FINAL
DRAFT

AMENDMENT

ISO/IEC
14496-15:2004
FDAM 3

ISO/IEC JTC **1**

Secretariat: **ANSI**

Voting begins on:
2009-10-16

Voting terminates on:
2009-12-16

Information technology — Coding of audio-visual objects —

Part 15:
Advanced Video Coding (AVC) file format

AMENDMENT 3: File format support for Multiview Video Coding

Technologies de l'information — Codage des objets audiovisuels —

Partie 15: Format de fichier de codage vidéo avancé (AVC)

AMENDEMENT 3 : Support de format de fichier pour codage vidéo multivues

Please see the administrative notes on page iii

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Reference number
ISO/IEC 14496-15:2004/FDAM 3:2009(E)

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Foreword

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Amendment 3 to ISO/IEC 14496-15:2004 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

Information technology — Coding of audio-visual objects —

Part 15:
Advanced Video Coding (AVC) file format

AMENDMENT 3: File format support for Multiview Video Coding

In the Introduction, replace:

This International Standard defines the storage for both plain AVC and SVC video streams, where 'plain AVC' refers to the main part of ISO/IEC 14496-10, not including Annex G (Scalable Video Coding), and SVC refers to ISO/IEC 14496-10 when the techniques in Annex G (Scalable Video Coding) are in use. Specific techniques are introduced for the handling of scalable streams, enabling their use, and assisting the extraction of subsets of scalable streams.

with:

This International Standard defines the storage for plain AVC, SVC, and MVC video streams, where 'plain AVC' refers to the main part of ISO/IEC 14496-10, excluding Annex G (Scalable Video Coding) and Annex H (Multiview Video Coding); SVC refers to ISO/IEC 14496-10 when the techniques in Annex G (Scalable Video Coding) are in use, and MVC refers to ISO/IEC 14496-10 when the techniques in Annex H (Multiview Video Coding) are in use. Specific techniques are introduced for handling of scalable and multiview streams, enabling their use, and assisting the extraction of subsets of scalable and multiview streams.

In Clause 1, Scope, replace:

The file format for storage of SVC content, as defined in Annexes A-E, uses the existing capabilities of the ISO base media file format and the AVC file format. In addition, the following new extensions to support SVC-specific features are specified:

with:

The file format for storage of SVC content, as defined in Annexes A-E, and the file format for storage of MVC content as defined in Annexes B-F, use the existing capabilities of the ISO base media file format and the AVC file format. In addition, the following new extensions to support SVC-specific features are specified:

and replace:

- **AVC Compatibility**: A provision for storing an SVC bitstream in an AVC compatible manner, such that the AVC compatible base layer can be used by any existing AVC file format compliant reader.

with:

- **AVC Compatibility**: A provision for storing an SVC or MVC bitstream in an AVC compatible manner, such that the AVC compatible base layer can be used by any existing AVC file format compliant reader.

In 3.2, replace:

AVC Advanced Video Coding. Where contrasted with SVC in this International Standard, this term refers to the main part of ISO/IEC 14496-10, not including Annex G (Scalable Video Coding) *with:*

AVC Advanced Video Coding. Where contrasted with SVC or MVC in this International Standard, this term refers to the main part of ISO/IEC 14496-10, including neither Annex G (Scalable Video Coding) nor Annex H (Multiview Video Coding)

and add the following row to 3.2 before the row 'NAL:'

MVC MultiviewVideo Coding. Refers to ISO/IEC 14496-10 when the techniques in Annex H (Multiview Video Coding) are in use

Replace all of 5.3.4.1.1 with:

Box Types: 'avc1', 'avc2', 'avcC', 'm4ds','btrt'
Container: Sample Table Box ('stbl')
Mandatory: An 'avc1' or 'avc2' sample entry is mandatory
Quantity:One or more sample entries may be present

An AVC visual sample entry shall contain an AVC Configuration Box, as defined below. This includes an `AVCDecoderConfigurationRecord`, as defined in 5.2.4.1.

