INTERNATIONAL STANDARD

ISO/IEC 14496-4

Second edition
2004-12-15

AMENDMENT 6
2005-09-01

Information technology — Coding of audio-visual objects —

Part 4: Conformance testing

AMENDMENT 6: Advanced Video Coding conformance

Technologies de l'information — Codage des objets audiovisuels —

Partie 4: Essai de conformité

AMENDEMENT 6: Conformité de codage vidéo avancé

Reference number
ISO/IEC 14496-4:2004/Amd.6:2005(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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.

Amendment 6 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*.

Introduction

This Recommendation | International Standard establishes conformance test requirements for conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10 Advanced Video Coding.

This specification has been jointly developed by ITU-T Video Coding Experts Group (VCEG) and the ISO/IEC Moving Picture Experts Group. It is published as technically-aligned twin text in both organizations ITU-T and ISO/IEC.

This document is the text of the ITU-T Rec. H.264.1 | ISO/IEC 14496-4 conformance test of ITU-T Rec. H.264 | ISO/IEC 14496-10 video bitstreams and decoders. This specification is specifically applied to ITU-T Rec. H.264 | ISO/IEC 14496-10, Advanced Video Coding.

The following subclauses specify the normative tests for verifying conformance of ITU-T Rec. H.264 | 14496-10 video bitstreams and video decoders. These normative tests make use of test data (bitstream test suites) provided as an electronic annex to this document, and the reference software decoder specified in ITU-T Rec. H.264.2 | ISO/IEC 14496-5:2001/Amd.6 with source code available in electronic format.

Information technology — Coding of audio-visual objects —

Part 4: Conformance testing

Amendment 6: Advanced Video Coding conformance

Add the following after clause 9:

10 Advanced Video Coding

10.1 Scope

This clause specifies tests designed to verify whether bitstreams and decoders meet normative requirements specified in ITU-T Rec. H.264 | ISO/IEC 14496-10. An encoder can claim conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10 if the bitstreams that it generates are conforming bitstreams.

Characteristics of coded bitstreams and decoders are defined for ITU-T Rec. H.264 | ISO/IEC 14496-10. The characteristics of a bitstream define the subset of the standard that is exploited in the bitstream. Examples are the applied values or range of the picture size and bit rate parameters. Decoder characteristics define the properties and capabilities of the applied decoding process. The capabilities of a decoder specify which bitstreams the decoder can decode and reconstruct, by defining the subset of the ITU-T Rec. H.264 | ISO/IEC 14496-10 standard that may be exploited in the bitstreams that it will decode. A bitstream can be decoded by a decoder if the characteristics of the bitstream are within the subset of the standard specified by the decoder capabilities.

Procedures are described for testing conformance of bitstreams and decoders to the requirements defined in ITU-T Rec. H.264 | ISO/IEC 14496-10. Given the set of characteristics claimed, the requirements that shall be met are fully determined by ITU-T Rec. H.264 | ISO/IEC 14496-10. This clause summarizes the requirements, cross references them to characteristics, and defines how conformance with them can be tested. Guidelines are given on constructing tests to verify bitstream and decoder conformance. This clause gives guidelines on how to construct bitstream test suites to check or verify decoder conformance. In addition, the test bitstreams implemented according to those guidelines are provided as an electronic annex to this document.

10.2 Normative references

10.2.1 General

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

10.2.2 Identical Recommendations | International Standards

– None.

10.2.3 Paired Recommendations | International Standards equivalent in technical content

– ITU-T Recommendation H.264 (2004), *Advanced video coding for generic audiovisual services.*
ISO/IEC 14496-10, *Information technology – Coding of audiovisual objects – Part 10: Advanced video coding.*

– ITU-T Recommendation H.264.2 (2004), *Advanced video coding reference software.*
ISO/IEC 14496-5, *Information technology – Coding of audiovisual objects – Part 5: Reference software.*

10.2.4 Additional references

– None.

10.3 Definitions

10.3.1 For the purposes of this document, the terms, definitions, abbreviations and symbols specified in bitstream: An ITU-T Rec. H.264 | ISO/IEC 14496-10 video bitstream. A bitstream may contain IDR, I, P, B, SI, and SP slices.

10.3.2 decoder: An ITU-T Rec. H.264 | ISO/IEC 14496-10 video decoder, i.e., an embodiment of the decoding process specified by ITU-T Rec. H.264 | ISO/IEC 14496-10. The decoder does not include the display process, which is outside the scope of this standard.

10.3.3 reference software decoder: The software decoders contained in ITU-T Rec. H.264.2 | ISO/IEC 14496-5.

10.4 Abbreviations

For the purposes of this Recommendation | International Standard, relevant abbreviations are specified in clause 4 of ITU-T Rec. H.264 | ISO/IEC 14496-10.

10.5 Conventions

For the purposes of this Recommendation | International Standard, relevant conventions are specified in clause 5 in ITU-T Rec.264 | ISO/IEC 14496-10.

