INTERNATIONAL STANDARD

ISO/IEC 23000-22

First edition
2019-06

AMENDMENT 2
2021-12

Information technology — Multimedia application format (MPEG-A) —

Part 22: Multi-image application format (MIAF)

AMENDMENT 2: HEVC Advanced HDR profile and other clarifications

Technologies de l'information — Format pour application multimédia (MPEG-A) —

Partie 22: Format pour application à images multiples (MIAF)

AMENDEMENT 2: Profil HDR avancé pour HEVC et autres clarifications

Reference number
ISO/IEC 23000-22:2019/Amd. 2:2021(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

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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 information*.

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Information technology — Multimedia application format (MPEG-A) —

Part 22:
Multi-image application format (MIAF)

AMENDMENT 2: HEVC Advanced HDR profile and other clarifications

3.3

Replace the definition with the following:

brand indicating that a MIAF file conforms to additional requirements that apply to all MIAF profiles and that MIAF readers and MIAF renderers that implement these requirements may process the MIAF file

Clause 3

Add the following new terms and definitions at the end of the clause:

3.16
CICP colour information
metadata provided by a colour information box or property with `colour_type` equal to '`nclx`'

3.17
ICC colour information
metadata provided by a colour information box or property with `colour_type` equal to '`prof`' or '`rICC`'

Clause 5

Replace paragraphs two to six with the following:

Clause 7 specifies general requirements that apply to all MIAF profiles. These requirements are split in two ways:

— requirements at the file format structure level, and requirements at the 'abstraction layer' that the file format structures create; and

— requirements for both still images, image sequences and video.

Clause 8 specifies constraints which are shared by one or more MIAF profiles.

Clause 9 specifies the coding format(s) that must be supported in any player, independent of any MIAF profile.

Clause 10 specifies the MIAF application brands that indicate conformance to the normative requirements of this document, common to all MIAF profiles (as documented in the clauses preceding the annexes), and the applicable file extensions.

Annex A specifies the MIAF profiles, each of which imposes a set of specific restrictions which shall be followed for enabling interoperability between MIAF files and MIAF readers.

6.3

Replace the text with the following:

A MIAF image item is independently decodable and represented by an image item that conforms

a) to the box-level requirements for image items in subclause 7.2.1; and

b) to the requirements for image items in subclause 7.3; and

c) to the requirements of a defined MIAF profile, if it exists, and for which a brand should appear in the FileTypeBox.

6.4

Replace the text with the following:

A MIAF thumbnail image item is a MIAF image item that

a) is referenced as a thumbnail image from a MIAF master image item;

b) has its image data stored in the same file as the MIAF master image item for which it is a thumbnail.

6.5

Replace the text with the following:

A MIAF auxiliary image item is a MIAF image item that

a) conforms also to the requirements for auxiliary image items in subclause 7.3.5;

6.6

Replace the first dashed item in the first dashed list with the following:

— a file compliant to this document

Replace the third dashed item in the "Outputs of a MIAF reader" dashed list with the following:

— the metadata associated with the output image(s), including the content of the `ColourInformationProperty` or `ColourInformationBox` box(es).

Designate the existing NOTE 3 as NOTE 4 and add the following new NOTE before it:

NOTE 3 All colour properties are expected to be parsed by MIAF readers, including all colour types (on-screen i.e. `colour_type` equal to '`nclx`', constrained and unconstrained ICC profiles), and passed as metadata to the MIAF renderer.

Replace the last dashed item before the existing NOTE 5 with:

— Otherwise, selectedIds is either empty or a list that has one and only one list element that is set equal to seedId.

Replace the first paragraph after the existing NOTE 5 with the following:

A MIAF reader concludes an error when any of the following occurs:

Renumber the existing NOTE 5 as NOTE 6 and the existing NOTE 6 as NOTE 7.

Replace the last paragraph and existing NOTE 7 with the following:

For each output image, the MIAF reader returns metadata, such as colour information.

NOTE 8 Decoding of an image item can involve image derivation, or the application of transformative properties applied in sequence. MIAF readers are expected to only use CICP colour information during decoding, derivation, transformation or colour conversion, and to ignore ICC colour information.

6.7

Replace the third dashed item in the first dashed list with the following:

— the metadata associated with the output image(s), including the content of the `ColourInformationProperty` or `ColourInformationBox` box(es).

