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Information technology — Coding of audio-visual objects — Part 12: ISO base media file format — Amendment 1: Tools for enhanced CMAF and DASH integration

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Information technology — Coding of audio-visual objects — Part 12: ISO base media file format — Amendment 1: Tools for enhanced CMAF and DASH integration

*3.1.28*

*Replace the definition as follows:samples of a media track in their decoding order*

*3.1.68*

*Add the following new term and definition:*

**3.1.68**

**content box**

box that is not a container box

*3.2*

*Add the following new abbreviated terms:*

CMAF Common Media Application Format

DASH Dynamic Adaptive Streaming over HTTP

*4.2.2*

*Replace the following text from the end of subclause 4.2.2:*

Boxes specified in this document may be extended but such extensions are reserved for future use by ISO/IEC. Syntax may be added at the end of a box derived from FullBox and an already specified version value may be kept, if it is not essential to parse such added syntax. When a parser has not reached the end of a box derived from FullBox as defined by the values of the size or largesize field (as appropriate) but does not recognize the remaining syntax elements, it shall ignore and skip the remaining of the box.

*with:*

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*5.2.1*

*Replace:*

This box shall be placed as early as possible in the file (e.g. after any obligatory signature, but before any significant variable-size boxes such as a MovieBox, MediaDataBox, or FreeSpaceBox). It identifies which specification is the ‘best use’ of the file (the major\_brand), and a minor version of that specification; and also a set of other specifications to which the file complies (the compatible\_brands); the major\_brand should be repeated in the compatible\_brands list. Readers implementing this format should attempt to read files that are marked as compatible with any of the specifications that the reader implements. Any incompatible change in a specification should therefore register a new ‘brand’ identifier to identify files conformant to the new specification.

The minor version is informative only. It does not appear for compatible-brands, and is not used to determine the conformance of a file to a standard. It may allow more precise identification of the major specification, for inspection, debugging, or improved decoding.

*to:*

This box shall be placed as early as possible in the file (e.g. after any obligatory signature, but before any significant variable-size boxes such as a MovieBox, MediaDataBox, or FreeSpaceBox). It identifies which specification is the ‘best use’ of the file (the major\_brand), and a minor version of that specification; and also a set of other specifications to which the file complies (the major\_brand and the compatible\_brands); the major\_brand may be repeated in the compatible\_brands list. If only a single brand needs to be signaled, the compatible brands list may be empty. Readers implementing this format should attempt to read files that are marked as compatible with any of the specifications that the reader implements. Any incompatible change in a specification should therefore register a new ‘brand’ identifier to identify files conformant to the new specification.

The minor version is informative only. It does not appear for compatible-brands, and is not used to determine the conformance of a file to a standard. It may allow more precise identification of the major specification, for inspection, debugging, or improved decoding. The interpretation of the minor version is major-brand specific. The semantics of the 32 bits of the minor\_version field may be re-defined by the specification defining the major brand value, for example using these 32 bits as flags.

*6.2*

*Replace subclause 6.2 with the following:*

An overall view of the normal encapsulation structure is provided in the following informative Table 2. In the event of a conflict between this table and the prose, the prose prevails. The order of boxes within its container is not necessarily indicated in Table 2.

The table shows those boxes that may occur at the top-level in the left-most column; indentation is used to show possible containment. Thus, for example, a TrackHeaderBox ('tkhd') is found in a TrackBox ('trak'), which is found in a MovieBox ('moov').

Boxes using an extended type may be placed in a wide variety of containers, not just the top level.