10.6 Conformance for ITU-T Rec. H.264 | ISO/IEC 14496-10

10.6.1 Introduction

The following subclauses specify the normative tests for verifying conformance of video bitstreams as well as decoders. Those normative tests make use of test data (bitstream test suites) provided as an electronic annex to this document, and the reference software decoder specified in ITU-T Rec. H.264.2 | ISO/IEC 14496-5 with source code included in electronic format.

10.6.2 Bitstream conformance

The bitstream conformance of ITU-T Rec. H.264 | ISO/IEC 14496-10 is specified by subclause C.3 in Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10.

10.6.3 Decoder conformance

The decoder conformance of ITU-T Rec. H.264 | ISO/IEC 14496-10 is specified by subclause C.4 in Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10.

10.6.4 Procedure to test bitstreams

A bitstream that claims conformance with this standard shall pass the following normative test:

The bitstream shall be decoded by processing it with the reference software decoder specified in ITU-T Rec. H.264.2 | ISO/IEC 14496-5. 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 ITU-T Rec. H.264 | ISO/IEC 14496-10.

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 ITU-T Rec. H.264 | ISO/IEC 14496-10 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 ITU-T Rec. H.264 | ISO/IEC 14496-10 including the 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.

ITU-T Rec. H.264 | ISO/IEC 14496-10 contains several informative recommendations that are not an integral part of that Recommendation | International Standard. 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 syntactic elements and other values derived from those syntactic elements and used by the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10.

A verifier may not necessarily perform all stages of the decoding process described in ITU-T Rec. H.264 | ISO/IEC 14496-10 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.

10.6.5 Procedure to test decoder conformance

10.6.5.1 Conformance bitstreams

In this subclause, except where stated otherwise, the term "bitstream" refers to a conforming ITU-T Rec. H.264 | ISO/IEC 14496-10 video bitstream (as defined in this document), that has values of profile_idc, level_idc, and constraint_setX_flag values (where X is a number in the range of 0 to 2, inclusive) corresponding to a set of specified constraints on a bitstream for which a decoder conforming to a specified profile and level is required in Annex A of ITU-T Rec. H.264 | ISO/IEC 14496-10 to properly perform the decoding process.

10.6.5.2 Contents of bitstream file

The conformance bitstreams are included in this specification as an electronic attachment. The following information is included in a single zipped file for each such bitstream.

- ITU-T Rec. H.264 | ISO/IEC 14496-10 video bitstream
- Reconstructed pictures or hashes of decoded pictures
- Short description of the bitstream
- Trace file (the bitstream in ASCII format)

10.6.5.3 Requirements on output of the decoding process and timing

Two classes of decoder conformance are specified:

- Output order conformance, and
- Output timing conformance

The output of the decoding process is specified by clause 8 and Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10.

For output order conformance, it is a requirement that all of the decoded pictures specified for output in Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10 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 clause 8 of ITU-T Rec. H.264 | ISO/IEC 14496-10.

For output timing conformance, it is a requirement that a conforming decoder shall also output the reconstructed samples at the rates and times specified in Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10.

The display process, which ordinarily follows the output of the decoding process, is outside the scope of this Recommendation | International Standard.

10.6.5.4 Recommendations (informative)

In addition to the requirements, it is desirable that conforming decoders implement various informative recommendations defined in ITU-T Rec. H.264 | ISO/IEC 14496-10 that are not an integral part of that Recommendation | International Standard. This subclause lists some of these recommendations.

It is recommended that a conforming decoder be able to resume the decoding process as soon as possible after the loss or corruption of part of a bitstream. In most cases it is possible to resume decoding at the next start code or slice header. It is recommended that a conforming decoder be able to perform concealment for the macroblocks or video packets for which all the coded data has not been received.

10.6.5.5 Static tests for output order conformance

Static tests of a video decoder require testing of the reconstructed samples. This subclause will explain how this test can be accomplished when the reconstructed samples at the output of the decoding process are available. It may not be possible to perform this type of test with a production decoder (due to the lack of an appropriate accessible interface in the design at which to perform the test). In that case this test should be performed by the manufacturer during the design and development phase. Static tests are used for testing the decoding process. The test will check that the values of the samples reconstructed by the decoder under test shall be identical to the values of the reference samples attached to the bitstream file, or shall be identical to the values of the samples reconstructed by the reference decoder in cases where the values of the samples are not attached to the bitstream file. When a hash of the values of the samples of the decoded pictures is attached to the bitstream file, a corresponding hash operation performed on the values of the samples of the decoded pictures produced by the decoder under test shall produce the same results.

10.6.5.6 Dynamic tests for output timing conformance

Dynamic tests are applied to check that all the reconstructed samples are output and that the timing of the output of the decoder's reconstructed samples conforms to the specification of clause 8 and Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10, and to verify that the HRD models (as defined by the CPB and DPB specification in Annex C of ITU-T Rec. H.264 | ISO/IEC 14496-10) are not violated when the bits are delivered at the proper rate.