Replace the third paragraph with the following:

MIAF profiles or MIAF application brands may specify the operation of the MIAF renderer. When MIAF profiles or MIAF application brands do not specify the operation of the MIAF renderer and no other information of the MIAF renderer operation is available, the MIAF renderer should operate as follows:

Move NOTE 1 after the first bullet point.

Replace NOTE 2 with the following:

NOTE 2 Colour properties and other descriptive properties are expected to be used to enable display matching. MIAF renderers are expected to use the various colour information from the MIAF reader in the following order of preference (from most preferred to least preferred): ICC profile information, if available; CICP colour information, if not set to unknown; application-provided colour information, if available; default CICP colour information, as defined in 7.3.6.4.

7.2.1.2

Replace the text with the following:

The `FileTypeBox` should contain, in the `compatible_brands` list, the '`mif1`' brand (specified in ISO/IEC 23008-12). Some MIAF profiles mandate the presence of this brand.

The FileTypeBox should also contain brands that identify the MIAF profile(s), to which the file conforms (specified in Annex A or externally), and possibly other brands to which the file conforms.

Files that contain multiple MIAF-compatible tracks or items that comply to different MIAF profiles should use the `TrackTypeBox` (in tracks) and the `BrandProperty` (in items) declaring the MIAF profile of the track or item, to enable determining to which tracks or items the brands declared in the `FileTypeBox` apply.

7.2.1.3, first paragraph

Replace the second sentence with the following:

Any editing operation on the file which changes box sizing or placement is expected to update this index or remove it to produce a file conformant to ISO/IEC 23001-14.

7.2.1.6

Replace the text with the following:

MIAF profiles may limit the use of data references for image items.

7.2.2.1

Replace the text with the following:

MIAF profiles may limit the use of data references for image sequences and video.

7.2.2.2

Replace the text with the following:

Content protection may be used in a valid MIAF file only if the following is true: if all the protected content is removed from the file, the remaining file conforms to this document.

7.3.2

Replace the text with the following:

The primary item shall be a MIAF master image item.

When a MIAF profile specified in Annex A or defined in external specifications is listed in the FileTypeBox, there shall be an image item that conforms to that MIAF profile and is among the set of items comprised of the primary item and its alternates.

NOTE 7.2.1.8 requires that MIAF image items be unprotected.

7.3.3, last paragraph

Replace the paragraph with the following:

There shall be no greater than a factor of 200 between the total number of pixels in a MIAF thumbnail image item and the next larger MIAF thumbnail image item. There shall be no greater a factor of 200 between the largest thumbnail image item and the associated MIAF master image item.

7.3.5.1, fourth paragraph

Replace the last sentence in the paragraph with the following:

Limits and requirements on auxiliary images may be expressed by specific MIAF profiles.

7.3.5.2, dashed list

Add the following list item at the end of the list:

— Given the semantics above, if a CICP colour property is associated with an alpha auxiliary image item, `full_range_flag` shall be set to 1.

7.3.6.4

Replace the text with the following:

All image items, both coded and derived, should be associated with at least one colour information property.

The handling of colour information by the system (i.e. colour management) is outside the scope of this document; a renderer takes this information into account when rendering the image(s).

If a coded image has no associated CICP colour property, the default property is defined as having `colour_type` equal to '`nclx`' with properties as follows:

— `colour_primaries` equal to 1,

— `transfer_characteristics` equal to 13,

— `matrix_coefficients` equal to 5 or 6 (which are functionally identical), and

— `full_range_flag` equal to 1.

NOTE 1 Any colour information in the bitstream is ignored by the MIAF reader and MIAF renderer processing models. The colour information property whether explicit or default, takes precedence over any colour information in the image bitstream.

NOTE 2 When creating a colour property with colour_type equal to 'nclx', authors are encouraged to set the values other than undefined (2), especially matrix_coefficients. If undefined values are still used, applications are expected to provide the necessary information to the MIAF reader and MIAF renderer to resolve the value. If that is not the case, MIAF readers and MIAF renderers may assume that the default value above are used.

