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Contents Page

[Foreword 5](#_Toc87519721)

[1 Scope 1](#_Toc87519722)

[2 Normative references 1](#_Toc87519723)

[3 Terms and definitions 1](#_Toc87519724)

[4 Technical overview 2](#_Toc87519725)

[5 Uncompressed video formats 3](#_Toc87519726)

[5.1 Overview 3](#_Toc87519727)

[5.2 Generic uncompressed video 3](#_Toc87519728)

[5.2.1 Generic uncompressed video 3](#_Toc87519729)

[5.2.2 Generic uncompressed video configuration 3](#_Toc87519730)

[5.3 Predefined uncompressed video configurations 8](#_Toc87519731)

[5.3.1 Overview 8](#_Toc87519732)

[5.3.2 Predefined configurations 9](#_Toc87519734)

[5.3.3 Other common configurations (informative) 10](#_Toc87519735)

[6 Video sample entry extensions 10](#_Toc87519736)

[6.1.1 Overview 10](#_Toc87519737)

[6.1.2 Chroma Location 11](#_Toc87519738)

[6.1.3 Interlaced Content Type 11](#_Toc87519739)

[6.1.4 Frame Packing Information 12](#_Toc87519741)

[6.1.5 Disparity Information 12](#_Toc87519743)

[6.1.6 Depth Mapping Information 13](#_Toc87519744)

[7 Multiple track storage 14](#_Toc87519745)

[7.1 Overview 14](#_Toc87519746)

[7.2 Uncompressed video track group 14](#_Toc87519747)

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](https://www.iso.org/directives-and-policies.html)).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information Technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia, and hypermedia*.

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Information technology — MPEG Systems technologies — Part 17: Uncompressed video in ISO Base Media File Format

# Scope

This document defines how uncompressed 2D image or video data is carried in files in the family of standards based on the ISO base media file format. This includes monochromatic data, colour data, transparency (alpha) information, depth information.

The primary goal of this specification is to allow exchange of uncompressed video or image data while relying on the information set provided by the ISO base media file format, such as timing, color space, sample aspect ratio...

# Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 14496‑12, Information technology — Coding of audio-visual objects — Part 12: ISO base media file format

ISO/IEC 23008-12, Information technology – *High efficiency coding and media delivery in heterogeneous environments – Part 12: Image File Format* (HEIF)

ISO/IEC 23091-2, *Information technology —Coding-independent code points — Part 2: Video*

ISO/IEC 23002-3*, Information technology — MPEG video technologies — Part 3: Representation of auxiliary video and supplemental information*

IEEE 754*, IEEE Std 754™-2008, IEEE Standard for Floating-Point Arithmetic*

# Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 14496‑12 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at [https://www.iso.org/obp](https://www.iso.org/obp/ui)

— IEC Electropedia: available at <http://www.electropedia.org/>

sample

media sample when the uncompressed data is described by a media track, or the payload of an item when the uncompressed data is described by an image item

Note 1 to entry: Media sample as defined in 14496-12.

Note 2 to entry: Payload of an item as defined in 14496-12.

component

one-dimensional information

Note to entry: In this specification, a component may describe visible information such as luminance or chroma, or other information usually not intended for direct display such as depth or transparency.

uncompressed video

One or more frame for which per-component values are coded independently from any component in this or any other frame

Note to entry: In this specification, the uncompressed term is used with some video formats applying some compression on one or more components, such as sub-sampling; however, data access to components for such formats is still independent from other components or frames.

frame

two-dimensional array of pixels contained within a sample

pixel

point associated with one or more components

# Technical overview

ISO/IEC 14496-12 shall be used as framework for the video extensions described in this document.

ISO/IEC 23008-12 shall be used as framework for the image extensions described in this document.

The extensions included in this document provide the necessary specifications to carry uncompressed video and images in these frameworks.