The dynamic test is often easier to perform on a complete decoder system, which may include a systems decoder, a video decoder and a display process. It may be possible to record the output of the display process and to check that display order and timing of fields or frames are correct at the output of the display process. However, since the display process is not within the normative scope of ITU-T Rec. H.264 | ISO/IEC 14496-10, there may be cases where the output of the display process differs in timing or value even though the video

decoder is conforming. In this case, the output of the video decoder itself (before the display process) would need to be captured in order to perform the dynamic tests on the video decoder. In particular the field or frame order and timing shall be correct.

If buffering period SEI and picture timing SEI are included in the test bitstream, HRD conformance shall be verified using the values of initial_cpb_removal_delay, initial_cpb_removal_delay_offset, cpb_removal_delay and dpb_removal_delay that are included in the bitstream.

If buffering period SEI and picture timing SEI are not included in the bitstream, the following inferences shall be made to generate the missing parameters:

- fixed_frame_rate_flag shall be inferred to be 1.
- low_delay_hrd_flag shall be inferred to be 0.
- cbr_flag shall be inferred to be 0.
- The frame rate of the stream shall be inferred to be the frame rate value specified in Table AMD9-1. If this is missing, then a frame rate of either 25 or 30000 ÷ 1001 can be inferred.
- time_scale shall be set to 90,000 and the value of num_units_in_tick shall be computed based on field rate (twice the frame rate).
- The bit rate of the bitstream shall be inferred to be the maximum value for the level defined in Table A-1 in ITU-T Rec. H.264 | ISO/IEC 14496-10.
- CPB and DPB sizes shall be inferred to be the maximum value for the level defined in Table A-1 in ITU-T Rec. H.264 | ISO/IEC 14496-10.

With the above inferences, the HRD shall be operated as follows.

- The CPB is filled starting at time t = 0, until it is full, before removal of the first access unit. This means that the initial_cpb_removal_delay shall be inferred to be equal to the total CPB buffer size divided by the bit rate divided by 90000 (rounded downwards) and initial_cpb_removal_delay_offset shall be inferred to be equal to zero.
- The first access unit is removed at time t = initial_cpb_removal_delay ÷ 90000 and subsequent access units are removed at intervals based on the frame distance, i.e. cpb_removal_delay = 2 * (90000 ÷ num_units_in_tick) or the field distance i.e. cpb_removal_delay = (90000 / num_units_in_tick), depending whether the access unit is coded as a frame picture or field picture.
- Using these inferences, the CPB will not overflow or underflow and the DPB will not overflow.

10.6.5.7 Decoder conformance test of a particular profile-and-level

In order for a decoder of a particular profile-and-level to claim output order conformance to the standard as described by this specification, the decoder shall successfully pass the static test defined in subclause 10.6.5.5 with all the bitstreams of the normative test suite specified for testing decoders of this particular profile-and-level.

In order for a decoder of a particular profile and level to claim output timing conformance to the standard as described by this specification, the decoder shall successfully pass both the static test defined in subclause 10.6.5.5 and the dynamic test defined in subclause 10.6.5.6 with all the bitstreams of the normative test suite specified for testing decoders of this particular profile-and-level. Table AMD9-1 define the normative test suites for each profile-and-level combination. The test suite for a particular profile-and-level combination is the list of bitstreams that are marked with an 'X' in the column corresponding to that profile-and-level combination.

'X' indicates that the bitstream is designed to test both the dynamic and static conformance of the decoder.

The bitstream specification indicates the test bitstream specification used for each bitstream.

10.6.6 Specification of the test bitstreams

Some characteristics of each bitstream listed in Table AMD9-1 are described in the subclauses of this subclause. In Table AMD9-1, the value "29.97" shall be interpreted as an approximation of an exact value of 30000 ÷ 1001.

10.6.6.1 Test Bitstreams – General

10.6.6.1.1 Test bitstream #AVCNL-1, #AVCNL-2

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 I slices.

Purpose: Check that the decoder can properly decode I slices.

10.6.6.1.2 Test bitstream #AVCNL-3, #AVCNL-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 P slices.

Purpose: Check that the decoder can properly decode P slices.

10.6.6.1.3 Test bitstream #AVCBA-1

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 I slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode I slices with the deblocking filter process enabled.

10.6.6.1.4 Test bitstream #AVCBA-2

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. 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 I slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode I slices with the deblocking filter process enabled.

10.6.6.1.5 Test bitstream #AVCBA-3

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 P slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode P slice with the deblocking filter process enabled.

10.6.6.1.6 Test bitstream #AVCBA-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. 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 P slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode P slices with the deblocking filter process enabled.

10.6.6.1.7 Test bitstream #AVCBA-5, #AVCBA-6

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 P slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode P slices with the deblocking filter process enabled.