Table 2 — Box types, structure and cross-reference

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ftyp |  |  |  |  |  |  | 5.2 | file type and compatibility |
| otyp |  |  |  |  |  |  | 8.16.5 | original file-type |
| pdin |  |  |  |  |  |  | 8.1.3 | progressive download information |
| moov |  |  |  |  |  |  | 8.2.1 | container for all the structure-data |
|  | mvhd |  |  |  |  |  | 8.2.2 | movie header, overall declarations |
|  | meta |  |  |  |  |  | 8.11.1 | metadata |
|  | trak |  |  |  |  |  | 8.3.1 | container for an individual track or stream |
|  |  | ttyp |  |  |  |  | 8.3.5 | track type |
|  |  | tkhd |  |  |  |  | 8.3.2 | track header, overall information about the track |
|  |  | tref |  |  |  |  | 8.3.3 | track reference container |
|  |  | trgr |  |  |  |  | 8.3.4 | track grouping indication |
|  |  |  | msrc |  |  |  | 8.3.4.4.1 | multi-source presentation track group type box |
|  |  |  | ster |  |  |  | 8.3.4.4.2 | stereoscopic pair track group type box |
|  |  | edts |  |  |  |  | 8.6.5 | edit list container |
|  |  |  | elst |  |  |  | 8.6.6 | an edit list |
|  |  | meta |  |  |  |  | 8.11.1 | metadata |
|  |  | mdia |  |  |  |  | 8.4.1 | container for the media information in a track |
|  |  |  | mdhd |  |  |  | 8.4.2 | media header, overall information about the media |
|  |  |  | hdlr |  |  |  | 8.4.3 | handler, declares the media (handler) type |
|  |  |  | elng |  |  |  | 8.4.6 | extended language tag |
|  |  |  | minf |  |  |  | 8.4.4 | media information container |
|  |  |  |  | vmhd |  |  | 12.1.2 | video media header, overall information (video track only) |
|  |  |  |  | smhd |  |  | 12.2.2 | sound media header, overall information (sound track only) |
|  |  |  |  | hmhd |  |  | 12.4.3 | hint media header, overall information (hint track only) |
|  |  |  |  | sthd |  |  | 12.6.2 | subtitle media header, overall information (subtitle track only) |
|  |  |  |  | nmhd |  |  | 8.4.5.2 | Null media header, overall information (some tracks only) |
|  |  |  |  | dinf |  |  | 8.7.1 | data information box, container |
|  |  |  |  |  | dref |  | 8.7.2 | data reference box, declares source(s) of media data in track |
|  |  |  |  | stbl |  |  | 8.5.1 | sample table box, container for the time/space map |
|  |  |  |  |  | stsd |  | 8.5.2 | sample description box (codec types, initialization etc.) |
|  |  |  |  |  | stts |  | 8.6.1.2 | (decoding) time-to-sample |
|  |  |  |  |  | ctts |  | 8.6.1.3 | (composition) time to sample |
|  |  |  |  |  | cslg |  | 8.6.1.4 | composition to decode timeline mapping |
|  |  |  |  |  | stsc |  | 8.7.4 | sample-to-chunk, partial data-offset information |
|  |  |  |  |  | stsz |  | 8.7.3.2 | sample sizes (framing) |
|  |  |  |  |  | stz2 |  | 8.7.3.3 | compact sample sizes (framing) |
|  |  |  |  |  | stco |  | 8.7.5 | chunk offset, partial data-offset information |
|  |  |  |  |  | co64 |  | 8.7.5 | 64-bit chunk offset |
|  |  |  |  |  | stss |  | 8.6.2 | sync sample table |
|  |  |  |  |  | stsh |  | 8.6.3 | shadow sync sample table |
|  |  |  |  |  | padb |  | 8.7.6 | sample padding bits |
|  |  |  |  |  | stdp |  | 8.5.3 | sample degradation priority |
|  |  |  |  |  | sdtp |  | 8.6.4 | independent and disposable samples |
|  |  |  |  |  | sbgp |  | 8.9.2 | sample-to-group |
|  |  |  |  |  | sgpd |  | 8.9.3 | sample group description |
|  |  |  |  |  | subs |  | 8.7.7 | sub-sample information |
|  |  |  |  |  | saiz |  | 8.7.8 | sample auxiliary information sizes |
|  |  |  |  |  | saio |  | 8.7.9 | sample auxiliary information offsets |
|  |  |  |  |  | ssrt |  | 8.7.10 | sub-sample references |
|  |  | udta |  |  |  |  | 8.10.1 | user-data |
|  |  |  | cprt |  |  |  | 8.10.2 | copyright etc. |
|  |  |  | tsel |  |  |  | 8.10.3 | track selection box |
|  |  |  | kind |  |  |  | 8.10.4 | track kind box |
|  |  |  | strk |  |  |  | 8.13.3 | sub track box |
|  |  |  |  | stri |  |  | 8.13.4 | sub track information box |
|  |  |  |  | strd |  |  | 8.13.5 | sub track definition box |
|  |  |  |  |  | stsg |  | 8.13.6 | sub track sample group |
|  |  |  | ludt |  |  |  | 12.2.7 | audio stream loudness |
|  | extk |  |  |  |  |  | 8.3.6.1 | external track box |
|  |  | extl |  |  |  |  | 8.3.6.2 | external track location box |
|  | mvex |  |  |  |  |  | 8.8.1 | movie extends box |
|  |  | mehd |  |  |  |  | 8.8.2 | movie extends header box |
|  |  | trex |  |  |  |  | 8.8.3 | track extends defaults |
|  |  | leva |  |  |  |  | 8.8.13 | level assignment |
|  |  | trep |  |  |  |  | 8.8.15 | Track extension properties |
|  |  |  | assp |  |  |  | 8.8.16 | Alternative startup sequence |
|  | udta |  |  |  |  |  | 8.10.1 | user-data |
|  |  | cprt |  |  |  |  | 8.10.2 | copyright etc. |
| moof |  |  |  |  |  |  | 8.8.4 | movie fragment |
|  | mfhd |  |  |  |  |  | 8.8.5 | movie fragment header |
|  | meta |  |  |  |  |  | 8.11.1 | metadata |
|  | traf |  |  |  |  |  | 8.8.6 | track fragment |
|  |  | tfhd |  |  |  |  | 8.8.7 | track fragment header |
|  |  | trun |  |  |  |  | 8.8.8 | track fragment run |
|  |  | sbgp |  |  |  |  | 8.9.2 | sample-to-group |
|  |  | sgpd |  |  |  |  | 8.9.3 | sample group description |
|  |  | subs |  |  |  |  | 8.7.7 | sub-sample information |
|  |  | saiz |  |  |  |  | 8.7.8 | sample auxiliary information sizes |
|  |  | saio |  |  |  |  | 8.7.9 | sample auxiliary information offsets |
|  |  | ssrt |  |  |  |  | 8.7.10 | sub-sample references |
|  |  | tfdt |  |  |  |  | 8.8.12 | track fragment decode time |
|  |  | rsot |  |  |  |  | 8.8.18 | sample original timing |
|  |  | meta |  |  |  |  | 8.11.1 | metadata |
|  |  | udta |  |  |  |  | 8.10.1 | user-data |
|  | udta |  |  |  |  |  | 8.10.1 | user-data |
| mfra |  |  |  |  |  |  | 8.8.9 | movie fragment random access |
|  | tfra |  |  |  |  |  | 8.8.10 | track fragment random access |
|  | mfro |  |  |  |  |  | 8.8.11 | movie fragment random access offset |
| mdat |  |  |  |  |  |  | 8.1.1 | media data container |
| free |  |  |  |  |  |  | 8.1.2 | free space |
| skip |  |  |  |  |  |  | 8.1.2 | free space |
| imda |  |  |  |  |  |  | 8.1.4 | media data container that contains an identifier to be used with data references |
| meta |  |  |  |  |  |  | 8.11.1 | metadata |
|  | hdlr |  |  |  |  |  | 8.4.3 | handler, declares the metadata (handler) type |
|  | dinf |  |  |  |  |  | 8.7.1 | data information box, container |
|  |  | dref |  |  |  |  | 8.7.2 | data reference box, declares source(s) of items |
|  | iloc |  |  |  |  |  | 8.11.3 | item location |
|  | ipro |  |  |  |  |  | 8.11.5 | item protection |
|  |  | sinf |  |  |  |  | 13.4.2 | protection scheme information box |
|  |  |  | frma |  |  |  | 13.4.3 | original format box |
|  |  |  | schm |  |  |  | 13.4.6 | scheme type box |
|  |  |  | schi |  |  |  | 13.4.7 | scheme information box |
|  | iinf |  |  |  |  |  | 8.11.6 | item information |
|  | xml |  |  |  |  |  | 8.11.2 | XML container |
|  | bxml |  |  |  |  |  | 8.11.2 | binary XML container |
|  | pitm |  |  |  |  |  | 8.11.4 | primary item reference |
|  | fiin |  |  |  |  |  | 8.12.2 | file delivery item information |
|  |  | paen |  |  |  |  | 8.12.2 | partition entry |
|  |  |  | fire |  |  |  | 8.12.7 | file reservoir |
|  |  |  | fpar |  |  |  | 8.12.3 | file partition |
|  |  |  | fecr |  |  |  | 8.12.4 | FEC reservoir |
|  |  | segr |  |  |  |  | 8.12.5 | file delivery session group |
|  |  | gitn |  |  |  |  | 8.12.6 | group id to name |
|  | idat |  |  |  |  |  | 8.11.11 | item data |
|  | iref |  |  |  |  |  | 8.11.12 | item reference |
|  | iprp |  |  |  |  |  | 8.11.14 | item properties |
|  |  | ipco |  |  |  |  | 8.11.14 | item properties container |
|  |  |  | brnd |  |  |  | 8.11.15 | item brand |
|  |  |  | hdlp |  |  |  | 8.11.16 | item handler |
|  |  | ipma |  |  |  |  | 8.11.14 | item properties association |
|  | grpl |  |  |  |  |  | 8.15.2 | entities groups list |
|  |  | swit |  |  |  |  | 8.15.4.2 | switching group box |
|  |  | prsl |  |  |  |  | 8.15.4.1 | preselection group |
|  |  |  | elng |  |  |  | 8.4.6 | extended language tag |
|  |  |  | udta |  |  |  | 8.10.1 | user-data |
|  |  |  | kind |  |  |  | 8.10.4 | track kind |
|  |  |  | labl |  |  |  | 8.10.5 | label |
|  |  |  | chnl |  |  |  | 12.2.4 | channel layout |
|  |  |  | ardi |  |  |  | 12.2.8 | audio rendering indication |
|  |  |  | aelm |  |  |  | 12.2.9 | audio element |
|  |  |  |  | elng |  |  | 8.4.6 | extended language tag |
|  |  |  |  | kind |  |  | 8.10.4 | track kind |
|  |  |  |  | labl |  |  | 8.10.5 | label |
|  |  |  |  | chnl |  |  | 12.2.4 | channel layout |
|  |  |  |  | aedb |  |  | 12.2.10 | audio element description |
|  |  |  |  |  | aepp |  | 12.2.11 | audio element positioning interactivity polar |
|  |  |  |  |  | aepr |  | 12.2.12 | audio element prominence interactivity |
|  |  |  | aesb |  |  |  | 12.2.13 | audio element selection |
|  |  |  |  | labl |  |  | 8.10.5 | label |
|  |  |  |  | aelm |  |  | 12.2.9 | audio element |
|  |  |  |  |  | elng |  | 8.4.6 | extended language tag |
|  |  |  |  |  | kind |  | 8.10.4 | track kind |
|  |  |  |  |  | labl |  | 8.10.5 | label |
|  |  |  |  |  | chnl |  | 12.2.4 | channel layout |
|  |  |  |  |  | aedb |  | 12.2.10 | audio element description |
|  |  |  |  |  |  | aepp | 12.2.11 | audio element positioning interactivity polar |
|  |  |  |  |  |  | aepr | 12.2.12 | audio element prominence interactivity |
|  |  |  |  | aepp |  |  | 12.2.11 | audio element positioning interactivity polar |
|  |  |  |  | aepr |  |  | 12.2.12 | audio element prominence interactivity |
|  |  |  |  | aesd |  |  | 12.2.14 | audio element selection description |
| styp |  |  |  |  |  |  | 8.14.2 | segment type |
| sidx |  |  |  |  |  |  | 8.14.3 | segment index |
| ssix |  |  |  |  |  |  | 8.14.4 | subsegment index |
| prft |  |  |  |  |  |  | 8.14.5 | producer reference time |
| !mov |  |  |  |  |  |  | 8.16.6 | compressed movie box |
| !mof |  |  |  |  |  |  | 8.16.7 | compressed movie fragment box |
| !six |  |  |  |  |  |  | 8.16.8 | compressed segment index box |
| !ssx |  |  |  |  |  |  | 8.16.9 | compressed subsegment index box |

*8.3.2.3*

*Replace:*

track\_in\_preview: Flag mask is 0x000004. This flag currently has no assigned meaning, and the value should be ignored by readers. In the absence of further guidance (e.g. from derived specifications), the same value as for track\_in\_movie should be written.

