Dynamic substitution of content in linear broadcast

Part 3: Carriage and signalling of placement opportunity information in DVB-DASH

DVB Document A178-3 Rev.1

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee {ETSI Technical Committee|ETSI Project|<other>} <long techbody> (<short techbody>).

The present document is part 1 of a multi-part deliverable covering the DVB Dynamic Substitution of adverting in linear broadcast specification, as identified below:

Part 1: " Carriage and signalling of placement opportunity information in DVB Transport Streams";

Part 2: "Interfacing to an advert decisioning service and optimal preparation of media".

Part 3: " Carriage and signalling of placement opportunity information in DVB-DASH";

Full details of the entire series can be found in the present document (see Clause 4).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

This document specifies signalling to identify placement opportunities in a DVB-DASH stream. The signalling described in this document may be applied to dynamic substitution or insertion of programme content.

In addition, signalling is defined for viewer impression reporting events that may be interpreted by DVB DASH players.

1   Scope

The present document specifies signalling for DVB-DASH Dynamic Advertisement Substitution (DAS).

Server-side and client/player-side replacement and insertion are in scope.

In addition, signalling for ad reporting callbacks from players is defined in this document.

Figure 1 illustrates the architecture and interfaces.

In clause 4 of the present document opportunity placement signalling illustrated by the green dashed lines in Figure 1 between origin and DAS server or origin and DAS player. Clause 4 defines usage of SCTE 35 for signalling ad insertion and replacement opportunities in DVB-DASH.

Signaling for ad tracking in a generic DVB-DASH player when DAS is performed by a DAS Server is defined in clause 5 (brown lines).

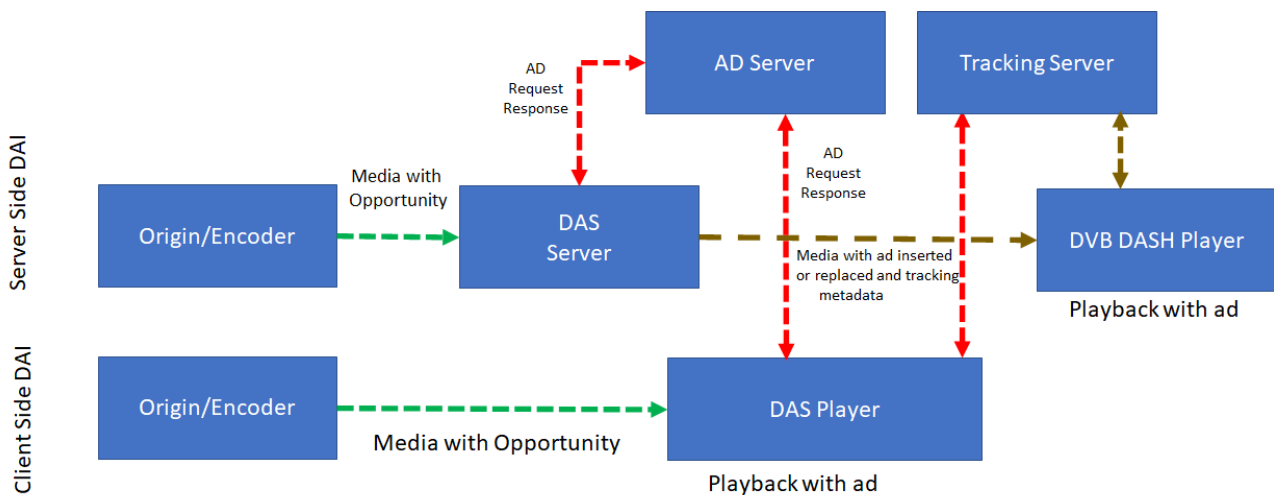The red lines are out of scope of this document, and may be based on guidelines from [i4].

Figure 1 Server-Side and Player-side Dynamic Ad Substitution

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents are necessary for the application of the present document.