10.6.6.1.8 Test bitstream #AVCBA-7, #AVCBA-8

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. Macroblock/sub-macroblock partition size is limited to 8x8 and above. 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 P slices with the deblocking filter process enabled.

Purpose: Check that the decoder can properly decode P slices with the deblocking filter process enabled.

10.6.6.1.9 Test bitstream #AVCMQ-1

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. mb_qp_delta is equal to a non-zero value to change the quantizer scale at each MB. 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 I slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode I slices with mb_qp_delta not equal to 0.

10.6.6.1.10 Test bitstream #AVCMQ-2

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. mb_qp_delta is equal to a non-zero value to change the quantizer scale at each MB. 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 P slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode P slices with mb_qp_delta not equal to 0.

10.6.6.1.11 Test bitstream #AVCMQ-3

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. Spatial direct prediction is used for direct prediction. mb_qp_delta is equal to a non-zero value to change the quantizer scale at each MB. 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 I slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode I slices with mb_qp_delta not equal to 0.

10.6.6.1.12 Test bitstream #AVCMQ-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. Spatial direct prediction is used for direct prediction. mb_qp_delta is equal to a non-zero value to change the quantizer scale at some MBs. 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 P slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode P slices with mb_qp_delta not equal to 0.

10.6.6.1.13 Test bitstream #AVCSL-1

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. 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 I and P slices.

Purpose: Check that the decoder can properly decode pictures with multiple slices.

10.6.6.1.14 Test bitstream #AVCSL-2

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 I and P slices.

Purpose: Check that the decoder can properly decode pictures with multiple slices.

10.6.6.1.15 Test bitstream #AVCSQ-1

Specification: All slices are coded as I slices. Each picture contains 20 slices. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. slice_qp_delta is equal to a non-zero value to change the quantizer scale at each slice. 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 I slices with non-zero values of slice_qp_delta.

Purpose: Check that the decoder can properly decode I slices with non-zero values of slice_qp_delta.

10.6.6.1.16 Test bitstream #AVCFM-1

Specification: All slices are coded as I or P slices. The number of slices and slice groups is greater than 1 in each picture. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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. Multiple parameter sets are included in the bitstream.

Functional stage: Slice groups.

Purpose: Check that the decoder handles multiple slice groups and parameter sets.

10.6.6.1.17 Test bitstream #AVCFM-2

Specification: All slices are coded as I or P slices. The number of slices and slice groups is greater than 1 in each picture. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slice groups.

Purpose: Check that the decoder handles multiple slice groups and parameter sets.

10.6.6.1.18 Test bitstream #AVCFM-3

Specification: All slices are coded as I or P slices. The number of slices and slice groups is greater than 1 in each picture. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. Recovery point SEI is included in this bitstream. 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: Slice groups.

Purpose: Check that the decoder handles multiple slice groups and parameter sets.

10.6.6.1.19 Test bitstream #AVCCI-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. constrained_intra_pred_flag 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: Constrained intra prediction.

Purpose: Check that the decoder handles constrained intra prediction.

10.6.6.1.20 Test bitstream #AVCCI-2

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. constrained_intra_pred_flag 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: Constrained intra prediction

Purpose: Check that the decoder handles constrained intra prediction.

10.6.6.1.21 Test bitstream #AVCCI-3

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. constrained_intra_pred_flag 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: Constrained intra prediction

Purpose: Check that the decoder handles constrained intra prediction.

10.6.6.1.22 Test bitstream #AVCFC-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Decoded pictures are cropped with frame_croping_flag 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 I and P slices with frame cropping.

Purpose: Check that the decoder can properly decode I and P slices with frame cropping.

10.6.6.1.23 Test bitstream #AVCAUD-1

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Access unit delimiter NAL units are included in the bitstream. 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 I slices with Access unit delimiter NAL units.

Purpose: Check that the decoder can properly decode I slices with Access unit delimiter NAL units.

10.6.6.1.24 Test bitstream #AVCMIDR-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. IDR is inserted in every two frame. 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 I slices and more than one IDR.

Purpose: Check that the decoder can properly decode I slices with more than IDR in bitstream.

10.6.6.1.25 Test bitstream #AVCNRF-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Two non-reference pictures are present. 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 I and P slices with non-reference pictures.

Purpose: Check that the decoder can properly decode I and P slices with non-reference pictures.

10.6.6.1.26 Test bitstream #AVCMPS-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Multiple parameter sets are included in this bitstream. 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 I and P slices with multiple parameter set.

Purpose: Check that the decoder can properly decode I and P slices with multiple parameter set.

10.6.6.1.27 Test bitstream #AVCBS-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag 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 B slices with temporal direct prediction.

Purpose: Check that the decoder can properly decode B slices with temporal direct prediction.

10.6.6.1.28 Test bitstream #AVCBS-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag 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 B slices with spatial direct prediction.

