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Information technology — Coded representation of immersive media —

Part 2: Omnidirectional media format

*Technologies de l'information — Représentation codée de média
immersifs — Partie 2: Format de média omnidirectionnel*

Withhold



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Contents

Foreword	vii
Introduction	viii
1 Scope	1
2 Normative references	1
3 Terms, definitions, abbreviated terms, and conventions	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	6
3.3 Arithmetic operators and mathematical functions	7
3.4 Order of operation precedence	8
3.5 Range notation	9
3.6 Variables	9
3.7 Processes	9
4 Overview	9
4.1 Organization of this document	9
4.2 Overall architecture for omnidirectional media with projected video	10
4.2.1 Overview	10
4.2.2 Stitching, rotation, projection, and region-wise packing	11
4.3 Overall architecture for omnidirectional media with fisheye video	12
4.4 Conformance and interoperability	13
4.4.1 General	13
4.4.2 Media profiles	14
4.4.3 Presentation profiles	15
4.4.4 Summary of referenceable code points	16
5 Omnidirectional video projection and region-wise packing	19
5.1 Coordinate system	19
5.2 Omnidirectional projection formats	20
5.2.1 General	20
5.2.2 Equirectangular projection for one sample location	20
5.2.3 Cubemap projection for one sample location	21
5.3 Conversion from the local coordinate axes to the global coordinate axes	23
5.4 Region-wise packing formats	24
5.4.1 General	24
5.4.2 Conversion of one sample location for rectangular region-wise packing	24
6 Fisheye omnidirectional video	25
6.1 General	25
6.2 FisheyeVideoEssentialInfoStruct syntax structure	26
6.2.1 Syntax	26
6.2.2 Semantics	26
6.3 FisheyeVideoSupplementalInfoStruct syntax structure	29
6.3.1 Syntax	29

6.3.2	Semantics	30
7	Omnidirectional media storage and metadata signalling in the ISOBMFF	33
7.1	Generic extensions to the ISOBMFF	33
7.1.1	Stereoscopic video track grouping	33
7.1.2	Indication of <code>track_group_id</code> uniqueness	34
7.1.3	Updated semantics of <code>track_IDs</code> of the track reference box	34
7.1.4	Indication of a track not intended to be presented alone	34
7.1.5	Timed metadata tracks	34
7.1.6	Compatible scheme type box	35
7.1.7	Multiple transformations for a single transformed media track	35
7.1.8	The ' <code>codecs</code> ' parameter for a transformed media track	35
7.1.9	Track type box	36
7.1.10	Clarifications on the stereo video box	36
7.2	Generic extensions to ISO/IEC 14496-15	37
7.2.1	Alternative extraction source track grouping	37
7.2.2	Tile base track association with coverage information box and timed metadata data track	37
7.3	OMAF-specific extensions to the ISOBMFF	37
7.3.1	Sync samples in timed metadata tracks	37
7.4	OMAF-specific extensions to ISO/IEC 14496-15	37
7.4.1	Coverage information box in a tile base track	37
7.5	Structures and semantics that are common for video tracks and image items	38
7.5.1	Semantics of sample locations within a decoded picture	38
7.5.2	Projection format structure	41
7.5.3	Region-wise packing structure	41
7.5.4	Rotation structure	48
7.5.5	Content coverage structure	48
7.5.6	Sphere region structure	49
7.6	Restricted video schemes for omnidirectional video	51
7.6.1	Scheme types	51
7.6.2	Projected omnidirectional video box	54
7.6.3	Fisheye omnidirectional video box	55
7.6.4	Region-wise packing box	55
7.6.5	Rotation box	56
7.6.6	Coverage information box	56
7.7	Timed metadata for sphere regions	56
7.7.1	General	56
7.7.2	Sample entry	57
7.7.3	Sample format	58
7.7.4	Initial viewing orientation	58
7.7.5	Recommended viewport	59
7.7.6	Timed text sphere location metadata	60
7.8	Signalling of region-wise quality ranking	61
7.8.1	General	61
7.8.2	Spherical region-wise quality ranking	61
7.8.3	2D region-wise quality ranking	63
7.9	Storage of omnidirectional images	65
7.9.1	General	65
7.9.2	Frame packing item property	65
7.9.3	Projection format item property	65
7.9.4	Essential fisheye image item property	66
7.9.5	Supplemental fisheye image item property	67
7.9.6	Region-wise packing item property	67
7.9.7	Rotation item property	68

