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Information technology — Coding of audio-visual objects —

Part 12: ISO base media file format

Technologies de l'information — Codage des objets audiovisuels —
Partie 12: Format ISO de base pour les fichiers médias

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Foreword

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

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

This sixth edition cancels and replaces the fifth edition (ISO/IEC 14496-12:2015), which has been technically revised. It also incorporates Amendments ISO/IEC 14496-12:2015/Amd.1:2017 and ISO/IEC 14496-12:2015/Amd.2:2018.

The main changes compared to the previous edition are as follows:

— incorporation of all changes provided in Amendments 1 and 2 and unpublished draft COR.1 for the fifth edition and draft Amendments 1 through 4 for this sixth edition.

— editorial changes to align the document with the drafting rules in ISO/IEC Directives Part 2.

A list of all parts in the ISO/IEC 14496 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 https://www.iso.org/members.html.

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Introduction

The ISO base media file format is designed to contain timed media information for a presentation in a flexible, extensible format that facilitates interchange, management, editing, and presentation of the media. This presentation may be 'local' to the system containing the presentation, or may be via a network or other stream delivery mechanism.

The file structure is object-oriented; a file can be decomposed into constituent objects very simply, and the structure of the objects inferred directly from their type.

The file format is designed to be independent of any particular network protocol while enabling efficient support for them in general.

The ISO base media file format is a base format for media file formats.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

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Information technology — Coding of audio-visual objects —

Part 12: ISO base media file format

1 Scope

This document specifies the ISO base media file format, which is a general format forming the basis for a number of other more specific file formats. This format contains the timing, structure, and media information for timed sequences of media data, such as audio-visual presentations.

2 Normative references

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

ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

ITU-T X.667 | ISO/IEC 9834-8, *Information technology — Procedures for the operation of object identifier registration authorities — Part 8: Generation of universally unique identifiers (UUIDs) and their use in object identifiers*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

ISO/IEC 13818-2:2013, *Information technology — Generic coding of moving pictures and associated audio information — Part 2: Video*

ISO/IEC 14496-1, *Information technology — Coding of audio-visual objects — Part 1: Systems*

ISO/IEC 14496-10:2014, *Information technology — Coding of audio-visual objects — Part 10: Advanced Video Coding*

ISO 15076-1, *Image technology colour management — Architecture, profile format and data structure — Part 1: Based on ICC.1:2010*

ISO/IEC 15938-1, *Information technology — Multimedia content description interface — Part 1: Systems*

ISO/IEC 23001-1, *Information technology — MPEG systems technologies — Part 1: Binary MPEG format for XML*

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

ISO/IEC 23003-4, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*

ITU-T H.265 |ISO/IEC 23008-2, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding*

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

ISO/IEC 23091-3, *Information technology —Coding-independent code points — Part 3: Audio*

IETF RFC 1951, *DEFLATE Compressed Data Format Specification version 1.3*

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IETF RFC 2045, *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*

IETF RFC 2046, *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types*

IETF RFC 3629, *UTF-8, a transformation format of ISO 10646*

IETF RFC 3711:2004, *The Secure Real-time Transport Protocol (SRTP)*

IETF RFC 5052, *Forward Error Correction (FEC) Building Block*

IETF RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*

ITU-R TF.460-6:2002, *Standard-frequency and time-signal emissions*

ITU-R BS.1770-4, *Algorithms to measure audio programme loudness and true-peak audio level*

IETF BCP 47, *Tags for Identifying Languages*

IETF RFC 4122, *A Universally Unique IDentifier (UUID) URN Namespace*

IETF RFC 3061, *A URN Namespace of Object Identifiers*

W3C Recommendation, *Extensible Markup Language (XML) 1.0 (Fifth Edition)*, 26 November 2008, https://www.w3.org/TR/2008/REC-xml-20081126/

3 Terms, definitions and abbreviated terms

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3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

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

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3.1.1
box
object-oriented building block defined by a unique type identifier and length

Note 1 to entry: Called 'atom' in some specifications, including the first definition of MP4.