[1] SCTE 35: "Digital Program Insertion Cueing Message for Cable"

[2] SCTE 104 2019r1: "Automation System to Compression System Communications Applications Program Interface (API)"

[3] TS 103 285: Digital Video Broadcasting (DVB); MPEG-DASH Profile for Transport of ISO BMFF Based DVB Services over IP Based Networks

[4] ANSI/SCTE 214-1: MPEG DASH for IP-Based Cable Services Part 1: MPD Constraints and Extensions

[5] ETSI TS 103 752-1 Dynamic substitution of content in linear broadcast: carriage and signalling of placement opportunity information in DVB Transport Streams

[6] IETF RFC 4648: "The Base16, Base32 and Base64 Data Encodings"

[7] ISO/IEC 23009-1:2022 : "Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ANSI/SCTE 67 2017: Recommended Practice for Digital Program Insertion for Cable

[i.2] Event Triggering Distribution Specification (ETDS), Media Perspectives

NOTE: Available at https://mediaperspectives.nl/publicationdoc/event-triggers-in-television-broadcasting/

[i.3] IAB Tech Lab Video Ad Serving Template version 4.3 released December 2022

[i.4] DVB-TA (Targeted Advertising – Part 2: interfacing and preparation) Dynamic s ubstitution of content in linear broadcast – Part 2: interfacing an advert decisioning service and optimal preparation

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply in addition to terms from [5] and [3]:

Dynamic Ad Insertion: A targeted ad is inserted before, during or after presenting (live or on-demand) video content, so that in addition to the original video content also the targeted ad is seen by viewers.

Dynamic Ad Substitution: A targeted dynamic ad substitution replaces an advert in (live or on-demand) video content, so that instead of the advert initially contained in the video content the replacement ad is shown.

Server-Side Ad Insertion: Dynamic Ad Insertion system where the ad content is stitched with the media by the server before delivery to the player.

Client-Side Ad Insertion: Dynamic Ad Insertion system where the ad content is stitched with the media by the player, possibly by using another application.

Server-Side Ad Substitution: Dynamic Ad Substitution system where the ad content is stitched with the media at the server-side before delivery to the player.

Client-Side Ad Substitution: Dynamic Ad Substitution system where the ad content is stitched with the media by the player, possibly by using another application.

Preroll: An advert shown before the content.

Midroll: An advert inserted or replaced into the middle of VoD content, or replaced in linear content.

Long-form: Content of significant length, comparable in format to a television programme rather than a short advert or trailer.

Infomercial: A long-form advertisement.

3.2 Symbols

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply in addition to [3] and [5]:

SCTE 214   profile for MPEG-DASH defined in ANSI SCTE 214-1

SSAI   Server-Side Ad Insertion
CSAI   Client-Side Ad Insertion
SSAS   Server-Side Ad Substitution
CSAS   Client-Side Ad Substitution
DVB-DASH Profile for MPEG-DASH as defined in ETSI 103 285
DAS   Dynamic Ad Substitution
DAI   Dynamic Ad Insertion

4 Signalling of Ad breaks in DVB-DASH Systems

4.1 Introduction & Scope

The signalling of ad breaks described in this clause applies to both DVB-DASH players (i.e. distribution signalling) and (DVB-) DASH entities for server-side ad insertion or substitution (i.e. contribution signalling).

The following are in scope:

1. Use of SCTE 104 between automation system and encoder
2. Use of SCTE 35 (e.g.) in DASH Events
3. Use of DASH Events with ad break signalling

4.2 Use of SCTE 104

The interface between the automation system and encoder is described in TS 103 752 1 [5] clause 5.2. SCTE 104 [2] may be used to generate a DVB-DASH stream with SCTE 35 [1] markers embedded in DVB-DASH.

4.3 Use of SCTE 35

4.3.1 Overview

SCTE 35 [1] splice_info_section() shall be used to signal ad break information. A splice_info_section() shall be encapsulated in MPEG-DASH Events following SCTE 214-1 [4]. Restrictions to the SCTE 35 [1] payload apply as outlined in this clause. Restrictions on the use of DASH Events as initially defined in SCTE 214-1 are outlined in clause 4.4.

4.3.2 Restrictions on the usage of SCTE 35 in DVB-DASH

Signalling of ad breaks in a DVB-DASH stream may use either splice_insert or time_signal but shall not use both command types.

