

Second edition  
2004-12-15

---

---

## Information technology — Coding of audio-visual objects —

### Part 4: Conformance testing

*Technologies de l'information — Codage des objets audiovisuels —  
Partie 4: Essai de conformité*

---

---

Reference number  
ISO/IEC 14496-4:2004(E)



This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

| <b>Contents</b>    |  | Page      |
|--------------------|--|-----------|
| Foreword.....      |  | vii       |
| Introduction ..... |  | viii      |
| <b>1</b>           | <b>Scope .....</b>                             | <b>1</b>  |
| <b>2</b>           | <b>Normative references.....</b>               | <b>1</b>  |
| <b>3</b>           | <b>Terms and definitions .....</b>             | <b>2</b>  |
| <b>4</b>           | <b>Systems .....</b>                           | <b>3</b>  |
| <b>4.1</b>         | <b>Conformance Points .....</b>                | <b>3</b>  |
| <b>4.1.1</b>       | <b>FlexMux Conformance Point .....</b>         | <b>4</b>  |
| <b>4.1.2</b>       | <b>Sync Layer Conformance Point.....</b>       | <b>4</b>  |
| <b>4.1.3</b>       | <b>OD Conformance Point.....</b>               | <b>4</b>  |
| <b>4.1.4</b>       | <b>BIFS Conformance Point.....</b>             | <b>4</b>  |
| <b>4.1.5</b>       | <b>OCI Conformance Point.....</b>              | <b>4</b>  |
| <b>4.1.6</b>       | <b>IPMP Conformance Point .....</b>            | <b>4</b>  |
| <b>4.1.7</b>       | <b>Scene Graph Conformance Point.....</b>      | <b>4</b>  |
| <b>4.2</b>         | <b>Bitstream Conformance .....</b>             | <b>4</b>  |
| <b>4.2.1</b>       | <b>FlexMux Conformance.....</b>                | <b>5</b>  |
| <b>4.2.2</b>       | <b>Synchronization Layer Conformance .....</b> | <b>5</b>  |
| <b>4.2.3</b>       | <b>OD Conformance.....</b>                     | <b>5</b>  |
| <b>4.2.4</b>       | <b>BIFS Conformance .....</b>                  | <b>5</b>  |
| <b>4.2.5</b>       | <b>OCI Conformance.....</b>                    | <b>5</b>  |
| <b>4.2.6</b>       | <b>IPMP Conformance .....</b>                  | <b>6</b>  |
| <b>4.2.7</b>       | <b>Miscellaneous Conformance .....</b>         | <b>6</b>  |
| <b>4.3</b>         | <b>Terminal Conformance .....</b>              | <b>6</b>  |
| <b>4.3.1</b>       | <b>FlexMux conformance .....</b>               | <b>7</b>  |
| <b>4.3.2</b>       | <b>Synchronization Layer Conformance .....</b> | <b>7</b>  |
| <b>4.3.3</b>       | <b>OD Conformance.....</b>                     | <b>10</b> |
| <b>4.3.4</b>       | <b>BIFS Conformance.....</b>                   | <b>13</b> |
| <b>4.3.5</b>       | <b>OCI Conformance.....</b>                    | <b>14</b> |
| <b>4.3.6</b>       | <b>IPMP Conformance .....</b>                  | <b>14</b> |
| <b>4.3.7</b>       | <b>Scene Graph Conformance.....</b>            | <b>14</b> |
| <b>4.3.8</b>       | <b>Miscellaneous Conformance .....</b>         | <b>15</b> |
| <b>4.4</b>         | <b>Test material and test suites.....</b>      | <b>15</b> |
| <b>4.4.1</b>       | <b>Parsing Hint File Format.....</b>           | <b>16</b> |
| <b>4.4.2</b>       | <b>Scene Dump File Format .....</b>            | <b>18</b> |
| <b>4.4.3</b>       | <b>Test Suites .....</b>                       | <b>20</b> |

