TECHNICAL REPORT

ISO/IEC TR 14496-9

Second edition
2008-08-15

Information technology — Coding of audio-visual objects —

Part 9: Reference hardware description

Technologies de l'information — Codage des objets audiovisuels —
Partie 9: Description de matériel de référence

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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. 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.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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.

ISO/IEC TR 14496-9, which is a Technical Report of type [3], 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 TR 14496-9:2004) which has been technically revised.

ISO/IEC TR 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: Optimized reference software for coding of audio-visual objects* [Technical Report]

— *Part 8: Carriage of ISO/IEC 14496 contents over IP networks*

— *Part 9: Reference hardware description* [Technical Report]

— *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*

— *Part 20: Lightweight Application Scene Representation (LASeR) and Simple Aggregation Format (SAF)*

— *Part 21: MPEG-J Graphics Framework eXtensions (GFX)*

— *Part 22: Open font format*

— *Part 23: Symbolic Music Representation*

— *Part 24: Audio and systems interaction* [Technical Report]

— *Part 25: 3D Graphics Compression Model*

Introduction

The main goal of this Technical Report is to facilitate a more widespread use of the MPEG-4 standard.

Design methodologies of the EDA industry have evolved from schematics to Hardware Description Languages (HDLs) to address the needs of the vast number of gates available on a single device. The increased number of gates allowed more elaborate algorithms to be deployed but also required a shift in design paradigm to handle the complexity created. Through HDLs, more complicated systems could be designed faster through the enabling technology of synthesis of the HDL code towards different silicon technologies where trade offs could be explored. Now the EDA industry again faces challenges where HDLs may not provide the level of abstraction needed for system designers to evaluate system level parameters and complexity issues. There have been a number of tool investigations under way to address this problem. Profiling tools aid in exposing bottlenecks in an abstract way so that early design decisions can be made. C to gates tools allow a C based simulation environment while also enabling direct synthesis to gates for hardware acceleration.

In conclusion, it is the aim of this Technical Report to enable more widespread use of the MPEG-4 standard through reference hardware descriptions and close integration with ISO/IEC TR 14496-7 (MPEG-4 Part 7 Optimized Reference Software). Additionally, it is aimed that exposure to such a platform will enable a more systematic way to investigate the complexity of new codecs and open up the algorithm search space with an order of magnitude more compute cycles.

Information technology — Coding of audio-visual objects —

Part 9:
Reference hardware description

1 Scope

This Technical Report specifies descriptions of the main video coding tools in hardware description language (HDL) form. Such alternative descriptions to the ones that are reported in ISO/IEC 14496-2, ISO/IEC 14496-5 and ISO/IEC TR 14496-7 correspond to the need of providing the public with conformant standard descriptions that are closer to the starting point of the development of codec implementations than textual descriptions or pure software descriptions. This part of ISO/IEC 14496 contains conformant descriptions of video tools that have been validated within the recommendation ISO/IEC TR 14496-7.

2 Copyright disclaimer for HDL software modules

Each HDL module, and all derivative modules, shall be accompanied by the following copyright disclaimer:

```
/************************************************************************
This software module was originally developed by
    <Family Name>, <Name>, <email address>, <Company Name>
    (date: <month>,<year>)
and edited by: <Family Name>, <Name>,<email address>
This HDL module is an implementation of a part of one or more MPEG-4
tools(ISO/IEC 14496).
ISO/IEC gives users of the MPEG-4 free license to this HDL module or
modifications thereof for use in hardware or software products claiming
conformance to the MPEG-4 Standard.
Those intending to use this HDL module in hardware or software products are
advised that its use may infringe existing patents.
The original developer of this HDL module and his/her company, the subsequent
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module or modifications thereof in an implementation.
Copyright is not released for non MPEG-4 Video conforming products.
<Company Name> retains full right to use the code for his/her own purpose, assign
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code for non MPEG standard conforming products.
This copyright notice must be included in all copies or derivative works.
Copyright (c) <year>.
Module Name:  <module_name>.vhd
Abstract:

Revision History:
************************************************************************/
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