

This is a preview of "ISO/IEC 15444-12:2015...". [Click here to purchase the full version from the ANSI store.](#)

Fifth edition  
2015-12-15

---

---

## Information technology — JPEG 2000 image coding system —

### Part 12: ISO base media file format

*Technologies de l'information — Système de codage d'images JPEG 2000 —  
Partie 12: Format ISO de base pour les fichiers médias*

---

---

Reference number

ISO/IEC 15444-12:2015(E)



© ISO/IEC 2015



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier; Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

This is a preview of "ISO/IEC 15444-12:201...". [Click here to purchase the full version from the ANSI store.](#)

<b>Contents</b>	<b>Page</b>
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms, definitions, and abbreviated terms.....</b>	<b>3</b>
3.1 Terms and definitions .....	3
3.2 Abbreviated terms.....	5
<b>4 Object-structured File Organization.....</b>	<b>6</b>
4.1 File Structure .....	6
4.2 Object Structure.....	6
4.3 File Type Box .....	7
<b>5 Design Considerations .....</b>	<b>8</b>
5.1 Usage.....	8
5.1.1 Introduction .....	8
5.1.2 Interchange.....	8
5.1.3 Content Creation.....	9
5.1.4 Preparation for streaming.....	10
5.1.5 Local presentation .....	10
5.1.6 Streamed presentation.....	10
5.2 Design principles .....	11
<b>6 ISO Base Media File organization .....</b>	<b>12</b>
6.1 Presentation structure.....	12
6.1.1 File Structure .....	12
6.1.2 Object Structure .....	12
6.1.3 Meta Data and Media Data .....	12
6.1.4 Track Identifiers.....	12
6.2 Metadata Structure (Objects) .....	13
6.2.1 Box .....	13
6.2.2 Data Types and fields .....	13
6.2.3 Box Order .....	14
6.2.4 URIs as type indicators.....	17
6.3 Brand Identification.....	17
<b>7 Streaming Support .....</b>	<b>17</b>
7.1 Handling of Streaming Protocols .....	17
7.2 Protocol 'hint' tracks.....	18
7.3 Hint Track Format .....	19
<b>8 Box Structures .....</b>	<b>20</b>
8.1 File Structure and general boxes.....	20
8.1.1 Media Data Box.....	20
8.1.2 Free Space Box.....	21

This is a preview of "ISO/IEC 15444-12:201...". [Click here to purchase the full version from the ANSI store.](#)

8.2.1	Movie Box.....	22
8.2.2	Movie Header Box.....	22
8.3	Track Structure .....	24
8.3.1	Track Box.....	24
8.3.2	Track Header Box .....	24
8.3.3	Track Reference Box.....	26
8.3.4	Track Group Box .....	27
8.4	Track Media Structure.....	28
8.4.1	Media Box .....	28
8.4.2	Media Header Box.....	29
8.4.3	Handler Reference Box.....	29
8.4.4	Media Information Box.....	30
8.4.5	Media Information Header Boxes.....	30
8.4.6	Extended language tag.....	31
8.5	Sample Tables.....	32
8.5.1	Sample Table Box.....	32
8.5.2	Sample Description Box.....	32
8.5.3	Degradation Priority Box.....	34
8.5.4	Sample Scale Box.....	35
8.6	Track Time Structures.....	35
8.6.1	Time to Sample Boxes .....	35
8.6.2	Sync Sample Box.....	40
8.6.3	Shadow Sync Sample Box .....	40
8.6.4	Independent and Disposable Samples Box.....	41
8.6.5	Edit Box.....	43
8.6.6	Edit List Box .....	43
8.7	Track Data Layout Structures .....	45
8.7.1	Data Information Box .....	45
8.7.2	Data Reference Box .....	45
8.7.3	Sample Size Boxes.....	47
8.7.4	Sample To Chunk Box.....	48
8.7.5	Chunk Offset Box .....	49
8.7.6	Padding Bits Box .....	49
8.7.7	Sub-Sample Information Box.....	50
8.7.8	Sample Auxiliary Information Sizes Box .....	51
8.7.9	Sample Auxiliary Information Offsets Box .....	53
8.8	Movie Fragments .....	54
8.8.1	Movie Extends Box.....	54
8.8.2	Movie Extends Header Box.....	54
8.8.3	Track Extends Box.....	55
8.8.4	Movie Fragment Box.....	56
8.8.5	Movie Fragment Header Box .....	56
8.8.6	Track Fragment Box.....	57
8.8.7	Track Fragment Header Box.....	57