SCTE 35 signalling of ad-breaks in DVB-DASH shall follow the restrictions defined in Table 1, 2 and 3.

The column restrictions introduces the constraints introduced in this clause, in case of N/A no additional restrictions apply.

The last column compares the restrictions to [5] that defines similar signalling in DVB Transport Streams.

Table 1 Restrictions on splice_info_section()

Syntax	Bits	Restrictions	Same as TS 103 752-1 [5]
table_id	8	N/A	YES
section_syntax_indicator	1	N/A	YES
private_indicator	1	N/A	YES
reserved	2	N/A	YES

section_length	12	N/A		NO, this field is limited to a maximum value of 4093.
protocol_version	8	N/A		YES
encrypted_packet	1	Shall be 1 or 0 see TS 103 752-1 5.3.4.1		YES
encryption_algorithm	6	N/A		YES
pts adjustment	33	May be set, but shall be ignored by receiving entities.		NO
tier	12	N/A		YES
splice_command_length	12	N/A		YES
splice_command_type	8	Shall be 0x05 or 0x06 (splice_insert() or time_signal())		YES
E_CRC_32	32	N/A		YES
CRC_32	32	N/A		YES

Table 2 Restrictions on splice_insert() command

syntax	Bits	Mnemonic	Restrictions	Same as TS 103 752-1
splice_event_id	32	uimsbf	(pseudo-)Unique. This field is not used to correlate in and out messages (start and end of a break), but instead to identify individual splices.	YES
splice_event_cancel_indicator	1	bslbf	Shall be 0	YES
reserved	7	bslbf	N/A	YES
out_of_network_indicator	1	bslbf	Shall be 1 for a start (OUT) of a break, 0 for an end (IN). It is recommended that the 0 (IN) is only used for an early return see clause 4.4.8.1.	NO, [5] does not support separate IN markers.
program_splice_flag	1	bslbf	Shall be 1	YES

duration_flag	1	bslbf	Shall be 1	YES
splice_immediate	1	bslbf	Should be 0, but should be ignored in DVB-DASH as the event presentation time is used as the splice time.	NO, [5] does not support splice_immediate
reserved	4	bslbf	N/A	YES
splice_time()				NO
time_specified_flag	1	bslbf	May be set, but should be ignored as this has no meaning in DVB-DASH. Should be set in case the marker originated from an MPEG-2 transport stream to keep this information, otherwise it should be set to 0.	NO
Reserved	6	bslbf	N/A	YES
pts_time	33	bslbf	N/A	YES
Auto_return	1	bslbf	Shall be 1 for OUT, shall be 0 for IN.	YES
Duration	33	Uimsbf	Shall equal the expected break duration when out_of_network_indicator is 1. Shall be 0 or the expected break duration when out_of_network_indicator is 0.	YES
Unique_program_id	16	uimsbf	N/A	YES
Avail_num	8	uimsbf	N/A	YES
avails_expected	8	uimsbf	N/A	YES

Table 3 Restrictions on time_signal() and segmentation descriptor

Syntax	Bits	Mnemonic	Restrictions	Same as TS 103 752-1
splice_time()				NO

time_specified_flag	1	bslbf	May be set, but should be ignored as this has no meaning in DVB-DASH. Should be 1 in case marker originated from a MPEG-2 transport stream to keep this information, otherwise it should be set to 0.	NO
reserved	6	bslbf	N/A	YES
pts_time	33	bslbf	N/A	YES
splice_descriptor_tag	8	uimsbf	0x02	YES
descriptor_length	8	uimsbf	N/A	YES
Identifier	32	bslbf	0x43554549	YES
segmentation_event_id	32	bslbf	It shall be the same for corresponding start and end descriptors that signal an ad slot.	YES
segmentation_event_cancel_indicator	1	bslbf	Shall be 0	YES
reserved	7	bslbf	N/A	YES
program_segmentation_flag	1	bslbf	Shall be 1	YES
segmentation_duration_flag	1	bslbf	Shall be 1	YES
delivery_not_restricted_flag	1	bslbf	1	YES
segmentation_duration	40	uimsbf	Shall match the expected duration for Dynamic Ad Substitution. Shall be zero for Dynamic Ad Insertion.	YES, except for Dynamic Ad Insertion that was not defined.
segmentation_upid_type	8	uimsbf	N/A	NO (0x0F)
segmentation_upid_length	8	uimsbf	N/A	YES
segmentation_upid()			N/A	NO
segmentation_type_id	8	uimsbf	For PO: 0x34, 0x35, 0x36, and 0x37, may be different for other descriptor types	YES