An optional `MPEG4BitRateBox` may be present in the AVC visual sample entry to signal the bit rate information of the AVC video stream. Extension descriptors that should be inserted into the Elementary Stream Descriptor, when used in MPEG-4, may also be present.

Multiple sample descriptions may be used, as permitted by the ISO Base Media File Format specification, to indicate sections of video that use different configurations or parameter sets.

The sample entry name 'avc1' may only be used when the entire stream is a compliant and usable AVC stream as viewed by an AVC decoder operating under the configuration (including profile and level) given in the AVCConfigurationBox. The file format specific structures that resemble NAL units (see Annex B) may be present but must not be used to access the AVC base data; that is, the AVC data must not be contained in Aggregators (though they may be included within the bytes referenced by the additional_bytes field) nor referenced by Extractors.

The sample entry name 'avc2' may only be used when Extractors or Aggregators (Annex B) are required to be supported, and an appropriate Toolset is required (for example, as indicated by the file-type brands). This sample entry type indicates that, in order to form the intended AVC stream, Extractors must be replaced with the data they are referencing, and Aggregators must be examined for contained NAL Units. Tier grouping may be present.

Add to the end of 5.3.4.1.2:

```
class AVC2SampleEntry() extends VisualSampleEntry ('avc2'){
   AVCConfigurationBox  avcconfig;
   MPEG4BitRateBox bitrate;              // optional
   MPEG4ExtensionDescriptorsBox descr;   // optional
   extra_boxes          boxes;           // optional
}
```

Replace A.2.1 with the following:

A.2.1
Aggregator

Aggregators are in-stream structures using a NAL unit header including a NAL unit header extension, with a NAL unit type equal to 30. Aggregators are used to group NAL units belonging to the same sample.

Replace A.2.6 with the following:

A.2.6
Extractor
Extractors are in-stream structures using a NAL unit header including a NAL unit header extension, with a NAL unit type equal to 31. Extractors contain instructions on how to extract data from other tracks. Logically an Extractor can be seen as a 'link'. While accessing a track containing Extractors, the Extractor is replaced by the data it is referencing.

Replace A.2.17 with the following:

SVC VCL NAL unit
SVC VCL NAL units follow the definitions in ISO/IEC 14496-10 Annex G for NAL units of type 20 and 14; they are NAL units with type 20, and NAL units with type 14 when the immediately following NAL units are AVC VCL NAL units. SVC VCL NAL units do not affect the decoding process of a legacy AVC decoder.

In A.6.3.1.1

change the paragraph:

The sample entry name 'avc1' may only be used when the entire stream is a compliant and usable AVC stream as viewed by an AVC decoder operating under the configuration (including profile and level) given in the AVCConfigurationBox. The file format specific structures that resemble NAL units may be present but must not be used to access the AVC base data; that is, the AVC data must not be contained in Aggregators (though they may be included within the bytes referenced by the additional_bytes field) nor referenced by Extractors. The sample entry name 'avc2' indicates that, in order to form the intended AVC stream, Extractors must be replaced with the data they are referencing, and Aggregators must be examined for contained NAL Units. Extractors or aggregators may be used for SVC VCL NAL units in 'avc1', 'avc2' or 'svc1' tracks.

as follows:

Extractors or aggregators may be used for SVC VCL NAL units in 'avc1', 'avc2' or 'svc1' tracks. The 'extra_boxes' in an 'avc2' sample entry may be an SVCConfigurationBox, ScalabilityInformationSEIBox, SVCPriorityAssignmentBox or other extension boxes.

remove this row from the Table:

'avc2'	AVC and SVC Configurations	An SVC track with both AVC NAL units and SVC NAL units; Extractors may be present and used to reference both AVC and SVC NAL units; Aggregators may be present to contain and reference both AVC and SVC NAL units; Tier grouping may be present.

and add to A.6.3.1.1 before the paragraph "The following table…":

The parameter sets required to decode a NAL unit that is present in the sample data of a video stream, either directly or by reference from an Extractor, shall be present in the decoder configuration of that video stream or in the associated parameter set stream (if used).