*with:*

track\_in\_preview: Flag mask is 0x000004. This flag is deprecated. Readers shall ignore its value. Writers should write the same value as in track\_in\_movie. Legacy files may contain this flag, but it shall not be assigned a new meaning and shall not be reused by derived specifications.

*8.3.3.3*

*Add the following two track reference types to the unnumbered list:*

|  |  |  |
| --- | --- | --- |
| — | 'adda' | Track reference for additional audio track |
| — | 'adrc' | Track reference for DRC metadata track |

*8.3.4.2*

*Replace subclause 8.3.4.2 with the following:*

aligned(8) class TrackGroupBox extends Box('trgr')

{

TrackGroupTypeBox boxes[];

}

aligned(8) class TrackGroupTypeBox(unsigned int(32) track\_group\_type)

extends FullBox(track\_group\_type, version, flags)

{

unsigned int(32) track\_group\_id;

// The remaining data may be specified for a particular track\_group\_type

}

*8.3.4.4.1*

*Replace subclause 8.3.4.4.1 with the following:*

**8.3.4.4.1   Multi-source presentation**

**8.3.4.4.1.1   Definition**

|  |  |
| --- | --- |
| Box Type: | 'msrc' |
| Container: | TrackGroupBox |
| Mandatory: | No |
| Quantity: | Zero or one |

track\_group\_type equal to 'msrc' indicates that this track belongs to a multi-source presentation. The tracks that have the same value of track\_group\_id within a TrackGroupTypeBox of track\_group\_type 'msrc' are mapped as being originated from the same source. For example, a recording of a video telephony call may have both audio and video for both participants, and the value of track\_group\_id associated with the audio track and the video track of one participant differs from value of track\_group\_id associated with the tracks of the other participant.

**8.3.4.4.1.2   Syntax**

aligned(8) class MultiSourcePresentationBox extends TrackGroupTypeBox('msrc')

{

}

*8.3.4.4.2.1*

*Insert the following table in the begining of the subclause:*

|  |  |
| --- | --- |
| Box Type: | 'ster' |
| Container: | TrackGroupBox |
| Mandatory: | No |
| Quantity: | Zero or one |

*8.3.6*

*Add a new subclause:*

**8.3.6   External Tracks**

**8.3.6.1   External Track Box**

**8.3.6.1.1   Definition**

|  |  |
| --- | --- |
| BoxType: | 'extk' |
| Container: | ‘moov’ |
| Mandatory: | No |
| Quantity: | zero or more |

An ExternalTrackBox can be used to include a track from another ISO Base Media file, as defined by its TrackBox and other track-related structures. The track being referred to is called an external track. The file containing the ExternalTrackBox is hereafter called the referring file, and the file containing the external track is called the referred file. Referred files shall be ISOBMFF compliant files.

External tracks may be fragmented or not, independently of whether the referring file is fragmented or not. Derived specifications may further restrict possible combinations.

The timeline of an external track may be modified by an edit list in the referring file.

The UserDataBox and MetaBox of an external track can be overridden or augmented. UserDataBox present at movie level or MetaBox present at file or movie level in the referred files shall be ignored, and only UserDataBox present at movie level or MetaBox present at file or movie level, if any, of the referring file shall apply.

Track references and track groups of the referred files are ignored and only track references and groups (track groups or entity groups) defined in the referring file are valid.

The track\_ID of the TrackHeaderBox present in ExternalTrackBox gives the identifier of the track in the referring file and can be used to describe track references, track groups and other track relationships relying on track identifiers within the referring file. This allows defining track relations or track groups independently from the identifiers used in the referred file(s).

Additionally, the TrackHeaderBox provides the presentation information of the external track within the presentation of the referring file, such as track width/height, matrix, volumes and track flags.

The following restrictions are set on the TrackHeaderBox in the ExternalTrackBox of an external track:

— If the duration field is undefined (all 1s) and there is no edit list for this track, then the duration of the track is the duration of the referenced track.

The sample description, offsets, sizes… for an external track are the ones declared in the referred file indicated by location in the ExternalTrackLocationBox.

**8.3.6.1.2   Syntax**

aligned(8) class ExternalTrackBox extends Box('extk'){

ExternalTrackLocationBox extl;

TrackHeaderBox tkhd;

Box other[];

}

**8.3.6.1.3   Semantics**

extl indicates the location of the external track. It shall be present and shall be the first box occurring in ExternalTrackBox

tkhd indicates the track header of the external track within the context of the referring file. It shall be present and shall be the second box occurring in ExternalTrackBox.

other indicates either the ExtendedLanguageBox or any possible box allowed as child of TrackBox (except MediaBox and TrackHeaderBox).

**8.3.6.2   External Track Location Box**

**8.3.6.2.1   Definition**

|  |  |
| --- | --- |
| BoxType: | 'extl' |
| Container: | ExternalTrackBox |
| Mandatory: | Yes |
| Quantity: | One |

The ExternalTrackLocationBox allows identifying an external track by its track\_ID in a referred file.

The following values are defined for the flags field of the ExternalTrackLocationBox:

— EXTERNAL\_TRACK\_EDTS\_SKIP (flag mask is 0x000001): shall be set if any edit list present in the external track shall be ignored. If an edit list is present in the container for the edit lists in the ExternalTrackBox for this track, flag shall be set and any edit list present in the external track shall be ignored. Otherwise, (not set) there shall be no EditBox in the ExternalTrackBox, and the edit lists of the external track apply.

— EXTERNAL\_TRACK\_URN (flag mask is 0x000002): if this flag is set, it indicates that the location field is a URN string, otherwise (not set) the location string is a URL,

— EXTERNAL\_TRACK\_UDTA\_IGNORE (flag mask is 0x000004): if this flag is set, this indicates that any UserDataBox defined in the ‘trak’ box of the external track shall be ignored. Otherwise (not set), UserDataBox present in the referring track completes UserDataBox information of the external track. The resulting user data consists in the union of the user data declared in the different UserDataBoxes.

— EXTERNAL\_TRACK\_META\_IGNORE (flag mask is 0x000008): if this flag is set, this indicates that any MetaBox defined in the ‘trak’ box of the external track shall be ignored. Otherwise (not set), MetaBox present in the referring track completes MetaBox information of the external track. The resulting meta data consists in the union of the meta data declared in the different MetaBoxes.

If the indicated location is a URL, it can be an absolute or a relative URL, and the located resource shall be a compliant ISOBMF file. Relative URLs are relative to the file that contains this location.

When EXTERNAL\_TRACK\_EDTS\_SKIP is set and no edit list is present in the ExternalTrackBox, this implies that any edit present in the referred track is ignored and no edit is applied to the track.

If edits from the referred track are used, file readers may need to remap the edit list durations from the timescale of the referred movie to the timescale of the referring movie, if these timescales differ.

**8.3.6.2.2   Syntax**

class ExternalTrackLocationBox extends FullBox ('extl', version=0, flags)

{

unsigned int(32) referenced\_track\_ID;

unsigned int(32) referenced\_handler\_type;

unsigned int(32) media\_timescale;

utf8string location;

}

**8.3.6.2.3   Semantics**

referenced\_track\_ID indicates the identifier (track\_ID) of the external track in the referred file. If value is 0, this indicates that the referenced track is the first TrackBox present in the MovieBox of the referred file. The external track shall be declared through a TrackBox, i.e. recursively referencing external track is forbidden. The external track can use external data references or not; this can be constrained by derived specifications.

referenced\_handler\_type indicates the handler (media) type of the track, and shall be equal to the handler type of the external track in the referred file.

media\_timescale indicates the timescale used to express edit list contained in this external track. Value may be 0 when no edit list is declared in the ExternalTrackBox, or a different value expressing a preferred timescale in case of future insertion of an edit list. Otherwise (an edit list is declared in the ExternalTrackBox), value shall not be 0.

NOTE: this value may be different from the timescale in the MediaHeader in the external track.

location indicates the location of the referred file as a URN or URN, depending on the flags EXTERNAL\_TRACK\_URN.