segment_num	8	uimsbf	Optional, N/A	YES
segments_expected	8	uimsbf	Optional, N/A	YES
sub_segment_num	8	uimsbf	N/A	YES
sub_segments_expected	8	uimsbf	N/A	YES

4.3.3 Signalling of replacement ad breaks using SCTE 35 in DVB-DASH

Signalling of ad break replacement follows the recommendations of TS 103 752-1. However, the SCTE 35 payload follows the constraints defined in tables 1, 2 and 3.

4.3.4 Signalling of insertion ad breaks using SCTE 35 in DVB-DASH

DVB-DASH allows for dynamic ad insertion, in this case ads are *inserted* instead of *replaced/substituted*. Insertion opportunities may be signalled using one of the following two options.

- The start of a dynamic ad insertion opportunity is signalled using a SCTE 35 marker constrained according to Table 1 and Table 2 with
    - out_of_network_indicator=1
    - auto_return=1, and
    - the duration=0.
- The start of a dynamic ad insertion opportunity is signalled using a SCTE 35 marker constrained according to Table 1 and 3. At least a pair of the following start and end descriptors is present: DPO, PPO, distributor advertisement, provider advertisement shall be carried in this SCTE 35 marker. The start and end descriptor shall use the same segmentation_event_id and the segmentation_duration shall be zero.

4.4 Use of SCTE 214

DVB-DASH signalling shall encapsulate SCTE 35 splice_info_section() in MPEG-DASH Events as defined in SCTE 214 [4].

Additional restrictions apply as detailed in the following clauses.

4.4.1 SCTE 35 scheme usage for MPEG-DASH Events

EventStream@schemeIdUri should be set to "*urn:scte:scte35:2014:xml+bin*" as defined in [4]. When easy human readability is required and editing is required **EventStream**@schemeIdUri may be set to *urn:scte:scte35:2013:xml*.

InbandEventStream@schemeIdUri, when present, shall be set to *"urn:scte:scte35:2013:bin"*.

Other @schemeIdUri values are not supported.

NOTE: EventStream with "*urn:scte:scte35:2014:xml+bin*" is preferred as it gives best interoperability.

4.4.2 Authoring and Interpreting SCTE 35 Event Stream Presentation Times

A DVB-DASH media presentation uses a presentation timeline that is different from the presentation timeline used inside the SCTE 35 markers which is based on MPEG-TS.

SCTE 35 fields such as splice_time, ptsAdjust may be ignored by a DAS player or DAS Server. Instead, the DVB-DASH **Event**@presentationTime is used to identify the splice-time accurately by a player or DAS server.

It is the responsibility of the content generator to convert the timing information from SCTE 35 markers to Events with correct timing information in (Inband)EventStream elements with accurate **Event**@presentationTime and **Event**@duration.

4.4.3 Global timing for multi-period (live) DASH presentations

For consistency between Periods, a global timeline in a live presentation is desired.

When generating a live DVB-DASH presentation a common way to do so is to use a well- known @availabilityStartTime such as relative to Unix Epoch (e.g. 1-1-1970) i.e. "1970-01-01T00:00:00Z".

By using this reference anchor all input streams can be converted to a DVB-DASH manifest that uses the same timeline anchor as reference for media presentation times. It is up to the content generator to do the required conversions.

In case a new period is started, and the media presentation time is continuous, and **Period**@start is not PT0S or equivalent, the **EventStream**@presentationTimeOffset shall be used to continue the timeline for **EventStream**, and **SegmentTemplate**@presentationTimeOffset or **SegmentBase**@presentationTimeOffset for **InbandEventStream** and the media content.

