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Information technology — Dynamic adaptive streaming over HTTP (DASH) —

Part 1: Media presentation description and segment formats

AMENDMENT 1: High Profile and Availability Time Synchronization

Technologies de l'information — Diffusion en flux adaptatif dynamique sur HTTP (DASH) —

Partie 1: Description de la présentation et formats de remise des médias

AMENDEMENT 1

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

Information technology — Dynamic adaptive streaming over HTTP (DASH) — Part 1: Media presentation description and segment formats, AMENDMENT 1: High Profile and Availability Time Synchronization

Replace

5.2.3.2 Elements and Attributes added in this Revision

with

5.2.3.2 Elements and Attributes added in ISO/IEC 23009-1:2014 2nd edition

Add

5.2.3.3 Elements and Attributes added in this Revision

This revision adds the following elements and attributes to the schema defined in Annex B compared to the 2014 revision (ISO/IEC 23009-1:2014) of this part of the standard:

— **`MPD.UTCTiming`**

In Table 3 add `UTCTiming` row at the end after `Metrics`

`UTCTiming`	0 ... N	specifies information on ways to obtain a synchronization to wall-clock time as used in this Media Presentation. The order of the elements expresses a preference of choice by the Media Presentation author. For more details refer to 5.8.4.10.

In 5.3.1.3 Replace

```
  <!-- MPD Type -->
  <xs:complexType name="MPDtype">
    <xs:sequence>
      <xs:element name="ProgramInformation" type="ProgramInformationType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="BaseURL" type="BaseURLType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Location" type="xs:anyURI" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Period" type="PeriodType" maxOccurs="unbounded"/>
      <xs:element name="Metrics" type="MetricsType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="id" type="xs:string"/>
    <xs:attribute name="profiles" type="xs:string" use="required"/>
    <xs:attribute name="type" type="PresentationType" default="static"/>
    <xs:attribute name="availabilityStartTime" type="xs:dateTime"/>
    <xs:attribute name="availabilityEndTime" type="xs:dateTime"/>
    <xs:attribute name="publishTime" type="xs:dateTime"/>
    <xs:attribute name="mediaPresentationDuration" type="xs:duration"/>
    <xs:attribute name="minimumUpdatePeriod" type="xs:duration"/>
    <xs:attribute name="minBufferTime" type="xs:duration" use="required"/>
    <xs:attribute name="timeShiftBufferDepth" type="xs:duration"/>
    <xs:attribute name="suggestedPresentationDelay" type="xs:duration"/>
    <xs:attribute name="maxSegmentDuration" type="xs:duration"/>
    <xs:attribute name="maxSubsegmentDuration" type="xs:duration"/>
    <xs:anyAttribute namespace="##other" processContents="lax"/>
  </xs:complexType>

  <!-- Presentation Type enumeration -->
  <xs:simpleType name="PresentationType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="static"/>
      <xs:enumeration value="dynamic"/>
    </xs:restriction>
  </xs:simpleType>
```

with

```
  <!-- MPD Type -->
  <xs:complexType name="MPDtype">
    <xs:sequence>
      <xs:element name="ProgramInformation" type="ProgramInformationType" minOccurs="0"
maxOccurs="unbounded"/>
      <xs:element name="BaseURL" type="BaseURLType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Location" type="xs:anyURI" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Period" type="PeriodType" maxOccurs="unbounded"/>
      <xs:element name="Metrics" type="MetricsType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="UTCTiming" type="DescriptorType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="id" type="xs:string"/>
    <xs:attribute name="profiles" type="xs:string" use="required"/>
    <xs:attribute name="type" type="PresentationType" default="static"/>
    <xs:attribute name="availabilityStartTime" type="xs:dateTime"/>
    <xs:attribute name="availabilityEndTime" type="xs:dateTime"/>
    <xs:attribute name="mediaPresentationDuration" type="xs:duration"/>
    <xs:attribute name="minimumUpdatePeriod" type="xs:duration"/>
    <xs:attribute name="minBufferTime" type="xs:duration" use="required"/>
    <xs:attribute name="timeShiftBufferDepth" type="xs:duration"/>
    <xs:attribute name="suggestedPresentationDelay" type="xs:duration"/>
    <xs:attribute name="maxSegmentDuration" type="xs:duration"/>
    <xs:attribute name="maxSubsegmentDuration" type="xs:duration"/>
    <xs:anyAttribute namespace="##other" processContents="lax"/>
  </xs:complexType>

  <!-- Presentation Type enumeration -->
  <xs:simpleType name="PresentationType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="static"/>
      <xs:enumeration value="dynamic"/>
    </xs:restriction>
  </xs:simpleType>
```