This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

8.8.10	Track Fragment Random Access Box .....	60
8.8.11	Movie Fragment Random Access Offset Box .....	61
8.8.12	Track fragment decode time.....	62
8.8.13	Level Assignment Box .....	63
8.8.14	Sample Auxiliary Information in Movie Fragments .....	65
8.8.15	Track Extension Properties Box.....	65
8.8.16	Alternative Startup Sequence Properties Box.....	66
8.8.17	Metadata and user data in movie fragments .....	66
8.9	Sample Group Structures .....	67
8.9.1	Introduction .....	67
8.9.2	Sample to Group Box.....	68
8.9.3	Sample Group Description Box.....	69
8.9.4	Representation of group structures in Movie Fragments.....	70
8.10	User Data .....	71
8.10.1	User Data Box .....	71
8.10.2	Copyright Box.....	72
8.10.3	Track Selection Box.....	72
8.10.4	Track kind .....	74
8.11	Metadata Support.....	75
8.11.1	The Meta box .....	75
8.11.2	XML Boxes.....	76
8.11.3	The Item Location Box .....	77
8.11.4	Primary Item Box.....	80
8.11.5	Item Protection Box .....	80
8.11.6	Item Information Box.....	81
8.11.7	Additional Metadata Container Box.....	83
8.11.8	Metabox Relation Box .....	84
8.11.9	URL Forms for meta boxes.....	85
8.11.10	Static Metadata.....	85
8.11.11	Item Data Box .....	86
8.11.12	Item Reference Box.....	87
8.11.13	Auxiliary video metadata .....	88
8.12	Support for Protected Streams.....	88
8.12.1	Protection Scheme Information Box.....	89
8.12.2	Original Format Box.....	90
8.12.3	IPMPInfoBox.....	90
8.12.4	IPMP Control Box .....	90
8.12.5	Scheme Type Box .....	90
8.12.6	Scheme Information Box.....	91
8.13	File Delivery Format Support.....	91
8.13.1	Introduction.....	91
8.13.2	FD Item Information Box.....	92
8.13.3	File Partition Box .....	92
8.13.4	FEC Reservoir Box.....	94

This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

8.13.7	File Reservoir Box.....	96
8.14	Sub tracks .....	97
8.14.1	Introduction .....	97
8.14.2	Backward compatibility.....	97
8.14.3	Sub Track box .....	98
8.14.4	Sub Track Information box.....	98
8.14.5	Sub Track Definition box.....	100
8.14.6	Sub Track Sample Group box .....	100
8.15	Post-decoder requirements on media.....	100
8.15.1	General .....	100
8.15.2	Transformation.....	101
8.15.3	Restricted Scheme Information box.....	102
8.15.4	Scheme for stereoscopic video arrangements.....	102
8.16	Segments .....	104
8.16.1	Introduction .....	104
8.16.2	Segment Type Box.....	104
8.16.3	Segment Index Box.....	105
8.16.4	Subsegment Index Box .....	109
8.16.5	Producer Reference Time Box.....	111
8.17	Support for Incomplete Tracks.....	112
8.17.1	General .....	112
8.17.2	Transformation.....	113
8.17.3	Complete Track Information Box .....	114
9	Hint Track Formats .....	114
9.1	RTP and SRTP Hint Track Format .....	114
9.1.1	Introduction.....	114
9.1.2	Sample Description Format .....	115
9.1.3	Sample Format.....	117
9.1.4	SDP Information .....	119
9.1.5	Statistical Information .....	120
9.2	ALC/LCT and FLUTE Hint Track Format.....	121
9.2.1	Introduction.....	121
9.2.2	Design principles .....	122
9.2.3	Sample Description Format .....	123
9.2.4	Sample Format.....	124
9.3	MPEG-2 Transport Hint Track Format.....	127
9.3.1	Introduction.....	127
9.3.2	Design Principles .....	128
9.3.3	Sample Description Format .....	130
9.3.4	Sample Format.....	132
9.3.5	Protected MPEG 2 Transport Stream Hint Track.....	134
9.4	RTP, RTCP, SRTP and SRTCP Reception Hint Tracks.....	134
9.4.1	RTP Reception Hint Track .....	134