For example, for a period starting 1000 seconds after a Period with start time of 0 for a 90 Khz timescale event stream or representation, @presentationTimeOffset should be 1000 * 90 KHz = 90,000,000.

Using @presentationTimeOffset in an EventStream element enables signalling SCTE 35 markers in a Period that started before the current Period. In this case, **Event**@presentationTime is smaller than **EventStream**@presentationTimeOffset.

This may happen when using SCTE 35 time_signal() with hierarchical descriptors. In this case the lower-level segmentation descriptors trigger period boundaries and the higher-level segmentation descriptors will have a start time equal or smaller than the **Period**@start.

Events are only valid in the Period in which they are announced, thus it is necessary to re-signal all events that are still active in a next period, and as the start time may be before the period start, using **EventStream**@presentationTimeOffset will be required to signal correct **Event**@presentationTime. See clause 4.4.5 for more details for signalling hierarchical descriptors.

4.4.4 Frame Accurate timing

A SCTE 35 **Event**@presentationTime shall be accurate enough to signal a frame start accurately. In other words when using 25 fps, a timescale of 25 might be sufficient, but when using fractional framerates more care should be taken to meet this requirement of frame accuracy.

An Event with a SCTE 35 marker containing a splice_info_sectoin with a splice_insert or time_signal command shall have a presentation time corresponding frame accurately to a key frame in corresponding video representations.

In a simple example the 90 KhZ timescale could be used/kept as it is used in the original SCTE 35 for the **EventStream**@timescale. Thus 25 Hz, 24Hz 50 Hz and 60 Hz video can be easily supported, but this may not be the case for some non-integer frame-rates.

In some cases, a content provider may have the desire to keep the original SCTE 35 markers, thus the ptsAdjust and splice_time may still be present, but these fields may be ignored by a DVB-DASH player or DAS Server and have no meaning for interpreting the splice time. The splice time is identified by the presentation time of the event.

The splice time should be aligned to a segment start in the media or a sync sample within a media segment [3].

If splices are not aligned, a sync sample shall exist within at least 100 milliseconds from the splice time for each Representation in [3].

4.4.5   Event duration handling for insertion and replacement

The @duration of the Event after a timescale conversion shall match a duration indicated in the SCTE 35 marker in a segmentation_duration or duration field.

Indefinite event duration (0xFFFFFFFF) shall not be used.

In case of splice_insert() the duration_flag shall be set and the break_duration() shall match the Event@duration after timescale conversion.

In case time_signal() is used, at least one segmentation_descriptor should be present with segmentation_duration_flag set and a segmentation_duration matching the event duration after timescale conversion.

In case of time_signal() and more than one segmentation descriptors are present with segmentation_duration_flag set, the longest segmentation_duration should be chosen as the Event@duration.

Another approach is to split segmentation descriptors in different events and SCTE 35 markers. In this case each Event only carries a single segmentation descriptor with a matching duration.

4.4.6   ID handling recommendations

The DVB-DASH processing for event streams requires unique **Event**@id's to trigger processing.

Thus, identical messages shall carry the same id, presentationTime and Event payload.

Re-using SCTE 35 splice_event_id or a checksum of the message_data may not always result in an id that is unique.

One way of generating ids is to use the 24 bits from the crc 32 checksum and 8 bits from a low resolution timestamp. This allows identical messages in temporal proximity to carry the same event id, but in case of longer archives, the uniqueness requirement of the event.id or **Event**@id is not violated for identical messages.

Otherwise, simple other methods may be used to generate unique identifiers, such as based on a counter for example.

4.4.7   Presence in the manifest

Events should be available in the media presentation description before media segments with the media presentation time matching the event presentation time. It is recommended that the events carrying a SCTE 35 corresponding to a splice a time T, are available at least 4 seconds before a segment overlapping time T becomes available according to the definitions of segment availability in DVB-DASH.