This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

|            |  |           |
|------------|--|-----------|
| <b>4.5</b> | <b>Advanced BIFS .....</b>   | <b>27</b> |
| 4.5.1      | Bitstream conformance .....  | 27        |
| 4.5.2      | Terminal conformance .....   | 27        |
| <b>4.6</b> | <b>MPEG-J .....</b>  | <b>28</b> |
| 4.6.1      | MPEG-J Conformance Points .....  | 28        |
| 4.6.2      | Bitstream Conformance.....   | 29        |
| 4.6.3      | Terminal Conformance .....   | 29        |
| <b>4.7</b> | <b>MP4 File Format.....</b>  | <b>30</b> |
| 4.7.1      | Writing .....  | 30        |
| 4.7.2      | Reading .....  | 31        |
| <b>5</b>   | <b>Visual .....</b>  | <b>31</b> |
| 5.1        | Introduction.....  | 31        |
| 5.2        | Definition of visual bitstream compliance .....  | 32        |
| 5.2.1      | Requirements and restrictions related to profile-and-level .....   | 32        |
| 5.2.2      | Additional restrictions on bitstream applied by the encoder .....  | 32        |
| 5.2.3      | Encoder requirements and recommendations.....  | 32        |
| 5.3        | Procedure for testing bitstream compliance .....   | 33        |
| 5.4        | Definition of visual decoder compliance .....  | 34        |
| 5.4.1      | Requirement on arithmetic accuracy in video objects (without IDCT).....  | 34        |
| 5.4.2      | Requirement on arithmetic accuracy in video objects (with IDCT).....   | 35        |
| 5.4.3      | Requirement on arithmetic accuracy in scalable still texture object (without IDWT).....  | 35        |
| 5.4.4      | Requirement on arithmetic accuracy in scalable still texture (with IDWT) .....   | 36        |
| 5.4.5      | Requirement on output of the decoding process and timing.....  | 36        |
| 5.4.6      | Recommendations .....  | 36        |
| 5.5        | Procedure to test decoder compliance .....   | 36        |
| 5.5.1      | Static tests .....   | 36        |
| 5.5.2      | Dynamic tests .....  | 37        |
| 5.5.3      | Specification of the test bitstreams.....  | 37        |
| 5.5.4      | Implementation of the static test .....  | 51        |
| 5.5.5      | Implementation of the dynamic test.....  | 52        |
| 5.5.6      | Decoder conformance .....  | 52        |
| 5.5.7      | Normative Test Suites for Simple, Simple Scalable, Core, Main and N-Bit profile.....   | 52        |
| 5.5.8      | Bitstream Donated by MPEG-4 Platform Verification Bitstream Development Project .....  | 55        |
| <b>5.6</b> | <b>Additional Conformance Testing.....</b>   | <b>63</b> |
| 5.6.1      | Specification of the test bitstreams.....  | 63        |
| 5.6.2      | Normative Test Suites for Advanced Real-Time Simple (ARTS), Core Scalable, Advanced Coding Efficiency (ACE), Advanced Core (AC) and Advanced Scalable Texture profiles ..... | 78        |
| <b>6</b>   | <b>Audio .....</b>   | <b>84</b> |
| 6.1        | Terms and Definitions.....   | 84        |
| 6.2        | Introduction.....  | 84        |