**8.3.6.3   External Track Processing Model**

A file reader processes an external track as follows:

— Identify whether the referring file can be processed (brands, track handler types): this follows the same process as for files with no external tracks

— Identify whether it should take the track into consideration: this follows the same rules as for regular tracks, e.g. looking at user preferences, groups, etc …

— If an external track is selected for processing, the referred file is loaded. The external track is marked as invalid if any of the following is true:

— the location described is invalid

— the file and/or track cannot be processed by the reader due to brand requirements in ftyp or ttyp

— the TrackBox corresponding to the external track cannot be found in the referred file,

— the external track handler type does not match the handler type in ExternalTrackLocationBox

— the ExternalTrackBox contains a TrackTypeBox with unsupported brands

If an external track is invalid, file readers may reject the file or present only a subset of the external tracks that are valid, as they would usually do for files with no external tracks,

— Otherwise (external track is valid), the processing of the external track is equivalent to processing the track using a second file reader, but using track groups and references defined in the referring file; this implies that global movie structure of the referred file, such as trex, pssh… may be required to process the external file.

‘Meta’ at file or moov level and ‘udta’ at moov level in the refered file(s) shall be ignored.

*8.4.5.2.2*

*Replace subclause 8.4.5.2.2 with the following:*

aligned(8) class NullMediaHeaderBox extends FullBox('nmhd', 0, 0)

{}

*8.5.2.1*

*Remove this paragraph:*

An optional BitRateBox may be present in any SampleEntry to signal the bit rate information of a stream. This can be used for buffer configuration.

*8.5.2.2*

*Replace clause 8.5.2.2 with the following:*

**8.5.2.2   Syntax**

aligned(8) abstract class SampleEntry (unsigned int(32) format)

extends Box(format)

{

const unsigned int(8)[6] reserved = 0;

unsigned int(16) data\_reference\_index;

}

aligned(8) class SampleDescriptionBox() extends FullBox('stsd', 0, 0)

{

computed int i;

unsigned int(32) entry\_count;

for (i = 1 ; i <= entry\_count ; i++){

SampleEntry sample\_entry;

}

}

*8.5.2.3*

*Replace clause 8.5.2.3 with the following:*

**8.5.2.3   Semantics**

version is set to zero. A version number of 1 shall be treated as a version of 0.

entry\_count is an integer that gives the number of entries in the following table.

sample\_entry is an instance of a class derived from SampleEntry that represents the appropriate sample entry.

data\_reference\_index is an integer that contains the index of the DataEntry to use to retrieve data associated with samples that use this sample entry. Data entries are stored in DataReferenceBoxes. The index ranges from 1 to the number of data entries.

*Add a new clause after clause 8.5.2.3 and before clause 8.5.3:*

**8.5.2.4   Generic sample entry boxes**

**8.5.2.4.1   Bitrate Box**

**8.5.2.4.1.1   Definition**

|  |  |
| --- | --- |
| Box Types: | 'btrt' |
| Container: | SampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

An optional BitRateBox may be present in any SampleEntry to signal the bit rate information of a stream. This can be used for buffer configuration.

**8.5.2.4.1.2   Syntax**

class BitRateBox extends Box('btrt')

{

unsigned int(32) bufferSizeDB;

unsigned int(32) maxBitrate;

unsigned int(32) avgBitrate;

}

**8.5.2.4.1.3   Semantics**

bufferSizeDB gives the size of the decoding buffer for the media stream in bytes.

maxBitrate gives the maximum rate in bits/second over any window of one second; this is a measured value for stored content, or a value that a stream is configured not to exceed; the stream shall not exceed this bitrate.

avgBitrate gives the average rate in bits/second of the stream; this is a measured value (cumulative over the entire presentation) for stored content, or the configured target average bitrate for a stream.

*8.7.2.1*

*Replace the following text:*

|  |  |
| --- | --- |
| Box Types: | 'url ', 'urn ' |
| Container: | DataReferenceBox |
| Mandatory: | Yes (at least one of 'url ' or 'urn ' shall be present) |
| Quantity: | One or more |

*with:*

|  |  |
| --- | --- |
| Box Types: | 'url ', 'urn ' |
| Container: | DataReferenceBox |
| Mandatory: | No |
| Quantity: | Zero or more |

*8.8.8.2*

*Replace the clause 8.8.8.2 with the following:*

**8.8.8.2   Syntax**

aligned(8) class TrackRunBox extends FullBox('trun', version, tr\_flags)

{

unsigned int(32) sample\_count;

// the following are optional fields

if (version < 2)

signed int(32) data\_offset;

else if (version == 2)

unsigned int(32) first\_sample\_flags;

// all fields in the following array are optional

// as indicated by bits set in the tr\_flags

{

unsigned int(32) sample\_duration;

unsigned int(32) sample\_size;

unsigned int(32) sample\_flags

if (version == 0)

{ unsigned int(32) sample\_composition\_time\_offset; }

else

{ signed int(32) sample\_composition\_time\_offset; }

}[ sample\_count ]

}

*8.8.11.2*

*Replace the subclause 8.8.11.2 with the following:*

aligned(8) class MovieFragmentRandomAccessOffsetBox

extends FullBox('mfro', 0, 0)

{

unsigned int(32) parent\_size;

}

*8.8.12.3*

*Replace the following text:*

baseMediaDecodeTime is an integer equal to the sum of the decode durations of all earlier samples in the media, expressed in the media's timescale. It does not include the samples added in the enclosing track fragment.

*with:*

baseMediaDecodeTime is the absolute decoding timestamp, measured on the decoding timeline, of the first sample in decoding order in the track fragment, expressed in the media's timescale. The value of baseMediaDecodeTime shall be greater than or equal to the sum of the sample durations of all the samples of this track that precede this track fragment in decoding order.

*8.10.4.1*

*Replace the text:*

|  |  |
| --- | --- |
| Box Type: | 'kind' |
| Container: | AudioElementBox, PreselectionGroupBox, or  UserDataBox of the corresponding TrackBox |
| Mandatory: | No |
| Quantity: | Zero or more |

The KindBox labels a track with its role or kind.

It contains a URI, possibly followed by a value. If only a URI occurs, then the kind is defined by that URI; if a value follows, then the naming scheme for the value is identified by the URI.

More than one of these may occur in a track, with different contents but with appropriate semantics (e.g. two schemes that both define a kind that indicates sub-titles).

*with:*

|  |  |
| --- | --- |
| Box Type: | 'kind' |
| Container: | AudioElementBox, PreselectionGroupBox, or  UserDataBox |
| Mandatory: | No |
| Quantity: | Zero or more |

The KindBox labels a track with its role or kind.

It contains a URI, possibly followed by a value. If only a URI occurs, then the kind is defined by that URI; if a value follows, then the naming scheme for the value is identified by the URI.

More than one of these may occur in the containing element, with different contents but with appropriate semantics (e.g. two schemes that both define a kind that indicates sub-titles).

*8.10.5.3*

*Replace the following paragraph:*

label\_id is an integer that contains an identifier for the label. Labels with the same value belong to a label group. label\_id values shall be unique among all labels contained in the file. The value of zero indicates that the label does not belong to any label group.

*with:*

label\_id is an integer that contains an identifier for the label. Labels with the same value belong to a label group. label\_id values assigned to one label group shall be unique among all groups of labels contained in the file. The value of zero indicates that the label does not belong to any label group.

*8.11.1.1*

*Remove NOTE 2:*

NOTE 2 The MetaBox is unusual in that it is a container box yet extends FullBox, not Box.

*8.11.1.2*

*Replace subclause 8.11.1.2 with the following:*

aligned(8) class MetaBox (handler\_type) extends Box('meta')

{

bit(32) obsolete\_full\_box\_fields = 0;

HandlerBox(handler\_type) theHandler; // optional

PrimaryItemBox primary\_resource; // optional

DataInformationBox file\_locations; // optional

ItemLocationBox item\_locations; // optional

ItemProtectionBox protections; // optional

ItemInfoBox item\_infos; // optional

IPMPControlBox IPMP\_control; // optional

ItemReferenceBox item\_refs; // optional

ItemPropertiesBox item\_properties; // optional

ItemDataBox item\_data; // optional

GroupsListBox entity\_groups; // optional

Box other\_boxes[]; // optional

}

*8.11.1.3*

*Add subclause:*

**8.11.1.3   Semantics**

NOTE 1: In some previous editions of this document MetaBox was defined as a FullBox.

obsolete\_full\_box\_fields is a 32-bit field that replaces the version and flags fields from the FullBox definition in some previous editions of this document. The value of this field shall be equal to 0 and has no defined semantics.

