
**Information technology — Generic coding
of moving pictures and associated audio
information: Systems**

**AMENDMENT 4: Transport of multiview
video over
Rec. ITU-T H.222.0 | ISO/IEC 13818-1**

*Technologies de l'information — Codage générique des images
animées et du son associé: Systèmes*

*AMENDEMENT 4: Transport de vidéos multivues sur
Rec. UIT-T H.222.0 | ISO/CEI 13818-1*



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Foreword

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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.

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This corrected version of ISO/IEC 13818-1:2007/Amd.4:2009 corrects the title.

INTERNATIONAL STANDARD
RECOMMENDATION ITU-TInformation technology – Generic coding of moving pictures
and associated audio information: Systems

Amendment 4

Transport of multiview video over Rec. ITU-T H.222.0 | ISO/IEC 13818-1

1) Subclause 1.2.2

In 1.2.2, Paired Recommendations | International Standards equivalent in technical content, replace:

- ITU-T Recommendation H.264 (2007), *Advanced video coding for generic audiovisual services*.
ISO/IEC 14496-10:2008, *Information technology – Coding of audio-visual objects – Part 10: Advanced video coding*.

with:

- ITU-T Recommendation H.264 (2009), *Advanced video coding for generic audiovisual services*.
ISO/IEC 14496-10:2009, *Information technology – Coding of audio-visual objects – Part 10: Advanced Video Coding*.

2) Subclause 2.1

a) In 2.1.78, replace:

AVC video sub-bitstream: The video sub-bitstream that contains the base layer as defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 and that shall additionally contain NAL units with `nal_unit_type` equal to 14 (prefix NAL units). The AVC video sub-bitstream contains all VCL NAL units associated with `dependency_id` equal to 0.

with:

AVC video sub-bitstream of SVC: The video sub-bitstream that contains the base layer as defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 and that shall additionally contain NAL units with `nal_unit_type` equal to 14 (prefix NAL units) as defined for SVC in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10. The AVC video sub-bitstream of SVC contains all VCL NAL units associated with `dependency_id` equal to 0.

b) In 2.1.81, replace:

SVC slice (system): A `byte_stream_nal_unit` as defined in ITU-T Rec. H.264 | ISO/IEC 14496-10 with `nal_unit_type` equal to 20.

with:

SVC slice (system): A `byte_stream_nal_unit` as defined in ITU-T Rec. H.264 | ISO/IEC 14496-10 with `nal_unit_type` equal to 20 of an AVC video stream which conforms to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10.

NOTE – As specified in ITU-T Rec. H.264 | ISO/IEC 14496-10, the value of `svc_extension_flag` is set equal to 1 for coded video sequences conforming to one or more profiles specified in Annex G. SVC slices should not include NAL units for which `nal_unit_type` is equal to 20 with `svc_extension_flag` equal to 0.

c) After 2.1.81, add subclauses 2.1.82 – 2.1.88:

2.1.82 view order index: An index that indicates the decoding order of MVC view components in an AVC access unit as defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10. The association of view order index values to the NAL unit header syntax element `view_id` is indicated for an AVC video sequence in the sequence parameter set MVC extension as defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10.

2.1.83 MVC view_id subset: A set of one or more `view_id` values, as defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10 in the NAL unit header syntax element, associated with one set of consecutive view order index values.

2.1.84 MVC video sub-bitstream: The MVC video sub-bitstream is defined to be all VCL NAL units with `nal_unit_type` equal to 20 associated with the same MVC `view_id` subset of an AVC video stream and associated non-VCL NAL units which conform to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10.

NOTE – In contrast to a sub-bitstream as specified in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10, an MVC video sub-bitstream according to this Specification is not necessarily a decodable MVC video sub-bitstream. The one exception is when an MVC video sub-bitstream is also an MVC base view sub-bitstream. Re-assembling MVC video sub-bitstreams in an increasing order of view order index, starting from the lowest value of view order index up to any value of view order index, results in a decodable AVC video stream.

2.1.85 MVC base view sub-bitstream: The MVC base view sub-bitstream is defined to contain the AVC video sub-bitstream of MVC conforming to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10 and one additional MVC video sub-bitstream associated with an MVC `view_id` subset including the view order index that immediately follows the view order index associated with the base view.

NOTE – The MVC base view sub-bitstream is also an AVC video stream where no re-assembly is required before decoding.

2.1.86 MVC view-component subset: The VCL NAL units of an AVC access unit associated with the same MVC `view_id` subset and associated non-VCL NAL units.

NOTE – Re-assembling MVC view-component subsets ordered according to the view order index, starting from the minimum view order index up to the highest view order index present in the access unit, while reordering the non-VCL NAL units conforming to the order of NAL units within an access unit, as defined in ITU-T Rec. H.264 | ISO/IEC 14496-10, results in an AVC access unit.

2.1.87 MVC slice (system): A `byte_stream_nal_unit` with `nal_unit_type` syntax element equal to 20 of an AVC video stream which conforms to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10.