In A.6.3.1.2 replace:

```
class AVC2SampleEntry() extends VisualSampleEntry (‘avc2’){
   AVCConfigurationBox  avcconfig;
   SVCConfigurationBox  svcconfig;      // optional
   MPEG4BitRateBox bitrate;             // optional
   MPEG4ExtensionDescriptorsBox descr;  // optional
   ScalabilityInformationSEIBox  scalability;  // optional
   SVCPriorityAssignmentBox   method;          // optional
}
```

with:

```
class AVC2SVCSampleEntry() extends VisualSampleEntry (‘avc2’){
   AVCConfigurationBox  avcconfig;
   SVCConfigurationBox  svcconfig;      // optional
   MPEG4BitRateBox bitrate;             // optional
   MPEG4ExtensionDescriptorsBox descr;  // optional
   ScalabilityInformationSEIBox  scalability;  // optional
   SVCPriorityAssignmentBox   method;          // optional
}
```

In the title of Annex B, replace:

SVC-file-format-specific in-stream structures

with:

In-stream structures specific to SVC and MVC file formats

In B.1, Introduction, replace:

Aggregators and Extractors use the NAL unit structure. These structures are seen as NAL units in the context of the sample structure.

with:

Aggregators and Extractors use the NAL unit syntax. These structures are seen as NAL units in the context of the sample structure.

In B.2.1, Definition (Aggregators), replace:

Aggregators are used to group NAL units belonging to the same sample. Aggregators use the same NAL unit header as SVC VCL NAL units of type 20 but with a different value of NAL unit type.

Aggregators can both aggregate, by *inclusion,* NAL units within them (within the size indicated by their length) and also aggregate, by *reference,* NAL units that follow them (within the area indicated by the additional_bytes field within them), When the stream is scanned by an AVC file reader, only the included NAL units are seen as “within” the aggregator; this permits, for example, an AVC file reader to skip a whole set of un-needed SVC VCL NAL units. Similarly if AVC NAL units are aggregated by reference, the AVC reader will not skip them and they remain in-stream for that reader.

with:

Aggregators are used to group NAL units belonging to the same sample. Aggregators use the same NAL unit header as SVC VCL NAL units or MVC VCL NAL units, but with a different value of NAL unit type. When the svc_extension_flag of the NAL unit syntax (specified in 7.3.1 of ISO/IEC 14496-10) of an aggregator is equal to 1, the NAL unit header of SVC VCL NAL units is used for the aggregator. Otherwise, the NAL unit header of MVC VCL NAL units is used for the aggregator.

Aggregators can both aggregate, by *inclusion,* NAL units within them (within the size indicated by their length) and also aggregate, by *reference,* NAL units that follow them (within the area indicated by the additional_bytes field within them). When the stream is scanned by an AVC file reader, only the included NAL units are seen as “within” the aggregator. This permits an AVC file reader to skip a whole set of un-needed SVC VCL NAL units or MVC VCL NAL units when they are aggregated by inclusion. This also permits an AVC reader not to skip AVC NAL units but let them remain in-stream when they are aggregated by reference.

Aggregators can be used to group AVC base view NAL units. If these Aggregators are used in an ‘avc1’ track then an aggregator shall not use inclusion but reference of AVC base view NAL units (the length of the Aggregator includes only its header and the NAL units referenced by the Aggregator are specified by additional_bytes).

In B.2.3, Semantics (Aggregators), replace:

NALUnitHeader(): The NAL unit structure as specified in ISO/IEC 14496-10 Annex G for NAL units of type 20:

nal_unit_type shall be set to the aggregator NAL unit type (type 30).

forbidden_zero_bit, reserved_one_bit, and reserved_three_2bits shall be set as specified in ISO/IEC 14496-10 Annex G.

Other fields (nal_ref_idc, idr_flag, priority_id, no_inter_layer_pred_flag, dependency_id, quality_id, temporal_id, use_ref_base_pic_flag, discardable_flag, and output_flag) shall be set as specified in B.4.

with:

NALUnitHeader(): the first four bytes of SVC and MVC VCL NAL units.

nal_unit_type shall be set to the aggregator NAL unit type (type 30).

