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Partie 11: Consommation des supports éconergétiques (métadonnées vertes)

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This third edition cancels and replaces the second edition (ISO/IEC 23001-11:2019), which has been technically revised.

The main changes are as follows:

— 6.2 related to complexity metrics for decoder-power reduction is amended by the specification of a new VVC SEI message carrying complexity metrics for decoder-power reduction.

— Clause 9 related to metrics for quality recovery after low-power encoding is amended by the specification of additional metrics for quality recovery after low-power encoding in the newly added VVC SEI message.

— 6.3 related to interactive signalling for remote decoder-power reduction is amended by adding new syntax elements allowing a finer control by decoder of the encoding operations.

A list of all parts in the ISO/IEC 23001 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

This document specifies the metadata (green metadata) that facilitates reduction of energy usage during media consumption as follows:

— the format of the metadata that enables reduced decoder power consumption;

— the format of the metadata that enables reduced display power consumption;

— the format of the metadata that enables media selection for joint decoder and display power reduction;

— the format of the metadata that enables quality recovery after low-power encoding.

This metadata facilitates reduced energy usage during media consumption without any degradation in the quality of experience (QoE). However, it is also possible to use this metadata to get larger energy savings, but at the expense of some QoE degradation.

The metadata for energy-efficient decoding specifies two sets of information: complexity metrics (CM) metadata and decoding operation reduction request (DOR-Req) metadata. A decoder uses CM metadata to vary operating frequency and thus reduce decoder power consumption. In a point-to-point video conferencing application, the remote encoder uses the DOR-Req metadata to modify the decoding complexity of the bitstream and thus reduce local decoder power consumption.

The metadata for energy-efficient encoding specifies quality metrics that are used by a decoder to reduce the quality loss from low-power encoding.

The metadata for energy-efficient presentation specifies RGB-component statistics and quality levels. A presentation subsystem uses this metadata to reduce power by adjusting display parameters, based on the statistics, to provide a desired quality level from those provided in the metadata.

The metadata for energy-efficient media selection specifies DOR-Req parameters, RGB-component statistics and quality levels. The client in an adaptive streaming session uses this metadata to determine decoder and display power-saving characteristics of available video representations and to select the representation with the optimal quality for a given power-saving.

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Information technology — MPEG systems technologies —

Part 11:
Energy-efficient media consumption (green metadata)

1 Scope

This document specifies metadata for energy-efficient decoding, encoding, presentation, and selection of media.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 14496-10, *Information technology — Coding of audio-visual objects — Part 10: Advanced video coding*

ISO/IEC 23008-2, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding*

ISO/IEC 23009-1, *Information technology — Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats*

ISO/IEC 23090-3, *Information technology — Coded representation of immersive media — Part 3: Versatile video coding*

3 Terms, definitions, symbols, abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 14496-10, ISO/IEC 23008-2, ISO/IEC 23009-1, ISO/IEC 23090-3 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
alpha-point deblocking instance
APDI
single filtering operation that produces either a single, filtered output p'_0 or a single, filtered output q'_0, where p'_0 and q'_0 are filtered samples across a 4x4 block edge

3.1.2
deblocking filtering instance
single filtering operation that produces either a single, filtered output p' or a single, filtered output q', where p' and q' are filtered samples across an 8x8 and 4x4 block edge for HEVC and VVC, respectively

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3.1.3
decoding process
process that reads a bitstream and derives decoded pictures from it

Note 1 to entry: The decoding process is specified in ISO/IEC 14496-10, ISO/IEC 23008-2 or ISO/IEC 23090-3.

3.1.4
encoding process
process that produces a bitstream

Note 1 to entry: The bitstream shall conform to ISO/IEC 14496-10, ISO/IEC 23008-2 or ISO/IEC 23090-3.

3.1.5
no-quality-loss operating point
NQLOP
metadata-enabled operating point associated with the largest display-power reduction that can be achieved without any quality loss (infinite PSNR)

3.1.6
non-zero block
block containing at least one non-zero transform coefficient

3.1.7
peak signal
maximum permissible RGB component in a reconstructed frame

Note 1 to entry: For *N*-bit video, peak signal is $(2^N - 1)$.

3.1.8
period
interval over which complexity-metrics metadata are applicable

3.1.9
pixel
smallest addressable element in an all-points addressable display device

3.1.10
reconstructed frames
frames obtained after applying RGB colour-space conversion and cropping to the specific decoded picture or pictures for which display power-reduction metadata are applicable

3.1.11
RGB component
single sample representing one of the three primary colours of the RGB colour space

3.1.13
six-tap filtering
STF
single application of the 6-tap filter to generate a single filtered sample for fractional positions using the samples at integer-sample positions

3.2 Symbols and abbreviated terms

3.2.1 Symbols

+	addition
-	subtraction (as a two-argument operator) or negation (as a unary prefix operator)
*	multiplication

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