NOTE – As specified in ITU-T Rec. H.264 | ISO/IEC 14496-10, the value of `svc_extension_flag` is set equal to 0 for coded video sequences conforming to one or more profiles specified in Annex H. MVC slices should not include NAL units for which `nal_unit_type` is equal to 20 with `svc_extension_flag` equal to 1.

2.1.88 AVC video sub-bitstream of MVC: The video sub-bitstream that contains the base view as defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10, containing all VCL NAL units associated with the minimum value of view order index present in each AVC video sequence of the AVC video stream. The AVC video sub-bitstream of MVC may additionally contain the associated NAL units with `nal_unit_type` syntax element equal to 14 (prefix NAL units), as defined for MVC in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10.

3) Subclause 2.4.2.8

In 2.4.2.8, T-STD extensions for carriage of ITU-T Rec. H.264 | ISO/IEC 14496-10 video, replace:

To define the decoding in the T-STD of ITU-T Rec. H.264 | ISO/IEC 14496-10 video streams carried in a Transport Stream, the T-STD model needs to be extended. The T-STD extension and T-STD parameters for decoding of AVC video streams conforming to one or more profiles defined in Annex A of ITU-T Rec. H.264 | ISO/IEC 14496-10 are defined in 2.14.3.1 and T-STD extension and T-STD parameters for decoding of AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 are defined in 2.14.3.5.

with:

To define the decoding in the T-STD of ITU-T Rec. H.264 | ISO/IEC 14496-10 video streams carried in a Transport Stream, the T-STD model needs to be extended. The T-STD extension and T-STD parameters for decoding of AVC video streams conforming to one or more profiles defined in Annex A of ITU-T Rec. H.264 | ISO/IEC 14496-10 are defined in 2.14.3.1, T-STD extension and T-STD parameters for decoding of AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 are defined in 2.14.3.5, and T-STD extension and T-STD parameters for decoding of AVC video streams conforming to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10 are defined in 2.14.3.7.

4) Subclause 2.4.3.5

In 2.4.3.5, Semantic definition of fields in "adaptation field", make the following modifications:

a) *In the section specifying the "discontinuity_indicator", replace:*

For the purpose of this clause, an elementary stream access point is defined as follows:

- ISO/IEC 11172-2 video and ITU-T Rec. H.262 | ISO/IEC 13818-2 video – The first byte of a video sequence header.
- ISO/IEC 14496-2 visual – The first byte of the visual object sequence header.

- AVC video streams conforming to one or more profiles defined in Annex A of ITU-T Rec. H.264 | ISO/IEC 14496-10 – The first byte of an AVC access unit. The SPS and PPS parameter sets referenced in this and all subsequent AVC access units in the coded video stream shall be provided after this access point in the byte stream and prior to their activation.
- Video sub-bitstreams of AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 – The first byte of an SVC dependency representation is an elementary stream access point if the following conditions are met:
 - The subset sequence parameter sets and picture parameter sets referenced in this and all subsequent SVC dependency representation in the video sub-bitstream shall be provided after this access point in the byte stream and prior to their activation.
 - If this SVC video sub-bitstream access point requires the elementary stream access point of the same AVC access unit, if any, contained in the corresponding elementary stream that needs to be present in decoding order before decoding the elementary stream associated with this elementary stream access point, then the corresponding elementary stream shall also include an elementary stream access point.

NOTE 1 – If the hierarchy descriptor is present for this SVC video sub-bitstream then the video sub-bitstream of which the `hierarchy_layer_index` equals the `hierarchy_embedded_layer_index` of this SVC sub-bitstream should have an elementary stream access point in the same access unit.
- Audio – The first byte of an audio frame.
- ISO/IEC 14496-17 text stream – The first byte of a text access unit. In case in-band sample descriptions are used, each in-band sample description shall be provided in the ISO/IEC 14496-17 stream after this access point and prior to its use by an access unit.

with:

For the purpose of this clause, an elementary stream access point is defined as follows:

- ISO/IEC 11172-2 video and ITU-T Rec. H.262 | ISO/IEC 13818-2 video – The first byte of a video sequence header.
- ISO/IEC 14496-2 visual – The first byte of the visual object sequence header.
- AVC video streams conforming to one or more profiles defined in Annex A of ITU-T Rec. H.264 | ISO/IEC 14496-10 – The first byte of an AVC access unit. The SPS and PPS parameter sets referenced in this and all subsequent AVC access units in the coded video stream shall be provided after this access point in the byte stream and prior to their activation.
- Video sub-bitstreams of AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10 – The first byte of an SVC dependency representation is an elementary stream access point if the following conditions are met:
 - The subset sequence parameter sets and picture parameter sets referenced in this and all subsequent SVC dependency representation in the video sub-bitstream shall be provided after this access point in the byte stream and prior to their activation.
 - If this SVC video sub-bitstream access point requires the elementary stream access point of the same AVC access unit, if any, contained in the corresponding elementary stream that needs to be present in decoding order before decoding the elementary stream associated with this elementary stream access point, then the corresponding elementary stream shall also include an elementary stream access point.