This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

|               |  |            |
|---------------|--|------------|
| <b>6.3</b>    | <b>Audio Conformance Points</b> .....  | <b>85</b>  |
| <b>6.4</b>    | <b>Audio Profiles</b> .....  | <b>86</b>  |
| <b>6.5</b>    | <b>Conformance data</b> .....  | <b>86</b>  |
| <b>6.5.1</b>  | <b>File name conventions</b> .....   | <b>86</b>  |
| <b>6.5.2</b>  | <b>Content</b> .....   | <b>88</b>  |
| <b>6.6</b>    | <b>Audio Object Types</b> .....  | <b>88</b>  |
| <b>6.6.1</b>  | <b>General</b> .....   | <b>88</b>  |
| <b>6.6.2</b>  | <b>Null</b> .....  | <b>94</b>  |
| <b>6.6.3</b>  | <b>AAC-based scalable configurations</b> .....                                     | <b>94</b>  |
| <b>6.6.4</b>  | <b>AAC (main, LC, ER LC, SSR, LTP, ER LTP, ER LD, scalable, ER scalable)</b> ..... | <b>95</b>  |
| <b>6.6.5</b>  | <b>TwinVQ and ER_TwinVQ</b> .....  | <b>112</b> |
| <b>6.6.6</b>  | <b>ER BSAC</b> .....   | <b>115</b> |
| <b>6.6.7</b>  | <b>CELP</b> .....  | <b>119</b> |
| <b>6.6.8</b>  | <b>ER CELP</b> .....   | <b>123</b> |
| <b>6.6.9</b>  | <b>HVXC</b> .....  | <b>127</b> |
| <b>6.6.10</b> | <b>ER HVXC</b> .....   | <b>137</b> |
| <b>6.6.11</b> | <b>ER HILN and ER Parametric</b> .....   | <b>139</b> |
| <b>6.6.12</b> | <b>TTSI</b> .....  | <b>153</b> |
| <b>6.6.13</b> | <b>General MIDI</b> .....  | <b>155</b> |
| <b>6.6.14</b> | <b>Wavetable Synthesis</b> .....   | <b>155</b> |
| <b>6.6.15</b> | <b>Algorithmic Synthesis and AudioFX</b> .....                                     | <b>156</b> |
| <b>6.6.16</b> | <b>Main Synthetic</b> .....  | <b>162</b> |
| <b>6.7</b>    | <b>Audio EP tool</b> .....   | <b>163</b> |
| <b>6.7.1</b>  | <b>Compressed data</b> .....   | <b>163</b> |
| <b>6.7.2</b>  | <b>Decoders</b> .....  | <b>165</b> |
| <b>6.8</b>    | <b>Audio Composition</b> .....   | <b>170</b> |
| <b>6.8.1</b>  | <b>Introduction</b> .....  | <b>170</b> |
| <b>6.8.2</b>  | <b>Common Audio Composition Characteristic</b> .....                               | <b>172</b> |
| <b>6.8.3</b>  | <b>AudioSource and Sound2D</b> .....   | <b>173</b> |
| <b>6.8.4</b>  | <b>AudioSource and Sound</b> .....   | <b>175</b> |
| <b>6.8.5</b>  | <b>AudioSwitch</b> .....   | <b>175</b> |
| <b>6.8.6</b>  | <b>AudioMix and Sampling Rate Conversion</b> .....                                 | <b>176</b> |
| <b>6.8.7</b>  | <b>AudioFX</b> .....   | <b>177</b> |
| <b>6.9</b>    | <b>MPEG-4 audio transport stream</b> .....   | <b>177</b> |
| <b>6.9.1</b>  | <b>Compressed Data</b> .....   | <b>178</b> |
| <b>6.9.2</b>  | <b>Decoders</b> .....  | <b>178</b> |
| <b>6.10</b>   | <b>Upstream</b> .....  | <b>179</b> |
| <b>6.10.1</b> | <b>Compressed data</b> .....   | <b>179</b> |
| <b>6.10.2</b> | <b>Decoders</b> .....  | <b>179</b> |
| <b>6.11</b>   | <b>Advanced Audio BIFS nodes</b> .....   | <b>179</b> |

This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

|                       |   |     |
|-----------------------|---|-----|
| 6.11.1                | Introduction.....   | 179 |
| 6.11.2                | Composition Unit Inputs.....  | 180 |
| 6.11.3                | Compositor Output.....  | 180 |
| 6.11.4                | Physical Approach .....   | 180 |
| 6.11.5                | Perceptual Approach .....   | 191 |
| 6.12                  | Conformance test sequence assignment to profiles and levels .....   | 202 |
| 6.12.1                | Audio .....   | 203 |
| 6.12.2                | Systems.....  | 210 |
| 7                     | DMIF.....   | 213 |
| 7.1                   | Introduction.....   | 213 |
| 7.2                   | The PICS.....   | 214 |
| 7.2.1                 | Global statement of conformance .....   | 214 |
| 7.2.2                 | DMIF-Application Interface.....   | 214 |
| 7.3                   | The Conformance ATS.....  | 224 |
| 7.3.2                 | ATS for DAI in Remote Interactive Scenarios .....   | 225 |
| 7.3.3                 | ATS for DAI in Local Storage Scenarios.....   | 226 |
| 7.3.4                 | ATS for DAI in Broadcast Scenarios .....  | 231 |
| 8                     | SNHC .....  | 235 |
| 8.1                   | Introduction.....   | 235 |
| 8.1.1                 | Purpose & Scope.....  | 236 |
| 8.1.2                 | Intended Use of Decoders .....  | 236 |
| 8.1.3                 | What Is To Be Tested .....  | 236 |
| 8.2                   | Body Animation .....  | 236 |
| 8.2.1                 | Simple FBA Profile .....  | 236 |
| 8.2.2                 | FBA Conformance Points.....   | 237 |
| 8.2.3                 | FBA Testing Conditions .....  | 238 |
| 8.3                   | 3D Mesh Coding .....  | 242 |
| 8.3.1                 | Conformance Points .....  | 243 |
| 8.3.2                 | Bitstream Conformance.....  | 243 |
| 8.3.3                 | Decoder Conformance.....  | 244 |
| Annex A (informative) | Sample Bank Format (SASBF) compliance testing and materials .....   | 250 |
| Annex B (informative) | Complexity measurement criteria and tool for level definitions of algorithmic synthesis and AudioFX Object Type ..... | 273 |
| Annex C (Informative) | Test bitstreams for the CELP object type.....   | 292 |
| Annex D (informative) | Patent statements.....  | 295 |
| Annex E (informative) | Revised Text for Agreement with Sun Microsystems.....   | 297 |
| Bibliography.....     |   | 298 |

