

Fourth edition
2019-01

Information technology — Coding of audio-visual objects —

Part 22: Open Font Format

*Technologies de l'information — Codage des objets audiovisuels —
Partie 22: Format de police de caractères ouvert*



Reference number
ISO/IEC 14496-22:2019(E)

© ISO/IEC 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

This is a preview of "ISO/IEC 14496-22:201...". [Click here to purchase the full version from the ANSI store.](#)

Contents

	Page
Foreword	vii
Introduction.....	viii
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	1
3.1 Terms and definitions	1
3.2 Abbreviated terms	2
4 The Open Font file format.....	3
4.1 Description	3
4.2 Filenames	3
4.3 Data types	3
4.4 Table version numbers	4
4.5 Top-level OFF organization	5
4.5.1 Offset table	5
4.5.2 Table directory	5
4.5.3 Calculating checksums	6
4.6 Font collections	6
4.6.1 The Font Collection overview	6
4.6.2 The Font Collection file structure	7
4.6.3 TTC header	7
5 Open font tables	8
5.1 General	8
5.2 Required common tables	8
5.2.1 List of required tables	8
5.2.2 cmap – Character to glyph index mapping table	9
5.2.3 head – Font header.....	21
5.2.4 hhea – Horizontal header.....	23
5.2.5 hmtx – Horizontal metrics	24
5.2.6 maxp – Maximum profile	25
5.2.7 name – Naming table.....	26
5.2.8 OS/2 – Global font information table	45
5.2.9 Font class parameters	67
5.2.10 post – PostScript.....	67
5.3 Tables related to TrueType outlines.....	69
5.3.1 List of TrueType outlines tables	69
5.3.2 cvt – Control value table.....	69
5.3.3 fpgm – Font program	69
5.3.4 glyf – Glyph data.....	70
5.3.5 loca – Index to location.....	75
5.3.6 prep – Control value program.....	75
5.3.7 gasp – Grid-fitting and scan-conversion procedure table	76
5.4 Tables related to CFF outlines	78
5.4.1 List of CFF outline tables.....	78
5.4.2 CFF – Compact Font Format (version 1) table	78
5.4.3 CFF2 – Compact Font Format (version 2) table	78
5.4.4 VORG – Vertical origin table	88
5.5 Table for SVG glyph outlines	89
5.5.1 SVG – The SVG (Scalable Vector Graphics) table	89
5.5.2 Color Palettes	90
5.5.3 Glyph Identifiers	91
5.5.4 Glyph Semantics and Metrics	91
5.5.5 Glyph Rendering.....	91
5.5.6 SVG glyph examples	93

This is a preview of "ISO/IEC 14496-22:201...". [Click here to purchase the full version from the ANSI store.](#)

5.6	Tables related to bitmap glyphs.....	98
5.6.1	List of bitmap glyph tables	98
5.6.2	EBDT – Embedded bitmap data table.....	98
5.6.3	EBLC – Embedded bitmap location table	101
5.6.4	EBSC – Embedded bitmap scaling table.....	108
5.6.5	CBDT – Color bitmap data table.....	109
5.6.6	CBLC – Color bitmap location table	111
5.6.7	sbix – Standard bitmap graphics table.....	112
5.7	Optional tables.....	114
5.7.1	DSIG – Digital signature table	115
5.7.2	hdmx – Horizontal device metrics.....	117
5.7.3	kern – Kerning.....	118
5.7.4	LTSH – Linear threshold	120
5.7.5	MERG – Merge table	121
5.7.6	meta – Metadata table	125
5.7.7	PCLT – PCL 5 table.....	128
5.7.8	VDMX – Vertical device metrics	135
5.7.9	vhea – Vertical header table	137
5.7.10	vmtx – Vertical metric table	141
5.7.11	COLR – Color Table	143
5.7.12	CPAL – Palette Table.....	144
6	Advanced Open Font layout tables.....	147
6.1	Advanced Open Font layout extensions	147
6.1.1	Overview of advanced typographic layout extensions.....	147
6.1.2	TrueType versus OFF layout	149
6.1.3	OFF layout terminology	149
6.1.4	Text processing with OFF layout	151
6.1.5	OFF layout and Font variations.....	153
6.2	OFF layout common table formats	153
6.2.1	Overview	153
6.2.2	OFF layout and Font variations.....	154
6.2.3	Table organization	155
6.2.4	Scripts and languages	156
6.2.5	Features and lookups.....	159
6.2.6	Coverage table	162
6.2.7	Class definition table.....	164
6.2.8	Device and VariationIndex tables.....	165
6.2.9	Feature variations	167
6.2.10	Common table examples	170
6.3	Advanced typographic tables.....	178
6.3.1	BASE Baseline table.....	178
6.3.2	GDEF – The glyph definition table	199
6.3.3	GPOS – The glyph positioning table.....	211
6.3.4	GSUB – The glyph substitution table	263
6.3.5	JSTF – The justification table.....	296
6.3.6	MATH – The mathematical typesetting table	306
6.4	Layout tag registry.....	322
6.4.1	Scripts tags	323
6.4.2	Language tags.....	327
6.4.3	Feature tags.....	344
6.4.4	Baseline tags.....	406
7	OFF font variations	410
7.1	Font variations overview.....	410
7.1.1	General.....	410
7.1.2	Terminology	412
7.1.3	Variation space, default instances and adjustment deltas	414
7.1.4	Coordinate scales and normalization.....	417
7.1.5	Variation data	419
7.1.6	Variation data tables and miscellaneous requirements	428
7.1.7	Algorithm for interpolation of instance values.....	429

This is a preview of "ISO/IEC 14496-22:201...". [Click here to purchase the full version from the ANSI store.](#)