Purpose: Check that the decoder can properly decode B slices with spatial direct prediction.

10.6.6.1.29 Test bitstream #AVCBS-3

Specification: All slices are coded as I, P or B slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag 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 B slices with temporal direct prediction.

Purpose: Check that the decoder can properly decode B slices with temporal direct prediction.

10.6.6.1.30 Test bitstream #AVCBS-4

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag 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 B slices with spatial direct prediction.

Purpose: Check that the decoder can properly decode B slices with spatial direct prediction.

10.6.6.1.31 Test bitstream #AVCBS-5

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag 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 B slices with spatial direct prediction.

Purpose: Check that the decoder can properly decode B slices with spatial direct prediction.

10.6.6.2 Test Bitstreams – I_PCM

10.6.6.2.1 Test bitstream #AVCPCM-1, AVCPCM-2

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. mb_type is equal to I_PCM for some macroblocks. 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 macroblocks with mb_type equal to I_PCM

Purpose: Check that the decoder can properly decode macroblocks with mb_type equal to I_PCM.

10.6.6.3 Test Bitstreams – Memory management control operation

10.6.6.3.1 Test bitstream #AVCMR-1

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. Reference picture list reordering 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 the decoder handles reference picture list reordering and memory management control operations.

10.6.6.3.2 Test bitstream #AVCMR-2

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. Reference picture list reordering 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 the decoder handles reference picture list reordering and memory management control operations.

10.6.6.3.3 Test bitstream #AVCMR-3

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. gaps_in_frame_num_value_allowed_flag is equal to 1. Reference picture list reordering and various

memory management control operation is 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 the decoder handles gaps in frame_num, reference picture list reordering and memory management control operations.

10.6.6.3.4 Test bitstream #AVCMR-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. gaps_in_frame_num_value_allowed_flag is equal to 1. Reference picture list reordering and various 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 the decoder handles reference picture list reordering and memory management control operations. Test output order conformance for non-increasing PicOrderCnt values.

10.6.6.3.5 Test bitstream #AVCMR-5

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. gaps_in_frame_num_value_allowed_flag is equal to 1. Reference picture list reordering and various memory management control operation is 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 operation and non-increasing PicOrderCnt values.

Purpose: Check that the decoder handles gaps_in_frame_num_value_allowed_flag equal to 1, reference picture list reordering and memory management control operation. Test output order conformance for non-increasing PicOrderCnt values.

10.6.6.3.6 Test bitstream #AVCMR-6

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Reference picture list reordering is 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.

Purpose: Check that the decoder handles reference picture list reordering.

10.6.6.3.7 Test bitstream #AVCMR-7

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. 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.

Purpose: Check that the decoder handles memory management control operations.

10.6.6.4 Test Bitstreams – Weighted sample prediction process

10.6.6.4.1 Test bitstream #AVCWP-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. weighted_pred_flag is equal to 1. Plural reference indices are assigned to each reference picture. 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: Weighted sample prediction process for P slices with plural reference indices.

Purpose: Check that the decoder handles weighted sample prediction for P slices with plural reference indexes.

10.6.6.4.2 Test bitstream #AVCWP-2

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 2. weighted_pred_flag is equal to 1. All NAL units are encapsulated into the byte stream

Functional stage: Weighted sample prediction process for P slices.

Purpose: Check that the decoder handles weighted sample prediction for P slices.

10.6.6.4.3 Test bitstream #AVCWP-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. weighted_bipred_idc 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: Weighted sample prediction process for B slices with temporal direct prediction.

Purpose: Check that the decoder handles weighted sample prediction for B slices with temporal direct prediction.

10.6.6.4.4 Test bitstream #AVCWP-4

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. weighted_bipred_idc is equal to 2. 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: Weighted sample prediction process for B slices with temporal direct prediction.

Purpose: Check that the decoder handles weighted sample prediction for B slices with temporal direct prediction.

10.6.6.5 Test Bitstreams – Slice of coded field

10.6.6.5.1 Test bitstream #AVCFI-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. Each slice is a coded field. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields.

Purpose: Check that the decoder handles I and P slices of coded fields.

10.6.6.5.2 Test bitstream #AVCFI-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. 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: Slices of coded fields with spatial direct prediction.

Purpose: Check that the decoder handles B slices of coded fields with spatial direct prediction.

10.6.6.5.3 Test bitstream #AVCFI-3

Specification: All slices are coded as I or P slices. Each picture contains only one slice. Each slice is a coded field. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields

Purpose: Check that the decoder handles I and P slices of coded fields.

10.6.6.5.4 Test bitstream #AVCFI-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. Each slice is a coded field. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields.

Purpose: Check that the decoder handles I and P slices of coded fields.

10.6.6.5.5 Test bitstream #AVCFI-5

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. Spatial direct prediction is used for direct prediction. 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: Slices of coded fields.

Purpose: Check that the decoder handles B slices of coded fields.

