INTERNATIONAL STANDARD

ISO/IEC 23008-12

First edition
2017-12

AMENDMENT 1
2020-11

Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 12: Image File Format

AMENDMENT 1: Support for predictive image coding, bursts, bracketing and other improvements

Technologies de l'information — Codage à haute efficacité et livraison des médias dans des environnements hétérogènes —

Partie 12: Format de fichier d'image

AMENDEMENT 1: Support pour le codage prédictif des images, les rafales, le bracketing et autres améliorations

Reference number
ISO/IEC 23008-12:2017/Amd.1:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO/IEC 23008 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 12: Image File Format

AMENDMENT 1: Support for predictive image coding, bursts, bracketing and other improvements

Clause 3

Add the following terms and definitions at the end of 3.1:

3.1.40
predictively coded image item
image item (3.1.17) that has a decoding dependency to one or more other coded image items (3.1.5)

3.1.41
unique ID
identifier for either an item, an entity group or a track that fulfils the requirements of the `'unif'` brand

Note 1 to entry: Requirements on the `'unif'` brand are specified in ISO/IEC 14496-12.

3.1.42
visual context
visual rendering surface such as a screen buffer, which may already contain visual material, and onto which an image (3.1.15) can be rendered

Clause 4, item a)

Replace the text in item a) with the following:

a) the storage of a single coded image or a collection of coded images, possibly with derived images; coded images are normally independently coded except when the `'pred'` brand is signalled. In such latter case, coded images may be independently coded or may have been coded with inter prediction;

Clause 4, third paragraph:

Replace the third paragraph with the following:

In general, the single image support is used for simpler cases, particularly when neither timing nor coding dependency is required. If advisory timing or other tools from the ISO base media file format available for tracks are needed (e.g. sample grouping), then the second approach is needed.

6.4

Add the following new subclause after subclause 6.4.8:

6.4.9 Predictively coded image items

Predictively coded image items have a decoding dependency to one or more other coded image items. An example for such an image item could be a P frame stored as an image item in a burst entity group that has IPPP... structure, with the P frames dependent only on the preceding I frames.

Capability to have predictively coded image items has certain benefits especially in content re-editing and cover image selection:

— Image sequences can be converted to image items with no transcoding.

— Any sample of an image sequence track can be selected as a cover image. The cover image does not need to be intra-coded.

— Devices that do not have a video or image encoder are capable of updating the cover image of a file containing an image sequence track.

— Storage efficiency is further achieved by re-using the predictively coded picture rather than re-encoding it as I frame and storing as an additional image item. Moreover, image quality degradation is also avoided.

— Re-encoding might not be allowed or preferred by the copyright owner. Predictively coded image items avoid the need of re-encoding of any image from an image sequence track.

Predictively coded image items are linked to the coded image items they directly and indirectly depend on by item references of type `'pred'`. The list of referenced items in item references of type `'pred'` shall indicate the decoding order. When concatenated, the encoded media data of items with `item_ID` equal to `to_item_ID` for all values of `j` from 0 to `reference_count` − 1, inclusive, in increasing order of `j`, followed by the item with `item_ID` equal to `from_item_ID` shall form a bitstream that conforms to the decoder configuration item property of the predictively coded image item.

In order to decode the predictively coded image item, there shall be no other decoding dependencies other than the image items referenced by item references of type `'pred'`.

The predictively coded image item shall be associated with exactly one `RequiredReferenceTypesProperty` containing one reference type with the value `'pred'`.

6.5.1

Add the following paragraphs at the end of the subclause 6.5.1, after the NOTE:

When unique IDs are used, an `item_ID` value in the `ItemPropertyAssociationBox` is resolved to an item identifier whenever the embedding MetaBox contains an item with such identifier, and is resolved to an entity group identifier otherwise.

Properties may be associated with an entity group, but only when explicitly stated in their specification. In such case, properties apply to the entity group as a whole, and not individually to each entity within the group.

6.5

Add the following new subclauses after subclause 6.5.12:

6.5.13 Image scaling

6.5.13.1 Definition

Box type:	`'iscl'`
Property type:	Transformative item property
Container:	`ItemPropertyContainerBox`
Mandatory (per item):	No
Quantity (per item):	At most one

The image scaling `'iscl'` transformative item property scales an input image.

The input image is the output of the previous transformative item property, if any, or the reconstructed image of the associated image item.

The width and height of the input image (call those `input_width` and `input_height`) are resized to a target width and height, in pixels, respectively equal to `ceil(` (`input_width` * `target_width_numerator`) / `target_width_denominator)` and `ceil(`(`input_height` * `target_height_numerator`) / `target_height_denominator)`, where `ceil()` is the ceiling function. The scaling of the input image applies to both width and height separately. The fraction may or may not be in reduced terms.

