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

**Part 4:
Conformance testing**

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

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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.

Attention is drawn to the possibility that some of the elements of this part of ISO/IEC 14496 may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard 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*.

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)*

Annexes A to D of this part of ISO/IEC 14496 are for information only.

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.

The text of ISO/IEC 14496-4 and the electronic attachments to this International Standard are provided on four CD-ROMs. All test sequences and bitstreams mentioned in the text of the standard are on these CD-ROMs.

- CD 1 contains all ISO/IEC 14496-1 and ISO/IEC 14496-2 sequences as well as those ISO/IEC 14496-3 which are not included on CD 2, CD 3 and CD 4.
- CD 2 contains ISO/IEC 14496-3 audio AAC lc, AAC ltp, AAC main and Twin-VQ sequences.
- CD 3 contains ISO/IEC 14496-3 audio AAC scalable and original sine-sweep sequences.
- CD 4 contains ISO/IEC 14496-3 audio AAC SSR sequences and International Standard ISO/IEC 14496-4.

Each CD-ROM contains a text file cdX.sum with a list of file names followed on the next line by a checksum, output of the Unix utility "sum". This allows the integrity of zip files to be checked.

Information technology — Coding of audio-visual objects — Part 4: Conformance testing

1 General

1.1 Scope

This part of ISO/IEC 14496 specifies how tests can be designed to verify whether bitstreams and decoders meet requirements specified in parts 1, 2 and 3 of ISO/IEC 14496 and for part 6 of ISO/IEC 14496 it specifies how tests can be designed for bitstream delivery over various delivery technologies in an interoperable transparent manner to parts 1, 2 and 3. In this part of ISO/IEC 14496, encoders are not addressed specifically. An encoder may be said to be an ISO/IEC 14496 encoder if it generates bitstreams compliant with the syntactic and semantic bitstream requirements specified in parts 1, 2 and 3 of ISO/IEC 14496.

Characteristics of coded bitstreams and decoders are defined for parts 1, 2 and 3 of ISO/IEC 14496. The characteristics of a bitstream define the subset of the standard that is exploited in the bitstream. Examples are the applied values or range of the picture size and bitrate parameters. Decoder characteristics define the properties and capabilities of the applied decoding process. An example of a property is the applied arithmetic accuracy. The capabilities of a decoder specify which coded bitstreams the decoder can decode and reconstruct, by defining the subset of the standard that may be exploited in decodable bitstreams. A bitstream can be decoded by a decoder if the characteristics of the coded bitstream are within the subset of the standard specified by the decoder capabilities.

Procedures are described for testing conformance of bitstreams and decoders to the requirements defined in parts 1, 2 and 3 of ISO/IEC 14496. Given the set of characteristics claimed, the requirements that must be met are fully determined by parts 1, 2 and 3 of ISO/IEC 14496. This part of ISO/IEC 14496 summarises the requirements, cross references them to characteristics, and defines how conformance with them can be tested. Guidelines are given on constructing tests to verify bitstream and decoder conformance. This document gives guidelines on how to construct bitstream test suites to check or verify decoder conformance. In addition, some test bitstreams implemented according to those guidelines are provided as an electronic annex to this document. The procedures and signaling messages for session and channel establishment are defined in part 6 of ISO/IEC 14496.

Conformance with the signaling messages and procedures in this part of ISO/IEC 14496 are defined in accordance to the specifications in part 6 of ISO/IEC 14496. This specification allows the manufacturer to identify the conformance of the signaling message in a static review and provides abstract test cases to test the conformance to the procedures in a dynamic review of an implementation as defined in ISO/IEC 9646 Conformance Testing standard.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14496. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 14496 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 639:1988, *Code for the representation of names of languages*.

ISO/IEC 14496-4:2000(E)

ISO 8859-1:1987, *Information processing - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1.*

IEC 461:1986, *Time and control code for video tape recorders.*

IEC 908:1987, *Compact disc digital audio system.*

ITU-T Rec. T.81 (1992)||ISO/IEC 10918-1:1994, *Information technology - Digital compression and coding of continuous-tone still images: Requirements and guidelines.*

ISO/IEC 9646-1, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts.*

ISO/IEC 9646-2, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification.*

ISO/IEC 9646-7, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements.*

ISO/IEC 11172-1:1993, *Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 1: Systems.*

ISO/IEC 11172-2:1993, *Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 2: Video.*

ISO/IEC 11172-3:1993, *Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 3: Audio.*

ISO/IEC 11172-4:1993, *Information technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part 4: Compliance testing.*

ITU-T Rec. H.222.0(1995)||ISO/IEC 13818-1:1996, *Information technology - Generic coding of moving pictures and associated audio information: Systems.*

ITU-T Rec. H.262(1995)||ISO/IEC 13818-2:1996, *Information technology - Generic coding of moving pictures and associated audio information: Video.*

ISO/IEC 13818-3:1998, *Information technology - Generic coding of moving pictures and associated audio information - Part 3: Audio.*

ISO/IEC 13818-7:1997, *Information technology - Generic coding of moving pictures and associated audio information - Part 7: Advanced Audio Coding (AAC).*

ISO/IEC 14496-1:1999, *Information technology - Coding of audio-visual objects - Part 1: Systems.*

ISO/IEC 14496-2:1999, *Information technology - Coding of audio-visual objects - Part 2: Visual.*

ISO/IEC 14496-3:1999, *Information technology - Coding of audio-visual objects - Part 3: Audio.*