This is a preview of "ISO/IEC 14496-4:2004". [Click here to purchase the full version from the ANSI store.](#)

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

ISO/IEC 14496-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology, Subcommittee SC 29, Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 14496-4:2000), which has been technically revised.

ISO/IEC 14496 consists of the following parts, under the general title *Information technology — Coding of audio-visual objects*:

- *Part 1: Systems*
- *Part 2: Visual*
- *Part 3: Audio*
- *Part 4: Conformance testing*
- *Part 5: Reference software*
- *Part 6: Delivery Multimedia Integration Framework (DMIF)*
- *Part 7: Optimised reference software for coding of audio-visual objects*
- *Part 8: Carriage of ISO/IEC 14496 contents over IP networks*
- *Part 9: Reference hardware description*
- *Part 10: Advanced Video Coding*
- *Part 11: Scene description and application engine*
- *Part 12: ISO base media file format*
- *Part 13: Intellectual Property Management and Protection (IPMP) extensions*
- *Part 14: MP4 file format*
- *Part 15: Advanced Video Coding (AVC) file format*
- *Part 16: Animation Framework eXtension (AFX)*
- *Part 17: Streaming text format*
- *Part 18: Font compression and streaming*
- *Part 19: Synthesized texture stream*

## Introduction

Parts 1, 2 and 3 of ISO/IEC 14496 specify a multiplex structure and coded representations of audio-visual information. Parts 1, 2 and 3 of ISO/IEC 14496 allow for large flexibility, achieving suitability of ISO/IEC 14496 for many different applications. The flexibility is obtained by including parameters in the bitstream that define the characteristics of coded bitstreams. Examples are the audio sampling frequency, picture size, picture shape, picture rate, bitrate parameters, synchronisation timestamps, the association of bitstreams and synthetic objects within objects, the association of objects within scenes, the protection of bitstreams, objects and scenes. Part 6 of ISO/IEC 14496 specifies a framework for uniform delivery of MPEG-4 content according to the requested associated QoS, irrespective of their location and the transport technology.

This part of ISO/IEC 14496 specifies how tests can be designed to verify whether bitstreams and decoders meet the requirements as specified in parts 1, 2, 3 and 6 of ISO/IEC 14496 and allow interoperability with remote terminals in interactive, broadcast and local (with stored contents) sessions. These tests can be used for various purposes such as:

- manufacturers of encoders, and their customers, can use the tests to verify whether the encoder produces bitstreams compliant with parts 1, 2 and 3 of ISO/IEC 14496.
- manufacturers of decoders and their customers can use the tests to verify whether the decoder meets the requirements specified in parts 1, 2 and 3 of ISO/IEC 14496 for the claimed decoder capabilities.
- manufacturers and customers of terminals supporting interactive, broadcast and local sessions over a multitude of transport protocols and networks, can use the tests to verify whether the claimed functionalities are compliant with ISO/IEC 14496-6.
- manufacturers of test equipments, and their customers can use the tests to verify compliance with parts 1, 2 and 3 of ISO/IEC 14496.