NOTE 2: For historical reason, the MetaBox is defined in the QuickTime specification without the obsolete\_full\_box\_fields. Readers supporting ISOBMFF and the QuickTime specification need to be careful when parsing the MetaBox. When the first 32 bits of the content of the MetaBox are not equal to 0, a reader is suggested to treat the MetaBox as a container box that does not include obsolete\_full\_box\_fields.

*8.11.6.1*

*Replace the following paragraph:*

This box contains an array of entries, and each entry is formatted as a box. This array is sorted by increasing item\_ID in the entry records. The item\_name shall be a valid URL (e.g. a simple name, or path name) and shall not be an absolute URL.

*with:*

This box contains an array of entries, and each entry is formatted as a box. This array shall be sorted in increasing order based on the item\_ID value within each entry record.

*8.11.6.3*

*Replace the following text:*

item\_name is the symbolic name of the item (source file for file delivery transmissions).

*With:*

item\_name shall be a string which represents a valid relative URL (e.g. a simple name, or path name), where spaces and special characters are percent-encoded (as defined in RFC 3986). When item\_name is used in the context of fragment identifiers as specified in Annex C, it shall be percent-encoded.

NOTE: The empty string is a valid value for item\_name but it cannot be used as value for the item\_name fragment identifier.

*8.14.3.1*

*Replace the paragraph:*

In the file containing the SegmentIndexBox, the anchor point for a SegmentIndexBox is the first byte after that box. If there are two files, the anchor point in the media file is the beginning of the top-level segment (i.e. the beginning of the segment file if each segment is stored in a separate file). The material in the file containing media (which may also be the file that contains the SegmentIndexBoxes) starts at the indicated offset from the anchor point. If there are two files, the material in the index file starts at the anchor point, i.e. immediately following the SegmentIndexBox.

*with:*

In the file containing the SegmentIndexBox, the anchor point is set as follows:

* if version = 2 of the SegmentIndexBox is used, then the anchor point is set by offset\_anchor.
* if version = 2 of the SegmentIndexBox is not used, then the anchor point is set to the first byte after that box.

If there are two files, the anchor point is set as follows:

* if version = 2 of the SegmentIndexBox is used, then the anchor point is set by offset\_anchor.
* if version = 2 of the SegmentIndexBox is not used, then the anchor point in the media file is the beginning of the top-level segment (i.e. the beginning of the segment file if each segment is stored in a separate file).

The material in the file containing media (which may also be the file that contains the SegmentIndexBoxes) starts at the indicated offset from the anchor point. If there are two files, the material in the index file starts at the anchor point.

|  |  |  |
| --- | --- | --- |
| *8.14.3.1*  *Replace the bullet point:* | | |
|  | — | Segment index boxes shall be placed before subsegment material they document, that is, before any MovieFragmentBox of the documented material of the subsegment; |
| *with:* | | |
|  | — | Segment index boxes shall be placed before subsegment material they document, that is, before any MovieFragmentBox of the documented material of the subsegment, unless sidx version 2 is used; |

*8.14.3.2*

*Replace the clause 8.14.3.2 with the following:*

**8.14.3.2   Syntax**

aligned(8) class SegmentIndexBox extends FullBox('sidx', version, 0) {

unsigned int(32) reference\_ID;

unsigned int(32) timescale;

if (version == 0) {

unsigned int(32) earliest\_presentation\_time;

unsigned int(32) first\_offset;

}

else if (version == 1) {

unsigned int(64) earliest\_presentation\_time;

unsigned int(64) first\_offset;

}

else if (version == 2) {

unsigned int(64) earliest\_presentation\_time;

unsigned int(64) offset\_anchor;

unsigned int(64) first\_offset;

}

unsigned int(16) reserved = 0;

unsigned int(16) reference\_count;

for(i=1; i <= reference\_count; i++) {

bit(1) reference\_type;

unsigned int(31) referenced\_size;

unsigned int(32) subsegment\_duration;

bit(1) starts\_with\_SAP;

unsigned int(3) SAP\_type;

unsigned int(28) SAP\_delta\_time;

}

}

*8.14.3.3*

*Add semantics for offset\_anchor:*

offset\_anchor is a distance in bytes, in the file containing the media, from the start of the file. first\_offset determines the distance in bytes to the indexed material from offset\_anchor.

*8.15.3.1*

*Change:*

'altr': The items and tracks mapped to this grouping are alternatives to each other, and only one of them should be played (when the mapped items and tracks are part of the presentation; e.g. are displayable items or tracks) or processed by other means (when the mapped items or tracks are not part of the presentation; e.g. are metadata). A player should select the first entity from the list of entity\_id values that it can process (e.g. decode and play for mapped items and tracks that are part of the presentation) and that suits the application needs. Any entity\_id value shall be mapped to only one grouping of type 'altr'. An alternate group of entities consists of those items and tracks that are mapped to the same entity group of type 'altr'.

'prsl': The tracks mapped to this grouping are belonging to a preselection as specified in 8.15.4.1.

NOTE EntityToGroupBox can have grouping\_type specific extensions.

*To:*

'altr': The items and tracks mapped to this grouping are alternatives to each other, and only one of them should be played (when the mapped items and tracks are part of the presentation; e.g. are displayable items or tracks) or processed by other means (when the mapped items or tracks are not part of the presentation; e.g. are metadata). A player should select the first entity from the list of entity\_id values that it can process (e.g. decode and play for mapped items and tracks that are part of the presentation) and that suits the application needs. Any entity\_id value shall be mapped to only one grouping of type 'altr'. An alternate group of entities consists of those items and tracks that are mapped to the same entity group of type 'altr'. None of the entity\_id values in an 'altr' group shall map to another 'altr' group. An 'altr' group shall not contain both entity groups and items.

'prsl': The tracks mapped to this grouping are belonging to a preselection as specified in 8.15.4.1.

'swit': The tracks mapped to this grouping are belonging to a switching group as specified in 8.15.4.2.

NOTE EntityToGroupBox can have grouping\_type specific extensions.

*8.15.3.3*

*Change:*

entity\_id is resolved to one of the following:

— an item, when an item with item\_ID equal to entity\_id is present in the hierarchy level (file, movie or track) that contains the GroupsListBox, or

— a track, when a track with track\_ID equal to entity\_id is present and the GroupsListBox is contained in the file level, or

— a track group, if the unified handling of identifiers is indicated with a brand as specified in Clause E.18, this EntityToGroupBox is present at file level, and a track group with track\_group\_id equal to entity\_id present, or

— a second entity group, if the unified handling of identifiers is indicated with a brand as specified in Clause E.18, this EntityToGroupBox is present at the same level that contains the EntityToGroupBox for the second entity group, and the EntityToGroupBox for the second entity group has group\_id equal to entity\_id. Circular references shall be avoided.

*To:*

entity\_id shall not have the same value as group\_id and is resolved to one of the following:

— an item, when an item with item\_ID equal to entity\_id is present in the hierarchy level (file, movie or track) that contains the GroupsListBox, or

— a track, when a track with track\_ID equal to entity\_id is present and the GroupsListBox is contained in the file level, or

— a track group, if the unified handling of identifiers is indicated with a brand as specified in Clause E.18, this EntityToGroupBox is present at file level, and a track group with track\_group\_id equal to entity\_id present, or

— a second entity group, if the unified handling of identifiers is indicated with a brand as specified in Clause E.18, this EntityToGroupBox is present at the same level that contains the EntityToGroupBox for the second entity group, and the EntityToGroupBox for the second entity group has group\_id equal to entity\_id. Circular references shall be avoided.

*8.15.4.1.3*

*Change:*

selection\_priority is an integer that declares the priority of the preselection in cases where no other differentiation such as through the media language is possible. A lower value of selection\_priority indicates a higher priority.

*To:*

selection\_priority is an integer that declares the priority of the preselection in cases where no other differentiation such as through the media language is possible. A higher value of selection\_priority indicates a higher priority. If not present, a default value of 1 shall be assumed.