Media tracks and media samples may be associated with meta-data information using the various tools defined in ISO/IEC 14496-12, such as sample group descriptions, MetaBox, metadata tracks and sample auxiliary information.

Media items may be associated with meta-data information using the various tools defined in ISO/IEC 23008-12, such as descriptive item properties.

# Uncompressed video formats

## Overview

Uncompressed video formats may be stored in ISO base media formats using either pre-defined identifiers for common configurations, or a generic uncompressed video description defined hereafter.

For media tracks, uncompressed video formats shall be described by a sample entry extending the VisualSampleEntry. The handler type associated with the track is usually 'vide', 'auxv' or 'pict' but derived specifications may introduce new handler types. The width and height fields of the sample entry shall document the exact frame dimension, in pixels, of any sample of the video stream that is described by this sample entry.

For image items, uncompressed images shall be associated with a ImageSpatialExtentsProperty associated whose image\_width and image\_height fields shall document the exact frame dimension, in pixels, of the image.

For video or image data intended to be displayed, the tools defined in ISO/IEC 14496-12 and ISO/IEC 23008-12 should be used whenever applicable, namely to specify pixel aspect ratio, colour information, display aperture, content light level, etc.

An uncompressed video media sample or item consists in one frame, the first byte of the sample data being the first byte of the first component stored for that frame.

The size in bytes of the associated media sample or item shall be the size of the components as documented by the uncompressed video configuration, whether explicitly present or pre-defined.

For media tracks, each uncompressed video sample is a sync sample. Consequently, the SyncSampleBox should be absent from the track.

## Generic uncompressed video

### Generic uncompressed video

A generic uncompressed video media shall use a video sample entry with codingname 'uncv' containing one UncompressedVideoConfigBox.

A generic uncompressed image item shall use the item\_type 'uncv', an associated UncompressedVideoConfigBox essential item property, i.e. essential shall be equal to 1 for an UncompressedVideoConfigBox item property associated with an image item of type 'uncv'.

### Generic uncompressed video configuration

#### Definition

Box Type: 'uncC'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: Yes, if codingname of the sample entry is 'uncv' or if the item\_type of the item is 'uncv'  
Quantity: Zero or one per video sample entry or per item

The UncompressedVideoConfigBox is used to document the format of the image data. This box appears in a video sample entry of type 'uncv', or is associated with an item of type 'uncv'. This box may also be present in pre-defined uncompressed video configurations defined in subclause 5.3.

The UncompressedVideoConfigBox allows describing uncompressed video frames that are composed of one or more components. RGB or YUV formats are typical examples of such uncompressed video samples for which each colour component is a component of the uncompressed video sample. Other component types that associate a value to one or more pixels of the frame can also be described. For example, disparity, depth and transparency are other types of components.

Each frame is made of one or more components, where each component is assigned its own type (e.g., Y, U, V), as detailed in Table 1. Unless explicitly allowed for a given component type or by derived specifications, there should not be two components in a UncompressedVideoConfigBox with the same type.

The order in which components are listed indicates the order in which components are stored within the sample data, and is further detailed in Table 4.

Table 1 - Component types

|  |  |
| --- | --- |
| Value | Description |
| 0 | Visible monochrome component |
| 1 | (Y) Luma component |
| 2 | (Cb / U) Chroma component |
| 3 | (Cr / V) Chroma component |
| 4 | (R) Red component |
| 5 | (G) Green component |
| 6 | (B) Blue component |
| 7 | (A) Alpha/transparency component |
| 8 | Depth component |
| 9 | Disparity component |
| 10 | Padded component (unused bits/bytes) |
| 11 | Gamma |
| 12 | X-ray |
| 13 | VUV (Vacuum Ultraviolet) |
| 14 | UVC (Ultraviolet C) |
| 15 | UVB (Ultraviolet B) |
| 16 | UVA (Ultraviolet A) |
| 17 | NIR (Near Infra-Red) |
| 18 | SWIR (Short Wavelength Infra-Red) |
| 19 | MWIR (Middle Wavelength Infra-Red) |
| 20 | LWIR (Long Wavelength Infra-Red) |
| 20-0x7FFF | ISO/IEC reserved |
| 0x8000-0xFFFF | User-defined |

For a given component, the binary representation of each value is given by its component\_format as defined in Table 2, and is uniform across all pixels.