NOTE 1 Formulas above use a floating-point division, not an integer division.

NOTE 2 When the input image is the reconstructed image of the associated image item, `input_width` and `input_height`, respectively, are equal to `image_width` and `image_height` declared in the `ImageSpatialExtentsProperty` associated with this image item. Otherwise, `input_width` and `input_height` are equal to the width and height of the output of the previous transformative item property.

6.5.13.2 Syntax

```
aligned(8) class ImageScaling
extends ItemFullProperty('iscl', version = 0, flags = 0) {
   unsigned int (16) target_width_numerator;
   unsigned int (16) target_width_denominator;
   unsigned int (16) target_height_numerator;
   unsigned int (16) target_height_denominator;
}
```

6.5.13.3 Semantics

`target_width_numerator` specifies the numerator of the scaling ratio for the resized image in the horizontal dimension. The value 0 shall not be used.

`target_width_denominator` specifies the denominator of the scaling ratio for the resized image in the horizontal dimension. The value 0 shall not be used.

`target_height_numerator` specifies the numerator of the scaling ratio for the resized image in the vertical dimension. The value 0 shall not be used.

`target_height_denominator` specifies the denominator of the scaling ratio for the resized image in the vertical dimension. The value 0 shall not be used.

6.5.14 Content light level

6.5.14.1 Definition

Box type: `'clli'`

Property type: Descriptive item property

Container: `ItemPropertyContainerBox`

Mandatory (per item): No

Quantity (per item): At most one

The content light level item property provides information about the light level in the content.

6.5.14.2 Syntax

The content light level `'clli'` descriptive item property has the same syntax as the `ContentLightLevelBox` as defined in ISO/IEC 14496-12.

6.5.14.3 Semantics

The semantics of the syntax elements within the content light level `'clli'` item property are the same as those specified for the syntax elements of `ContentLightLevelBox` as defined in ISO/IEC 14496-12.

6.5.15 Mastering display colour volume

6.5.15.1 Definition

Box type: `'mdcv'`

Property type: Descriptive item property

Container: `ItemPropertyContainerBox`

Mandatory (per item): No

Quantity (per item): At most one

This property provides information about the colour primaries, white point, and mastering luminance in the content.

6.5.15.2 Syntax

This property has the same syntax as the `MasteringDisplayColourVolumeBox` as defined in ISO/IEC 14496-12.

6.5.15.3 Semantics

The semantics of the syntax elements within this property are the same as those specified for the syntax elements of `MasteringDisplayColourVolumeBox` as defined in ISO/IEC 14496-12.

6.5.16 Content colour volume

6.5.16.1 Definition

Box type:	`'cclv'`
Property type:	Descriptive item property
Container:	`ItemPropertyContainerBox`
Mandatory (per item):	No
Quantity (per item):	At most one

This property describes the colour volume characteristics of the associated pictures.

6.5.16.2 Syntax

This property has the same syntax as the `ContentColourVolumeBox` as defined in ISO/IEC 14496-12.

6.5.16.3 Semantics

The semantics of the syntax elements within this property are the same as those specified for the syntax elements of `ContentColourVolumeBox` as defined in ISO/IEC 14496-12.

6.5.17 Required reference types

6.5.17.1 Definition

Box type:	`'rref'`
Property type:	Descriptive item property
Container:	`ItemPropertyContainerBox`
Mandatory (per item):	Yes, for a predictively coded image item. No, otherwise.
Quantity (per item):	At most one

The `RequiredReferenceTypesProperty` descriptive item property lists the item reference types that a reader shall understand and process to decode the associated image item. The respective `essential` flag shall be equal to 1 in `ItemPropertyAssociationBox`.

NOTE In the absence of this property, required reference types are not explicitly listed, but can still exist.

6.5.17.2 Syntax

```
aligned(8) class RequiredReferenceTypesProperty
extends ItemFullProperty('rref', version = 0, flags = 0){
   unsigned int(8) reference_type_count;
   for (i=0; i< reference_type_count; i++) {
      unsigned int(32) reference_type[i];
   }
}
```

6.5.17.3 Semantics

`reference_type_count` indicates the number of reference types that are required to understand and process to decode the associated image item.

`reference_type[i]` indicates a reference type that is required to understand and process to decode the associated image item.

6.5.18 Creation time information

6.5.18.1 Definition

Box type: 'crtt'

Property type: Descriptive item property

Container: ItemPropertyContainerBox

Mandatory (per associated item_ID): No

Quantity (per associated item_ID): At most one

The CreationTimeProperty documents the creation time of the associated item or group of entities.