For an aggregator including or referencing SVC NAL units, the following shall apply.

forbidden_zero_bit and reserved_three_2bits shall be set as specified in ISO/IEC 14496-10.

Other fields (nal_ref_idc, idr_flag, priority_id, no_inter_layer_pred_flag, dependency_id, quality_id, temporal_id, use_ref_base_pic_flag, discardable_flag, and output_flag) shall be set as specified in B.4.

For an aggregator including or referencing MVC NAL units, the following shall apply.

forbidden_zero_bit and reserved_one_bit shall be set as specified in ISO/IEC 14496-10.

Other fields (nal_ref_idc, non_idr_flag, priority_id, view_id, temporal_id, anchor_pic_flag, and inter_view_flag) shall be set as specified in B.5.

In B.3.1 change the first sentence as follows:

This Subclause describes Extractors, which enable compact formation of tracks that extract, by reference, NAL unit data from other tracks.

In B.3.3, Semantics (Extractor), replace:

NALUnitHeader(): The NAL unit structure as specified in ISO/IEC 14496-10 Annex G for NAL units of type 20:

nal_unit_type shall be set to the extractor NAL unit type (type 31).

forbidden_zero_bit, reserved_one_bit, and reserved_three_2bits shall be set as specified in ISO/IEC 14496-10 Annex G.

Other fields (nal_ref_idc, idr_flag, priority_id, no_inter_layer_pred_flag, dependency_id, quality_id, temporal_id, use_ref_base_pic_flag, discardable_flag, and output_flag) shall be set as specified in B.4.

with:

NALUnitHeader(): the first four bytes of SVC and MVC VCL NAL units.

nal_unit_type shall be set to the extractor NAL unit type (type 31).

For an extractor referencing SVC NAL units, the following shall apply.

forbidden_zero_bit and reserved_three_2bits shall be set as specified in ISO/IEC 14496-10.

Other fields (nal_ref_idc, idr_flag, priority_id, no_inter_layer_pred_flag, dependency_id, quality_id, temporal_id, use_ref_base_pic_flag, discardable_flag, and output_flag) shall be set as specified in B.4.

For an extractor referencing MVC NAL units, the following shall apply.

forbidden_zero_bit and reserved_one_bit shall be set as specified in ISO/IEC 14496-10.

Other fields (nal_ref_idc, non_idr_flag, priority_id, view_id, temporal_id, anchor_pic_flag, and inter_view_flag) shall be set as specified in B.5.

In the title of Annex B.4, replace:

NAL unit header values

with:

NAL unit header values for SVC

In B.4, replace the following paragraph:

Aggregators can be used to group AVC base layer NAL units. If these Aggregators are used in an ‘avc1’ track then an aggregator shall not use inclusion but reference of AVC base layer NAL units (the length of the Aggregator includes only its header and the NAL units referenced by the Aggregator are specified by additional_bytes).

with:

The fields below shall take the following values:

After B.4, add B.5:

B.5 NAL unit header values for MVC

Both Aggregators and Extractors use NAL unit headers with the NAL unit header extension. The NAL units extracted by an extractor or aggregated by an aggregator are all those NAL units that are referenced or included by recursively inspecting the contents of aggregator or extractor NAL units.

The fields nal_ref_idc, non_idr_flag, priority_id, view_id, temporal_id, anchor_pic_flag, and inter_view_flag shall take the following values:

nal_ref_idc shall be set to the highest values of the field in all the aggregated or extracted NAL units.

non_idr_flag shall be set to the lowest values of the field in all the aggregated or extracted NAL units.

priority_id and temporal_id shall be set to the lowest values of the fields, respectively, in all the aggregated or extracted NAL units.

view_id shall be set to the view_id value of the VCL NAL unit with the lowest view order index among all the aggregated or extracted VCL NAL units.

anchor_pic_flag and inter_view_flag shall be set to the highest value of the fields, respectively, in all the aggregated or extracted VCL NAL units.