10.6.6.5.6 Test bitstream #AVCFI-6

Specification: All slices are coded as I or P slices. Each picture contains more than one slice. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields.

Purpose: Check that the decoder handles I and P slices of coded fields.

10.6.6.5.7 Test bitstream #AVCFI-7

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. 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: Slices of coded fields with temporal direct prediction.

Purpose: Check that the decoder handles B slices of coded fields with temporal direct prediction.

10.6.6.5.8 Test bitstream #AVCFI-8

Specification: All slices are coded as I slices. Only one slices is contained in each picture. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields.

Purpose: Check that the decoder handles I slices of coded fields.

10.6.6.5.9 Test bitstream #AVCFI-9

Specification: All slices are coded as I or P slices. Each picture contains only one slice. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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: Slices of coded fields.

Purpose: Check that the decoder handles I and P slices of coded fields.

10.6.6.5.10 Test bitstream #AVCFI-10

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. 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: Slices of coded fields with temporal direct prediction.

Purpose: Check that the decoder handles B slices of coded fields with temporal direct prediction.

10.6.6.5.11 Test bitstream #AVCFI-11

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. Each slice is a coded field. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. 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: Slices of coded fields with spatial direct prediction.

Purpose: Check that the decoder handles B slices of coded fields with spatial direct prediction.

10.6.6.5.12 Test bitstream #AVCFI-12

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. The number of motion vectors per tow consecutive MBs is equal to the maximum value specified in Annex A.3.1.m in ITU-T Rec. H.264 | ISO/IEC 14496-10. No intra, skip and direct MBs are included in P and B slices. Each slice is a coded field. 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: Slices of coded fields.

Purpose: Check that the decoder can properly decode slices of coded fields with maximum number of motion vectors per consecutive MBs.

10.6.6.6 Test Bitstreams – Frame/field coding

10.6.6.6.1 Test bitstream #AVCPA-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. Spatial direct prediction is used for direct prediction. Each slice is either a coded frame or a coded field. 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: Slices of coded frames/fields.

Purpose: Check that the decoder can properly decode slices of coded frames and fields.

10.6.6.6.2 Test bitstream #AVCPA-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. Each slice is either a coded frame or a coded field. 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: Slices of coded frames/fields.

Purpose: Check that the decoder can properly decode slices of coded frames and fields.

10.6.6.6.3 Test bitstream #AVCPA-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. Each slice is either a coded frame or a coded field. 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: Slices of coded frames/fields.

Purpose: Check that the decoder can properly decode slices of coded frames and fields.

10.6.6.7 Test bitstreams - Macroblock adaptive frame/field coding

10.6.6.7.1 Test bitstream #AVCMA-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.2 Test bitstream #AVCMA-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.3 Test bitstream #AVCMA-3

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.4 Test bitstream #AVCMA-4

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.5 Test bitstream #AVCMA-5

Specification: All slices are coded as I, or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. mb_adaptive_frame_field_coding is equal to 1. mb_qp_delta is equal to a non-zero value to change the quantizer scale at some MBs. 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.6 Test bitstream #AVCMA-6

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. mb_adaptive_frame_field_coding is equal to 1. mb_qp_delta is equal to a non-zero value to change the quantizer scale at some MBs. 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.7 Test bitstream #AVCMA-7

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Some slices are coded as a coded field. mb_adaptive_frame_field_coding equal to 1 in the rest of the frames. mb_qp_delta is equal to a non-zero value to change the quantizer scale at some MBs. 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: Macroblock adaptive frame field decoding and slices of a coded field.

Purpose: Check that the decoder can properly decode both slices of a coded frame with mb_adaptive_frame_field_flag=1 and slices of a coded field.

10.6.6.7.8 Test bitstream #AVCMA-8

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.7.9 Test bitstream #AVCMA-9

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. The number of motion vectors per tow consecutive MBs is equal to the maximum value specified in Annex A.3.1.m in ITU-T Rec. H.264 | ISO/IEC 14496-10. No intra, skip and direct MBs are included in P and B slices. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1 and with maximum number of motion vectors per consecutive MBs.

10.6.6.8 Test Bitstreams – S picture

10.6.6.8.1 Test bitstream #AVCSP-1

Specification: All slices are coded as I, P and SP slice. Each picture contains more than one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. memory_management_operation is set to 5 on SP slice. 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 SP slice.

Purpose: Check that the decoder can properly decode SP slice.

10.6.6.8.2 Test bitstream #AVCSP-2

Specification: All slices are coded as I, P and SP slice. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 1. memory_management_operation is set to 5 on SP slice. 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 SP slice.

Purpose: Check that the decoder can properly decode SP slice with deblocking filter.

10.6.6.9 Test Bitstreams – Long sequence

10.6.6.9.1 Test bitstream #AVCLS-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type 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 picture order count for long sequence.

Purpose: Check that the decoder can properly decode picture order count for long sequence.

