International Standard

ISO/IEC 23000-19

Information technology — Multimedia application format (MPEG-A) —

Part 19: Common media application format (CMAF) for segmented media

Technologies de l'information — Format pour application multimédia (MPEG-A) —

Partie 19: Format CMAF (Common Media Application Format) pour médias segmentés

Third edition
2024-02

Reference number
ISO/IEC 23000-19:2024(en)

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Published in Switzerland

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Foreword

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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 third edition cancels and replaces the second edition (ISO/IEC 23000-19:2020), which has been technically revised. It also incorporates the Amendment ISO/IEC 23000-19:2020/Amd.1:2021.

The main changes are as follows:

— addition of subclauses 9.6, 10.6 and 11.7,

— addition of Annexes M and N.

A list of all parts in the ISO/IEC 23000 series can be found on the ISO and IEC websites.

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 and www.iec.ch/national-committees.

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Introduction

Common media application format (CMAF) combines and constrains several MPEG specifications to define a multimedia format that is optimized for delivery of a single adaptive multimedia presentation to a variety of devices, using a variety of adaptive streaming, broadcast, download and storage methods.

Several MPEG specifications have been adopted for much of the video delivered over the internet and other IP networks (cellular, cable, broadcast, etc.). Various organizations have taken MPEG's core coding, file format and system standards and combined them into their own specifications for their specific application. While these specifications are similar, their differences result in unnecessary duplication of engineering effort and duplication of identical content in slightly different formats, which results in increased storage and delivery costs.

CMAF provides a common media specification that application specifications, such as MPEG dynamic adaptive streaming over HTTP (DASH), can reference and a common media format that allows a single encoded multimedia presentation to be used by many applications.

Clause 6 provides a description of the objects and terminology specified, the CMAF object model, and the hypothetical application model, which defines how these objects can be combined to form adaptive multimedia presentations.

The specifications in Clauses 7 through Clause 12 are terse to facilitate development and testing and assume an understanding of Clause 6. Clause 7 specifies ISO Base Media File Format boxes and structures such as movie fragments and tracks that are used to construct all CMAF media objects. Clause 8 through Clause 11 contain details specific to encryption, audio, video, and subtitle tracks. Clause 12 specifies the combination of CMAF tracks and media profiles into CMAF presentations. It also recommends how to specify additional CMAF media profiles and presentation profiles, which can be specified by other documents and organizations.

CMAF presentation profiles and CMAF media profiles are specified in annexes to allow the addition of new profiles without changing the core document. Additional informative annexes have been added to provide explanations and recommendations on specific topics.

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Information technology — Multimedia application format (MPEG-A) —

Part 19: Common media application format (CMAF) for segmented media

1 Scope

This document specifies the CMAF multimedia format, which contains segmented media objects optimized for streaming delivery and decoding on end user devices in adaptive multimedia presentations.

CMAF specifies a track format derived from the ISO base media file format, then derives addressable media objects from CMAF tracks that can be used for storage and delivery.

CMAF specifies sets of tracks that share encoding and packaging constraints that enable the selection of multiple tracks to form a multimedia presentation and allow seamless switching of alternative encodings of the same content at different bit rates, frame rates, resolution, etc.

CMAF specifies a hypothetical application model that determines how tracks in a CMAF presentation are intended to be combined and synchronized to form a multimedia presentation. The model abstracts delivery to allow any delivery method. The hypothetical application model assumes a manifest and player, but CMAF does not specify a manifest, player, or delivery protocol, with the intent that any that support the hypothetical application model can be used.

CMAF specifies media profiles and brands that constrain media encoding and packaging of CMAF tracks to enable seamless adaptive switching of tracks and allow devices to identify compatible content by its brand.

CMAF specifies presentation profiles that conditionally require sets of CMAF tracks conforming to specified media profiles and allow content creators and devices to identify compatible multimedia presentations.

CMAF enables extensibility by specifying how new media profiles and presentation profiles can be specified and identified and includes guidelines for those specifications.

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

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

ISO/IEC 14496-10, *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, *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*

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

ISO/IEC 23001-7, *Information technology — MPEG systems technologies — Part 7: Common encryption in ISO base media file format files*

ISO/IEC 23003-4:2020, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*

ISO/IEC 23003-3, *Information technology — MPEG audio technologies — Part 3: Unified speech and audio coding*

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

ISO/IEC 23008-3:2022, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 3: 3D audio*

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

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

ISO/IEC 23090-3, *Information technology — Coded representation of immersive media — Part 3: Versatile video coding*

ISO/IEC 23094-1, *Information technology — General video coding — Part 1: Essential video coding*

IETF RFC 5234, *Augmented BNF for Syntax Specifications: ABNF*[1)]

IETF RFC 6381, *The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types*[2)]

ITU-R Recommendation BT.709, *Parameter values for the HDTV standards for production and international programme exchange*

ITU-R Recommendation BT.1886, *Reference electro-optical transfer function for flat panel displays used in HDTV studio production*

ITU-R Recommendation BT.2035, *A reference viewing environment for evaluation of HDTV program material or completed programmes*

ITU-T Recommendation X.667:2014, *Information technology — Open Systems Interconnection — Procedures for the operation of OSI Registration Authorities: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 object identifier components*[3)]

ANSI/SCTE 214-1, *MPEG DASH for IP-Based Cable Services Part 1: MPD Constraints and Extensions*, https://www.scte.org/standards/library/catalog/scte-214-1-mpeg-dash-for-ip-based-cable-services-part1-mpd-constraints-and-extensions/

W3C IMSC1, *TTML Profiles for Internet Media Subtitles and Captions 1.0.1,* https://www.w3.org/TR/ttml-imsc1

W3C IMSC1.1, *TTML Profiles for Internet Media Subtitles and Captions 1.1,* https://www.w3.org/TR/ttml-imsc1.1

W3C WebVTT, *The Web Video Text Tracks Format, Candidate Recommendation 4 April* 2019 https://www.w3.org/TR/webvtt1/

W3C *TTML Media Type Definition and Profile Registry, W3C Working Group Note,* https://www.w3.org/TR/ttml-profile-registry

1) https://tools.ietf.org/html/rfc5234

2) https://tools.ietf.org/html/rfc6381

3) https://www.itu.int/rec/T-REC-X.667

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