7.3.6.7

Replace the text with the following:

The clean aperture (cropping) property may be associated with any image and shall be supported by the MIAF reader. The clean aperture property is restricted according to the chroma sampling format of the input image (4:4:4, 4:2:2:, 4:2:0, or 4:0:0) as follows:

— cleanApertureWidth and cleanApertureHeight shall be integers;

— The leftmost pixel and the topmost line of the clean aperture as defined in ISO/IEC 14496-12:2020, Section 12.1.4.1 shall be integers;

— If chroma is subsampled horizontally (i.e., 4:2:2 and 4:2:0), the leftmost pixel of the clean aperture shall be even numbers;

— If chroma is subsampled vertically (i.e., 4:2:0), the topmost line of the clean aperture shall be even numbers.

7.3.9, second paragraph

Replace the paragraph with the following:

The image grid, overlay, and identity derivations shall be supported by a MIAF reader.

All transformative properties associated with coded and derived images shall be marked as essential, and shall be from the set defined in 7.3.6.7 or the applicable MIAF profile. No other essential transformative property shall be associated with such images.

7.3.11.1

Replace the first paragraph with the following:

A MIAF player shall process all derived images of the types identified in this subclause.

Replace the third sentence in the third paragraph with the following:

An identity derivation shall not be derived immediately from another identity derivation.

7.3.11.2

Replace the text with the following:

Any derived image item of the `item_type` value '`iden`' shall not be derived from an image item of `item_type` value '`iden`'.

NOTE Identity derivations are useful when it is desired to have the base image and an image to which transformative properties have been applied, both visible as separate items in the file. If this is not needed, transformative properties can be associated with the base image itself.

7.3.11.3, second paragraph

Replace the paragraph with the following:

All input items to an overlay shall have the same the same pixel aspect ratio and the same bit depth.

All input items to an overlay shall have identical explicit colour information with a given value of '`colour_type`' , or none of them shall have explicit colour information. Additionally, the colour information with a given value of '`colour_type`' associated with the overlay item shall be the same as the colour information of the inputs, either defaulted because all the inputs use default colour information, or explicitly associated if the inputs use explicit colour information.

7.3.11.4.1

Replace the text with the following:

A MIAF file may include grid images, i.e. derived image items with item_type value 'grid'.

All input images of a grid image item shall use the same coding format, chroma sampling format, and the same decoder configuration (see 7.3.6.2).

A MIAF file may have a grid of 'iden' image items with the limitation that each such identity image item has to refer directly to a coded image.

NOTE The concept of a grid of images is sometimes referred to as 'system tiles', to distinguish it from any tiling structure defined within a codec.

The colour information constraints that apply to a grid and its inputs are the same as the ones that apply to an overlay and its inputs.

7.3.11.4.2, third paragraph

Delete the second sentence.

7.4.1

Replace the text with the following:

A MIAF file may include image sequences. Examples are burst, animations, “living images”.

If present and conforming to the constraints of one of the MIAF profiles, the corresponding brand should be listed in the `FileTypeBox`. A MIAF file may include other types of tracks (e.g. video, audio, timed text, metadata, etc.).

7.4.2, last paragraph

Replace the paragraph with the following:

Thumbnail or auxiliary sequences shall conform either to the requirements the same MIAF profile as the MIAF image sequence or video to which it is linked, or to the requirements of a format defined in Clause 9.

7.4.6, last sentence

Replace the sentence with the following:

The track header width and height of the alpha plane track shall be the same as the track header width and height of the associated video track, respectively.

8.1

Replace the text with the following:

The conditions and requirements in this clause are shared by selected, but not all, MIAF profiles. The MIAF profiles indicate which of them apply. Each condition has a name, that is the clause title.

8.2.2

Replace the text with the following:

External data references in the `DataReferenceBox` may be used in MIAF files under the following constraint:

— if all image sequences or video tracks that use external data references are removed from the file, the remaining file conforms to this document.

8.8

Add the following subclause after 8.7, before Clause 9.

8.8 HDR signalling

If HDR signaling is required, the image should be associated with CICP colour information with values chosen from one of the following rows in Table 2, using values defined in ISO/IEC 23091-2. Other values are permitted:

Table 2 — Recommended colour information for HDR signaling

`colour_primaries`	`transfer_characteristics`	`matrix_coefficients`
9 (ITU-R BT.2100)	16 (PQ) (ITU-R BT.2100)	9 (non constant luminance) (ITU-R BT.2100)
9 (ITU-R BT.2100)	18 (HLG) (ITU-R BT.2100)	9 (non constant luminance) (ITU-R BT.2100)

The `full_range_flag` may take either value; readers shall support both values, i.e. both video range and full range.