*8.15.4.1*

*Add the following new subclause after subclause 8.15.4.1 (and update references to bibliography):*

**8.15.4.2   Switching group box**

**8.15.4.2.1   Definition**

|  |  |
| --- | --- |
| Box Type: | 'swit' |
| Container: | GroupsListBox in a MetaBox on movie level |
| Mandatory: | No |
| Quantity: | Zero or more |

The SwitchingGroupBox is used to facilitate the generation of adaptive streaming manifests or descriptions such as DASH[10] MPD. Generating DASH[10] or CMAF[x] groupings, such as CMAF Switching Sets or DASH Adaptation Sets, from a set of ISOBMFF tracks may require out-of-band knowledge, e.g. knowing which tracks contain the same source content meant to be used in adaptive streaming switching, or may require deep parsing of the tracks to determine if a decoder can decode all the tracks only with the sample description of a single track. This box allows signaling of generic properties used in adaptive streaming such as switching, time alignment or initialization characteristics, where the precise semantics of the properties are deferred to DASH or CMAF, and identified by identifiers defined in these specifications.

**8.15.4.2.2   Syntax**

aligned(8) class SwitchingGroupBox

extends EntityToGroupBox('swit', version=0, flags)

{

unsigned int(1) switch\_flag;

unsigned int(1) timed\_aligned\_flag;

unsigned int(2) init\_type;

unsigned int(4) reserved;

if (flags & 0x001000) utf8string tag;

if (flags & 0x002000) utf8string int(32) structural\_brand;

if (flags & 0x004000) utf8string int(32) mediaprofile\_brand;

Box boxes[]; // optional other boxes e.g. ExtendedLanguageBox

}

**8.15.4.2.3   Semantics**

switch\_flag equal 1 indicates that the track of this group are alternative encodings of the same source content intended for adaptive streaming switching. The normative requirements applying to tracks belonging to such group are defined by DASH or CMAF and identified by the structural brand and/or media profile brand fields. If the value is equal to 0, no information is provided with respect to alternative encoding. When equal to 1, if one track uses a non-zero alternate\_group value, then any other track in this group shall either use that value or the value 0.

time\_aligned\_flag equal 1 indicates the tracks of this group have some timed alignment characteristics. The normative requirements applying to tracks belonging to such group are defined by DASH and CMAF and identified by the structural brand and/or the media profile brand fields. If the value is equal to 0, no information is provided with respect to time alignment

init\_type with the following values:

— 0: The entity which its entity\_id is first listed in this box can be used to initialize a decoder for decoding any track that directly or indirectly belongs to this group. No information is provided regarding whether or not other tracks can be used.

— 1: Every track directly or indirectly belonging to this group can be used to initialize a decoder for decoding any track that directly or indirectly belongs to this group.

— 2: reserved

— 3: No indication is provided regarding whether a single track can be used to initialize the decoder for decoding other tracks.

tag specifies additional information about the entity group which may be used for selection purposes. Derived specifications define the use of this field. For MPEG-H 3D Audio as specified in ISO/IEC 23008-3[8], the value of this field shall contain the whitespace-separated list of mae\_GroupIDs that are contained in the described switching group.

structural\_brand specifies an identifier defined in derived specifications that corresponds to structural constraints of all direct and indirect entities of this group.

mediaprofile\_brand specifies the media profile brand that all direct and indirect entities of this group conform to.

boxes is an array of boxes providing information about the group that can be used to generate DASH or CMAF groupings. Boxes suitable include but are not limited to the following list of boxes defined in this document:

— ExtendedLanguageBox (subclause 8.4.6)

— UserDataBox (subclause 8.10.1)

— KindBox (subclause 8.10.4)

— LabelBox (subclause 8.10.5)

*12.1.3.1*

*Add the following table:*

**12.1.3.1   Definition**

|  |  |
| --- | --- |
| Box Types: | codingname |
| Container: | SampleTableBox |
| Mandatory: | Yes, for video tracks |
| Quantity: | One or More |

*12.1.3.2*

*Replace:*

class VisualSampleEntry(codingname) extends SampleEntry (codingname)

{

unsigned int(16) pre\_defined = 0;

const unsigned int(16) reserved = 0;

unsigned int(32) pre\_defined[3] = 0;

unsigned int(16) width;

unsigned int(16) height;

template unsigned int(32) horizresolution = 0x00480000; // 72 dpi

template unsigned int(32) vertresolution = 0x00480000; // 72 dpi

const unsigned int(32) reserved = 0;

template unsigned int(16) frame\_count = 1;

uint(8) compressorname[32];

template unsigned int(16) depth = 0x0018;

int(16) pre\_defined = -1;

// other boxes from derived specifications

CleanApertureBox clap; // optional

PixelAspectRatioBox pasp; // optional

}

*with:*

class VisualSampleEntry(codingname) extends SampleEntry (codingname)

{

unsigned int(16) pre\_defined = 0;

const unsigned int(16) reserved = 0;

unsigned int(32) pre\_defined[3] = 0;

unsigned int(16) width;

unsigned int(16) height;

template unsigned int(32) horizresolution = 0x00480000; // 72 dpi

template unsigned int(32) vertresolution = 0x00480000; // 72 dpi

const unsigned int(32) reserved = 0;

template unsigned int(16) frame\_count = 1;

uint(8) compressorname[32];

template unsigned int(16) depth;

int(16) pre\_defined = -1;

Box other\_boxes[];

}

*12.1.3.3*

*Replace:*

resolution fields give the resolution of the image in pixels-per-inch, as a fixed 16.16 number

frame\_count indicates how many frames of compressed video are stored in each sample. The default is 1, for one frame per sample; it may be more than 1 for multiple frames per sample

compressorname is a name, for informative purposes. It is formatted in a fixed 32-byte field, with the first byte set to the number of bytes to be displayed, followed by that number of bytes of displayable data encoded using UTF-8, and then padding to complete 32 bytes total (including the size byte). The field may be set to 0.

depth takes one of the following values

0x0018 – images are in colour with no alpha width and height are the maximum visual width and height of the stream described by this sample entry, in pixels

*with:*

width and height are the maximum visual width and height of the stream described by this sample entry, in pixels

horizresolution and vertresolution fields give the resolution of the image in pixels-per-inch, as a fixed 16.16 number

frame\_count indicates how many frames of compressed video are stored in each sample. The default is 1, for one frame per sample; it may be more than 1 for multiple frames per sample

compressorname is a name, for informative purposes. It is formatted in a fixed 32-byte field, with the first byte set to the number of bytes to be displayed, followed by that number of bytes of displayable data encoded using UTF-8, and then padding to complete 32 bytes total (including the size byte). The field may be set to 0.

depth takes one of the following values

0x0018 – the video sequence is in colour with no alpha

0x0028 – the video sequence is in greyscale with no alpha

0x0020 – the video sequence has alpha (grey or colour)

other\_boxes an optional array of boxes. Other boxes may be defined in derived specifications.

*12.1.4.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | pasp |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |
|  |  |
| Box Types: | clap |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

*12.1.5.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | colr |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or more |

*12.1.5.1*

*Replace the following text :*

If colour information is supplied in both this box, and also in the video bitstream, this box takes precedence, and over-rides the information in the bitstream.

*with:*

The colour information supplied in both this box and in the video bitstream should match. If it is not the case, this box takes precedence, and over-rides the information in the bitstream.

*12.1.5.2*

*Replace:*

class ColourInformationBox extends Box('colr')

{

unsigned int(32) colour\_type;

if (colour\_type == 'nclx') /\* on-screen colours \*/

{

unsigned int(16) colour\_primaries;

unsigned int(16) transfer\_characteristics;

unsigned int(16) matrix\_coefficients;

unsigned int(1) full\_range\_flag;

unsigned int(7) reserved = 0;

}

else if (colour\_type == 'rICC')

{

ICC\_profile; // restricted ICC profile

}

else if (colour\_type == 'prof')

{

ICC\_profile; // unrestricted ICC profile

}

}

*with:*

class ColourInformationBox extends Box('colr')

{

unsigned int(32) colour\_type;

if (colour\_type == 'nclx') /\* on-screen colours \*/

{

unsigned int(16) colour\_primaries;

unsigned int(16) transfer\_characteristics;

unsigned int(16) matrix\_coefficients;

unsigned int(1) full\_range\_flag;

unsigned int(7) reserved = 0;

}

else if (colour\_type == 'rICC')

{

bit(8) icc\_profile[]; // restricted ICC profile

}

else if (colour\_type == 'prof')

{

bit(8) icc\_profile[]; // unrestricted ICC profile

}

}

*12.1.5.3*

*Replace:*

ICC\_profile: an ICC profile as defined in ISO 15076 1 or ICC.1[26] is supplied.