Add the following section

5.8.4.10 UTC Timing Descriptor

Using the **`UTCTiming`** element, the Media Presentation author provides additional information for the client to optionally obtain wall-clock time to be used in Media Presentation. If multiple schemes are specified by the Media Presentation author, their order indicates their relative preference, first having the highest, and the last having the least priority. However, the client may choose any method, potentially having to deal with reduced accuracy.

Add the following section

5.8.5.X DASH UTC Timing Schemes

This part of the Standard defines several methods, specified in Table X, by which DASH clients can obtain wall-clock times as used by the Media Presentation. Specifically this clock is synchronized to the one used to generate the MPD.

Table X — Different UTC timing Methods

@schemeIdURI	Description
urn:mpeg:dash:utc:ntp:2014	The identifier indicates that the @value contains a white-space separated list of servers that are recommended to be used in combination with the NTP protocol as defined in IETF RFC 5905 for getting the appropriate time.
urn:mpeg:dash:utc:sntp:2014	The identifier indicates that the @value contains a white-space separated list of servers that are recommended to be used in combination with the SNTP protocol as defined in IETF RFC 5905 for getting the appropriate time.
urn:mpeg:dash:utc:http-head:2014	The identifier indicates that the @value contains a white-space separated list of HTTP URLs that are recommended to be used in combination with the HTTP protocol as defined in IETF RFC 2616 for getting the appropriate time. The value of the @value attribute contains a white-space separated list of HTTP URLs to which HTTP HEAD requests can be made to obtain the Date information in the HTTP Header providing the wall-clock time for this Media Presentation
urn:mpeg:dash:utc:http-xsdate:2014	The identifier indicates that the @value contains a white-space separated list of HTTP URLs that are recommended to be used in combination with the HTTP protocol as defined in IETF RFC 2616 for getting the appropriate time. The value of the @value attribute contains a white-space separated list of HTTP URLs to which HTTP GET requests can be made to obtain the timing information. The timing information is contained in the message body of the HTTP response to the above HTTP GET request and contains time value formatted according to xs:dateTime as defined in W3C XML Schema Part 2: Datatypes specification. This value is based on a wall clock synchronized to the one used to generate the MPD.
urn:mpeg:dash:utc:http-iso:2014	The identifier indicates that the @value contains a white-space separated list of HTTP URLs that are recommended to be used in combination with the HTTP protocol as defined in IETF RFC 2616 for getting the appropriate time. The value of the @value attribute contains a white-space separated list of HTTP URLs to which HTTP GET requests can be made to obtain the timing information. The timing information is contained in the message body of the HTTP response to the above HTTP GET request and contains time value formatted according to ISO time code as defined in ISO/IEC 8601. This value is based on a wall clock synchronized to the one used to generate the MPD.
urn:mpeg:dash:utc:http-ntp:2014	The identifier indicates that the @value contains a white-space separated list of HTTP URLs that are recommended to be used in combination with the HTTP protocol as defined in IETF RFC 2616

	for getting the appropriate time. The value of the `@value` attribute contains a white-space separated list of HTTP URLs to which HTTP GET requests can be made to obtain the timing information. The timing information is contained in the message body of the HTTP response to the above HTTP GET request and contains time value formatted according to formatted according to NTP timestamp format in IETF RFC 5905. This value is based on a wall clock synchronized to the one used to generate the MPD.
`urn:mpeg:dash:utc:direct:2014`	The identifier indicates that the `@value` field, contains a time formatted according to xs:dateTime as defined in W3C XML Schema Part 2: Datatypes specification. This value is based on a wall clock synchronized to the one used to generate the MPD