Each pixel of the frame contains exactly the number of components defined.

A component value may be coded for a pixel or for a group of pixels, depending on the sampling\_type. For every pixel, or for every group of pixels described by sampling\_type, a given component value is coded in the same way.

NOTE Components may use different coding bit length, either explicitly by using different component\_format, or implicitly as indicated by the sampling\_type.

Table 2 - Component formats

|  |  |
| --- | --- |
| Value | Description |
| 0 | The format is inferred by the packing type |
| 1 – 32 | Component value is an integer coded on the given number of bits using little-endian byte ordering if more than 8 bits. |
| 33 – 55 | Component value is an integer coded on the given number of bits minus 23 bits using big-endian byte ordering |
| 56 | Component value is a binary float number coded on 32 bits as defined by IEEE 754 |
| 57 | Component value is a binary float number coded on 64 bits as defined by IEEE 754 |
| 58 – 255 | ISO/IEC reserved for future definition |

EDITOR’S NOTE: Do we need to signal signed vs unsigned or let the interpretation of the value to the application or derived spec ?

When a component with a component\_type value of 1, 2 or 3 is present, there shall not be any component with a component\_type value of 0, 4, 5 or 6 present.

When a component with a component\_type value of 4, 5 or 6 is present, there shall not be any component with a component\_type value of 0, 1, 2 or 3 present.

Some formats, such as YUV video, do not use the same 2D resolution for each of the component of the frame. This is indicated by the sampling\_type field.

The sampling\_type field only covers common sub-sampling or pattern-based layout of components. This field shall be ignored when interpreting component with component\_type different from 2, 3, 4, 5 or 6; for these types of components, sampling\_type is always interpreted as having the value 0, i.e. the 2D dimension of the component is the one given in the sample entry or in the image item.

Table 3 – Components sampling types

|  |  |
| --- | --- |
| Value | Definition |
| 0 | No subsampling, all components have the same visual size  (e.g. RGB, YYV 4:4:4) |
| 1 | YCbCr 4:2:2  Shall only be used if component\_type values 1, 2 and 3 are present. |
| 2 | YCbCr 4:2:0  Shall only be used if component\_type values 1, 2 and 3 are present. |
| 3 | YCbCr 4:1:1  Shall only be used if component\_type values 1, 2 and 3 are present. |
| 4 | Bayer pattern  A block of 2x2 pixels with top-left pixel aligned on even line and even column is made of components  {C1, 0, 0} {0, C2, 0}  {0, C2, 0} {0, 0, C3}  with C1, C2, C3 the first three components listed. component\_format values shall be the same for C1, C2, and C3.  Shall only be used if component\_type values 4, 5 and 6 are present. |
| 5-0xFF | reserved |

The components may be packed in memory, as indicated by packing\_type.