In the title of Annex C, replace:

SVC sample group definitions

with:

SVC and MVC sample group definitions

In C.1, Introduction, replace:

The following sample groups may be used in an SVC track to document the structure of the SVC stream and to ease obtaining information of subsets of the stream and extraction of any of the subsets.

There are a number of boxes, defined below, which may occur in the sample group description, namely the Scalable Group Entry.

Each Scalable Group Entry documents a subset of the SVC stream. Each of the subsets is associated with a tier and may contain one or more operating points. These entries are defined using a grouping type of 'scif'.

NOTE For each tier, there may be more than one ScalableGroupEntry in the SampleGroupDescriptionBox of grouping type 'scif'. Only one of those entries is the primary definition of the tier.

Though the Scalable Group Entries are contained in the SampleGroupDescription box, the grouping is not a true *sample* grouping as each sample may be associated with more than one scalable group, as these groups are used to describe *sections* of the samples – the NAL units. As a result, it is possible that there may not be a SampleToGroup box of the grouping type 'scif', unless it happens that a group does, in fact, describe a whole sample. Even if a SampleToGroup box of the grouping type 'scif' is present, the information is not needed for extraction of NAL units of tiers; instead, the map groups must always document the 'pattern' of NAL units within the samples and provide the NAL-unit-to-tier mapping information that may be needed for extraction of NAL units.

with:

The following sample groups may be used in an SVC or MVC track to document the structure of the SVC or MVC stream and to ease obtaining information of subsets of the stream and extraction of any of the subsets.

If views from the same MVC bitstream are stored in multiple MVC tracks and one or more of these tracks contain multiple views, sample group entries and map groups can be used for these tracks containing multiple views.

There are a number of boxes, defined below, which may occur in the sample group description, namely the Scalable Group Entry for an SVC stream or the Multiview Group Entry for an MVC stream.

Each Scalable Group Entry or Multiview Group Entry documents a subset of the SVC stream or the MVC stream, respectively. Each of the subsets is associated with a tier and may contain one or more operating points. A grouping type of 'scif' or 'mvif' is used to define Scalable Group Entries or Multiview Group Entries, respectively.

For each tier, there may be more than one Scalable Group Entry or Multiview Group Entry in the SampleGroupDescriptionBox of grouping type 'scif' or 'mvif', respectively. Only one of those entries is the primary definition of the tier.

Though the Scalable and Multiview Group Entries are contained in the SampleGroupDescription box, the grouping is not a true *sample* grouping as each sample may be associated with more than one tier, as these groups are used to describe *sections* of the samples – the NAL units. As a result, it is possible that there may not be a SampleToGroup box of the grouping type 'scif' or 'mvif', unless it happens that a group does, in fact, describe a whole sample. Even if a SampleToGroup box of the grouping type 'scif' or 'mvif' is present, the information is not needed for extraction of NAL units of tiers; instead, the map groups must always document the ‘pattern’ of NAL units within the samples and provide the NAL-unit-to-tier mapping information that may be needed for extraction of NAL units.

A multiview group specifies an MVC operating point and is therefore associated with the target output views of the MVC operating point. The Multiview Group box, defined in F8.3, is used to specify a multiview group. Many of the boxes used to characterize SVC and MVC tiers are also used to characterize MVC operating points and can therefore be contained in the Multiview Group box too.

In C.2.1.1, Definition (Tier information box), replace:

Box Types:	‘tiri’
Container:	ScalableGroupEntry
Mandatory:	Yes
Quantity:Zero or One // depends on primary_definition

The tier information box provides information about the profile, level, frame size, discardability, and frame-rate of a tier.

with:

Box Type:	‘tiri’
Container:	ScalableGroupEntry or MultiviewGroupEntry or MultiviewGroupBox
Mandatory:	Yes
Quantity:Zero or One // depends on primary_definition

The tier information box provides information about the profile, level, frame size, discardability, and frame-rate of a covered bitstream subset. If the Tier Information box is included in a Scalable Group entry or a Multiview Group entry, the covered bitstream subset consists of the tier and tiers it depends upon. If the Tier Information box is included in a Multiview Group box, the covered bitstream subset consists of the target output views of the multiview group and all the views required for decoding the target output views.

