INTERNATIONAL STANDARD

ISO/IEC 23008-8

Second edition
2018-08-30

AMENDMENT 1
2019-10

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

Part 8: Conformance specification for HEVC

AMENDMENT 1: Conformance testing for HEVC screen content coding (SCC) extensions and non-intra high throughput profiles

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

AMENDEMENT 1: .

Reference number
ISO/IEC 23008-8:2018/Amd.1:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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.

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) or the IEC list of patent declarations received (see http://patents.iec.ch).

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

For an explanation of 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 www.iso.org/iso/foreword.html.

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*, in collaboration with ITU-T. The technically aligned text is published as ITU-T H.265 (02/2018).

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

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.

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

Part 8: Conformance specification for HEVC

AMENDMENT 1: Conformance testing for HEVC screen content coding (SCC) extensions and non-intra high throughput profiles

NOTE The conformance bitstreams added by this Amendment are available at: https://standards.iso.org/iso-iec/23008/-8/ed-2/en/amd/-1.

4.5.7

Replace paragraph 9 with the following:

A decoder that conforms to the High Throughput 4:4:4 16 Intra, High Throughput 4:4:4, High Throughput 4:4:4 10 and High Throughput 4:4:4 14 profiles (as specified in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, A.3.6), which are collectively referred to as the high throughput profiles, at specific level shall be capable of decoding the specified bitstreams in Table 4.

4.5.7

At the end of 4.5.7, add the following paragraph:

A decoder that conforms to the Screen-Extended Main, Screen-Extended Main 10, Screen-Extended Main 4:4:4, Screen-Extended Main 4:4:4 10, Screen-Extended High Throughput 4:4:4, Screen-Extended High Throughput 4:4:4 10 or Screen-Extended High Throughput 4:4:4 14 profiles (as specified in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, A.3.7), which are collectively referred to as the screen content coding extensions profiles, shall be capable of decoding the specified bitstreams in Table 7. A decoder that conforms to some screen content coding extensions profiles is also required to be capable of decoding bitstreams that conform to particular other profiles. Thus, in addition to the specified bitstreams in Table 7, a decoder that conforms to a screen content coding extension profile shall also be capable of decoding the bitstreams specified in Table 1 or Table 4 that conform to the decoding requirements specified for the screen content coding extensions profile in Rec. ITU-T H.265 | ISO/IEC 23008-2:2017, A.3.7.

4.6.16.43

At the end of 4.6.16.43, add the following additional subclauses:

4.6.16.44 Test bitstreams #WPP_AND_TILE_10Bit422Test_HIGH_TP_444_10BIT_REXt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 2. The value of bit_depth_chroma_minus8 is set equal to 2. The value of chroma_format_idc is set equal to 2. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag and extended_precision_processing_flag are set equal to 0.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise the combination of simultaneously using wavefronts and tiles in the specified profile (the High Throughput 4:4:4 10 profile) when cabac_bypass_alignment_enabled_flag and extended_precision_processing_flag are set equal to 0.

4.6.16.45 Test bitstreams # WPP_AND_TILE_AND_CABAC_BYPASS_ALIGN_0_HIGH_TP_444_14BIT_REXt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 0. The value of bit_depth_chroma_minus8 is set equal to 0. The value of chroma_format_idc is set equal to 1. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag and extended_precision_processing_flag are set equal to 0. The video_full_range_flag is set equal to 1 in VUI.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise the combination of simultaneously using wavefronts and tiles in the specified profile (the High Throughput 4:4:4 14 profile) when cabac_bypass_alignment_enabled_flag and extended_precision_processing_flag are set equal to 0.

4.6.16.46 Test bitstreams #WPP_AND_TILE_AND_CABAC_BYPASS_ALIGN_1_HIGH_TP_444_14BIT_REXt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 0. The value of bit_depth_chroma_minus8 is set equal to 0. The value of chroma_format_idc is set equal to 1. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag is set equal to 1. The extended_precision_processing_flag is set equal to 0. The video_full_range_flag is set equal to 1 in VUI.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise the combination of simultaneously using wavefronts and tiles in the specified profile (the High Throughput 4:4:4 14 profile) when cabac_bypass_alignment_enabled_flag is set equal to 1 and the extended_precision_processing_flag is set equal to 0.

