Byte Stream Format for CMAF

Versions:

* Initial Draft
* Version after Call Nov 11, 2019

# 1. Introduction

This specification defines segment formats for implementations that choose to support the CMAF ISO/IEC 23000-19 [CMAF] and CTA WAVE Content Specification [CTA WAVE CONTENT].

The CMAF Byte Stream Format is a restriction of the ISO BMFF BYte Stream format <https://www.w3.org/TR/mse-byte-stream-format-isobmff/> [ISO-BMFF-BYTE-STREAM].

It defines the MIME-type parameters used to signal codecs, and provides the necessary format specific definitions for [initialization segments](https://www.w3.org/TR/media-source/#init-segment), [media segments](https://www.w3.org/TR/media-source/#media-segment), and [random access points](https://www.w3.org/TR/media-source/#random-access-point) required by the [byte stream formats section](https://www.w3.org/TR/media-source/#byte-stream-formats) of the Media Source Extensions spec.

This specification addresses the requirements here: <https://www.w3.org/TR/media-source/#byte-stream-formats>

# MIME type Parameters

MIME-types for this specification must conform to the rules outlined for "audio/mp4" and "video/mp4" in [RFC 6381](http://tools.ietf.org/html/rfc6381).

Examples for appropriate MIME-type parameters for CMAF Media Profiles are for example provided in the CTA WAVE content specification, clause 4.

NOTE

Implementations may only implement a subset of the codecs and profiles mentioned in CMAF or the CTA WAVE content specification.

# Initialization Segments

1. The user agent must run the [append error algorithm](https://www.w3.org/TR/media-source/#sourcebuffer-append-error) if any of the following conditions are met:
   1. An Initialization Segment does not conform to a CMAF header as defined in [CMAF]
   2. An Initialization Segment does not conform to the constraints in<https://www.w3.org/TR/mse-byte-stream-format-isobmff/>, clause 3
2. The user agent must support setting the offset from media composition time to movie presentation time by handling an Edit Box (**edts**) containing a single Edit List Box (**elst**) that contains a single edit with media rate one. This edit may have a duration of 0 (indicating that it spans all subsequent media) or may have a non-zero duration (indicating the total duration of the movie including fragments).
3. The user agent must support codec configurations stored out-of-band in the sample entry, and for codecs which allow codec configurations stored inband in the samples themselves, the user agent MUST support codec configurations stored inband within the requirements of a CMAF media profile.
4. Valid top-level boxes such as **pdin**, **free**, and **sidx** are allowed to appear before the **moov** box. These boxes must be accepted and ignored by the user agent and are not considered part of the [initialization segment](https://www.w3.org/TR/media-source/#init-segment) in this specification.
5. The user agent must source (i.e., extract) attribute values for id, kind, label and language for [AudioTrack](https://www.w3.org/TR/html51/semantics-embedded-content.html#audiotrack-audiotrack), [VideoTrack](https://www.w3.org/TR/html51/semantics-embedded-content.html#videotrack-videotrack) and [TextTrack](https://www.w3.org/TR/html51/semantics-embedded-content.html#texttrack-texttrack) objects as described for MPEG-4 ISOBMFF in the in-band tracks spec [[INBANDTRACKS](https://www.w3.org/TR/mse-byte-stream-format-isobmff/#bib-INBANDTRACKS)] => Check CMAF more carefully

# Media Segments

An CMAF media segment is defined in this specification as by CMAF Chunk (as defined in CMAF Spec).

If the Segment Type Box is present and contains

* ‘cmff’: an CMAF media segment is defined in this specification must conform to a CMAF Fragment (as defined in CMAF Spec)
* ‘cmfs’: an CMAF media segment is defined in this specification must conform to a CMAF Segment (as defined in CMAF Spec)

If the Segment Type Box is not present, the segment must conform to the brands listed in the File Type Box (**ftyp**) in the i[nitialization segment](https://www.w3.org/TR/media-source/#init-segment).

Valid top-level boxes defined in [ISO/IEC 14496-12](http://standards.iso.org/ittf/PubliclyAvailableStandards/c061988_ISO_IEC_14496-12_2012.zip) other than **ftyp**, **moov**, **styp**, **moof**, and **mdat** are allowed to appear between the end of an [initialization segment](https://www.w3.org/TR/media-source/#init-segment) or [media segment](https://www.w3.org/TR/media-source/#media-segment) and before the beginning of a new [media segment](https://www.w3.org/TR/media-source/#media-segment). This in particular includes ‘emsg’ and ‘prft’. These boxes must be accepted and ignored by the user agent and are not considered part of the [media segment](https://www.w3.org/TR/media-source/#media-segment) in this specification.

1. The user agent must run the [append error algorithm](https://www.w3.org/TR/media-source/#sourcebuffer-append-error) if any of the following conditions are met:
   1. A Media Segment does not conform to a CMAF Chunk
   2. Inband parameter sets are not present in the appropriate samples and parameter sets are not present in the last initialization segment appended.

# Random Access

A [random access point](https://www.w3.org/TR/media-source/#random-access-point) as defined in this specification corresponds to a Stream Access Point of type 1, 2 or 3 as defined in Annex I of [ISO/IEC 14496-12](http://standards.iso.org/ittf/PubliclyAvailableStandards/c061988_ISO_IEC_14496-12_2012.zip).

# Compatibility

<Mention compatibility with ISO BMFF Byte Stream format>

# Conformance

As well as sections marked as non-normative, all authoring guidelines, diagrams, examples, and notes in this specification are non-normative. Everything else in this specification is normative.

The key words may, must, and should are to be interpreted as described in [[RFC2119](https://www.w3.org/TR/mse-byte-stream-format-isobmff/#bib-RFC2119)].

# References

## A.1 Normative references

**[CMAF]**

ISO/IEC. 23000-19

**[CTA WAVE CONTENT]**

CTA-WAVE 5001

**[MEDIA-SOURCE]**

Matthew Wolenetz; Jerry Smith; Mark Watson; Aaron Colwell; Adrian Bateman. W3C. [Media Source Extensions](https://www.w3.org/TR/media-source/). 5 July 2016. W3C Candidate Recommendation. URL: <https://www.w3.org/TR/media-source/>

**[ISO-BMFF-BYTE-STREAM]**

Matthew Wolenetz; Jerry Smith; Mark Watson; Aaron Colwell; Adrian Bateman. W3C. [ISO BMFF Byte Stream Format](https://www.w3.org/TR/mse-byte-stream-format-isobmff/). 6 October 2016. W3C Candidate Recommendation. URL: https://www.w3.org/TR/mse-byte-stream-format-isobmff/

**[RFC2119]**

S. Bradner. IETF. [Key words for use in RFCs to Indicate Requirement Levels](https://tools.ietf.org/html/rfc2119). March 1997. Best Current Practice. URL: <https://tools.ietf.org/html/rfc2119>

## A.2 Informative references

**[INBANDTRACKS]**

Bob Lund; Silvia Pfeiffer. W3C. [Sourcing In-band Media Resource Tracks from Media Containers into HTML](https://dev.w3.org/html5/html-sourcing-inband-tracks/). URL: <https://dev.w3.org/html5/html-sourcing-inband-tracks/>