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Information technology — Coding of audio-visual objects —

Part 4:
Conformance testing

AMENDMENT 38: Conformance testing for Multiview Video Coding

Technologies de l'information — Codage des objets audiovisuels —

Partie 4: Essai de conformité

AMENDEMENT 38: Essais de conformité pour cogage vidéo multivues

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Foreword

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Amendment 38 to ISO/IEC 14496-4:2004 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This Amendment establishes conformance test requirements for conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10.

In this Amendment, additional text to ITU-T Rec. H.264 | ISO/IEC 14496-10 is specified for testing the conformance of ITU-T Rec. H.264 | ISO/IEC 14496-10 video decoders including in particular the MVC Profiles, which consist of the Multiview High and Stereo High profiles.

This Amendment specifies the normative tests for verifying conformance of ITU-T Rec. H.264 | ISO/IEC 14496-10 video bitstreams and decoders. These normative tests make use of test data (bitstream test suites) provided as an electronic attachment to this Amendment, and of the reference software decoder specified in ITU-T Rec. H.264.2 | ISO/IEC 14496-5 with source code available in electronic format.

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Information technology — Coding of audio-visual objects —

Part 4:
Conformance testing

AMENDMENT 38: Conformance testing for Multiview Video Coding

In 10.6.5.7, add the following text at the end of the subclause:

A decoder that conforms to the Multiview High profile at a specific level shall be capable of decoding all bitstreams in which all active MVC sequence parameter sets have any of the following.

— profile_idc equal to 118

— profile_idc equal to 100 or 77 and constraint_set4_flag is equal to 1

— profile_idc equal to 88 and constraint_set1_flag equal to 1 and constraint_set4_flag is equal to 1

— profile_idc equal to 66 and constraint_set1_flag equal to 1

and in which level_idc or the combination of level_idc and constraint_set3_flag for all active MVC sequence parameter sets represent a level less than or equal to the specific level. In addition to the bitstreams defined in Table AMD38-1, a decoder that conforms to the Multiview High profile shall be capable of decoding the Main profile bitstreams specified in Table AMD6-1, and the High profile bitstreams specified in Table AMD9-2.

A decoder that conforms to the Stereo High profile at a specific level shall be capable of decoding all bitstreams in which all active MVC sequence parameter sets have any of the following.

— profile_idc equal to 118 and constraint_set5_flag is equal to 1

— profile_idc equal to 128

— profile_idc equal to 100 or 77

— profile_idc equal to 88 and constraint_set1_flag equal to 1

— profile_idc equal to 66 and constraint_set1_flag equal to 1

and in which level_idc or the combination of level_idc and constraint_set3_flag for all active MVC sequence parameter sets represent a level less than or equal to the specific level. In addition to the bitstreams defined in Table AMD38-1, a decoder that conforms to the Stereo High profile shall be capable of decoding the Main profile bitstreams specified in Table AMD6-1, and the High profile bitstreams specified in Table AMD9-2.

After 10.6.6.32.3, add the following text:

10.6.6.33 Test bitstreams – Multiview High Profile

10.6.6.33.1 Test bitstream #MVCDS-1

Specification: All slices are coded as I slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_lX and num_non_anchor_refs_lX are equal to 0. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views without inter-prediction or inter-view prediction.

Purpose: Check that the decoder can properly decode multiple view components.

10.6.6.33.2 Test bitstream #MVCDS-2

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_lX and num_non_anchor_refs_lX are equal to 0. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views with inter-prediction, but without inter-view prediction.

Purpose: Check that the decoder can properly decode multiple view components with inter-prediction.

10.6.6.33.3 Test bitstream #MVCDS-3

Specification: All slices are coded as I or P slices. Only the first picture is coded as an IDR access unit with all subsequent pictures coded as anchor access units. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_l0 is equal to 1, num_anchor_refs_l1 is equal to 0, and num_non_anchor_refs_lX are equal to 0. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views with inter-view prediction in anchor pictures, but without inter-prediction within views.

Purpose: Check that the decoder can properly decode multiple view components with inter-view prediction in anchor pictures.

10.6.6.33.4 Test bitstream #MVCDS-4

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_l0 is equal to 1, and num_non_anchor_refs_l0 is equal to 0. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views with inter-prediction, and inter-view prediction in anchor pictures.

Purpose: Check that the decoder can properly decode multiple view components with inter-prediction, as well as inter-view prediction in anchor pictures.

10.6.6.33.5 Test bitstream #MVCDS-5

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_l0 and num_non_anchor_refs_l0 are equal to 1. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views with inter-prediction, and inter-view prediction in both anchor pictures and non-anchor pictures.

Purpose: Check that the decoder can properly decode multiple view components with inter-prediction, as well as inter-view prediction in both anchor and non-anchor access units.

10.6.6.33.6 Test bitstream #MVCDS-6

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. num_anchor_refs_l0 and num_non_anchor_refs_l0 are equal to 1. inter_view_flag is equal to 0 for a subset of non-anchor view components of the base view. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of two views with inter-prediction, and inter-view prediction in both anchor pictures and non-anchor pictures.

Purpose: Check that the decoder can properly decode multiple view components with inter-prediction, as well as inter-view prediction in both anchor and non-anchor access units, with different settings of inter_view_flag in different view components.