Table 4 - Components packing types

|  |  |
| --- | --- |
| Value | Packing description |
| 0 | Planar (No packing), byte-aligned  The first value of component *i+1* is located immediately after the last value of component *i* (“planar” mode). Values of a component each start on a byte boundary, and with unused bits, if any, set to 0 (i.e. individual values that do not fall on natural byte boundaries, such as 10, 12 or 14 bits values, shall be aligned to the LSB, with padding occurring at the MSBs). |
| 1 | Planar (No packing), not byte-aligned  The first value of component *i+1* is located immediately after the last value of component *i* (“planar” mode). Values of a component follow each other with no padding bits in-between them. |
| 2 | component packing, byte aligned  for a given pixel, the component values are located one after the other, in their order of declaration, each component value starting on a byte boundary and unused bits, if any, set to 0 (i.e. individual values that do not fall on natural byte boundaries, such as 10, 12 or 14 bits values, shall be aligned to the LSB, with padding occurring at the MSBs). |
| 3 | component packing, not byte-aligned  for a given pixel, the component values are located one after the other, in their order of declaration, with no padding bits in-between them. |
| 4 | Mixed planar/packed, byte-aligned  The first component listed is stored with packing\_type=0, components 2 and 3 are stored with packing\_type=3, and remaining components, if present, are stored with packing\_type=0.  Note: in this mode, all component values are byte-aligned. This mode is typically used to store YUV 420 data with additional image planes for depth or alpha. |
| 5 | component (pixel or value) packing with byte interleaving  *EDITOR’S NOTE: Byte interleaving not fully described in original contributions, needs further input to handle formats like Monochrome 10, or drop it* |
| 6-255 | Reserved |

For packing\_type values 1 and 3, integer component values shall be stored starting with the most significant bit up to the least significant bit, and endianness indicated by component\_format shall be ignored.

For packing\_type values 2 and 3, if sampling\_type value is 1 (4:2:2 sampling), the Y components of two consecutive horizontal pixels are present in the packed pattern, once at the location indicated in the component listing, and once after the component following the Y component in the component listing. For example, if the component list indicates 2, 1, 3 (Cb, Y, Cr) and a packing\_type value 2, the packing pattern of components will be 2, 1, 3, 1 (Cb, Y0, Cr, Y1), describing two pixels.

EDITOR’S NOTES:

- do we need restriction on packing\_type for 420 and 411 ?

- do we want to take into account all possible 411 packed patterns ? {Cb, Y0, Y1, Cr, Y2, Y3}, {Cr, Y0, Y1, Cb, Y2, Y3}, { Y0, Y1, Cb, Y2, Y3, Cr}, { Cb, Cr, Y0, Y1, Y2, Y3 } … ?

#### Syntax

aligned(8) class UncompressedVideoConfigBox extends FullBox('uncC', 0, 0) {  
 unsigned int(16) component\_count;   
 {  
 unsigned int(16) component\_type;  
 unsigned int(8) component\_format;  
 } [component\_count];  
 unsigned int(8) sampling\_type;  
 unsigned int(8) packing\_type;

}

EDITOR’S NOTE: An alternative design for bayer support is to not use a given sampling\_type per pattern but use a monochrome single component with sampling\_type indicating a pattern, and a pattern following the definition:

if (component\_type == MULTICOMPONENT\_MONOCHROME) {  
 unsigned int(4) matrix\_columns;  
 unsigned int(4) matrix\_rows;  
 for (int i=0; i < matrix\_rows; i++) {  
 for (int j=0; j < matrix\_columns; j++) {  
 unsigned int(8) component\_type[i][j]; //from table 1  
 }  
 }  
}

This has the benefit of providing an explicit description of the pattern rather than introducing a new sampling\_type for each new pattern used, which can get out of control. The drawback is that the component list only lists a monochrome component and the pattern has to be analysed to check if it is supported. An additional benefit is that this pattern description could be used to describe packing variations of YUV411.

If this approach is kept, an additional component type for multi-component monochrome would be needed in table 1.

Contributions on this matter are welcome.

#### Semantics

component\_count indicates the number of components present in the sample

component\_type indicates the type of the component, as defined in Table 1.

component\_format indicates the format of the component, as defined in Table 2

sampling\_type indicates the sampling type of the components, as defined in Table 3

packing\_type indicates the packing type of the components, as defined in Table 4

## Predefined uncompressed video configurations

### Overview

The four-character codes defined in this subclause identify common video formats for which the information contained in the UncompressedVideoConfigBox can be inferred.

NOTE These formats are introduced to document existing practices in the industry prior the definition of this specification.

