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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 8: Conformance specification for HEVC

Technologies de l'information — Codage à haute efficacité et livraison des medias dans des environnements hétérogènes —

Partie 8: Spécification de conformité du codage video à haute efficacité

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T. A technically aligned twin text is published as ITU-T H.265.1.

This second edition cancels and replaces the first edition (ISO/IEC ISO/IEC 23008-8:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— addition of conformance testing for Multiview Main and 3D Main profiles;

— addition of conformance testing for Format Range Extensions profiles;

— addition of conformance testing for Scalable profiles.

A list of all parts in the ISO/IEC 23008 series can be found on the ISO website.

Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 8: Conformance specification for HEVC

1 Scope

This document specifies a set of tests and procedures designed to indicate whether encoders or decoders meet the normative requirements specified in Rec. ITU-T H.265 | ISO/IEC 23008-2.

NOTE The conformance bitstreams identified within the text are available at http://standards.iso.org/iso-iec/23008/-8/ed-2/en.

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.

Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, *Information technology — High efficiency video coding and media delivery in heterogeneous environment — Part 2: High Efficiency Video Coding*

Rec. ITU-T H.265.2 | ISO/IEC 23008-5, *Information technology — High efficiency video coding and media delivery in heterogeneous environment — Part 2: High Efficiency Video Coding Reference Software*

3 Terms, definitions, abbreviated terms and conventions

For the purposes of this document, the terms, definitions, abbreviated terms and conventions given in Rec. ITU-T H.265 | ISO/IEC 23008-2 and the following apply.

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

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

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

3.1
bitstream
sequence of bits, in the form of a NAL unit stream or a byte stream, that forms the representation of coded pictures and associated data forming one or more CVSs

Note 1 to entry: In this document, this refers specifically to video bitstream according to ISO/IEC 23008-2.

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, 3.12, modified – Note 1 to entry added]

3.2
decoder
embodiment of a decoding process

Note 1 to entry: In this document, this refers specifically to a video decoder as specified in ISO/IEC 23008-2.

Note 2 to entry: The decoder does not include the display process, which is outside the scope of this document.

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, 3.40, modified – Notes 1 and 2 to entry added]

3.3
encoder
embodiment of an encoding process

Note 1 to entry: The process, not specified in this document (except in regard to identification of the reference software encoder), produces a bitstream.

[SOURCE: Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, 3.49, modified – Note 1 to entry added]

3.4
reference software decoder
decoding software required for this document

Note 1 to entry: For this document, the reference software decoder is provided in Rec. ITU-T H.265.2 | ISO/IEC 23008-5.

3.5
reference software encoder
encoding software required for this document

Note 1 to entry: For this document, the reference software encoder is provided in Rec. ITU-T H.265.2 | ISO/IEC 23008-5.

4 Conformance testing for Rec. ITU-T H.265 | ISO/IEC 23008-2

4.1 General

The following clauses specify normative tests for verifying conformance of video bitstreams as well as decoders. Those normative tests make use of test data (bitstream test suites) provided at http://standards.iso.org/iso-iec/23008/-8/ed-2/en and the reference software decoder specified in Rec. ITU-T H.265.2 | ISO/IEC 23008-5.

4.2 Bitstream conformance

Bitstream conformance for Rec. ITU-T H.265 | ISO/IEC 23008-2 is specified by ISO/IEC 23008-2:2017, C.4.

4.3 Decoder conformance

Decoder conformance for Rec. ITU-T H.265 | ISO/IEC 23008-2 is specified by ISO/IEC 23008-2:2017, C.5.

4.4 Procedure to test bitstreams

A bitstream that claims conformance with Rec. ITU-T H.265 | ISO/IEC 23008-2 shall pass the following normative test.

The bitstream shall be decoded by processing it with the reference software decoder. When processed by the reference software decoder, the bitstream shall not cause any error or non-conformance messages to be reported by the reference software decoder. This test should not be applied to bitstreams that are known to contain errors introduced by transmission, as such errors are highly likely to result in bitstreams that lack conformance to Rec. ITU-T H.265 | ISO/IEC 23008-2.

Successfully passing the reference software decoder test provides only a strong presumption that the bitstream under test is conforming to the video layer, i.e., that it does indeed meet all the requirements for the video layer (except Annexes C, D and E) specified in Rec. ITU-T H.265 | ISO/IEC 23008-2 that are tested by the reference software decoder.

Additional tests may be necessary to more thoroughly check that the bitstream properly meets all the requirements specified in Rec. ITU-T H.265 | ISO/IEC 23008-2 including the hypothetical reference decoder (HRD) conformance (based on Annexes C, D and E). These complementary tests may be performed using other video bitstream verifiers that perform more complete tests than those implemented by the reference software decoder.

Rec. ITU-T H.265 | ISO/IEC 23008-2 contains several informative recommendations that are not an integral part of that Document. When testing a bitstream for conformance, it may also be useful to test whether or not the bitstream follows those recommendations.

To check correctness of a bitstream, it is necessary to parse the entire bitstream and to extract all the syntax elements and other values derived from those syntactic elements and used by the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2.

A verifier may not necessarily perform all stages of the decoding process specified in Rec. ITU-T H.265 | ISO/IEC 23008-2 in order to verify bitstream correctness. Many tests can be performed on syntax elements in a state prior to their use in some processing stages.

4.5 Procedure to test decoder conformance

4.5.1 Conformance bitstreams

A bitstream has values of general_profile_idc, general_tier_flag, and general_level_idc corresponding to a set of specified constraints on a bitstream for which a decoder conforming to a specified profile, tier, and level is required in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, Annex A to properly perform the decoding process.

4.5.2 Contents of the bitstream file

The conformance bitstreams are provided at http://standards.iso.org/iso-iec/23008/-8/ed-2/en. The following information is included in a single zipped file for each such bitstream.

— bitstream;

— decoded pictures or hashes of decoded pictures (may not be present);

— short description of the bitstream;

— trace file (results while decoding the bitstream, in ASCII format).

In cases where the decoded pictures or hashes of decoded pictures are not available, the reference software decoder shall be used to generate the necessary reference decoded pictures from the bitstream.

4.5.3 Requirements on output of the decoding process and timing

Two classes of decoder conformance are specified:

— output order conformance;

— output timing conformance.

The output of the decoding process is specified in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, Clause 8 and Annex C.

For output order conformance, it is a requirement that all of the decoded pictures specified for output in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, Annex C shall be output by a conforming decoder in the specified order and that the values of the decoded samples in all of the pictures that are output shall be (exactly equal to) the values specified in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, Clause 8.