Any event overlapping one or more available segments is signalled in the manifest. Expired events carrying SCTE 35 may be removed from the manifest, but only when any segment overlapping the expiration time of the event may also be removed from the manifest (i.e. is no longer available). Thus, for example, an event that expires at T=100 may be removed when a segment starting at T=100 may be removed from the manifest (based on the segment availability end time as defined in DVB-DASH).

4.4.8   Early Termination and Extension of ad breaks

4.4.8.1   Early Termination

A DAS system with early termination capability shall publish ad content segments at the same rate as the live content segment, and use (near) identical segment durations. Thus at any time an ad segment is ended, potentially a switch to the main content can be made by switching to a subsequent corresponding segment from the live content. For example, if the main content at time T has segment T with duration d, the ad content shall have a corresponding segment with start time T and duration d. In practice slight deviations in d and T may happen, but to switch back seamlessly approximate alignment of the segment boundaries is recommended. In case of such a switch back to the live main content from an advertisement, earlier than expected, it is recommended that the period boundary/ SCTE 35 Event splice is introduced at least 4 seconds in advance. This way a player has enough time to return and playback the main content seamlessly. The switch shall not remove media segment references from the manifest other than those that would already become unavailable due to expiration. If a segment was already published in the manifest after the boundary, the boundary is shifted with this segment's duration to avoid losing an already published segment.

The switch to main content sooner than expected is signalled by a DASH Event with a SCTE 35 splice_insert with out_of_network_indicator=0 before a corresponding splice_insert with out_of_network_indicator=1 Event that is not yet ended. The SCTE 35 marker of the original ad with out_of_network_indicator=1 may be updated in the manifest to correspond to the actual break duration with the shortened duration, but this is not required. If it is not updated, the marker with out_of_network_indicator=0 shall be repeated in the manifest while the original marker is still in the manifest.

Equivalent rules apply for an end segmentation descriptor arriving earlier than expected. In this case the Event with the SCTE 35 marker with end descriptor shall be kept in the manifest as long as the original event with the corresponding start descriptor is in the manifest.

MPD@maxSegmentDuration is mandatory for dynamic MPD's in [3], setting the maxSegmentDuration to 1.5 x the average segment duration is recommended when such early termination functionality is required

4.4.8.2   Ad Break Extension

Existing ad breaks cannot be extended beyond their original duration. Nevertheless, a new ad break may be signalled immediately following the end of the existing ad break.

4.4.9 Single and Multi-period manifests

4.4.9.1 Single period versus multi-period

SCTE 35 Events and ad break signalling can be embedded in either multi or single period media presentation description. In both cases constraints apply that the SCTE 35 splice aligns with DVB-DASH segment boundaries.

In many cases a single period manifest is useful when ads are not yet inserted or replaced.

After client or server-side ad-insertion, a multi-period manifest may be useful to handle the timeline discontinuity resulting from the ad-insertion.

4.4.9.2 Conversion of single to multi period using splice_insert and auto_return =1

1. Detect SCTE 35 commands splice_insert and out_of_network_indicator = 1 and auto_return =true. The original Period Elements may initially be copied to create the new period, but several attributes and elements need to be changed as follows:
2. The presentation time of the event can be used as the **Period**@start time of the ad period and the **Event**@duration matches the **Period**@duration (This need not to be explicit as it can also be calculated through the **Period**@start of the next Period in case MPD@type='dynamic', otherwise when MPD@type='static' it must be set). The **Period**@duration and **Period**@start time of a subsequent period not signalled through a SCTE 35 Event may have a **Period**@start and optionally id of presentationTime + duration of the preceding Event.
3. The **Period**@id can be set to the **Period**@start time as this value will be unique.
4. When a segment timeline is present, the segment timeline is used to find all segment presentation times and durations that overlap the period, and then create the corresponding **SegmentTimeline** with corresponding S elements in each Period, and rewrite the **SegmentTimeline** of each **SegmentTemplate** element in the Periods.
5. The **SegmentTemplate**@presentationTimeOffset shall be set to a time matching the Event presentation time or **Period**@start, when converted to the correct timescale.

