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Foreword

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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).

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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 second edition cancels and replaces the first edition (ISO/IEC 23000-19:2018), which has been technically revised. It also incorporates the Amendments ISO/IEC 23000-19:2018/Amd.1:2018 and ISO/IEC 23000-19:2018/Amd.2:2019.

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

- addition of supplemental data brands;
- modification to the structural brand cmfc for compatibility with DASH segments;
- definition of a stricter brand 'cmf2' for legacy devices;

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- refinements and updates to HEVC media profiles for SDR and HDR;
- definition of the scalable HEVC media profile;
- definition of AAC multichannel media profiles;
- definition of MPEG-H 3D audio track format and CMAF media profile;
- definition of MPEG-D USAC track format and CMAF media profile;
- definition of IMSC1.1 media profile.

A list of all parts in the ISO/IEC 23000 series can be found on the ISO ~~and IEC websites~~[website](https://www.iso.org/standards.html).

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~~www.iso.org/members.html.

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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.](#) First-time readers of this document are advised to start with [Clause 6](#) for 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 normative specifications in Clause 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. Clauses 8 through 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.](#)

[The following is a list of the main clauses of this document, with a brief description of each.](#)

[Clause 6 describes the segmented media encoding and playback model using the media objects defined by the CMAF.](#)

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Clause ~~77~~ describes the use of ISO base media file format for the common media application format brand.

Clause ~~88~~ describes how digital rights management information and encryption is applied to the common media application format.

Clause ~~9~~ describes the general video track format, constraints for NAL structured video tracks, and the AVC video track format.

Clause ~~1010~~ describes the general audio track format and specifies two AAC audio CMAF media profiles.

Clause ~~1111~~ describes the subtitle track format, CMAF media profiles for WebVTT and IMSC1 TTML subtitles, and signalling of CTA 608/708 captions embedded in video streams.

Clause ~~1212~~ describes the general requirements for CMAF media profiles and CMAF presentation profiles.

~~Annex A specifies Annex A describes several CMAF media profiles, their brands, and a CMAF presentation profile that conditionally requires some of those media profiles. It is expected that a CMAF presentations shall presentation conform to the provisions of Annex A. Annex A.~~

~~Annex B specifies Annex B describes packaging and codec constraints for some CMAF media profiles using the HEVC video codec. Systems claiming conformance to CMAF using HEVC shall are expected to conform to the provisions of Annex B. Annex B.~~

~~Annex C informatively Annex C describes framing and encoding CMAF switching sets using subsampling and scaling of video to provide seamless playback with adaptive bit rate and scaling.~~

~~Annex D informatively Annex D describes examples of player track selection, synchronization, and adaptive switching of a CMAF presentation.~~

~~Annex E informatively Annex E describes the use of event messages attached to media objects to deliver metadata.~~

~~Annex F informatively Annex F describes maintaining presentation timing and delivery in the event of missing media samples and resources.~~

~~Annex G informatively Annex G describes encoding recommendations for AAC audio CMAF tracks conforming to adaptive CMAF switching sets.~~

~~Annex H Annex H specifies the CMAF media profile for scalable HEVC (SHVC). Systems claiming conformance to CMAF using scalable HEVC shall are expected to conform to the provisions of Annex H. Annex H.~~

~~Annex I Annex I specifies the CMAF media profile for multichannel AAC. Systems claiming conformance to CMAF using multichannel AAC shall are expected to conform to the provisions of Annex I. Annex I.~~

~~Annex J Annex J specifies the CMAF media profile for MPEG-H audio. Systems claiming conformance to CMAF using MPEG-H shall are expected to conform to the provisions of Annex J. Annex J.~~

~~Annex K Annex K specifies the CMAF media profile for MPEG-D USAC. Systems claiming conformance to CMAF using MPEG-D USAC shall are expected to conform to the provisions of Annex K. Annex K.~~

~~Annex L Annex L specifies the CMAF media profile for IMSC 1.1. Systems claiming conformance to CMAF using IMSC 1.1 shall are expected to conform to the provisions of Annex L. Annex L.~~

~~Annex M specifies Annex M describes packaging and codec constraints for some CMAF media profiles using the VVC video codec. Systems claiming conformance to CMAF using VVC shall are expected to conform to the provisions of Annex M. Annex M.~~