10.6.6.10 Test Bitstreams – SEI/VUI

10.6.6.10.1 Test bitstream #AVCSE-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. SEI (Buffering period SEI and Picture timing SEI with pic_struct) and VUI are included in the bitstream. 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 SEI/VUI.

Purpose: Check that the decoder can properly decode SEI/VUI.

10.6.6.10.2 Test bitstream #AVCSE-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. SEI

(Buffering period SEI and Picture timing SEI with pic_struct) and VUI are included in the bitstream. 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 SEI/VUI.

Purpose: Check that the decoder can properly decode SEI/VUI.

10.6.6.10.3 Test bitstream #AVCSE-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 0, specifying the CAVLC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. SEI (Buffering period SEI and Picture timing SEI with pic_struct) and VUI are included in the bitstream. 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 SEI/VUI.

Purpose: Check that the decoder can properly decode SEI/VUI.

10.6.6.11 Test Bitstreams – CABAC: Basic features

10.6.6.11.1 Test bitstream #AVCCANL-1

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 2. 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 I slice with CABAC parsing.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.2 Test bitstream #AVCCANL-2

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 I slice with CABAC parsing.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.3 Test bitstream #AVCCANL-3

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 P slices with CABAC parsing.

Purpose: Check that the decoder can properly decode P slices with CABAC parsing.

10.6.6.11.4 Test bitstream #AVCCANL-4

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. 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 B slices with CABAC parsing.

Purpose: Check that the decoder can properly decode B slices with CABAC parsing.

10.6.6.11.5 Test bitstream #AVCCANL-5

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 2. 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 I slice with CABAC parsing.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.6 Test bitstream #AVCCANL-6

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 I slice with CABAC parsing.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.7 Test bitstream #AVCCANL-7

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 P slices with CABAC parsing.

Purpose: Check that the decoder can properly decode P slices with CABAC parsing.

10.6.6.11.8 Test bitstream #AVCCANL-8

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. 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 B slices with CABAC parsing.

Purpose: Check that the decoder can properly decode B slices with CABAC parsing.

10.6.6.11.9 Test bitstream #AVCCABA-1

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 I slice with the deblocking filter process enabled and CABAC.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.10 Test bitstream #AVCCABA-2

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 P slices with CABAC parsing.

Purpose: Check that the decoder can properly decode P slices with CABAC parsing.

10.6.6.11.11 Test bitstream #AVCCABA-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. 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 B slices with CABAC parsing.

Purpose: Check that the decoder can properly decode B slices with CABAC parsing.

10.6.6.11.12 Test bitstream #AVCCABA-4

Specification: All slices are coded as I, or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 P slices with CABAC parsing.

Purpose: Check that the decoder can properly decode P slices with CABAC parsing.

10.6.6.11.13 Test bitstream #AVCCABA-5

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 I slice with the deblocking filter process enabled and CABAC.

Purpose: Check that the decoder can properly decode I slices with CABAC parsing.

10.6.6.11.14 Test bitstream #AVCCABA-6

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type 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 P slices with CABAC parsing.

Purpose: Check that the decoder can properly decode P slices with CABAC parsing.

10.6.6.11.15 Test bitstream #AVCCABA-7

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. 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 B slices with CABAC parsing.

Purpose: Check that the decoder can properly decode B slices with CABAC parsing.

10.6.6.11.16 Test bitstream #AVCCABA-8

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. 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 B slices with CABAC parsing.

Purpose: Check that the decoder can properly decode B slices with CABAC parsing.

10.6.6.12 Test Bitstreams – CABAC: Initialization

10.6.6.12.1 Test bitstream #AVCCAIN-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 0. cabac_init_idc is equal to 0, 1, or 2 in slice headers. 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: Initialization of CABAC.

Purpose: Check that the decoder can initialize CABAC with cabac_init_idc=0, 1, or 2.

10.6.6.13 Test Bitstreams – CABAC: MB QP Delta

10.6.6.13.1 Test bitstream #AVCCAQP-1

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 1. mb_qp_delta is equal to non-zero value to change the quantizer scale at each MB. 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 I slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode I slices with mb_qp_delta not equal to 0.

10.6.6.13.2 Test bitstream #AVCCAQP-2

Specification: All slices are coded as I, P or B slices. Each picture contains more than one slice. Each slice has different size. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. mb_qp_delta is equal to non-zero value to change the quantizer scale at each MB. disable_deblocking_filter_idc is equal to 2. chroma_qp_index_offset is equal to non-zero value. 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 I, P, and B slices with mb_qp_delta not equal to 0.

Purpose: Check that the decoder can properly decode I slices with mb_qp_delta not equal to 0, disable_deblocking_filter_idc equal to 2, and non-zero chroma_qp_index_offset.

10.6.6.14 Test Bitstreams – CABAC: Slice

10.6.6.14.1 Test bitstream #AVCCASL-1

Specification: All slices are coded as I, P or B slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 0. Each picture contains more than one slice. 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 different slice types in a picture with CABAC parsing.