In C.2.1.3, Semantics (Tier information box), replace:

`tierID` gives the identifier of the tier.

`profileIndication` contains the profile_idc as defined in ISO/IEC 14496-10, when the parameter applies to the bitstream subset consisting of the tier and all the dependent tiers.

`profile_compatibility` is a byte defined exactly the same as the byte which occurs between the profile_idc and level_idc in a sequence parameter set or a subset sequence parameter set, as defined in ISO/IEC 14496-10 Annex G, when the parameters apply to the bitstream subset consisting of the tier and all the dependent tiers.

`levelIndication` contains the level_idc as defined in ISO/IEC 14496-10, when the parameter applies to the bitstream subset consisting of the tier and all the dependent tiers.

The profile, profile compatibility flags and level indicated by the fields `profileIndication`, `profile_compatibility`, and `levelIndication` specifies an interoperability point with which the bitstream obtained from the particular tier and all the dependent tiers is compatible.

`visualWidth` gives the value of the width of the coded picture or coded sub-picture in luma pixels of the representation of this tier in the SVC stream. A coded sub-picture consists of a proper subset of coded slices of a coded picture. A tier may consist of only sub-pictures. In this case, the tier is referred to as a sub-picture tier. A sub-picture tier may represent a region-of-interest part of the region represented by the entire stream.

NOTE	The tier representation of a sub-picture tier might not be a valid SVC stream. One example is as follows. An AVC bitstream is encoded using two slice groups. The first slice group includes the macroblocks representing a region-of-interest and is coded without referring to slices in the other slice group for inter prediction over all the access units. The slices of the first slice group in each access unit then form a sub-picture and a sub-picture tier can be specified to include all the sub-pictures over all the access units.

`visualHeight` gives the value of the height of the coded picture or coded sub-pictures in luma pixels of the representation this tier in the SVC stream.

`discardable` takes one of the following values; the value 02 is reserved.

00 this tier does not contain NAL units with discardable_flag equal to 1.

01 this tier contains both NAL units with discardable_flag equal to 1 and discardable_flag equal to 0.

03 all NAL units in this tier are with discardable_flag equal to 1.

`constantFrameRate` specifies if the frame rate of this tier is constant. A value of 0 denotes a non-constant frame rate, a value of 1 denotes a constant frame rate and a value of 2 denotes that it is not clear whether the frame rate is constant. A value of 3 is reserved.

`frameRate` gives the frame rate when the bitstream corresponding to this tier and all the lower tiers that this tier depends on is decoded. If `constantFrameRate` has a value of 0 or 2 then `frameRate` gives the average frame rate. If `constantFrameRate` has a value of 1 then `frameRate` gives the constant frame rate. `frameRate` equal to 0 indicates an unspecified frame rate.

with:

`tierID` gives the identifier of the tier, when the Tier Information box is included a Scalable Group entry or a Multiview Group entry. Otherwise, the semantics of `tierID` are unspecified, and in this case, `tierID` must be set to the reserved value 0.

`profileIndication` contains the profile_idc as defined in ISO/IEC 14496-10, when the parameter applies to the covered bitstream subset.

`profile_compatibility` is a byte defined exactly the same as the byte which occurs between the profile_idc and level_idc in a sequence parameter set or a subset sequence parameter set, as defined in ISO/IEC 14496-10 Annex G or Annex H, when the parameters apply to the covered bitstream subset.

`levelIndication` contains the level_idc as defined in ISO/IEC 14496-10, when the parameter applies to the covered bitstream subset. If the Tier Information Box is included in a Multiview Group Entry, `levelIndication` shall be valid when all the views of the covered bitstream subset are target output views. If the Tier Information Box is included in a Multiview Group Box, `levelIndication` shall be valid when the views specified by the respective multiview group are the target output views. If `levelIndication` is equal to 0 for an MVC stream, the level that applies to the covered bitstream subset and operating with all the views being target output views is unspecified.

The profile, profile compatibility flags and level indicated by the fields `profileIndication`, `profile_compatibility`, and `levelIndication` specifies an interoperability point with which the covered bitstream subset, and, for MVC, operating with the target output views as specified in the semantics of `levelIndication`, is compatible.

