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ANSI/SCTE 214-3 2015

**MPEG DASH for IP-Based Cable Services
Part 3: DASH/FF Profile**

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1. Scope

This standard is part of a suite documenting use of MPEG DASH in cable networks.

This part of the standard defines a profile of MPEG DASH which is based on the ISO BMFF Common Profile. It also defines inband carriage of information typically present in cable systems – such as closed captioning and cue messages – in DASH ISO-BMFF media segments. This profile is a combination of generic restrictions in SCTE 214-1 and restrictions specific to ISO-BMFF specified in this standard.

2. Normative References

No informative references are applicable

2.1. SCTE References

- [1] SCTE 214-1 2015, MPEG DASH for IP-Based Cable Services, Part 1: MPD Constraints and Extensions
- [2] ANSI/SCTE 35 2014, Digital Program Insertion Cueing Message for Cable
- [3] ANSI/SCTE 128-1 2013, AVC Video Constraints for Cable Television: Part 1 – Coding
- [4] ANSI/SCTE 128-2 2013, AVC Video Constraints for Cable Television Part 2 – Transport
- [5] SCTE 215-1 2015, HEVC Video Constraints for Cable Television, Part 1 – Coding
- [6] SCTE 215-2 2015, HEVC Video Constraints for Cable Television, Part 2 – Transport

2.2. Standards from other Organizations

- [7] ISO/IEC 23009-1:2014 2nd Ed., Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats (incl. ISO/IEC 23009-1:2014 COR1:2015 and ISO/IEC 23009-1:2014 AMD1:2015).
- [8] ITU-T Recommendation H.264 (01/2012): "Advanced video coding for generic audio-visual services" | ISO/IEC 14496-10:2010: "Information technology – Coding of audio-visual objects – Part 10: Advanced Video Coding".
- [9] ISO/IEC 14496-12:2014 Information technology -- Coding of audio-visual objects -- Part 12: ISO base media file format.
- [10] ISO/IEC 14496-15:2014: Information technology -- Coding of audio-visual objects -- Part 15: Carriage of network abstraction layer (NAL) unit structured video in ISO base media file format.
- [11] ITU-T Recommendation H.265 (07/2013): "Advanced video coding for generic audio-visual services" | ISO/IEC 23008-2:2013: " High Efficiency Coding and Media Delivery in Heterogeneous Environments – Part 2: High Efficiency Video Coding"
- [12] ISO/IEC 23001-7:2015 3rd Ed.: "Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media file format files".
- [13] ANSI/CEA-608-E, Line 21 Data Services, April 2008
- [14] ANSI/CEA-708-E, Digital Television (DTV) Closed Captioning, August 2013

- [15] IETF RFC 2141, URN Syntax, May 1997
- [16] IETF RFC 2616, Hypertext Transfer Protocol – HTTP/1.1, June 1999
- [17] IETF RFC 3406, Uniform Resource Names (URN) Namespace Definition Mechanisms, October 2002
- [18] IETF RFC 6381, The ‘Codecs’ and ‘Profiles’ Parameters for ‘Bucket’ Media Types
- [19] ETSI TS 103 285 V1.1.1: "MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks", May 2015
- [20] DASH-IF Implementation Guidelines: Interoperability Points; Version 3.0, <http://dashif.org/w/2015/04/DASH-IF-IOP-v3.0.pdf>

3. Informative References

The following documents may provide valuable information to the reader but are not required when complying with this standard.

- None are applicable.