This is a preview of "ISO/IEC 15444-12:2015...". [Click here to purchase the full version from the ANSI store.](#)

9.4.4	SRTCP Reception Hint Tracks .....	142
9.4.5	Protected RTP Reception Hint Track .....	143
9.4.6	Recording Procedure .....	143
9.4.7	Parsing Procedure .....	143
10	Sample Groups .....	143
10.1	Random Access Recovery Points .....	143
10.2	Rate Share Groups.....	144
10.2.1	Introduction.....	144
10.2.2	Rate Share Sample Group Entry .....	146
10.2.3	Relationship between tracks .....	147
10.2.4	Bitrate allocation .....	147
10.3	Alternative Startup Sequences .....	148
10.4	Random Access Point (RAP) Sample Grouping.....	151
10.5	Temporal level sample grouping.....	152
10.6	Stream access point sample group.....	152
11	Extensibility .....	153
11.1	Objects.....	153
11.2	Storage formats.....	154
11.3	Derived File formats.....	154
12	Media-specific definitions.....	155
12.1	Video media.....	155
12.1.1	Media handler .....	155
12.1.2	Video media header .....	155
12.1.3	Sample entry.....	156
12.1.4	Pixel Aspect Ratio and Clean Aperture .....	156
12.1.5	Colour information.....	158
12.2	Audio media .....	159
12.2.1	Media handler .....	159
12.2.2	Sound media header .....	159
12.2.3	Sample entry.....	160
12.2.4	Channel layout .....	162
12.2.5	Downmix Instructions.....	163
12.2.6	DRC Information .....	165
12.2.7	Audio stream loudness .....	165
12.3	Metadata media.....	167
12.3.1	Media handler .....	167
12.3.2	Media header.....	167
12.3.3	Sample entry.....	167
12.4	Hint media.....	169
12.4.1	Media handler .....	169
12.4.2	Hint media header .....	169
12.4.3	Sample entry.....	170
12.5	Text media .....	170

This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

12.5.3	Sample entry .....	170
12.6	Subtitle media .....	171
12.6.1	Media handler.....	171
12.6.2	Subtitle media header .....	171
12.6.3	Sample entry .....	171
12.7	Font media.....	172
12.7.1	Media handler.....	172
12.7.2	Media header .....	172
12.7.3	Sample entry .....	172
12.8	Transformed media .....	172
<b>Annex A (informative) Overview and Introduction.....</b>		<b>173</b>
A.1	Section Overview.....	173
A.2	Core Concepts .....	173
A.3	Physical structure of the media .....	174
A.4	Temporal structure of the media .....	174
A.5	Interleave.....	175
A.6	Composition .....	175
A.7	Random access.....	175
A.8	Fragmented movie files.....	176
<b>Annex B (void).....</b>		<b>178</b>
<b>Annex C (informative) Guidelines on deriving from this specification.....</b>		<b>179</b>
C.1	Introduction .....	179
C.2	General Principles.....	179
C.2.1	General.....	179
C.2.2	Base layer operations.....	180
C.3	Boxes.....	180
C.4	Brand Identifiers .....	181
C.4.1	Introduction.....	181
C.4.2	Usage of the Brand.....	181
C.4.3	Introduction of a new brand .....	182
C.4.4	Player Guideline .....	182
C.4.5	Authoring Guideline.....	182
C.4.6	Example .....	183
C.5	Storage of new media types .....	183
C.6	Use of Template fields.....	183
C.7	Tracks .....	184
C.7.1	Data Location.....	184
C.7.2	Time .....	184
C.7.3	Media Types .....	185
C.7.4	Coding Types.....	185
C.7.5	Sub-sample information.....	185
C.7.6	Sample Dependency.....	185
C.7.7	Sample Groups .....	185