`visualWidth` gives the value of the width of the coded picture (of an SVC stream), coded sub-picture (of an SVC stream), or coded view component (of an MVC stream) in luma pixels of the representation of this tier in the stream or any view component of the covered bitstream subset. A coded sub-picture consists of a proper subset of coded slices of a coded picture. A tier may consist of only sub-pictures. In this case, the tier is referred to as a sub-picture tier. A sub-picture tier may represent a region-of-interest part of the region represented by the entire stream.

NOTE The tier representation of a sub-picture tier might not be a valid stream. One example is as follows. An AVC bitstream is encoded using two slice groups. The first slice group includes the macroblocks representing a region-of-interest and is coded without referring to slices in the other slice group for inter prediction over all the access units. The slices of the first slice group in each access unit then form a sub-picture and a sub-picture tier can be specified to include all the sub-pictures over all the access units.

`visualHeight` gives the value of the height of the coded picture (of an SVC stream), coded sub-picture (of an SVC stream), or coded view component (of an MVC stream) in luma pixels of the representation of this tier in the stream or any view component of the covered bitstream subset.

`discardable` takes one of the following values; the value 02 is reserved.

00 this tier does not contain NAL units with discardable_flag (for SVC) equal to 1 or inter_view_flag (for MVC) equal to 0.

01 this tier contains both NAL units with discardable_flag (for SVC) equal to 1 or inter_view_flag (for MVC) equal to 0 and discardable_flag (for SVC) equal to 0 or inter_view_flag (for MVC) equal to 1.

03 all NAL units in this tier are with discardable_flag (for SVC) equal to 1 or inter_view_flag (for MVC) equal to 0.

`constantFrameRate` specifies if the frame rate of this tier is constant. A value of 0 denotes a non-constant frame rate, a value of 1 denotes a constant frame rate and a value of 2 denotes that it is not clear whether the frame rate is constant. A value of 3 is reserved.

`frameRate` gives the frame rate when the bitstream corresponding to this tier and all the lower tiers that this tier depends on is decoded in frames per second rounded to the closest integer using the Round function specified in ISO/IEC 14496-10. If `constantFrameRate` has a value of 0 or 2 then `frameRate` gives the average frame rate. If `constantFrameRate` has a value of 1 then `frameRate` gives the constant frame rate. `frameRate` equal to 0 indicates an unspecified frame rate. For SVC streams, decoded frames, complementary field pairs and non-paired fields are regarded as frames when deriving the value of `frameRate`. For MVC streams, decoded view components of any single view only are regarded as frames when deriving the value of `frameRate,` regardless of the total number of the views, since all output views are required to have simultaneous view components.

In C.2.2.1, Definition (Tier bit rate box), replace:

Box Type: 'tibr'
Container: ScalableGroupEntry
Mandatory: No
Quantity:Zero or One

The tier bit rate box provides information about the bit rate values of a tier. Two sets of information are provided: for the tier representation, including all the tiers on which the current tier depends, and for the tier alone. Similarly, for each set of information, three values are supplied:

a) the lowest long-term average bit rate that this tier could deliver. Let maxDid be the greatest dependency_id for all NAL units of the tier, and minQid be the least quality_id for all the NAL units of the tier and having dependency_id equal to maxDid. The following NAL units of this tier are not considered in calculating this bit rate value: those having dependency_id equal to maxDid and quality_id greater than minQid.

with:

Box Type: 'tibr'
Container: ScalableGroupEntry or MultiviewGroupEntry or MultiviewGroupBox
Mandatory: No
Quantity:Zero or One

When included in a Scalable Group entry or a Multiview Group entry, the tier bit rate box provides information about the bit rate values of a tier. Two sets of information are provided: for the tier representation, including all the tiers on which the current tier depends, and for the tier alone. Similarly, for each set of information, the following values are supplied:

a) for SVC streams, the lowest long-term average bit rate that this tier could deliver. Let maxDid be the greatest dependency_id for all NAL units of the tier, and minQid be the least quality_id for all the NAL units of the tier and having dependency_id equal to maxDid. The following NAL units of this tier are not considered in calculating this bit rate value: those having dependency_id equal to maxDid and quality_id greater than minQid. For MVC streams, the lowest long-term average bit rate that this tier could deliver is equal to the long-term average bit rate of the tier, when all NAL units of the tier are considered.