*with:*

icc\_profile: an ICC profile as defined in ISO 15076 1 or ICC.1[26] is supplied.

*12.1.6.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | clli |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

*12.1.7.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | mdcv |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

*12.1.8.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | cclv |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

*12.1.9.1*

*Add the following table:*

|  |  |
| --- | --- |
| Box Types: | amve |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

*12.1.9*

*Add the following new subclause after subclause 12.1.9:*

**12.1.10   Target Surface Orientation Box**

**12.1.10.1   Definition**

|  |  |
| --- | --- |
| Box Types: | ornt |
| Container: | VisualSampleEntry |
| Mandatory: | No |
| Quantity: | Zero or one |

When a video track is intended for a specific rendering surface orientation for consumption, this creator’s intent is signalled using the SurfaceOrientationBox. A player is expected to detect the current rendering surface orientation of the device and then select an appropriate track based on this information.

When multiple video tracks are alternative of the same content but for different rendering surface orientations, those tracks may be grouped in the same 'altr' entity group.

A given video track can be suitable for multiple rendering surface orientations.

**12.1.10.2   Syntax**

aligned(8) class TargetSurfaceOrientationBox extends Box('ornt')

{

bit(1) landscape;

bit(1) portrait;

bit(1) square;

bit(5) reserved;

}

**12.1.10.3   Semantics**

landscape equal to 1 indicates that a target rendering surface with a landscape orientation is suitable for rendering

portrait equal to 1 indicates that a target rendering surface with a portrait orientation is suitable for rendering

square equal to 1 indicates that a target rendering surface with a 1:1 aspect ratio is suitable for rendering.

*13.4.1*

*Replace the following row of Table 13:*

|  |  |  |
| --- | --- | --- |
| Systema | encs |  |

*with:*

|  |  |  |
| --- | --- | --- |
| Systema | encs | MpegSampleEntry |

*Annex A.11*

*Replace the following paragraph:*

— For video, it is suggested to form track fragments so that the first sample of a track fragment can be marked as a sync sample or a SAP sample. In the case of gradual decoder refresh, a SAP sample of type 4 and the corresponding random access recovery point are stored in the same movie fragment. For audio, samples having the closest presentation time for every video random accessible sample are stored as the first sample of each TrackFragmentBox. Hence, the first samples of each media in the MovieFragmentBox have the approximately equal presentation times.

*with:*

— For video, it is suggested to form track fragments so that the first sample of a track fragment can be marked as a sync sample or a SAP sample. In the case of gradual decoder refresh, a SAP sample of type 4 and the corresponding random access recovery point are stored in the same movie fragment. For audio, samples having the closest presentation time for every video random access point sample are stored as the first sample of each TrackFragmentBox. Hence, the first samples of each media in the MovieFragmentBox have the approximately equal presentation times.

*Annex C*

*Replace the bullet points c), e) and g) with the following text:*

c) item\_name=<item\_name>, identifying the item of the MetaBox at the file level that has the given name (as provided in the ItemInfoBox). The item\_name shall be percent-encoded in compliance with RFC 3986 and shall not be an empty string.

e) /item\_name=<item\_name>, identifying the item of the MetaBox at the movie level that has the given name (as provided in the ItemInfoBox). The item\_name shall be percent-encoded in compliance with RFC 3986 and shall not be an empty string.

g) track\_ID=<track\_ID>/item\_name=<item\_name>, identifying the item that has the given name (as provided in the ItemInfoBox) in the MetaBox located in the track with the given track\_ID. The item\_name shall be percent-encoded in compliance with RFC 3986 and shall not be an empty string.

*Annex C.2*

*Add the following lines to numbered list of identifiers:*

h) group\_id=<group\_id>, identifying the entity group that has the given id in the EntityToGroupBox in the MetaBox either at file level or when the 'unif' brand applies.

i) /group\_id=<group\_id>, identifying the entity group that has the given id in the EntityToGroupBox located at movie level.

j) track\_ID=<track\_ID>/group\_id=<group\_id>, identifying the entity group that has the given id in the EntityToGroupBox located in the track with the given track\_ID.

*Add the following text at the end of the clause:*

|  |  |  |
| --- | --- | --- |
| Examples of item\_name usage in fragment identifiers: | | |
|  | — | item\_name=simple-name |
|  | — | item\_name=path/to/resource |
|  | — | item\_name="" (empty string) is not allowed |
|  | — | item\_name=HEVC%20Image |

*Annex E.2*

*Replace Annex E.2 with the following:*

**E.2   The 'isom' brand**

**E.2.1   Requirements on files**

The type 'isom' (ISO base media file) is defined in this clause, as identifying files that conform to the first version of ISO base media file format.

The boxes listed in Table E.1 are required in a file conforming to the this brand. The Version column in Table E.1 specifies the version values allowed by this brand. Other version values shall not be present. A '-' in the Version column indicates that the box is derived from Box and does not contain a version field. The Additional requirements column in Table E.1 specifies additional requirements on files conforming to this brand.

Table E.1 — Required boxes in a file conforming to the 'isom' brand

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Version** | **Additional requirements** |
| ftyp |  |  |  |  |  | - |  |
| moov |  |  |  |  |  | - |  |
|  | mvhd |  |  |  |  | 0, 1 |  |
|  | trak |  |  |  |  | - | There shall be at least one media track present that is constrained as specified in this table. |
|  |  | tkhd |  |  |  | 0, 1 |  |
|  |  | mdia |  |  |  | - |  |
|  |  |  | mdhd |  |  | 0, 1 |  |
|  |  |  | hdlr |  |  | 0 |  |
|  |  |  | minf |  |  | - | Exactly one media header box shall be present within the 'minf' box. |
|  |  |  |  | dinf |  | - |  |
|  |  |  |  |  | dref | 0 | Each DataEntryBox within the DataReferenceBox shall be either a DataEntryUrnBox or a DataEntryUrlBox. |
|  |  |  |  | stbl |  | - |  |
|  |  |  |  |  | stts | 0 |  |
|  |  |  |  |  | stsd | 0 |  |
|  |  |  |  |  | stsz | 0 | Either SampleSizeBox ('stsz') or CompactSampleSizeBox ('stz2') shall be present within the 'stbl' box. |
|  |  |  |  |  | stz2 | 0 | Either SampleSizeBox ('stsz') or CompactSampleSizeBox ('stz2') shall be present within the 'stbl' box. |
|  |  |  |  |  | stsc | 0 |  |
|  |  |  |  |  | stco | 0 | Either ChunkOffsetBox ('stco') or ChunkLargeOffsetBox ('co64') shall be present within the 'stbl' box. |
|  |  |  |  |  | co64 | 0 | Either ChunkOffsetBox ('stco') or ChunkLargeOffsetBox ('co64') shall be present within the 'stbl' box. |

When a file is marked with this brand and includes a TrackFragmentHeaderBox, the default-base-is-moof flag shall not be set in tf\_flags of the TrackFragmentHeaderBox.

NOTE Some requirements of the TrackHeaderBox do not apply to this brand; see subclause .

Under this brand and its derivatives the media\_rate in the EditListBox is restricted such that the fraction shall have the value 0 and the integer shall have the value 0 or 1.

**E.2.2   Requirements on readers**

Support for the structural boxes according to Table E.2 is required. The Version column in Table E.2 specifies the version values that shall be supported by the readers of this brand. A '-' in the Version column indicates that the box is derived from Box and does not contain a version field.