4.6.16.47 Test bitstreams #WPP_AND_TILE_AND_CABAC_EXT_PREC_1_HIGH_TP_444_14BIT_REXt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 0. The value of bit_depth_chroma_minus8 is set equal to 0. The value of chroma_format_idc is set equal to 1. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag is set equal to 0. The extended_precision_processing_flag is set equal to 1. The video_full_range_flag is set equal to 1 in VUI.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise the combination of simultaneously using wavefronts and tiles in the specified profile (the High Throughput 4:4:4 14 profile) when cabac_bypass_alignment_enabled_flag is set equal to 0 and the extended_precision_processing_flag is set equal to 1.

4.6.16.48 Test bitstreams #WPP_AND_TILE_HIGH_TP_444_8BIT_REXt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 0. The value of bit_depth_chroma_minus8 is set equal to 0. The value of chroma_format_idc is set equal to 1. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag and the extended_precision_processing_flag are set equal to 0. The video_full_range_flag is set equal to 1 in VUI.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise the combination of simultaneously using wavefronts and tiles in the specified profile (the High Throughput 4:4:4 profile) when the cabac_bypass_alignment_enabled_flag and the extended_precision_processing_flag are set equal to 0.

4.6.16.49 Test bitstreams # WPP_HIGH_TP_444_8BIT_RExt

Specification: All slices are coded as I or P slices. The value of bit_depth_luma_minus8 is set equal to 0. The value of bit_depth_chroma_minus8 is set equal to 0. The value of chroma_format_idc is set equal to 1. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag and the extended_precision_processing_flag is set equal to 0. The video_full_range_flag is set equal to 1 in VUI.

Functional stage: Test parsing and reconstruction process with various combinations of tools.

Purpose: The purpose of the stream is to exercise use wavefronts in the specified profile (the High Throughput 4:4:4 profile) when the cabac_bypass_alignment_enabled_flag and the extended_precision_processing_flag are set equal to 0.

4.6.17

At the end of 4.6.17, add the following subclause and subordinate subclauses:

4.6.18 Test bitstreams – screen content coding extensions

4.6.18.1 Test bitstreams #PPI_A

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set to 3. There are a total of 33 pictures.

In the bitstream, the palette predictor initializers in both SPS and PPS are enabled. The bitstream consists of one SPS and three PPS's:

— The first part of the bitstream contains the first SPS with sps_palette_predictor_initializer_present_flag equal to 1 and the first PPS with pps_palette_predictor_initializer_present_flag equal to 0. Therefore, the pictures in the first part of the bitstream use the palette predictor initializer signalled in the SPS.

— The second part of the bitstream contains the second PPS with pps_palette_predictor_initializer_present_flag set equal to 1. Therefore, the pictures in the second part of the bitsream use the palette predictor initializers as signalled in the second PPS.

— The third part of the bitstream contains the third PPS with pps_palette_predictor_initializer_present_flag equal to 1 and pps_num_palette_predictor_initializer equal to 0. Therefore, the pictures in the third part of the bitstream use an empty palette predictor initializer.

Coding structure: Hierarchical B-pictures with GOP size of 16.

Functional stage: Test palette predictor initializer in SPS and/or PPS

Purpose: Test that the decoder correctly parses and decodes pictures when a palette predictor is initialized using different types of palette predictors such as from SPS or PPS or the palette predictor is initialized 0.

4.6.18.2 Test bitstreams #PPI_B

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set to 1. There are a total of 33 pictures.

In the bitstream, the palette predictor initializers in both SPS and PPS are enabled. The bitstream consists of one SPS and three PPS's:

— The first part of the bitstream contains the first SPS with sps_palette_predictor_initializer_present_flag equal to 1 and the first PPS with pps_palette_predictor_initializer_present_flag equal to 0. Therefore, the pictures in the first part of the bitstream use the palette predictor initializer signalled in the SPS.