4. Compliance Notation

| | |
|-------------------|---|
| <i>shall</i> | This word or the adjective “ required ” means that the item is an absolute requirement of this specification. |
| <i>shall not</i> | This phrase means that the item is an absolute prohibition of this specification. |
| <i>forbidden</i> | This word means the value specified shall never be used. |
| <i>should</i> | This word or the adjective “ <i>recommended</i> ” means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course. |
| <i>should not</i> | This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label. |
| <i>may</i> | This word or the adjective “ <i>optional</i> ” means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item. |
| <i>deprecated</i> | Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of the standard. Implementations should avoid use of deprecated features. |

5. Abbreviations and Definitions

5.1. Abbreviations

| | |
|-----------------|--|
| AAC | Advanced Audio Coding (ISO/IEC 14496-3) |
| AVC | Advanced Video Coding (ISO/IEC 14496-10) |
| DTS | Trademark for DTS Audio |
| HEVC | High Efficiency Video Coding (ISO/IEC 23008-2) |
| HTTP | Hypertext Transfer Protocol (HTTP/1.1, defined in RFC 2616) |
| ISO-BMFF | ISO Base Media File Format (ISO/IEC 14496-12) |
| MPD | Media Presentation Description (ISO/IEC 23009-1) |
| DASH | MPEG Dynamic Adaptive Streaming over HTTP (ISO/IEC 23009-1) |
| SAP | Stream Access Point (ISO/IEC 14496-12) |
| URN | Universal Resource Namespace (RFC 2141) |
| XLink | eXternal Link (<i>only</i> subset defined in ISO/IEC 23009-1) |
| XML | eXtensible Markup Language (http://www.w3.org/TR/REC-xml/) |

5.2. Notation

This document uses notation similar to the one of ISO/IEC 23009-1.

XML elements are written in bold face, e.g. **Element1**.

Child XML elements are separated from parent elements by a dot ('.'), e.g. **Element2.Element1**.

XML attributes are prefixed by an at-sign ('@'), e.g. @attribute. Attributes of an element are separated from the name of the containing element by at-sign, e.g. **Element@attribute**.

ISO-BMFF boxes are written as box names enclosed in backquote ('`') signs, e.g. `box0`

Fields in ISO-BMFF boxes are separated from box names by a dot ('.'), e.g. `box0`.field0

In cases where an element has the same name as a concept it describes, when the name is written in bold face, it refers to the syntactic element. E.g., **Representation** refers to an XML element named "Representation", while "representation" refers to the concept representation as defined in ISO/IEC 23009-1.

6. Restrictions on MPD

6.1. General

An MPD conforming to this profile *shall* comply with all requirements in SCTE 214-1. This mandates compliance with MPD constraints that are not specific to a media format.

An MPD conforming to this profile *shall* comply with DASH Common Profile, as defined in ISO/IEC 23009-1:2014 AMD1.

NOTE: Content conforming to this profile will in many cases be subsets of the DASH-AVC/264 High and/or DASH-IF IOP Main, which are defined in DASH-IF IOP v3.0. A compliant MPD should carry the appropriate DASH-IF URN in **MPD@profiles**.

6.2. MPD Element

When an MPD is created for this profile the **MPD@profiles** attribute *shall* contain the value `urn:scte:dash:2015#isobmff`.

6.3. Period Element

Association between **AdaptationSet@id** value and content characteristics SHOULD be maintained across periods. E.g., if in two separate periods contain video adaptation sets using same codecs, resolutions and bitrates, the **AdaptationSet@id** values SHOULD match.

6.4. AdaptationSet Element

Each Period *shall* contain at least one separate **AdaptationSet** Element for every media component present in the content. Multiplexed Adaptation Sets *shall* be ignored.

The **AdaptationSet@id** is set to the `track_ID` of the `'tfhd'` boxes corresponding to the media segments that the **AdaptationSet** describes. See **Error! Reference source not found.** for `'tfhd'` and `track_ID` definitions.

If **MPD@type** = "dynamic", then **SegmentTemplate** *shall* be present in all adaptation sets, either at adaptation set or representation level.

7. Restrictions on media segments

7.1. General

Edit lists should not be used. `@presentationTimeOffset` *shall* be sufficient to determine a presentation time of a sample.

7.2. Video

1. If `AdaptationSet@bitstreamSwitching` is set in a video adaptation set, then constraints of DASH-IF IOP 3.0 sec. 3.2.10.3 *shall* apply.