Replace 7.3.1 with the following:

7.3.1 General

The Media Presentation as introduced in 5 and 6 is instantiated in this subclause using the ISO base media file format as defined in ISO/IEC 14496-12 as Segment formats.

An ISOBMFF-based DASH Media Presentation is described by an MPD as specified in 5.1. The MIME type of the MPD shall be as defined in Annex C.

The general rules defined in 7.2 shall apply.

The `@mimeType` attribute of each Representation shall be provided according to RFC 4337. Additional parameters may be added according to RFC 6381.

If present, the `@SegmentProfiles` shall provide a comma-separated list of the individual Segment profile identifiers.

The following Segment types and formats may be used

- Initialization Segments complying with formats as defined in 6.3.3.
- Media Segments complying with formats as defined in 6.3.4.2.
- Self-Initializing Media Segments complying with formats as defined in 6.3.5.

For ISOBMFF-based Media Presentation the following applies:

1) In all cases for which a Representation contains more than one Media Segment, the following applies:

   i) The Initialization Segment as defined in 6.3.3 shall be present.

   ii) Media Segments shall not be self-initializing. The Media Segment format is defined in 6.3.4.

   iii) If the Media Segment is the last Media Segment in the Representation, this Media Segment may carry the `'lmsg'` compatibility brand. If the Media Segment is not the last Media Segment in the Representation, the `'lmsg'` compatibility brand shall not be present. The `'lmsg'` type is defined in this subclause.

2) In case a Representation contains only a single Media Segment, then one of the following two options are valid.

   - One Initialization Segment as defined in 6.3.3 and one Media Segment as defined in 6.3.4 that is not self-initializing.
   - One Self-Initializing Media Segment as defined in 6.3.5.

Index Segments may be present.

The content authoring rules for the Media Segments in combination with certain MPD attributes for ISOBMFF-based DASH are provided in 7.3.2.

In case Sub-Representations are used, the rules in 7.3.4 shall apply.

NOTE 1 Multiple servers may be used to improve accuracy

NOTE 2 Use of NTP servers not specified in the `@value` attribute is allowed

Add to 5.10

5.10.3.3.6 Inband Event Alignment

If **`AdaptationSet.InbandEventStream`** element is present and **`AdaptationSet`**`@SegmentAlignment` attribute is present and non-false, event message boxes in non-overlapping Segments shall be *aligned*. Let $S_{R1}(T)$ be the a segment of Representation R_1 with earliest presentation time T, and let the Adaptation Set contain N representations. If $S_{R1}(T)$ contains one or more Event Message (`emsg`) boxes, identical `emsg` boxes shall be contained in each of the non-overlapping Segments $S_{R2}(T)…S_{RN}(T)$.

NOTE 1 As a consequence, under the above constrains, all representations in the Adaptation Set will contain events.

NOTE 2 If **`AdaptationSet`**`@SegmentAlignment` is an integer larger than 1, the alignment described above applies only to non-overlapping Segments.

NOTE 3 If Segments are non-overlapping, but their EPT differ, alignment described above still applies, and Event Message boxes will be in the beginning of both Segments.

Add to 8.3.3

— Index Segments shall not be present. However, a **`RepresentationIndex`** element or a `@indexRange` attribute may be present to signal the byte range for Segment Index within a Media Segment.

Add to 8.4.3

— Index Segments shall not be present.