10.6.6.33.7 Test bitstream #MVCNV-1

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 2, and the views are denoted as A, B, and C, where view A is the base view, and view B and C are non-base views. View B refers to view A, and view C refers to view B. num_anchor_refs_l0 and num_non_anchor_refs_l0 for view B and C are equal to 1, respectively. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of three views with inter-prediction and inter-view prediction in anchor access units and non-anchor pictures.

Purpose: Check that the decoder can properly decode three views with inter-prediction, as well as inter-view prediction in anchor access units.

10.6.6.33.8 Test bitstream #MVCNV-2

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 7, and the views are denoted as A, B, C, D, E, F, G, H, where view A is the base view, and other views are non-base views. View C refers to view A, view B refers to view A and view C, view E refers to view C, view D refers to view C and view E, view G refers to view E, view F refers to view E and view G, and view H refers to view G. num_anchor_refs_l0 and num_non_anchor_refs_l0 for view C, E, G, and H are equal to 1, respectively, and num_anchor_refs_lX (X=0,1) and num_non_anchor_refs_lX (X=0,1) for view B, D, and F are equal to 1, respectively. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of eight views with inter-prediction and inter-view prediction in anchor access units and non-anchor pictures.

Purpose: Check that the decoder can properly decode eight views with inter-prediction, as well as inter-view prediction in anchor access units.

10.6.6.33.9 Test bitstream #MVCNV-3

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 2, and the views are denoted as A, B, and C, where view A is the base view, and views B and C are non-base views. View B refers to view A, and view C does not refer to either view A or B, i.e., it is an independently coded non-base view. num_anchor_refs_l0 and num_non_anchor_refs_l0 for view C is equal to 1. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of three views including a base view with inter-prediction, a non-base view with inter-prediction but no inter-view prediction, and a non-base view with inter-view prediction from the base view and non-base view without inter-view prediction.

Purpose: Check that the decoder can properly decode a bitstream including a mix of non-base views with and without inter-view prediction.

10.6.6.33.10 Test bitstream #MVCNV-4

Specification: All slices are coded as I or P slices. Only the first picture is coded as an IDR access unit with all subsequent pictures coded as anchor access units. Each view component contains only one slice. num_views_minus1 is equal to 3, and the views are denoted as A, B, C, and D, where view A is the base view, and views B, C and D are non-base views. View B refers to view A, view C refers to view B, and view D refers to view C. num_anchor_refs_l0 is equal to 1, num_anchor_refs_l1 is equal to 0, and num_non_anchor_refs_lX are equal to 0. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Decoding of four views with inter-view prediction in anchor pictures and subsequent predictions over the views, but without inter-prediction within views.

Purpose: Check that the decoder can properly decode multiple view components with inter-view prediction in anchor pictures for a higher number of views.

10.6.6.33.11 Test bitstream #MVCRP-1

Specification All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 0. Reference picture list reordering is used without reordering_of_pic_nums_idc equal to 4 or 5. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Reference picture list reordering of reference pictures used for inter-prediction.

Purpose: Check that decoder handles reference picture list reordering of reference pictures used for inter-prediction.

10.6.6.33.12 Test bitstream #MVCRP-2

Specification: All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 0. Memory management control operations are used. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Memory management control operations in context of decoding multiple view components.

Purpose: Check that decoder handles memory management control operations.

10.6.6.33.13 Test bitstream #MVCRP-3

Specification All slices are coded as I or P slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 0. Reference picture list reordering is used including reordering_of_pic_nums_idc equal to 4 and 5. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Reference picture list reordering of reference pictures used for both inter-prediction and inter-view prediction.

Purpose: Check that decoder handles reference picture list reordering of reference pictures used for both inter-prediction and inter-view prediction.

10.6.6.33.14 Test bitstream #MVCRP-4

Specification All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 2. Reference picture list reordering including reordering_of_pic_nums_idc equal to 4 and 5, and memory management control operations, are used. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Reference picture list reordering for both inter-prediction and inter-view prediction, and memory management control operations.

Purpose: Check that decoder handles reference picture list reordering and memory management control operations.

10.6.6.33.15 Test bitstream #MVCRP-5

Specification All slices are coded as I, P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 2. gaps_in_frame_num_value_allowed_flag is equal to 1. Reference picture list reordering including reordering_of_pic_nums_idc equal to 4 and 5, and memory management control operations, are used. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Reference picture list reordering and memory management control operations.

Purpose: Check that decoder handles gaps in frame_num, reference picture list reordering and memory management control operations.

10.6.6.33.16 Test bitstream #MVCRP-6

Specification: All slices are coded as I or P or B slices. Only the first picture is coded as an IDR access unit. Each view component contains only one slice. num_views_minus1 is equal to 1. pic_order_cnt_type is equal to 0. gaps_in_frame_num_value_allowed_flag is equal to 1. Reference picture list reordering including reordering_of_pic_nums_idc equal to 4 and 5, and memory management control operations, are used. The decoding order is different from the output order. All NAL units are encapsulated into the byte stream format specified in Annex B in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Functional stage: Reference picture list reordering, memory management control operations and non-increasing PicOrderCnt values.

Purpose: Check that decoder handles reference picture list reordering and memory management control operations. Test output order conformance for non-increasing PicOrderCnt values.