— The second part of the bitstream contains the second PPS with pps_palette_predictor_initializer_present_flag set equal to 1. Therefore, the pictures in the second part of the bitsream use the palette predictor initializers as signalled in the second PPS.

— The third part of the bitstream contains the third PPS with pps_palette_predictor_initializer_present_flag equal to 1 and pps_num_palette_predictor_initializer equal to 0. Therefore, the pictures in the third part of the bitstream use an empty palette predictor initializer.

Coding structure: Hierarchical B-pictures with GOP size of 16.

Functional stage: Test palette predictor initializer in SPS and/or PPS

Purpose: Test that the decoder correctly parses and decodes pictures when a palette predictor is initialized using different types of palette predictors such as from SPS or PPS or the palette predictor is initialized 0.

4.6.18.3 Test bitstreams #Zero_and_One_Palette_Size_A

Specification: The bitstream consists of a single picture that is coded as a single slice. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set to 3. Several CUs within the picture are coded using the palette mode with palette size of 0 and 1.

Coding structure: The single picture is coded as a P-picture with the current picture as the only reference picture.

Functional stage: Test the decoding and reconstruction of a palette block for palette sizes of 0 and 1.

Purpose: Test that the decoder correctly parses and decodes a palette block when the palette size is 0 or 1.

4.6.18.4 Test bitstreams #Slice_ACT_QP_Offsets_A

Specification: There are two pictures with each picture containing a single slice. The first slice is coded as a P slice with the current picture as the only reference picture. The second slice is coded as a B slice. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3.

There are two PPSs. The first picture uses the first PPS and the second picture uses the second PPS. For each PPS, pps_act_y_qp_offset_plus5, pps_act_cb_qp_offset_plus5, and pps_act_cr_qp_offset_plus3 are set to 2, –1, and 1, respectively. For the first PPS, pps_slice_act_qp_offsets_present_flag is set equal to 0. For the second PPS, pps_slice_act_qp_offsets_present_flag is set equal to 1 and slice_act_y_qp_offset, slice_act_cb_qp_offset, and slice_act_cr_qp_offset are set to –2, –1, and 1, respectively.

Coding structure: The first slice is a P slice with the current picture as the only reference picture. The second slice is a B slice.

Functional stage: Test the ACT QP offsets at the PPS and slice level.

Purpose: Check that ACT QP offsets can be specified in the PPS and modified at the slice level.

4.6.18.5 Test bitstreams #Bipred_8x8_A

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 1. There are 3 pictures. In the 3rd picture, there 5 8×8 non-merge blocks for which the signalled motion vector is bi-directional. It is converted to unidirectional during the decoding process.

Coding structure: Low delay B configuration with hierarchical B pictures.

Functional stage: Test the decoding process for 8×8 blocks when a bi-directional motion vector is converted to a uni-directional motion vector.

Purpose: Check the decoder correctly converts a bi-directional motion vector for an 8×8 block to a uni-directional motion vector when bi-directional prediction is restricted.

4.6.18.6 Test bitstreams #IBF_Disabled_A

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3. There are 33 pictures. The intra_boundary_filtering_disabled_flag is set to 0.

Coding structure: Hierarchical B-pictures with GOP size of 16.

Functional stage: Test the reconstruction process of intra boundary filtering based on the intra_boundary_filtering_disabled_flag.

Purpose: Check that the decoder decodes properly when intra_boundary_filtering_disabled_flag is equal to 0.

4.6.18.7 Test bitstreams #IBF_Disabled_B

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 1. There are 33 pictures. The intra_boundary_filtering_disabled_flag is set to 1.

Coding structure: Hierarchical B-pictures with GOP size of 16.

Functional stage: Test the reconstruction process of intra boundary filtering based on intra_boundary_filtering_disabled_flag.

Purpose: Check that the decoder properly decodes when intra_boundary_filtering_disabled_flag is equal to 1.