Table E.2 — Boxes required to be supported in readers of the 'isom' brand

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | **Version** | **Box description** |
| ftyp |  |  |  |  |  |  | - | *file type and compatibility* |
| moov |  |  |  |  |  |  | - | *container for all the meta-data* |
|  | mvhd |  |  |  |  |  | 0, 1 | *movie header, overall declarations* |
|  | trak |  |  |  |  |  | - | *container for an individual track or stream* |
|  |  | tkhd |  |  |  |  | 0, 1 | *track header, overall information about the track* |
|  |  | tref |  |  |  |  | - | *track reference container* |
|  |  | edts |  |  |  |  | - | *edit list container* |
|  |  |  | elst |  |  |  | 0, 1 | *an edit list* |
|  |  | mdia |  |  |  |  | - | *container for the media information in a track* |
|  |  |  | mdhd |  |  |  | 0, 1 | *media header, overall information about the media* |
|  |  |  | hdlr |  |  |  | 0 | *handler, at this level, the media (handler) type* |
|  |  |  | minf |  |  |  | - | *media information container* |
|  |  |  |  | vmhd |  |  | 0 | *video media header, overall information (video track only)* |
|  |  |  |  | smhd |  |  | 0 | *sound media header, overall information (sound track only)* |
|  |  |  |  | hmhd |  |  | 0 | *hint media header, overall information (hint track only)* |
|  |  |  |  | <mpeg> |  |  |  | *mpeg stream headers* |
|  |  |  |  | dinf |  |  | - | *data information box, container* |
|  |  |  |  |  | dref |  | 0 | *data reference box, declares source(s) of media in track* |
|  |  |  |  |  |  | url | 0 | *URL data entry box* |
|  |  |  |  |  |  | urn | 0 | *URN data entry box* |
|  |  |  |  | stbl |  |  | - | *sample table box, container for the time/space map* |
|  |  |  |  |  | stts |  | 0 | *(decoding) time-to-sample* |
|  |  |  |  |  | ctts |  | 0 | *composition time-to-sample table* |
|  |  |  |  |  | stss |  | 0 | *sync (key, I-frame) sample map* |
|  |  |  |  |  | stsd |  | 0 | *sample description box (codec types, initialization etc.)* |
|  |  |  |  |  | stsz |  | 0 | *sample sizes (framing)* |
|  |  |  |  |  | stz2 |  | 0 | *compact sample sizes (framing)* |
|  |  |  |  |  | stsc |  | 0 | *sample-to-chunk, partial data-offset information* |
|  |  |  |  |  | stco |  | 0 | *chunk offset, partial data-offset information* |
|  |  |  |  |  | co64 |  | 0 | *64-bit chunk offset* |
|  |  |  |  |  | stsh |  | 0 | *shadow sync* |
|  |  |  |  |  | padb |  | 0 | *sample padding bits* |
|  |  |  |  |  | stdp |  | 0 | *degradation priority* |
|  |  | udta |  |  |  |  | - | *user-data, copyright etc.* |
|  | mvex |  |  |  |  |  | - | *movie extends box* |
|  |  | mehd |  |  |  |  | 0, 1 | *movie extends header box* |
|  |  | trex |  |  |  |  | 0 | *track extends defaults* |
|  | udta |  |  |  |  |  | - | *user-data, copyright etc.* |
| mdat |  |  |  |  |  |  | - | *Media data container* |
| free |  |  |  |  |  |  | - | *free space* |
| skip |  |  |  |  |  |  | - | *free space* |
| moof |  |  |  |  |  |  | - | *movie fragment* |
|  | mfhd |  |  |  |  |  | 0 | *movie fragment header* |
|  | traf |  |  |  |  |  | - | *track fragment* |
|  |  | tfhd |  |  |  |  | 0 | *track fragment header* |
|  |  | trun |  |  |  |  | 0 | *track fragment run* |
| mfra |  |  |  |  |  |  | - | *movie fragment random access* |
|  | tfra |  |  |  |  |  | 0, 1 | *track fragment random access* |
|  | mfro |  |  |  |  |  | 0 | *movie fragment random access offset* |

Hint tracks shall be recognized, and in hint tracks, RTP protocol hint tracks.

The following syntax elements within default\_sample\_flags of TrackExtendsBox and TrackFragmentHeaderBox and within sample\_flags and first\_sample\_flags of TrackRunBox shall be supported: sample\_padding\_value, sample\_is\_non\_sync\_sample, sample\_degradation\_priority.

The following flags of TrackFragmentHeaderBox shall be supported:

base-data-offset-present

sample-description-index-present

default-sample-duration-present

default-sample-size-present

default-sample-flags-present

duration-is-empty

The following flags of TrackRunBox shall be supported:

data-offset-present

first-sample-flags-present

sample-duration-present

sample-size-present

sample-flags-present

sample-composition-time-offsets-present

*Annex K*

*Add a new clause:*

**K.2.3   Processing Capabilities as an Extension of the** 'codecs' **parameter**

To signal additional processing requirements within the existing 'codecs' parameter, this clause defines an optional syntax extension using the reserved four-character code 'desc'. This extension enables codec-agnostic signaling of processing capabilities allowing applications to signal processing information directly within the codecs string.

The use of 'desc' provides a mechanism to declare parameters that may influence playback behavior or decoding requirements. When present, these parameters shall be declared as completely as possible. Implementations may decide whether partial compatibility suffices for successful processing such as rendering but shall treat the information in 'desc' as a full declaration of intended processing requirements. Only one 'desc' is allowed per track.

**K.2.3.1   Structure of the 'desc' 4CC extension**

Processing capabilities are signaled using the 'desc' 4CC, followed by a dot (.) and a sequence of key-value pairs. Each key-value pair consists of a key and its corresponding value, separated by an equals sign (=). Key-value pairs are concatenated using plus signs (+). The set of valid keys and their permissible values is defined in Table K.1.

The 'desc' 4CC extension of the 'codecs' MIME parameter applies at the track level. When the 'desc' 4CC extension is used, at least one codec attribute shall be present in combination with at least one other attribute. The codec attribute may appear multiple times to signal multiple codec layers or streams, and may carry parameters such as profile, tier, and level information. When multiple codec attributes are present, they shall reflect layered streams in increasing order as they appear in the bitstream.

Table K.1 — Supported attributes in the 'desc' 4CC extension

|  |  |  |
| --- | --- | --- |
| **Attribute key** | **Description** | **Attribute value** |
| usecase | Specifies the intended use case of the media. | valpha: The resource contains a video/image with alpha.  vstereo: The resource contains a stereo video/image pair.  valphastereo: The resource contains a pair of stereo video/image, each with alpha. |
| codec | Embeds codec-specific string. | Codec identifier (e.g., hvc1.1.6.L93.B0) |
| colr | Specifies color characteristics. | Three dot-separated integers representing CICP values: colour\_primaries.transfer\_characteristics.matrix\_coefficients |
| subsample | Subsampling method. | Values as defined in ISO/IEC 23091-2. |

Example of 'codecs' string with rendering capabilities:

codecs=”desc.usecase=valpha+codec=hvc1.1.6.L93.B0+colr=1.13.1”

NOTE: Applications can choose to use the 'desc' extension for consolidated signaling of processing, including rendering, and codec information. Alternatively, applications may use the separate 'desc' MIME type parameter defined in K.7.

*Add a new clause:*

**K.7   Use of the** 'desc' **parameter**

This clause introduces a MIME type parameter, 'desc', to provide a codec-agnostic signalling mechanism for processing capabilities. This parameter allows applications that prefer to separate requirements from the 'codecs' parameter, offering a distinct location for processing information without modifying the 'codecs' identifier.

Applications may choose between using the 'desc' MIME type parameter defined in this clause or the 'codecs' parameter extension specified in K.2.3. The choice is application-specific, allowing flexibility based on playback requirements and compatibility considerations.

The 'desc' parameter uses the same key-value pair syntax and definitions as specified in K.2.3.1, except that the codec attribute is not permitted. All other attributes defined in Table K.1 are applicable.

If the 'desc' parameter contains a value without any = sign (i.e., a bare token), it shall be interpreted as the value of the usecase attribute. This allows simplified syntax when only the use case needs to be conveyed.

Examples:

Full form:

desc="usecase=valpha+colr=1.13.1"

Shorthand form:

desc=valpha

*Bibliogrphy*

*Add a new entry:*

[x] ISO/IEC 23000-19, *Information technology — Multimedia application format (MPEG-A)*

*Part 19: Common media application format (CMAF) for segmented media*