6.5.18.2 Syntax

```
aligned(8) class CreationTimeProperty
extends ItemFullProperty('crtt', version = 0, flags = 0) {
   unsigned int(64)  creation_time;
}
```

6.5.18.3 Semantics

creation_time is an integer that declares the creation time of the item or group of entities (in microseconds since midnight, Jan. 1, 1904, in UTC time).

6.5.19 Modification time information

6.5.19.1 Definition

Box type: 'mdft'

Property type: Descriptive item property

Container: ItemPropertyContainerBox

Mandatory (per associated item_ID): No

Quantity (per associated item_ID): At most one

The ModificationTimeProperty documents the last modification time of the associated item or group of entities.

6.5.19.2 Syntax

```
aligned(8) class ModificationTimeProperty
extends ItemFullProperty('mdft', version = 0, flags = 0) {
   unsigned int(64)  modification_time;
}
```

6.5.19.3 Semantics

modification_time is an integer that declares the most recent time the item or group of entities was modified (in microseconds since midnight, Jan. 1, 1904, in UTC time).

6.5.20 User description

6.5.20.1 Definition

Box type: 'udes'

Property type: Descriptive item property

Container: ItemPropertyContainerBox

Mandatory (per associated item_ID): No

Quantity (per associated item_ID): Zero or more

The UserDescriptionProperty permits the association of item(s) or entity group(s) with a user-defined name, description and tags; there may be multiple such properties, which shall have different language codes.

When several instances of UserDescriptionProperty are associated with the same item or entity group, they represent alternatives possibly expressed in different languages and a reader should choose the most appropriate. At most one UserDescriptionProperty with the same alt_lang value should apply to the same item or entity group.

6.5.20.2 Syntax

```
aligned(8) class UserDescriptionProperty
extends ItemFullProperty('udes', version = 0, flags = 0){
   utf8string lang;
   utf8string name;
   utf8string description;
   utf8string tags;
}
```


6.5.20.3 Semantics

lang is a character string containing an IETF RFC 5646 compliant language tag string, such as "en-US", "fr-FR", or "zh-CN", representing the language of the text contained in name, description and tags. When lang is empty, the language is unknown/undefined.

name is a null-terminated UTF-8 character string containing human readable name for the item or group of entities. If not present (an empty string is supplied) no name is provided.

description is a null-terminated UTF-8 character string containing human readable description of the item or group of entities. If not present (an empty string is supplied) no description is provided.

tags is a null-terminated UTF-8 character string containing comma-separated user-defined tags related to the item(s). If not present (an empty string is supplied) no tags is provided.

6.5.21 Accessibility text

6.5.21.1 Definition

Box type: 'altt'

Property type: Descriptive item property

Container: ItemPropertyContainerBox

Mandatory (per an item): No

Quantity (per an item): Zero or more

The AccessibilityTextProperty contains a string suitable to be used as an alternate text for an image if the image cannot be displayed, similarly to alt text in HTML. The language used by the alternate text is represented by a language tag string compliant with IETF RFC 5646.

When several instances of AccessibilityTextProperty are associated with the same item, they represent alternatives possibly expressed in different languages and a reader should choose the most appropriate. At most one AccessibilityTextProperty with the same alt_lang value should apply to the same item.

6.5.21.2 Syntax

```
aligned(8) class AccessibilityTextProperty
extends ItemFullProperty('altt', version = 0, flags = 0) {
   utf8string alt_text;
   utf8string alt_lang;
}
```

6.5.21.3 Semantics

alt_text is a character string suitable to be used as an alternate text for an image if the image cannot be displayed, similarly to alt text in HTML.

alt_lang is a character string containing an IETF RFC 5646 compliant language tag string, such as "en-US", "fr-FR", or "zh-CN", representing the language of the text contained in alt_text. When alt_lang is empty, the language is unknown/undefined.

6.5.22 Auto Exposure Information

6.5.22.1 Definition

Box type:	'aebr'
Property type:	Descriptive item property
Container:	ItemPropertyContainerBox
Mandatory (per item):	No
Quantity (per item):	At most one

The auto exposure descriptive item property defines the exposure variation of the associated image item relatively to the camera settings.

It is used to specify the properties of an image item included in an 'aebr' entity group as specified in subclause 6.8.6.

6.5.22.2 Syntax

```
aligned(8) class AutoExposureProperty
extends ItemFullProperty('aebr', version = 0, flags = 0) {
   int(8) exposure_step;
   int(8) exposure_numerator;
}
```

6.5.22.3 Semantics

exposure_step is an integer value that specifies the increment steps used during the exposure bracketing. When equals to 1, a full stop increment is used, when equals to 2, a half stop increment is used, when equals to 3, a third stop increment is used, and when equals to 4, a quarter stop increment is used. Other values are reserved.

exposure_numerator is an integer value specifying the exposure numerator used to compute the exposure value stop of the item.