A VisualSampleEntry using one of these predefined four-character codes may include at most one UncompressedVideoConfigBox in its child boxes. When present, the UncompressedVideoConfigBox shall match the predefined information described for this code.

### Predefined configurations

Table 5 - Predefined uncompressed video formats

|  |  |  |
| --- | --- | --- |
| Sample entry codingname | Description | Predefined configuration (for UncompressedVideoConfigBox) |
| '2vuy' | 8 bits YUV 422 packed  Cb Y0 Cr Y1 | {3, [ {2, 8}, {1, 8}, {3, 8} ], 1, 2} |
| 'yuv2' | 8 bits YUV 422 packed  Y0 Cb Y1 Cr | {3, [ {1, 8}, {2, 8}, {3, 8} ], 1, 2} |
| 'v308' | 8 bits YUV 444 packed  Cr Y Cb | {3, [ {3, 8}, {1, 8}, {2, 8} ], 0, 2} |
| 'v408' | 8 bits YUVA 444 packed  Cb Y Cr A | {4, [ {2, 8}, {1, 8}, {3, 8}, {7, 8}], 0, 2} |
| 'v216' | 10,12,14,16 bits YUVA 422 packed  Cb Y0 Cr Y1 | {3, [ {2, 16}, {1, 16}, {3, 16}], 1, 2}  EDITOR NOTE: mapping is not possible here as QT uses an ‘sgbt’ extension to signal n=10,12,14,16.  Do we want to introduce this box, only for v216 ? |
| 'v410' | 10 bits YUV 444 packed, 2 unused bits at beginning  Cr Y Cb | {4, [ {10, 2}, {2, 10}, {1, 10}, {3, 10}], 1, 3} |
| 'v210' | YUV 422 10bits | Not mappable, unless an adhoc packing type is introduced |
| 'raw ' | RGB 24bits as defined in QT | {3, [ {4, 8}, {5, 8}, {6, 8} ], 0, 2} |
| 'j420'  'I420' | YUV 420 8 bits planar  Y Cb Cr full scale (JPEG) | {3, [ {1, 8}, {2, 8}, {3, 8} ], 2, 0}  + a ‘colr’ box in the sample entry with full\_range\_flag |
| 'IYUV'  'yv12' | YUV 420 8 bits planar  Y Cb Cr | {3, [ {1, 8}, {2, 8}, {3, 8} ], 2, 0} |
| 'YVYU' | 8 bits YUV 422 packed  Y0 Cr Y1 Cb | {3, [ {1, 8}, {3, 8}, {2, 8} ], 1, 2} |
| 'RGBA' | Packed RGBA 32bits  RGBARGBA... | {4, [ {4, 8}, {5, 8}, {6, 8}, {7, 8}], 0, 1} |
| 'ABGR' | Packed RGBA 32bits  ABGRABGR… | {4, [ {7, 8}, {6, 8}, {5, 8}, {4, 8}], 0, 1} |

EDITOR’S NOTE1: decide which one we keep

EDITOR’S NOTE2: there is an ongoing discussion about not using sample entry 4CCs for predefined configurations but define a ‘profile indicator’ in the sample entry, and define common profiles based on the above table, with precise documentation of the requirements on the config record for each profile. This approach is more elegant in terms of proliferation of 4CCs, however it breaks backward compatibility with current existing practices. Contributions on this topic are welcome.

