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

**Part 33:
Internet video coding**

Technologies de l'information — Codage des objets audiovisuels —

Partie 33: Codage vidéo Internet

**(<https://standards.iteh.ai>)
Document Preview**

ISO/IEC 14496-33:2019

<https://standards.iteh.ai/catalog/standards/iso/17bc2d01-119c-460c-b501-e216b6df343c/iso-iec-14496-33-2019>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC 14496-33:2019

<https://standards.iteh.ai/catalog/standards/iso/17bc2d01-119c-460c-b501-e216b6df343c/iso-iec-14496-33-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviations	7
5 Conventions	7
5.1 Arithmetic operators	7
5.2 Logical operators	8
5.3 Relational operators	8
5.4 Bitwise operators	8
5.5 Assignment	8
5.6 Order of operation precedence	9
5.7 Mathematical functions	9
5.8 Variables, syntax elements and tables	10
5.9 Text description of logical operations	11
5.10 Processes	12
5.11 Description of bitstream syntax parsing process and decoding process	12
5.11.1 Method of describing bitstream syntax	12
5.11.2 Syntax functions	14
5.11.3 Syntax descriptors	15
5.11.4 Reserved, forbidden and marker bit	16
6 Source, coded, decoded and output data formats	16
6.1 Source	16
6.2 Colour format	16
6.3 Coded bitstream format	17
6.4 Sequence header	17
6.5 Frame	17
6.6 Frame types	17
6.7 Slice	18
6.8 Macroblock	18
6.9 Block	18
6.10 Frame re-ordering	19
6.11 Reference frames	19
6.12 Inverse scanning processes and derivation processes for neighbours	20
6.12.1 General	20
6.12.2 Inverse macroblock scanning process	20
6.12.3 Inverse macroblock partition scanning process	20
6.12.4 Inverse 8x8 luma block scanning process	21
6.12.5 Inverse 4x4 luma block scanning process	21
6.12.6 Derivation process of the availability for macroblock addresses	21
6.12.7 Derivation process for neighbouring macroblock addresses and their availability	22
6.12.8 Derivation processes for neighbouring macroblocks, blocks, and partitions	23
6.12.9 Derivation process for neighbouring locations	25
7 Syntax and semantics	26
7.1 Bitstream syntax	26
7.1.1 Start codes	26
7.1.2 Video sequence	27
7.1.3 Frame	28
7.1.4 Slice	30
7.1.5 Macroblock	30

	7.1.6	Block.....	33
7.2		Video bitstream semantics.....	34
	7.2.1	Start code.....	34
	7.2.2	Video sequence.....	34
	7.2.3	Frame.....	37
	7.2.4	Slice.....	38
	7.2.5	Macroblock.....	38
	7.2.6	Block.....	41
8		Decoding process.....	41
8.1		General.....	41
8.2		Intra prediction.....	42
	8.2.1	General.....	42
	8.2.2	Intra_4x4 prediction process for luma samples.....	42
	8.2.3	Intra_8x8 prediction process for luma samples.....	45
	8.2.4	Intra_16x16 prediction process for luma samples.....	47
	8.2.5	Intra prediction for 8x8 chroma block.....	49
8.3		Inter prediction.....	51
	8.3.1	General.....	51
	8.3.2	Derivation process for motion vector components and reference indices.....	52
	8.3.3	Decoding process for inter prediction samples.....	60
8.4		Transform coefficient decoding process and frame reconstruction process.....	69
	8.4.1	General.....	69
	8.4.2	Inverse scanning.....	70
	8.4.3	Inverse quantization.....	71
	8.4.4	Inverse transform process.....	74
	8.4.5	Reconstruction.....	79
8.5		Loop filtering.....	79
8.6		Reference frame buffer management.....	81
9		Parsing process.....	82
9.1		General.....	82
9.2		ue(v).....	82
9.3		Parsing process for transform coefficient levels.....	82
9.4		ae(v).....	83
	9.4.1	General.....	83
	9.4.2	Description.....	83
	9.4.3	Initialization.....	84
	9.4.4	Binarization process.....	84
	9.4.5	Parsing binary string.....	87
10		Profiles and levels.....	97
10.1		General.....	97
10.2		Profiles.....	98
10.3		Levels.....	98

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).

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).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

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 www.iso.org/members.html.

Introduction

This document specifies Internet video coding, a video compression technology that is intended to be suitable for video distribution models currently adopted on the Internet.

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.

ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO and IEC. Information may be obtained from:

Nokia Technologies Oy

Joensuunkatu 7E

FIN-24100 Salo

FINLAND

Telephone : +358 50 366 2022

Apple Inc.

Intellectual Property and Licensing

1 Infinite Loop, MS 169-3IPL

Cupertino, CA 95014

USA

Telephone: +1(408) 974-0015

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC 14496-33:2019

<https://standards.iteh.ai/catalog/standards/iso/17bc2d01-119c-460c-b501-e216b6df343c/iso-iec-14496-33-2019>

Industry-University Cooperation Foundation Hanyang University

222 Wangsimni-ro, Seongdong-gu

Seoul 04763

REPUBLIC OF KOREA

Telephone: +82-2-2220-2212

Mitsubishi Electric Corporation
Corporate Licensing Division
2-7-3 Marunouchi, Chiyoda-ku
Tokyo 100-8310
JAPAN
Telephone: +81-3-3218-3465

QUALCOMM Incorporated
5775 Morehouse Drive
San Diego, CA 92121
USA
Telephone: +1 (858) 587-1121

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 above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC 14496-33:2019

<https://standards.iteh.ai/catalog/standards/iso/17bc2d01-119c-460c-b501-e216b6df343c/iso-iec-14496-33-2019>