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**Information technology — Dynamic adaptive streaming over  
HTTP (DASH) — Part 1: Media presentation description and  
segment formats**

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ISO/IEC FDIS 23009-1

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## 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](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

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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](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://www.iec.ch/understanding-standards).

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 fifth edition cancels and replaces the fourth edition (ISO/IEC 23009-1:2020), which has been technically revised. ~~The main changes compared to the previous edition are as follows:~~

The main changes are as follows:

- DASH profile for using Common Media Application Format (CMAF) are added;
- ~~the~~The concept Resynchronization is added in order to identify stream access points in Segments;
- MPD patching is updated to support explicit MPD updates of smaller size, not only as inband messages;
- ~~a~~A client processing model for Event Streams and Timed Metadata tracks is introduced;
- Extensions are added to content protection for efficient signalling and to support robustness levels.
- A descriptor is added in order to describe the minimum required device output protection security;
- More flexible bandwidth signalling is provided to signal variable bitrate encoding.

A list of all parts in the ISO/IEC 23009 series can be found on the ISO ~~website~~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](http://www.iso.org/members.html) and <https://www.iec.ch/national-committees>.

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## Introduction

Dynamic adaptive streaming over HTTP (DASH) is intended to support a media-streaming model for delivery of media content in which control lies primarily with the client. Clients may request data using the HTTP protocol from standard web servers that have no DASH-specific capabilities. Consequently, this document focuses not on client or server procedures but on the data formats used to provide a DASH Media Presentation.

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 a patent.

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# Information technology — Dynamic adaptive streaming over HTTP (DASH) — ~~Part 1: Media presentation description and segment formats~~

## Part 1: Media presentation description and segment formats

### 1 Scope

This document primarily specifies formats for the Media Presentation Description and Segments for dynamic adaptive streaming delivery of MPEG media over HTTP. It is applicable to streaming services over the Internet.

### 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 13818-1, *Information technology — Generic coding of moving pictures and associated audio information — Part 1: Systems*

ISO/IEC 14496-12:2021<sup>4</sup>, *Information technology — Coding of audio-visual objects — Part 12: ISO base media file format*

ISO/IEC 23000-19:2020, *Information technology — Multimedia application format (MPEG-A) — Part 19: Common media application format (CMAF) for segmented media*

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

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

~~Digital Content Protection LLC, *HDCP Interface Independent Adaptation Specification Revision 2.3*~~

~~IETF RFC 1738, *Uniform Resource Locators*~~

IETF RFC 2397, *The "data" URL scheme*

IETF RFC 3629, *UTF-8, a transformation format of ISO 10646*

IETF RFC 3986:2005, *Uniform Resource Identifier (URI): Generic Syntax*

IETF RFC 4122, *A Universally Unique Identifier (UUID) URN Namespace*

IETF RFC 4337, *MIME Type Registration for MPEG-4*

IETF RFC 4648, *The Base16, Base32, and Base64 Data Encodings*

<sup>4</sup>Under preparation.

**ISO #####-#:#####(X/IEC 23009-1:2022(E))**

IETF RFC 5234, *Augmented BNF for Syntax Specifications: ABNF*

IETF RFC 5261, *An Extensible Markup Language (XML) Patch Operations Framework Utilizing XML Path Language (XPath) Selectors*

IETF RFC 5646, *Tags for Identifying Languages*

IETF RFC 6381:2011, *The ~~'Codecs'~~'Codecs' and ~~'Profiles'~~'Profiles' Parameters for "Bucket" Media Types*

IETF RFC 6838:2013, *Media Type Specifications and Registration Procedures*

IETF RFC 7231:2014, *Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content*

IETF RFC 7233:2014, *Hypertext Transfer Protocol (HTTP/1.1): Range Requests*

IETF RFC 8141:2017, *URN Syntax*

IETF RFC 8673:2019, *HTTP Random Access and Live Content*

HTML 4.01 Specification, W3C Recommendation, 24 December 1999

W3C ~~XML~~ Canonical XML Version 1.1, W3C Recommendation, 2 May 2008

W3C ~~XML~~, Extensible Markup Language (XML) 1.0 (Fifth Edition), W3C Recommendation, 26 November 2008