7.9.8	Coverage information item property.....	68
7.9.9	Initial viewing orientation item property	69
7.10	Storage of timed text for omnidirectional video	69
7.10.1	General	69
7.10.2	OMAF timed text configuration box	70
7.10.3	IMSC1 tracks.....	72
7.10.4	WebVTT tracks	73
8	Omnidirectional media encapsulation and signalling in DASH	73
8.1	Architecture of DASH delivery in OMAF	73
8.2	Usage of DASH in OMAF	74
8.2.1	General	74
8.2.2	Signalling of stereoscopic frame packing	74
8.2.3	Carriage of timed metadata.....	74
8.3	DASH MPD descriptors for omnidirectional media	75
8.3.1	XML namespace and schema	75
8.3.2	Signalling of projection type information.....	75
8.3.3	Signalling of region-wise packing type	76
8.3.4	Signalling of content coverage	76
8.3.5	Signalling of spherical region-wise quality ranking.....	79
8.3.6	Signalling of 2D region-wise quality ranking.....	84
8.3.7	Signalling of fisheye omnidirectional video	88
9	Omnidirectional media encapsulation and signalling in MMT	89
9.1	Architecture of MMT delivery in OMAF	89
9.2	OMAF signalling in MPEG composition information.....	90
9.3	VR application-specific MMT signalling	90
9.3.1	General	90
9.3.2	MMT signalling.....	91
10	Media profiles	103
10.1	Video profiles.....	103
10.1.1	Overview	103
10.1.2	HEVC-based viewport-independent OMAF video profile	103
10.1.3	HEVC-based viewport-dependent OMAF video profile	106
10.1.4	AVC-based viewport-dependent OMAF video profile.....	109
10.2	Audio profiles.....	111
10.2.1	Overview	111
10.2.2	OMAF 3D audio baseline profile	111
10.2.3	OMAF 2D audio legacy profile.....	114
10.3	Image profiles.....	118
10.3.1	Overview	118
10.3.2	Common specifications for image profiles	119
10.3.3	OMAF HEVC image profile	120
10.3.4	OMAF legacy image profile.....	121
10.4	Timed text profiles	122
10.4.1	Overview	122
10.4.2	OMAF IMSC1 timed text profile	123
10.4.3	OMAF WebVTT timed text profile.....	123
11	Presentation profiles.....	124
11.1	OMAF viewport-independent baseline presentation profile.....	124
11.1.1	General (informative)	124

11.1.2 ISO base media file format constraints	124
11.2 OMAF viewport-dependent baseline presentation profile	124
11.2.1 General	124
11.2.2 ISO base media file format constraints	124
Annex A (normative) OMAF DASH schema	125
Annex B (normative) DASH integration of media profiles	128
Annex C (normative) CMAF integration of media profiles	134
Annex D (informative) Viewport-dependent omnidirectional video processing	136
Annex E (informative) DASH MPD examples	154
Annex F (informative) MMT signalling examples.....	158

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Foreword

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Introduction

When omnidirectional media content is consumed with a head-mounted display and headphones, only the parts of the media that correspond to the user's viewing orientation are rendered, as if the user were in the spot where and when the media was captured. One of the most popular forms of omnidirectional media applications is omnidirectional video, also known as 360° video. Omnidirectional video is typically captured by multiple cameras that cover up to 360° of the scene. Compared to traditional media application formats, the end-to-end technology for omnidirectional video (from capture to playback) is more easily fragmented due to various capturing and video projection technologies. From the capture side, there exist many different types of cameras capable of capturing 360° video, and on the playback side there are many different devices that are able to playback 360° video with different processing capabilities. To avoid fragmentation of omnidirectional media content and devices, a standardized format for omnidirectional media applications is specified in this document.