4.4.10 Examples

This example shows the usage of a an EventStream element containing a binary SCTE 35 message. The <Binary> element contains the SCTE 35 splice_info_section encoded using Base64 [6] and the EventStream@presentationTimeOffset is aligned with the Period@start.

```
<Period id="1519" start="PT451209H39M31.000S">

<EventStream schemeIdUri="urn:scte:scte35:2014:xml+bin" timescale="1"
presentationTimeOffset="1624354771">

    <Event presentationTime="1624354848" duration="19" id="760">

    <Signal xmlns="http://www.scte.org/schemas/35/2016">

    <Binary>/DAgAAAAAAAAAP/wDwUAAAL4f//+ABoXsMAAAAAAAPF20V0=</Binary>

    </Signal>

    </Event>

</EventStream>
```

```
</Period>
```

5   Player-Side Impression Reporting for DAS

5.1 Introduction

DVB-TA part 2 clause 5.6 describes tracking to measure an ad or viewer impression based on IAB VAST [i.3].

DVB-DASH players do not support interpretation and processing of IAB VAST elements defined in [i.3].

An application running a DVB-DASH player for ad insertion or substitution may support interpreting and responding to IAB VAST tracking elements, as described in [i.4] clause 5.6.

The IAB VAST specification describes Tracking and Impression elements in XML which provide a URI that is requested when the Tracking or Impression is triggered. These describe progression through a linear creative by tracking points of time, such as start, end, first quartile, second quartile, etc. As these are directly timed with the playout of the media, the DASH event mechanisms can be used to convey and align these to media presentation playback.

Other tracking events such as click tracking, or non-linear ad tracking may be implemented in an application but are not in scope of DVB-DASH players.

Interpretation and processing of Tracking and Impression elements as defined in IAB VAST is not required by DVB-DASH players supporting this specification. However, the callback events defined in [7] clause 5.10.4.5 may be used to insert callback or tracking uri's to enable impression reporting by a DVB-DASH player or application.

This may be useful for server-side ad insertion with player or client side reporting.

5.2 MPEG-DASH callback event signalling

The MPEG-DASH callback event is defined in 5.10.4.5 of [7] and uses the schemeIdURI "urn:mpeg:dash:event:callback:2015".

DVB-DASH players supporting this specification shall support the interpretation of MPD events with the callback event in the MPD using the EventStream or InbandEventStream element.

The callback URI's shall be contained in the value space of Event Elements in an EventStream element and shall be enclosed using <![CDATA[]]> when using EventStream element.Event@messageData shall not be used. The URI may contain query parameters.

In case InbandEventStream is used the URI's are contained in the segments and the escaping using <![CDATA[]]> is not required.

DVB-DASH players conforming to this document should perform the callback to the URI, in this case the player shall perform the HTTP request for each callback event at the corresponding media start time. This happens when the media playback time first overlaps the Event presentationTime (i.e. this is the on-start mode of processing events according to [1] clause A.13.2). Some DVB-DASH players may not support a callback to the URI, in this case the application is responsible to do the callback.

NOTE: For a native DASH player not supporting the MPEG DASH callback event, the event would likely be passed back to the application which would need to handle the event and the callback.

Servers responding to callback should generate a 2xx status code, but players should ignore the response to the HTTP GET request initiated from a callback event, even if another response code is generated.

An example of callback Event Embedded in a DVB-DASH MPD Is shown below:

```
<EventStream schemeIdUri=" urn:mpeg:dash:event:callback:2015" value="1">

 <Event presentationTime="0" duration="0" id="0">
<![CDATA[https://example.com/tracking/start]]>

 </Event>

</EventStream>
```

Deriving MPEG DASH callback events from IAB VAST elements is out of scope of this document.

It is the responsibility of the DAS server and may be implementation specific.

As defined in 10.11 players support the use of Cookies as specified in IETF RFC 6265 [18], therefore a server may use cookies to generate a state between the player and the server.

5.3 Player Event Processing

Players shall do the HTTP request at the time when the Event@presentationTime first matches the presentation time of the media playback (i.e. on-start mode as described in A.13.2).

History

Document history		
A178-3	August 2022	First BlueBook publication
A178-3r1	July 2023	Added viewer impression callback processing