Purpose: Check that the decoder can properly decode different slice types in a picture with CABAC parsing.

10.6.6.14.2 Test bitstream #AVCCASL-2

Specification: All slices are coded as I, P or B slices. Each picture contains more than one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 0. Slices with different slice types are included in a picture. Stored B slices are included in the bitstream. 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 different slice types in a picture with CABAC parsing.

Purpose: Check that the decoder can properly decode different slice types in a picture with CABAC parsing.

10.6.6.15 Test Bitstreams – CABAC: I_PCM

10.6.6.15.1 Test bitstream #AVCCAPCM-1

Specification: All slices are coded as I slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. mb_type is equal to I_PCM at some Macroblocks. 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 Macroblock with mb_type equal to I_PCM.

Purpose: Check that the decoder can properly decode Macroblock with mb_type equal to I_PCM.

10.6.6.15.2 Test bitstream #AVCCAPCM-2

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. mb_type is equal to I_PCM at some Macroblocks. 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 Macroblock with mb_type equal to I_PCM.

Purpose: Check that the decoder can properly decode Macroblock with mb_type equal to I_PCM.

10.6.6.15.3 Test bitstream #AVCCAPCM-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_type is equal to I_PCM at some Macroblocks. 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 Macroblock with mb_type equal to I_PCM.

Purpose: Check that the decoder can properly decode macroblocks with mb_type equal to I_PCM.

10.6.6.16 Test Bitstreams – CABAC: Weighted sample prediction process

10.6.6.16.1 Test bitstream #AVCCAWP-1

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 2. weighted_pred_flag 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: Weighted sample prediction process for P slice

Purpose: Check that the decoder handles weighted sample prediction for P slice.

10.6.6.16.2 Test bitstream #AVCCAWP-2

Specification: All slices are coded as I or P slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 2. weighted_pred_flag is equal to 1. Plural reference indices are assigned to each reference picture. 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: Weighted sample prediction process for P slices with plural reference indices.

Purpose: Check that the decoder handles weighted sample prediction for P slices with plural reference indexes.

10.6.6.17 Test Bitstreams – CABAC: Field coding

10.6.6.17.1 Test bitstream #AVCCAFI-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Each slice is a coded field. Stored B slices are included in the bitstream. 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 coded fields.

Purpose: Check that the decoder can properly decode slice of coded field including stored B slice.

10.6.6.17.2 Test bitstream #AVCCAFI-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 0. Each slice is a coded field. 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 coded fields.

Purpose: Check that the decoder can properly decode slice of coded field.

10.6.6.17.3 Test bitstream #AVCCAFI-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Each slice is a coded field. 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 coded fields.

Purpose: Check that the decoder can properly decode slice of coded field.

10.6.6.18 Test Bitstreams – CABAC: Frame/field decoding

10.6.6.18.1 Test bitstream #AVCCAPA-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 1. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Each slice is either a coded frame or a coded field. 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: Picture adaptive frame/field decoding.

Purpose: Check that the decoder can properly decode slices of coded frames and fields with direct_8x8_inference_flag=1.

10.6.6.18.2 Test bitstream #AVCCAPA-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Each slice is either a coded frame or a coded field. 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: Picture adaptive frame/field decoding.

Purpose: Check that the decoder can properly decode slices of coded frames and fields with direct_8x8_inference_flag=1.

10.6.6.18.3 Test bitstream #AVCCAPA-3

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. Each slice is either a coded frame or a coded field. 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: Picture adaptive frame/field decoding.

Purpose: Check that the decoder can properly decode slices of coded frames and fields with direct_8x8_inference_flag=1.

10.6.6.19 Test bitstreams - Macroblock adaptive frame/field decoding

10.6.6.19.1 Test bitstream #AVCCAMA-1

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.2 Test bitstream #AVCCAMA-2

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.3 Test bitstream #AVCCAMA-3

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. num_ref_frames is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.4 Test bitstream #AVCCAMA-4

Specification: All slices are coded as I or P slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.5 Test bitstream #AVCCAMA-5

Specification: All slices are coded as I slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.6 Test bitstream #AVCCAMA-6

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Spatial direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.

10.6.6.19.7 Test bitstream #AVCCAMA-7

Specification: All slices are coded as I, P or B slices. Each picture contains only one slice. disable_deblocking_filter_idc is equal to 1, specifying disabling of the deblocking filter process. entropy_coding_mode_flag is equal to 1, specifying the CABAC parsing process. pic_order_cnt_type is equal to 0. Temporal direct prediction is used for direct prediction. direct_8x8_inference_flag is equal to 1. mb_adaptive_frame_field_coding 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: Macroblock adaptive frame field decoding.

Purpose: Check that the decoder can properly decode slices with mb_adaptive_frame_field_flag=1.