This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

C.8	Construction of fragmented movies .....	186
C.9	Meta-data .....	187
C.10	Registration .....	187
C.11	Guidelines on the use of sample groups, timed metadata tracks, and sample auxiliary information .....	187
<b>Annex D</b>	<b>(informative) Registration Authority .....</b>	<b>190</b>
D.1	Code points to be registered.....	190
D.2	Procedure for the request of an MPEG-4 registered identifier value .....	191
D.3	Responsibilities of the Registration Authority .....	191
D.4	Contact information for the Registration Authority .....	191
D.5	Responsibilities of Parties Requesting a RID .....	192
D.6	Appeal Procedure for Denied Applications .....	192
D.7	Registration Application Form .....	192
D.7.1	Contact Information of organization requesting a RID .....	192
D.7.2	Request for a specific RID .....	193
D.7.3	Short description of RID that is in use and date system was implemented.....	193
D.7.4	Statement of an intention to apply the assigned RID .....	193
D.7.5	Date of intended implementation of the RID .....	193
D.7.6	Authorized representative .....	193
D.7.7	For official use of the Registration Authority .....	194
<b>Annex E</b>	<b>(normative) File format brands .....</b>	<b>195</b>
E.1	Introduction .....	195
E.2	The 'isom' brand .....	196
E.3	The 'avc1' brand .....	197
E.4	The 'iso2' brand .....	197
E.5	The 'mp71' brand .....	198
E.6	The 'iso3' brand .....	198
E.7	The 'iso4' brand .....	199
E.8	The 'iso5' brand .....	199
E.9	The 'iso6' brand .....	200
E.10	The 'iso7' brand .....	200
E.11	The 'iso8' brand .....	201
E.12	The 'iso9' brand .....	201
<b>Annex F</b>	<b>(void).....</b>	<b>202</b>
<b>Annex G</b>	<b>(informative) URI-labelled metadata forms.....</b>	<b>203</b>
G.1	UUID-labelled metadata .....	203
G.2	ISO OID-labelled metadata .....	203
G.3	SMPTE-labelled metadata.....	204
<b>Annex H</b>	<b>(informative) Processing of RTP streams and reception hint tracks.....</b>	<b>205</b>
H.1	Introduction .....	205
H.1.1	Overview .....	205
H.1.2	Structure .....	205