### Other common configurations (informative)

Table 6 - Examples of common uncompressed formats

|  |  |
| --- | --- |
| Video format description | Configuration |
| YUV420 planar 10 bits Y 9 bits CrCb | {3, [ {1, 10}, {2, 9}, {3, 9} ], 2, 0} |
| RGB565 | {3, [ {4, 5}, {5, 6}, {6, 5} ], 0, 3} |
| RGB555+A bit mask: | {4, [ {4, 5}, {5, 5}, {6, 5}, {7, 1}], 0, 3} |
| YUV420 planar 8 bits with alpha and depth | {5, [ {1, 8}, {2, 8}, {3, 8}, {7, 8}, {8, 8} ], 2, 0} |
| RGB 10bits + 2 bits unused  (xx Rx10 Gx10 Bx10) | {4, [ {10, 2}, {4, 10}, {5, 10}, {6, 10} ], 0, 3} |
| RGB 10bits + 2 bits alpha  (AA Rx10 Gx10 Bx10) | {4, [ {7, 2}, {4, 10}, {5, 10}, {6, 10} ], 0, 3} |

# Video sample entry extensions

### Overview

The boxes defined in this subclause can be used to provide further information on one or more components present in the uncompressed video format.

Each of the defined box can be:

* added to an uncompressed video sample entry (whether pre-defined or using 'uncv' sample entries)
* associated with an uncompressed video item (whether pre-defined or using 'uncv' item type)

NOTE The syntaxes in this section are given for a video sample entry container and the defined boxes therefore extend Box or FullBox. When used in an ItemPropertyContainerBox, the same syntax applies but the defined boxes extend ItemProperty or ItemFullProperty.

EDITOR’S NOTE: we don’t have anything for alpha or other component types. Some YUV+A format assume that alpha values range in 16-235 for 8bit, other assume full range for alpha. Additionally, not all components will be interpreted as a linear value, or as unsigned for integer values. Contributions on this topic are welcome.

### Chroma Location

#### Definition

Box Type: 'cloc'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: No  
Quantity: Zero or one per video sample entry or per item

The ChromaLocationBox may be used to describe the chroma subsampling location method used for uncompressed video using a sampling\_type value of 2. It shall not be present for other uncompressed video configurations.

If ChromaLocationBox is not present for an uncompressed video using sampling\_type value of 2, the associated Chroma420SampleLocType is 0.

If ChromaLocationBox is used as an item property, it shall be marked as essential.

#### Syntax

aligned(8) class ChromaLocationBox extends Box('cloc') {  
 unsigned int(5) reserved = 0b00000;  
 unsigned int(3) chroma\_location;  
}

#### Semantics

chroma\_location indicates the Chroma420SampleLocType as defined in ISO/IEC 23091-2.

### Interlaced Content Type

#### Definition

Box Type: 'fiel'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: No  
Quantity: Zero or one per video sample entry or per item

The InterlaceContentTypeBox is used to describe field ordering in uncompressed video configurations. When absent, the video is assumed to be progressive.

If InterlaceContentTypeBox is used as an item property, it shall be marked as essential.

#### Syntax

class InterlacedContentTypeBox extends Box('fiel’) {

unsigned int(8) field\_count; //1 or 2   
 unsigned int(8) field\_ordering;

}

#### Semantics

field\_count indicates the number of fields. Value shall be either 1 (progressive video) or 2 (interlaced video).

field\_ordering: when the field count is 2, specifies which field contains the topmost scan-line, which field should be displayed earliest, and which is stored first in each sample. Each sample consists of two distinct images, each coding one field: the field with the topmost scan-line, T, and the other field, B. The following defines the permitted variants:

0: There is only one field.

1: T is displayed earliest, T is stored first in the file.

6: B is displayed earliest, B is stored first in the file.

9: B is displayed earliest, T is stored first in the file.

14: T is displayed earliest, B is stored first in the file.

### Frame Packing Information

#### Definition

Box Type: 'pack'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: No  
Quantity: Zero or one per video sample entry or per item

TheFramePackingInformationBox can be used to describe how two pictures are packed into an uncompressed video frame for stereoscopic imagery.

If not present, each uncompressed video frame consists in a single picture.

If FramePackingInformationBox is used as an item property, it shall be marked as essential.