This document defines a media format that enables omnidirectional media applications, focusing on 360° video, images, and audio, as well as associated timed text. What is specified in this document includes (but is not limited to):

- 1) a coordinate system that consists of a unit sphere and three coordinate axes, namely the X (back-to-front) axis, the Y (lateral, side-to-side) axis, and the Z (vertical, up) axis,
- 2) projection and rectangular region-wise packing methods that may be used for conversion of a spherical video sequence or image into a two-dimensional rectangular video sequence or image, respectively,
- 3) storage of omnidirectional media and the associated metadata using the ISO base media file format (ISOBMFF) as specified in ISO/IEC 14496-12,
- 4) encapsulation, signalling, and streaming of omnidirectional media in a media streaming system, e.g., dynamic adaptive streaming over HTTP (DASH) as specified in ISO/IEC 23009-1 or MPEG media transport (MMT) as specified in ISO/IEC 23008-1, and
- 5) media profiles and presentation profiles that provide interoperable and conformance points for media codecs as well as media coding and encapsulation configurations that may be used for compression, streaming, and playback of the omnidirectional media content.

Information technology — Coded representation of immersive media —

Part 2: Omnidirectional media format

1 Scope

This document specifies the omnidirectional media format for coding, storage, delivery, and rendering of omnidirectional media, including video, images, audio, and timed text.

In an OMAF player the user's viewing perspective is from the centre of the sphere looking outward towards the inside surface of the sphere.

NOTE 1 In this document, only 3 degrees of freedom (3DOF) is supported. In other words, purely translational movement of the user does not result in different omnidirectional media being rendered to the user. For 3DOF support with stereoscopic video, when the user rolls his/her head, there could be a stereoscopic rendering issue.

NOTE 2 Omnidirectional video could contain graphics elements generated by computer graphics but encoded as video.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images — Part 1: Requirements and guidelines*

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

ISO/IEC 14496-3:2009, *Information technology — Coding of audio-visual objects — Part 3: Audio*

ISO/IEC 14496-10:2014, *Information technology — Coding of audio-visual objects — Part 10: Advanced video coding*

ISO/IEC 14496-12, *Information technology — Coding of audio-visual objects — Part 12: ISO base media file format*

ISO/IEC 14496-14, *Information technology — Coding of audio-visual objects — Part 14, MP4 file format*

ISO/IEC 14496-15:2017, *Information technology — Coding of audio-visual objects — Part 15, Carriage of network abstraction layer (NAL) unit structured video in the ISO base media file format*

ISO/IEC 14496-30:2018, *Information technology — Coding of audio-visual objects — Part 30: Timed text and other visual overlays in ISO base media file format*

ISO/IEC 23000-19:2018, *Information technology — Multimedia application format (MPEG-A) — Part 19: Common media application format (CMAF) for segmented media*

ISO/IEC 23003-4:2015, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*

ISO/IEC 23008-1:2017, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 1: MPEG media transport (MMT)*

ISO/IEC 23008-2:2017, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding*

ISO/IEC 23008-3:2015, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 3: 3D audio*

ISO/IEC 23008-12, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 12: Image file format*

ISO/IEC 23009-1, *Information technology — Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats*

ISO/IEC 23091-2¹, *Information technology — Coding-independent code points — Part 2: Video*

ISO/IEC 23091-3, *Information technology — Coding-independent code points — Part 3: Audio*

W3C Recommendation, *TTML profiles for Internet media subtitles and captions 1.0 (IMSC1)*

WebVTT: *The web video text tracks format*, W3C (Working Draft, 08 August 2017)

W3C Recommendation, *XML schema part 1: Structures*

W3C Recommendation, *XML schema part 2: Datatypes*

IETF BCP 47, *Tags for Identifying Languages*

IETF RFC 6381, *MIME Codecs and Profiles*

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