This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

<b>H.3</b>	<b>Recording of RTP streams</b>	<b>206</b>
<b>H.3.1</b>	<b>Introduction</b>	<b>206</b>
<b>H.3.2</b>	<b>Compensation for unequal starting for position of received RTP streams</b>	<b>209</b>
<b>H.3.3</b>	<b>Recording of SDP</b>	<b>210</b>
<b>H.3.4</b>	<b>Creation of a sample within an RTP reception hint track</b>	<b>210</b>
<b>H.3.5</b>	<b>Representation of RTP timestamps</b>	<b>211</b>
<b>H.3.6</b>	<b>Recording operations to facilitate inter-stream synchronization in playback</b>	<b>214</b>
<b>H.3.7</b>	<b>Representation of reception times</b>	<b>216</b>
<b>H.3.8</b>	<b>Creation of media samples</b>	<b>217</b>
<b>H.3.9</b>	<b>Creation of hint samples referring to media samples</b>	<b>217</b>
<b>H.4</b>	<b>Playing of recorded RTP streams</b>	<b>217</b>
<b>H.4.1</b>	<b>Introduction</b>	<b>217</b>
<b>H.4.2</b>	<b>Preparation for the playback</b>	<b>218</b>
<b>H.4.3</b>	<b>Decoding of a sample within an RTP reception hint track</b>	<b>218</b>
<b>H.4.4</b>	<b>Lip synchronization</b>	<b>219</b>
<b>H.4.5</b>	<b>Random access</b>	<b>220</b>
<b>H.5</b>	<b>Re-sending recorded RTP streams</b>	<b>221</b>
<b>H.5.1</b>	<b>Introduction</b>	<b>221</b>
<b>H.5.2</b>	<b>Re-sending RTP packets</b>	<b>222</b>
<b>H.5.3</b>	<b>RTCP Processing</b>	<b>223</b>
<b>Annex I (normative)</b>	<b>Stream Access Points</b>	<b>224</b>
<b>I.1</b>	<b>Introduction</b>	<b>224</b>
<b>I.2</b>	<b>SAP properties</b>	<b>224</b>
<b>I.2.1</b>	<b>General</b>	<b>224</b>
<b>I.2.2</b>	<b>SAP properties for layers</b>	<b>225</b>
<b>I.3</b>	<b>SAP types</b>	<b>226</b>
<b>Annex J (normative)</b>	<b>MIME Type Registration of Segments</b>	<b>227</b>
<b>J.1</b>	<b>Introduction</b>	<b>227</b>
<b>J.2</b>	<b>Registration</b>	<b>227</b>
<b>Annex K : Segment Index Examples (informative)</b>		<b>228</b>
<b>K.1</b>	<b>Introduction</b>	<b>228</b>
<b>K.2</b>	<b>Examples</b>	<b>228</b>
<b>K.2.1</b>	<b>Simple one-level indexing</b>	<b>228</b>
<b>K.2.2</b>	<b>Hierarchical</b>	<b>228</b>
<b>K.2.3</b>	<b>Daisy-chain</b>	<b>229</b>
<b>K.2.4</b>	<b>Combination hierarchical and daisy-chain</b>	<b>230</b>

## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/IEC JTC 1, *Information technology, SC 29, Coding of audio, picture, multimedia and hypermedia information*.

This fifth edition cancels and replaces the fourth edition (ISO/IEC 15444-12:2012), which has been technically revised. It also incorporates the Amendment ISO/IEC 15444-12:2012/Amd1:2013 and the Technical Corrigenda ISO/IEC 15444-12:2012/Cor 2:2014 and ISO/IEC 15444-12:2012/Cor 3:2015.

ISO/IEC 15444 consists of the following parts, under the general title *Information technology — JPEG 2000 image coding system*:

- *Part 1: Core coding system*
- *Part 2: Extensions*
- *Part 3: Motion JPEG 2000*
- *Part 4: Conformance testing*
- *Part 5: Reference software*

This is a preview of "ISO/IEC 15444-12:201...". [Click here to purchase the full version from the ANSI store.](#)

- *Part 8: Secure JPEG 2000*
- *Part 9: Interactivity tools, APIs and protocols*
- *Part 10: Extensions for three-dimensional data*
- *Part 11: Wireless*
- *Part 12: ISO base media file format*
- *Part 13: An entry level JPEG 2000 encoder*
- *Part 14: XML structural representation and reference*

This is a preview of "ISO/IEC 15444-12:201...". Click here to purchase the full version from the ANSI store.

## 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.

It is intended that the ISO Base Media File Format shall be jointly maintained by WG1 and WG11. Consequently, a subdivision of work created ISO/IEC 15444-12 and ISO/IEC 14496-12 in order to document the ISO Base Media File Format and to facilitate the joint maintenance.

This technically identical text is published as ISO/IEC 14496-12 for MPEG-4, and as ISO/IEC 15444-12 for JPEG 2000, and reference to this specification should be made accordingly. The recommendation is to reference one, for example ISO/IEC 14496-12, and append to the reference a parenthetical comment identifying the other, for example "(technically identical to ISO/IEC 15444-12)".

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.

The ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the ISO and IEC that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with the ISO and IEC. Information may be obtained from the companies listed in Annex B.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified in Annex B. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO ([www.iso.org/patents](http://www.iso.org/patents)) and IEC (<http://patents.iec.ch>) maintain on-line databases of patents relevant to their standards. Users are encouraged to consult the databases for the most up to date information concerning patents.