3.1.2
chunk
contiguous set of samples for one track

3.1.3
clean aperture
part of a decoded video image from which undesirable pixels introduced for coding purposes such as having integer number of coding blocks have been removed for presentation

3.1.4
container box
box whose sole purpose is to contain and group a set of related boxes

Note 1 to entry: Container boxes are normally not derived from `FullBox`.

3.1.5
file level
byte position in an ISO base media file not contained in a Box structure

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3.1.6
full aperture
decoded video image as output by the decoder which may contain undesirable pixels for presentation

3.1.7
hint track
special track which does not contain media data, but instead contains instructions for packaging one or more tracks into a streaming channel

3.1.8
hinter
tool that is run on a file containing only media, to add one or more hint tracks to the file and so facilitate streaming

3.1.9
index file
ISO base media file containing only `SegmentIndexBox`

3.1.10
ISO base media file
file conforming to the file format described in this document (either a movie file, a metadata file, a segment file or an index file)

3.1.11
item
data which does not require timed processing, as opposed to sample data

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3.1.12
leading sample
sample associated with a random access point (RAP) that precedes the RAP in composition order and immediately follows the RAP or another leading sample in decoding order, and which possibly cannot be correctly decoded when decoding starts from the RAP

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3.1.13
leaf subsegment
subsegment that does not contain any indexing information that would enable its further division into subsegments

3.1.14
mod
modulo operator: (x mod y) = x-y floor (x/y)

3.1.15
media data box
box which can hold the actual media data for a presentation (`'mdat'`)

3.1.16
metadata file
ISO base media file containing a top-level `MetaBox`

Note 1 to entry: A Movie File may also be a Metadata File, and vice-versa.

3.1.17
movie box
container box whose sub-boxes define the metadata for a presentation (`'moov'`)

3.1.18
movie file
ISO base media file containing a `MovieBox`

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3.1.19
movie fragment
fragment of the information contained in a `MovieBox`, defined by a `MovieFragmentBox` and its contents

3.1.20
movie-fragment relative addressing
signalling of offsets for media data in movie fragments that is relative to the start of those movie fragments, specifically setting the flags base-data-offset-present to 0 and default-base-is-moof to 1 in `TrackFragmentHeaderBox`es

Note 1 to entry: Setting the default-base-is-moof flag to 1 is only relevant for movie fragments that contain more than one track run (either in the same or several tracks).

3.1.21
open random access point
sample after which all samples in composition order can be correctly decoded, but some samples following the random access point in decoding order and preceding the random access point in composition order need not be correctly decodable

Note 1 to entry: For example, an intra picture starting an open group of pictures can be followed in decoding order by (bi-)predicted pictures that however precede the intra picture in composition order; though they possibly cannot be correctly decoded if the decoding starts from the intra picture, they are not needed.

3.1.22
pixel aspect ratio
scaling required to be applied to the output pixel of a decoder to produce a non-distorted image

Note 1 to entry: The term "Sample Aspect Ratio" is sometimes used for this term, but "sample" in this standard has a specific meaning.

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3.1.23
presentation
one or more motion sequences, possibly combined with audio

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3.1.24
presentation time
composition time of a sample, as adjusted by any edit list

3.1.25
random access point
RAP
sample in a track that starts at the ISAU of a SAP of type 1 or 2 or 3; informally, a sample, from which when decoding starts, the sample itself and all samples following in composition order can be correctly decoded

Note 1 to entry: SAP types are defined in Annex I.

3.1.26
random access recovery point
sample in a track with presentation time equal to the TSAP of a SAP of type 4; informally, a sample, that can be correctly decoded after having decoded a number of samples that is before this sample in decoding order, sometimes known as gradual decoding refresh

Note 1 to entry: SAP types are defined in Annex I.

3.1.27
sample
all the data associated with a single time

Note 1 to entry: No two samples within a track can share the same decoding time; no two samples can share the same composition time.

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