPEG-2 video recoding data set. This standard uses that method. In the case of the present specification, for data sets that have been recoded with data-reduction, the decoder shall assume that red_bw_flag is set to 1 and that red_bw_indicator is set to "Indicator 1". This value of red_bw_indicator indicates that coded_block_pattern, slice_start, mb_quant and skipped_mb are not transmitted. It will be noted that mb_quant and skipped macroblock information are in fact transmitted in the data-reduced bit stream, but this information is transmitted as part of the data reduction mechanism and does not automatically indicate the values of those parameters in the original MPEG-2 bit stream.

5 Picture rate information

The picture rate information consists of 4,320 bits, exactly as given in table 4 of SMPTE 319M.

If the MPEG-2 **picture_structure** is "Field picture", then the picture rate information for the two field-pictures in the frame is transmitted in succession, a total of 8,640 bits.

6 Macroblock rate information

The macroblock rate information is transmitted immediately following the picture-rate information. It consists of two parts. The first part is essentially the picture data in an MPEG-2 video elementary stream without coefficients and containing reduced-precision motion vectors. The second part