~~W3C XML Path Language (XPath) Version 1.0, W3C Recommendation, 16 November 1999~~

W3C XLINK, XML Linking Language (XLink) Version 1.1, W3C Recommendation 06, May 2010

W3C Media Fragments URI 1.0 (basic), W3C Recommendation, 25 September 2012

~~United States Code Title 47 CFR 79.103, Electronic Code of Federal Regulations: Closed caption decoder requirements for apparatus, [https://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.79\\_1103](https://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.79_1103)~~

~~SMPTE ST 2067-2, SMPTE Standard – Interoperable Master Format – Core Constraints~~

### 3 Terms, definitions, symbols and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the ~~following~~ terms and definitions given in ISO/IEC 23000-19 and the following apply.

ISO and IEC maintain ~~terminological~~terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

**3.1.1**

**access unit**

unit of a *media stream* (3.1.29) with an assigned Media Presentation time

**3.1.2**

**accessibility**

degree to which a media content or certain *media content components* (3.1.22) are available to as many people as possible

**3.1.3**

**Adaptation Set**

set of interchangeable encoded versions of one or several *media content components* (3.1.22)

**3.1.4**

**asset**

content including media and metadata together with the rights to use the content by the content provider

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**3.1.5 associated Representation**

*Representation* (3.1.38) which provides supplemental or descriptive information for at least one other *Representation*

**3.1.6 available Segment**

*Segment* (3.1.40) that is accessible at its assigned *HTTP-URL* (3.1.17) and a possibly assigned byte range that is the request with an HTTP GET results in a reply of the *Segment* and 2xx status code

**3.1.7 Bitstream Switching Segment**

*Segment* (3.1.40) that if present contains essential data to switch to the *Representation* (3.1.38) it is assigned to

**3.1.8 complementary Representation**

*Representation* (3.1.38) which complements at least one *dependent Representation* (3.1.12)

**3.1.9 continuous media**

media with an inherent notion of time

EXAMPLES Speech, audio, video, timed text or timed metadata.

**3.1.10 DASH metric**

metric computed by the DASH Client and uniquely identified by a key

**3.1.11 data URL**

URL with a fixed scheme "data"

**3.1.12 dependent Representation**

*Representation* (3.1.38) for which *Segments* (3.1.40) from its *complementary Representations* (3.1.8) are necessary for presentation and/or decoding of the contained *media content components* (3.1.22)

**3.1.13 earliest presentation time**

smallest *presentation time* (3.1.36) of any *access unit* (3.1.1) of a *Media Segment* (3.1.28) ~~or~~ *Subsegment* (3.1.50) for a *media stream* (3.1.29)

**3.1.14 event**

aperiodic sparse media-time related auxiliary information to the DASH Client or to an application

**3.1.15 event stream**

sequence of related *events* (3.1.14)

**3.1.16 group**

collection of *Adaptation Sets* (3.1.3) that are not expected to be presented simultaneously

**3.1.17**

**HTTP-URL**

URL with a fixed scheme of “http” or “https”

**3.1.18**

**Index Segment**

*Segment* (3.1.40) that primarily contains indexing information for *Media Segments* (3.1.28)

**3.1.19**

**Initialization Segment**

*Segment* (3.1.40) containing metadata that is necessary to present the *media streams* (3.1.29) encapsulated in *Media Segments* (3.1.28)

**3.1.20**

**Main Adaptation Set**

*Adaptation Set* (3.1.3) in *an A Preselection* (3.1.35) that contains the *Initialization Segment* (3.1.19) for the complete experience

**3.1.21**

**media content**

single *media content period* (3.1.24) or contiguous sequence of media content periods

**3.1.22**

**media content component**

single continuous component of the *media content* (3.1.21) with an assigned *media content component type* (3.1.23)

**3.1.23**

**media content component type**

single type of *media content* (3.1.21)

**EXAMPLES**

Audio, video, or text.