NOTE 1 – If the hierarchy descriptor is present for this SVC video sub-bitstream then the video sub-bitstream of which the `hierarchy_layer_index` equals the `hierarchy_embedded_layer_index` of this SVC sub-bitstream should have an elementary stream access point in the same access unit.
- MVC video sub-bitstreams of AVC video streams conforming to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10 – The first byte of an MVC view-component subset is an elementary stream access point if the following two conditions are met:
 - The subset sequence parameter sets and picture parameter sets referenced in this and all subsequent MVC view-component subsets in the MVC video sub-bitstream shall be provided after this access point in the byte stream and prior to their activation.
 - If this MVC video sub-bitstream access point requires the elementary stream access point of the same AVC access unit, if any, contained in the corresponding elementary stream that needs to be present in decoding order before decoding the elementary stream associated with this elementary stream access point, then the corresponding elementary stream shall also include an elementary stream access point.

NOTE 2 – If the hierarchy descriptor is present for this MVC video sub-bitstream, then the MVC video sub-bitstream of which the hierarchy_layer_index equals the hierarchy_embedded_layer_index of this MVC sub-bitstream should have an elementary stream access point in this same access unit.

- Audio – The first byte of an audio frame.
- ISO/IEC 14496-17 text stream – The first byte of a text access unit. In case in-band sample descriptions are used, each in-band sample description shall be provided in the ISO/IEC 14496-17 stream after this access point and prior to its use by an access unit.

b) *Replace:*

elementary_stream_priority_indicator – The elementary_stream_priority_indicator is a 1-bit field. It indicates, among packets with the same PID, the priority of the elementary stream data carried within the payload of this Transport Stream packet. A '1' indicates that the payload has a higher priority than the payloads of other Transport Stream packets.

In the case of ISO/IEC 11172-2 or ITU-T Rec. H.262 | ISO/IEC 13818-2 or ISO/IEC 14496-2 video, this field may be set to '1' only if the payload contains one or more bytes from an intra-coded slice.

In the case of ITU-T Rec. H.264 | ISO/IEC 14496-10 video, this field may be set to '1' only if the payload contains one or more bytes from a slice with slice_type set to 2, 4, 7, or 9.

A value of '0' indicates that the payload has the same priority as all other packets which do not have this bit set to '1'.

with:

elementary_stream_priority_indicator – The elementary_stream_priority_indicator is a 1-bit field. It indicates, among packets with the same PID, the priority of the elementary stream data carried within the payload of this Transport Stream packet. A '1' indicates that the payload has a higher priority than the payloads of other Transport Stream packets.

In the case of ISO/IEC 11172-2 or ITU-T Rec. H.262 | ISO/IEC 13818-2 or ISO/IEC 14496-2 video, this field may be set to '1' only if the payload contains one or more bytes from an intra-coded slice.

In the case of ITU-T Rec. H.264 | ISO/IEC 14496-10 video, this field may be set to '1' only if the payload contains one or more bytes from a slice with slice_type set to 2, 4, 7, or 9.

A value of '0' indicates that the payload has the same priority as all other packets which do not have this bit set to '1'.

For MVC video sub-bitstreams or MVC base view sub-bitstreams of AVC video streams conforming to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10, this field may be set to '1' only if the payload contains one or more bytes from an anchor picture, indicated by the slice type equal to 2, 4, 7, or 9 and the anchor_pic_flag syntax element equal to 1 for all prefix NAL units and slice extension NAL units.

5) Subclause 2.4.3.7

In 2.4.3.7, Semantic definition of fields in PES packet, make the following modifications:

a) *Replace:*

stream_id – In Program Streams, the stream_id specifies the type and number of the elementary stream as defined by the stream_id Table 2-22. In Transport Streams, the stream_id may be set to any valid value which correctly describes the elementary stream type as defined in Table 2-22. In Transport Streams, the elementary stream type is specified in the Program Specific Information as specified in 2.4.4.

For AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10, all video sub-bitstreams of the same AVC video stream shall have the same stream_id value.

with:

stream_id – In Program Streams, the stream_id specifies the type and number of the elementary stream as defined by the stream_id Table 2-22. In Transport Streams, the stream_id may be set to any valid value which correctly describes the elementary stream type as defined in Table 2-22. In Transport Streams, the elementary stream type is specified in the Program Specific Information as specified in 2.4.4.

For AVC video streams conforming to one or more profiles defined in Annex G of ITU-T Rec. H.264 | ISO/IEC 14496-10, all video sub-bitstreams of the same AVC video stream shall have the same stream_id value.

For AVC video streams conforming to one or more profiles defined in Annex H of ITU-T Rec. H.264 | ISO/IEC 14496-10, all MVC video sub-bitstreams of the same AVC video stream shall have the same stream_id value.