#### Syntax

class FramePackingInfoBox extends Box('pack') {  
 unsigned int(4) video\_frame\_packing;  
 unsigned int(4) PackedContentInterpretationType  
 unsigned int(1) QuincunxSamplingFlag;  
 unsigned int(7) reserved = 0;  
}

#### Semantics

video\_frame\_packing, QuincunxSamplingFlag, PackedContentInterpretationType as defined in ISO/IEC 23091-2.

### Disparity Information

#### Definition

Box Type: 'disi'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: No  
Quantity: Zero or one per video sample entry or per item

TheDisparityInformationBox can be used to describe how values of a disparity map should be interpreted. If not present, the mapping from disparity value to distance in meters uses the default values (parallax\_zero=2N-1, parallax\_scale=256, dref=300, wref=100) as defined in ISO/IEC 23002-3.

If this box is used as an item property, it shall be marked as essential.

EDITOR’S NOTE: there is no disparity-related aspects in CICP, maybe merging things from 23002-3 in CICP video should be considered

#### Syntax

class DisparityInformationBox extends FullBox('disi', 0, 0) {  
 unsigned int(16) parallax\_zero;  
 unsigned int(16) parallax\_scale;  
 unsigned int(16) dref;  
 unsigned int(16) wref;  
}

#### Semantics

parallax\_zero, parallax\_zero, parallax\_zero, parallax\_zero: as defined in ISO/IEC 23002-3.

### Depth Mapping Information

#### Definition

Box Type: 'depi'   
Container: Video sample entry, ItemPropertyContainerBox  
Mandatory: No  
Quantity: Zero or one per video sample entry or per item

The DepthMappingInformationBox may be used to describe how values in a depth map are transformed into distance values. If not present, the mapping from depth value to distance values follow the default values (nknear=128, nkfar=128) as defined in ISO/IEC 23002-3.

If this box is used as an item property, it shall be marked as essential.

EDITOR’S NOTE: there is no depth-related aspects in CICP, maybe merging things from 23002-3 in CICP video should be considered

#### Syntax

class DepthInfoBox extends FullBox('depi', 0, 0) {  
 unsigned int(8) nknear;  
 unsigned int(8) nkfar;  
}

#### Semantics

nknear, nkfar near and far distances as defined in ISO/IEC 23002-3.

# Multiple track storage

## Overview

Multiple track storage allows describing uncompressed video streams whose components are in multiple tracks. This process may be used in various cases:

* simplify editing, by modifying only one component (e.g. alpha or depth) without modifying the other components (colour)
* provide players a way to play a subpart of the components (e.g. colour) instead of failing playback due to unsupported configuration
* enable efficient disk and network usage for partial access (spatial, temporal) of a subset of the components. Note that this might not always be possible depending on component packing types.
* Use components with different spatial resolutions

## Uncompressed video track group

Uncompressed video tracks containing components related to the same media source may be grouped using a TrackGroupBox with the track\_group\_type value of 'unvg'.

The pair of track\_group\_id and track\_group\_type identifies a track group within the file. The tracks that contain a particular TrackGroupTypeBox having the same value of track\_group\_id and track\_group\_type belong to the same track group.

Tracks belonging to such a group may have different size, but shall have:

* The same aspect ratio
* The same temporal layout, i.e. there shall not be any time for which no sample is defined for one or more tracks of the group while a sample is defined for other tracks of the group.

NOTE Derived specification may further restrict the kind of components allowed in 'uncv' track groups, the timescale used, the visual dimension of the tracks, etc…

All tracks belonging to a track group with track\_group\_type value of 'unvg' shall be uncompressed video tracks as defined in Clause 5. The display or processing of (part of) a track group with track\_group\_type value of 'uncv' is application specific.

EDITOR’S NOTE1: we don’t have any proposal for multiple item storage, maybe Entity Groups could be used if feature is needed. Contributions on the topic are welcome.

EDITOR’S NOTE2: the proposed group could be used for a mix of compressed and uncompressed video (e.g. color compressed, alpha / depth uncompressed) as a generic technology for 14491-12.