4.6.18.8 Test bitstreams #DPB_Loop_Filters_A

Specification: All slices are coded as P or B slices. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3. There are 10 pictures. For one picture in the middle, both SAO and deblocking filters are off and the pps_curr_pic_ref_enabled_flag is equal to 1. For this picture, the number of reference pictures is increased by 1.

Coding structure: Low delay B configuration with hierarchical B pictures.

Functional stage: Test the maximum number of reference pictures based on whether loop filters are on or off and the value of pps_curr_pic_ref_enabled_flag.

Purpose: Check that the decoder allows one more reference picture to be used when all the loop filters are off and pps_curr_pic_ref_enabled_flag is equal to 1.

4.6.18.9 Test bitstreams #Delta_QP_Chroma_QP_Offsets_A

Specification: Each slice is coded as a P slice with current picture as the only reference picture. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3. There are two pictures with each picture containing a single slice.

Additionally, cu_qp_delta_enabled_flag is set to 1 and diff_cu_qp_delta_depth is also set to 1. Similarly, chroma_qp_offset_list_enabled_flag is set to 1 and diff_cu_chroma_qp_offset_depth is set to 1.

There are 7 instances when delta QP is signalled in a palette-coded block. There are 19 instances when chroma QP offsets are signalled in a palette-coded block.

Coding structure: P slices with only the current picture as reference.

Functional stage: Test delta QP and chroma QP offset signalling for a coding unit coded in palette mode with escape samples.

Purpose: Check that for a quantization or chroma offset group, delta QP and chroma QP offsets may be signalled either for a palette block with escape sample(s) or a non-palette block with non-zero residual, based on the order of occurrence of the blocks within the quantization or chroma offset group.

4.6.18.10 Test bitstreams #MVRESIDC_A

Specification: There are 9 pictures with each picture containing a single slice. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3.

Additionally, motion_vector_resolution_control_idc is set equal to 0. This implies that luma motion vectors have a quarter pel precision.

Coding structure: Low delay B configuration with hierarchical B pictures. The first picture is a P-picture with only the current picture as reference.

Functional stage: Test motion vector decoding process based on the value of motion_vector_resolution_control_idc.

Purpose: Check that the decoder can properly decode motion vectors and slices when motion_vector_resolution_control_idc is set equal to 0.

4.6.18.11 Test bitstreams #MVRESIDC_B

Specification: There are 9 pictures with each picture containing a single slice. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3.

Additionally, motion_vector_resolution_control_idc is set equal to 1. This implies that luma motion vectors have an integer pel precision.

Coding structure: Low delay configuration with hierarchical B pictures. The first picture is a P-picture with only the current picture as reference.

Functional stage: Test motion vector decoding process based on the value of motion_vector_resolution_control_idc.

Purpose: Check that the decoder can properly decode motion vectors and slices when motion_vector_resolution_control_idc is set equal to 1.

4.6.18.12 Test bitstreams #MVRESIDC_C

Specification: There are 9 pictures with each picture containing a single slice. bit_depth_luma_minus8 is set equal to 0 and bit_depth_chroma_minus8 is set equal to 0. chroma_format_idc is set equal to 3.

Additionally, motion_vector_resolution_control_idc is set equal to 2. For pictures with even numbered POCs, the use_integer_mv_flag is set equal to 1. For the remaining pictures, the use_integer_mv_flag is set equal to 0.

Coding structure: Low delay configuration with hierarchical B pictures. The first picture is a P-picture with only the current picture as reference.

Functional stage: Test motion vector decoding process based on the value of motion_vector_resolution_control_idc.

Purpose: Check that the decoder can properly decode motion vectors and slices when motion_vector_resolution_control_idc is set equal to 2.

4.6.18.13 Test bitstreams #HT_A_SCC

Specification: All slices are coded as P or B slices. The value of bit_depth_luma_minus8 is set equal to 2. The value of bit_depth_chroma_minus8 is set equal to 2. The value of chroma_format_idc is set equal to 3. There are 3 pictures in the bitstream. The cabac_bypass_alignment_enabled_flag and extended_precision_processing_flag are set equal to 0.