7.3. Inband events

7.3.1. General

Event message boxes with same event scheme *shall* be aligned, per definition of event alignment in ISO/IEC 23009-1.

7.3.2. Carriage of SCTE 35 cue messages

Media segments may contain inband events with scheme "urn:scte:scte35:2013:bin".

For events with the above scheme, entire SCTE 35 `splice_info_section` starting at the `table_id` and ending with the `CRC_32` *shall* be carried in ``emsg`.message_bytes[]`.

Sum of the earliest presentation time of the ``emsg``-bearing segment and ``emsg`.presentation_time_delta` *shall* equal the time distance between the splice time and `PeriodStart` in the time units specified in ``emsg`.timescale`.

``emsg`.event_duration` *shall* be a translation of `segmentation_duration` or `break_duration` into time units specified in ``emsg`.timescale`. If not known, the value shall be 0xFFFF (not known)

NOTE: the scope of events is only a single period – event in period *P* and presentation time in period *P+1* will be ignored; thus there is no need to preserve event information across periods.

``emsg`.value` *shall* be the value of the SCTE 35 PID.

NOTE: ``emsg`.value` may be used by the application to distinguish between cue messages from different PIDs.

``emsg`.id` is an integer unique within the scope of the period – event messages with ``emsg`.id` values that already appeared in the period may be discarded by the DASH client.

Presence of inband SCTE 35 events in media segments *shall* always be signaled using **AdaptationSet.InbandEventStream** element with @schemeIdUri value of "urn:scte:scte35:2014:bin". SCTE 35 events are essential as defined in SCTE 214-1 6.8.3

NOTE 1: As `emsg` boxes are aligned, all `emsg` boxes will be read if media from an adaptation set is played out irrespective of representation selections.

NOTE 2: Repeated or subsequently canceled cue messages should not appear in a segment.

Figure 1 below shows the content of an `emsg` box at the beginning of a segment with earliest presentation time T . There is a 6-sec warning of an upcoming splice – delta to splice time is indicated as 6 seconds – and duration is given as 1 minute. This means that an ad will start playing at time $T + 6$ till $T + 66$.

| |
|---|
| scheme_id_uri="urn:scte:scte35:2013:xml" |
| value=1001 |
| timescale=90000 |
| presentation_time_delta=540000 |
| duration=5400000 |
| id=0 |
| <pre> message_data[]= <SpliceInfoSection ptsAdjustment="0" scte35:tier="22"> <SpliceInsert spliceEventId="111" spliceEventCancelIndicator="false" outOfNetworkIndicator="true" uniqueProgramId="65535" availNum="1" availsExpected="2" spliceImmediateFlag="false"> <Program><SpliceTime ptsTime="122342"/></Program> <BreakDuration autoReturn="false" duration="5400000"/> </SpliceInsert> <AvailDescriptor scte35:providerAvailId="332"/> </pre> |

Figure 1: Inband carriage of SCTE 35 cue message

8. Accessibility Features

8.1. Associated Audio Services

Role values for associated audio service signaling are described in SCTE 214-1 sec 7.1

For ST > 1 `kind` box *shall* be used to signal the role.

8.2. Closed Captions

SEI messages carrying CEA-608 / CEA-708 closed captioning may be present in SEI messages, as defined in SCTE 215-1 and SCTE 128-1. These SEIs will be present in media samples in ISO-BMFF.

If SEI messages carrying CEA-608 / CEA-708 closed captioning are present in at least one media segment in a representation, then the corresponding **AdaptationSet** element *shall* contain caption service metadata signaling as described in SCTE 214-1 sec. 7.2.

CEA-608 / CEA-708 closed captioning *shall* either be present in all representations within an adaptation set, or in none.

9. Content protection

9.1. General

Common Encryption as defined in ISO/IEC 23001-7 3rd ed. *shall* be used if content protection is deemed necessary. Modes other than AES-128 CTR *shall not* be used.

Restrictions defined in DASH-IF IOP v3.0 [20] sec. 7.1-7.4 *shall* apply.