**3.1.24**

**media content period**

set of *media content components* (3.1.22) that have a common timeline as well as relationships on how they can be presented

**3.1.25**

**Media Presentation**

collection of data that establishes a bounded or unbounded presentation of *media content* (3.1.21)

**3.1.26**

**Media Presentation Description**

**{MPD}**

formalized description for a *Media Presentation* (3.1.25) for the purpose of providing a streaming service

**3.1.27**

**Media Presentation timeline**

concatenation of the timeline of all *Periods* (3.1.34) which itself is common to all *Representations* (3.1.38) in the *Period*

### 3.1.28

#### Media Segment

*Segment* (3.1.40) that complies with media format in use and enables playback when combined with zero or more preceding Segments and an *Initialization Segment* (3.1.19) (if any)

### 3.1.29

#### media stream

encoded version of a *media content component* (3.1.22)

### 3.1.30

#### Media Subsegment

*Subsegment* (3.1.50) that only contains media data but no *Segment Index* (3.1.44)

### 3.1.31

#### message

part of an *event* (3.1.14) containing information that is exclusively handled by the event handler

### 3.1.32

#### MPD start time

approximate presentation start time of a *Media Segment* (3.1.28) signalled in *MPD* (3.1.26)

### 3.1.33

#### MPD duration

approximate presentation duration of a *Media Segment* (3.1.28) signalled in *MPD* (3.1.26)

### 3.1.34

#### Period

interval of the *Media Presentation* (3.1.24), where a contiguous sequence of all Periods constitutes the *Media Presentation*

### 3.1.35

#### Preselection

set of *media content components* (3.1.22) that are intended to be consumed jointly

### 3.1.36

#### presentation time

time associated to an *access unit* (3.1.1) that maps it to the *Media Presentation timeline* (3.1.27)

### 3.1.37

#### remote element entity

entity that contains one or more elements and is referenced in the *MPD* (3.1.26) with an *HTTP-URL* (3.1.17) contained in an @xlink:href attribute, referred to as "remote resource" by XLink

### 3.1.38

#### Representation

collection and encapsulation of one or more *media streams* (3.1.29) in a delivery format and associated with descriptive metadata

### 3.1.39

#### Resynchronization Point

point within a Segment from which it is possible to start processing the Representation

### 3.1.40

#### Segment

unit of data associated with an *HTTP-URL* (3.1.17) and optionally a byte range that are specified by an *MPD* (3.1.26), or with a *data URL* (3.1.11)

### 3.1.41

#### Segment availability start time

latest time instant in *wall-clock time* (3.1.53) at which a *Segment* (3.1.40) becomes an *available Segment* (3.1.6)

### 3.1.42

#### adjusted Segment availability start time

time instant in *wall-clock time* (3.1.53) at which a *Segment* (3.1.40) becomes an *available Segment* (3.1.6)

### 3.1.43

#### Segment availability end time

time instant in *wall-clock time* (3.1.53) at which a *Segment* (3.1.40) ceases to be an *available Segment* (3.1.6)

### 3.1.44

#### Segment Index

compact index of the time range to byte range mapping within a *Media Segment* (3.1.28) separately from the *MPD* (3.1.26)

### 3.1.45

#### Segment Sequence

sequence of *Segments* (3.1.40) that are sharing a common address prefix

### 3.1.46

#### Segment Track

concatenation of *Segments* (3.1.40) forming a track with potential conformance properties

### 3.1.47

#### Spatial Object

#### spatial object

*media content component* (3.1.22) corresponding to a region in a coordinate system associated to this *media content component*

### 3.1.48

#### stream access point

#### SAP

position in a *Representation* (3.1.38) enabling playback of a *media stream* (3.1.29) to be started using only the information contained in *Representation* data starting from that position onwards preceded by initializing data in the *Initialization Segment* (3.1.19), if any

### 3.1.49

#### sub-asset

*media content component* (3.1.22) (or part thereof) identified as corresponding to a part of an *asset* (3.1.4)