At the end of C.2.2.1 insert:

When included in a Multiview Group box, the tier bit rate box provides information about the bit rate values of the covered bitstream subset consisting of the target output views indicated by the multiview group and all the views required for decoding of the target output views. The maximum and long-term average bit rate for the covered bitstream subset are provided.

In C.2.2.3, Semantics (Tier bit rate box), make the following modifications:

Replace:

`baseBitRate` gives the lowest long-term average bit rate in bits/second of the stream made from this tier and the tiers it depends upon over the entire stream, when the Tier Bit Rate box is included in a Scalable Group entry or a Multiview Group entry.

For SVC streams, `baseBitRate` is derived as follows. Let maxDid be the greatest dependency_id for all NAL units of the tier, and minQid be the least quality_id for all NAL units of the tier and having dependency_id equal to maxDid. The NAL units that are taken into account when calculating this bit rate value are as follows: 1) all NAL units of the tier except for those having dependency_id equal to maxDid and quality_id greater than minQid; 2) all NAL units of the lower tiers the current tier depends on.

For MVC streams, `baseBitRate` shall be equal to `avgBitRate`.

`maxBitRate` gives the maximum bit rate in bits/second of the stream containing all NAL unit mapped to this tier and the tiers it depends upon (when the Tier Bit Rate box is included in a Scalable Group entry or a Multiview Group entry) or the covered bitsteam subset (when the Tier Bit Rate box is included in a Multiview Group box), over any window of one second. All NAL units in this tier and the lower tiers this tier depends on are taken into account (when the Tier Bit Rate box is included in a Scalable Group entry or a Multiview Group entry).

`avgBitRate` gives the long-term average bit rate in bits/second of the stream containing all NAL unit mapped to this tier and the tiers it depends upon (when the Tier Bit Rate box is included in a Scalable Group entry or a Multiview Group entry) or the covered bitsteam subset (when the Tier Bit Rate box is included in a Multiview Group box), averaged over the entire stream. All NAL units in this tier and the lower tiers this tier depends on are taken into account.

`tierBaseBitRate`, `tierMaxBitRate`, and `tierAvgBitRate` are unspecified when the Tier Bit Rate box is included in a Multiview Group box. Otherwise, `tierBaseBitRate`, `tierMaxBitRate`, and `tierAvgBitRate` are specified as follows.

`tierBaseBitRate` gives the lowest long-term average bit rate in bits/second of the stream made from only this tier over the entire stream. For SVC streams, the set of NAL units that are taken into account when calculating this bit rate value is the same as for baseBitRate but excluding all NAL units of the dependent lower tiers. For MVC streams, `tierBaseBitRate` shall be equal to `tierAvgBitRate`.

`tierMaxBitRate` gives the maximum bit rate in bits/second that is provided by only this tier over any window of one second. All NAL units mapped to this tier are taken into account. All NAL units of the dependent lower tiers are not considered.

`tierAvgBitRate` - gives the long-term average bit rate in bits/second that is provided by only this tier, averaged over the entire stream. All NAL units mapped to this tier are taken into account. All NAL units of the dependent lower tiers are not considered.

with:

`baseBitRate` gives the lowest long-term average bit rate in bits/second of the stream made from this tier and the lower tiers this tier depends on over the entire stream.

For SVC streams, `baseBitRate` is derived as follows. Let maxDid be the greatest dependency_id for all NAL units of the tier, and minQid be the least quality_id for all NAL units of the tier and having dependency_id equal to maxDid. The NAL units that are taken into account when calculating this bit rate value are as follows: 1) all NAL units of the tier except for those having dependency_id equal to maxDid and quality_id greater than minQid; 2) all NAL units of the lower tiers the current tier depends on.