The image should be associated with the Content light level, Content colour volume, and Mastering display colour volume properties. Readers should support a Mastering display colour volume property that declares the use of P3 primaries (SMPTE ST 2113), i.e. as indicated in Table 3:

Table 3 — Recommended MDCV values for P3 primaries

	CIE 1931		MDCV colour properties (P3)	
`c`	`x`	`y`	`display_primaries_x[c]`	`display_primaries_y[c]`
0	0.265 0	0.690 0	13 250	34 500
1	0.150 0	0.060 0	7 500	3 000
2	0.680 0	0.320 0	34 000	16 000

with a D65 white point indicate in Table 4:

Table 4 — Recommended MDCV value for D65 white point

CIE 1931	CIE 1931	MDCV white point (D65)	
`x`	`y`	`white_point_x`	`white_point_y`
0.312 7	0.329 0	15 635	16 450

10.1

Replace the first sentence with the following:

Files containing the brand 'miaf' in the compatible brands array of the FileTypeBox shall conform to the constraints defined in Clause 7.

Replace the third paragraph with the following:

A MIAF file should use the filename extensions specified by the applicable specification (such as HEIF) to identify the presence of specific image coding formats. Those for HEIF are summarized in Table 2.

NOTE Various practices exist in the case of file extensions and their handling. It is recommended that systems treat the extension as case-insensitive and recognize both cases.

Replace the existing Table 2 with the following:

Table 5 — Informative summary of filename extensions for HEIF

Coding format	Extension—single image	Extension—sequence
HEVC	.heic or .hif	.heics or .hif
AVC	.avci	.avcs
any	.heif or .hif	.heifs of .hif

10.2

Replace the eighth dashed item with the following:

The maximum number of bytes between the beginning of the file to the last byte of the coded data for at least one of the thumbnail images of the primary item is 128 000 bytes.

10.3

Replace the text with the following:

This application brand is intended to be used for animations. A file of this brandincludes one image sequence track and may also include an associated alpha plane sequence and an audio track. A MIAF renderer for this application brand is required to support alpha blending.

The presence of the animation MIAF application brand indication ('MiAn') in the FileTypeBox indicates that the file conforms to the following additional constraints:

— There shall be
  — exactly one non-auxiliary image sequence track,
  — at most one auxiliary image sequence track (that shall be an alpha plane track, when present),
  — at most one audio track, and
  — no other media tracks.
— The luma sample rate of each image sequence track shall be less than or equal to 62 914 560 samples per second.
— The constraints of 8.6 ("Edit-lists") apply.

A MIAF renderer claiming support for the animation brand shall perform alpha blending when the inputs include an alpha plane.

10.4

Replace the second paragraph with the following:

The presence of the burst capture MIAF application brand indication ('MiBu') in the FileTypeBox indicates that an image sequence track conforms to the constraints specified in this clause, or the presence of 'MiBu' in a TrackTypeBox indicates that the indicated track conforms to this MIAF application brand.

Replace the second dashed item with the following:

— In the image sequence track any single coded picture shall be decodable by decoding a maximum of two coded pictures (i.e. the picture itself and at most one reference), and these two coded pictures shall form a bitstream conforming to the coding format implied by the sample description entry type.

A.1, second and third paragraphs

Replace the paragraphs with the following:

A MIAF profile imposes a set of specific restrictions. Those restrictions are typically on the media coding format/profile/level, content protection scheme, or on quantitative measures of the MIAF file format.

The presence of a brand indicating a MIAF profile can be interpreted as the permission for those MIAF readers and MIAF renderers that only implement the features required by the profile to process the corresponding MIAF file.

A.2, second paragraph

Replace the paragraph with the following:

The MIAF profile definitions in this document provide a template for such other profile definitions.

A.3.4

Add the following paragraph at the end of the subclause:

As permitted in 7.2.1.2, this profile requires the brand '`mif1`' to be present in the `FileTypeBox`.

A.4.4

Add the following paragraph at the end of the subclause:

As permitted in 7.2.1.2, this profile requires the brand '`mif1`' to be present in the `FileTypeBox`.

A.5.4

Add the following paragraph at the end of the subclause:

As permitted in 7.2.1.2, this profile requires the brand '`mif1`' to be present in the `FileTypeBox`.