ISO/IEC 14496-6:1999, *Information technology - Coding of audio-visual objects - Part 6: Delivery Multimedia Integration Framework (DMIF).*

Recommendations and reports of the CCIR, 1990 XVIIth Plenary Assembly, Dusseldorf, 1990 Volume XI - Part 1 Broadcasting Service (Television) Recommendation ITU-R BT.601-3, *Encoding parameters of digital television for studios.*

CCIR Volume X and XI Part 3 Recommendation ITU-R BR.648, *Recording of audio signals.*

CCIR Volume X and XI Part 3 Report ITU-R 955-2, *Satellite sound broadcasting to vehicular, portable and fixed receivers in the range 500 - 3000Mhz.*

IEEE Standard Specifications for the Implementations of 8 x 8 Inverse Discrete Cosine Transform, IEEE Std 1180-1990, December 6, 1990.

ITU-T Rec. H.261 (Formerly CCITT Rec. H.261), *Video codec for audiovisual services at p x 64 kbit/s*, Geneva, 1990.

2 Technical elements

2.1 Definitions

Relevant definitions for this part of ISO/IEC 14496 can be found in ISO/IEC 14496-1, ISO/IEC 14496-2, ISO/IEC 14496-3 and ISO/IEC 14496-6 for Systems, Visual, Audio and DMIF definitions respectively.

2.2 Abbreviations and symbols

Relevant abbreviations and symbols for this part of ISO/IEC 14496 can be found in ISO/IEC 14496-1, ISO/IEC 14496-2, ISO/IEC 14496-3 and ISO/IEC 14496-6 for Systems, Visual, Audio and DMIF definitions respectively.

3 Systems

3.1 Conformance Points

Figure 3-1 illustrates a typical MPEG-4 terminal, as per the specifications of the Systems Decoder Model as identified in ISO/IEC 14496-1. With reference to this model, the following conformance point types have been identified.

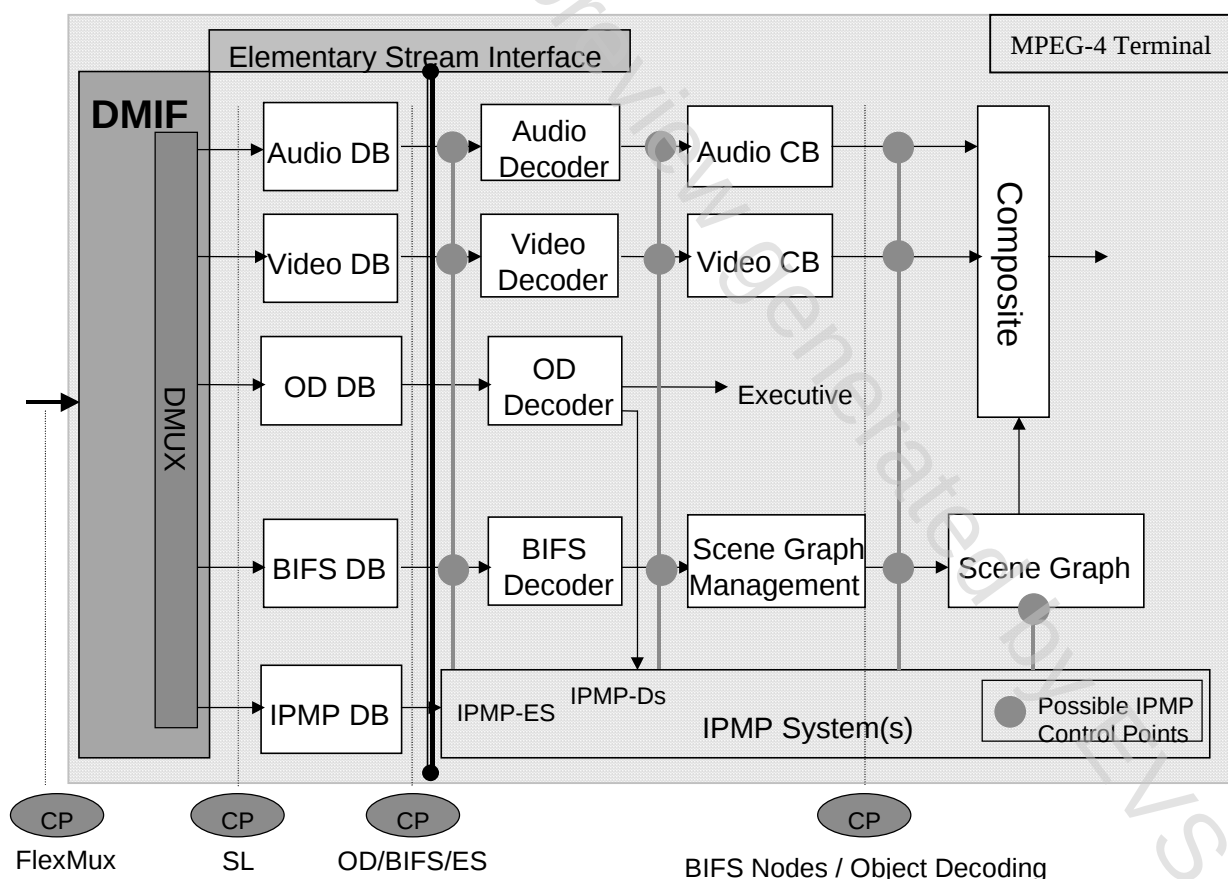


Figure 3-1 — Typical MPEG-4 terminal