Add

8.7 ISO base Media File Format Extended Live profile

8.7.1 General

This profile is largely an extension of ISO-BMFF Live profile as described in 8.4 of this part of the standard. The main extensions are non-exclusion of remote elements and features introduced in the second edition of this part of the standard, such as events.

This profile also imposes additional restrictions on MPD and Segment format in order to simplify implementations.

The ISO-Base Media File Format Extended Live profile is identified by the following URN: `"urn:mpeg:dash:profile:isoff-ext-live:2014"` .

8.7.2 Media Presentation Description constraints

8.7.2.1 General

The Media Presentation Description shall conform to the following constraints:

— The rules for the MPD and the Segments as defined in ISO/IEC 23009-1 7.3, shall apply.

— Periods which do not conform to the constraints in 8.7.2.2 may not be presented

— Representations not inferred to have `@profiles` equal to the profile identifier as defined in 8.7.1 may be ignored

8.7.2.2 Constraints on Period elements

— The **`Subset`** element may be ignored.

— The **`Period.SegmentList`** element shall not be present

— If a Period contains multiple Adaptation Sets with `@contentType="video"` then at least one Adaptation Set shall contain a Role element with `@schemeIdUri="urn:mpeg:dash:role:2011"` and `@value="main"` and each Adaptation Set containing such a **`Role`** element shall provide perceptually equivalent media streams.

— **`AdaptationSet`** elements that do not conform to 8.7.2.3 may be ignored

8.7.2.3 Constraints on AdaptationSet elements

— **`AdaptationSet`** element can be ignored unless **`AdaptationSet.SegmentTemplate`** is present and/or for each Representation within this Adaptation Set **`Representation.SegmentTemplate`** element is present;

— **`AdaptationSet`** element that contains more than one Representation can be ignored unless all of the following hold:

  — **`AdaptationSet`**`@SegmentAlignment` is present and has value of `true` or '1';

— **AdaptationSet**@startsWithSAP is present and has value of 1 or 2;

— **Representation** elements that do not conform to 8.7.2.4 may be ignored

8.7.2.4 Constraints on Representation elements

— Representations with value of the @mimeType attribute other than video/mp4, audio/mp4, application/mp4, or text/mp4 may be ignored. Additional profile or codec specific parameters may be added to the value of the MIME type attribute.

— If **Representation.InbandEventStream** or **SubRepresentation.InbandEventStream** are present, this Representation can be ignored.

8.7.3 Segment format constraints

Representations and Segments complying to this profile shall meet the following constraints:

— Representations shall comply with the formats defined in section 7.3.

— In Media Segments, all Segment Index ('sidx') and Subsegment Index ('ssix') boxes, if present, shall be placed before any Movie Fragment ('moof') boxes.

— Index Segments shall not be present.

8.7.4 Inband Events

If an **AdaptationSet** element inferred to have this profile within contains an **InbandEventStream** element, and **InbandEventStream**@schemeIdUri has value "urn:mpeg:dash:event:2012", all representations within this adaptation set shall contain aligned inband events

NOTE 1 MPD validity expiration inband events (see 5.10.4.2) are essential for correct presentation of content formatted for the ISO-BMFF Extended Live profile.

NOTE 2 The author may assume that for each value of MPD@publishTime he announces using MPD validity expiration event(s), the DASH client will receive and process at least one Event Message ('emsg') box with this value in course of normal playback of this Period.

8.8 ISO Base Media File Format Extended On Demand profile

8.8.1 General

This profile is largely an extension of ISO-BMFF On Demand profile as described in section 8.3 of this part of the standard. The main extensions are non-exclusion of remote elements and features introduced in the second edition of this part of the standard.

This profile also imposes additional restrictions on MPD and Segment format in order to simplify implementations.

The ISO-Base Media File Format Extended On Demand profile is identified by the following URN: "urn:mpeg:dash:profile:isoff-ext-on-demand:2014" .