7.1.8	Interpolation example	432
7.1.9	Dynamic generation of static instance fonts	437
7.2	Font variations common table formats	438
7.2.1	Overview	438
7.2.2	Tuple variation store	439
7.2.3	Item variation stores	446
7.2.4	Design-variation axis tag registry	450
7.3	Font variations tables	455
7.3.1	avar – Axis variations table	455
7.3.2	cvar – CVT variations table	459
7.3.3	fvar – Font variations table	461
7.3.4	gvar – Glyph variations table	468
7.3.5	HVAR – Horizontal metrics variations table	478
7.3.6	MVAR – Metrics variations table	481
7.3.7	STAT – Style attributes table	485
7.3.8	VVAR – Vertical metrics variations table	497
8	Recommendations for OFF fonts	499
8.1	Byte ordering	499
8.2	'sfnt' version	499
8.3	Mixing outline formats	499
8.4	Filenames	499
8.5	Table alignment and length	500
8.6	Glyph 0: the .notdef glyph	500
8.7	'BASE' table	500
8.8	'cmap' table	500
8.9	'cvt' table	501
8.10	'fpgm' table	501
8.11	'glyf' table	501
8.12	'hdmx' table	501
8.13	'head' table	501
8.14	'hhea' table	501
8.15	'hmtx' table	502
8.16	'kern' table	502
8.17	'loca' table	502
8.18	'LTSH' table	502
8.19	'maxp' table	502
8.20	'name' table	502
8.21	'OS/2' table	504
8.22	'post' table	505
8.23	'prep' table	505
8.24	'VDMX' table	505
8.25	TrueType Collections	505
9	General recommendations	506
9.1	Optimized table ordering	506
9.2	Non-standard (Symbol) fonts	506
9.3	Baseline to baseline distances	506
9.4	Style bits	507
9.5	Drop-out control	507
9.6	Embedded bitmaps	507
9.7	OFF CJK font guidelines	508
9.8	Stroke reduction in variable fonts	508
9.9	Families with optical size variants	508
Annex A (informative)	Font Class and Font Subclass parameters	510
Annex B (informative)	Earlier versions of OS/2 – OS/2 and Windows metrics	521
Annex C (informative)	OFF Mirroring Pairs List	596
Annex D (informative)	The CFF2 CharString Format	603
Annex E (informative)	CFF2 DICT Encoding	622

This is a preview of "ISO/IEC 14496-22:201...". [Click here to purchase the full version from the ANSI store.](#)

Annex F (informative) Registration of Media Type: application/font-sfnt.....	624
Bibliography.....	627

This is a preview of "ISO/IEC 14496-22:201...". 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.

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) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

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

This fourth edition cancels and replaces the third edition (ISO/IEC 14496-22:2015), which has been technically revised. It also incorporates the Amendments ISO/IEC 14496-22:2015/Amd.1:2017 and ISO/IEC 14496-22:2015/Amd.2:2017.

The main changes compared to the previous edition are as follows:

- new technology clauses were added;
- many existing clauses, subclauses, tables, figures and annexes were editorially revised.

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

Multimedia applications require a broad range of media-related standards. In addition to the typical audio and video applications, multimedia presentations include scalable 2D graphics and text supporting all languages of the world. Faithful reproduction of scalable multimedia content requires additional components including scalable font technology. The Open Font Format, which is based on the OpenType®¹ font format, was originally developed as an extension of the TrueType®² font format, adding support for PostScript®³ Compact Font Format (CFF) font data. OFF fonts and the operating system services which support OFF fonts provide users with a simple way to install and use fonts, whether the fonts contain TrueType outlines or CFF (PostScript Type1) outlines.

The Open Font Format addresses the following goals:

- broader multi-platform support;
- excellent support for international character sets;
- excellent protection for font data;
- smaller file sizes to make font distribution more efficient;
- excellent support for advanced typographic control.

CFF data included in OFF fonts may be directly rasterized or converted to the TrueType outline format for rendering, depending on which rasterizers have been installed in the host operating system. But the user model is the same: OFF fonts just work. Users will not need to be aware of the type of outline data in OFF fonts. And font creators can use whichever outline format they feel provides the best set of features for their work, without worrying about limiting a font's usability.

OFF fonts can include the OFF Layout tables, which allow font creators to design broader international and high-end typographic fonts. The OFF Layout tables contain information on glyph substitution, glyph positioning, justification, and baseline positioning, enabling text-processing applications to improve text layout.

As with TrueType fonts, OFF fonts allow the handling of large glyph sets using Unicode encoding. Such encoding allows broad international support, as well as support for typographic glyph variants.

Additionally, OFF fonts may contain digital signatures, which allows operating systems and browsing applications to identify the source and integrity of font files, including embedded font files obtained in web documents, before using them. Also, font developers can encode embedding restrictions in OFF fonts which cannot be altered in a font signed by the developer.

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 statement of the holders of these patent rights is registered with ISO and IEC.

¹ OpenType® is the trademark of a product supplied by Microsoft. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of this product.

² TrueType® is the trademark of a product supplied by Apple Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of this product.

³ PostScript® is the trademark of a product supplied by Adobe Systems Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO or IEC of this product.

This is a preview of "ISO/IEC 14496-22:201...". [Click here to purchase the full version from the ANSI store.](#)

Information may be obtained from:

Apple Inc.
1 Infinite Loop MS 3-PAT
US-Cupertino, CA 95014-2084
Tel.: +1 408 974 9453
Email: iplaw@apple.com

Microsoft Corporation
Interoperability Group 3460 157th Avenue NE
US-Redmond, WA 98052
Tel.: +1 425 882 80 80

Monotype Imaging Inc.
500 Unicorn Park Drive
US-Woburn, MA 01801
Tel.: +1 781-970-6088
E-mail: vladimir.levantovsky@monotypeimaging.com

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.