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1 Scope

The present document defines the delivery of TV content via HTTP adaptive streaming building on the MPEG DASH specification [1]. In order to improve interoperability, additional constraints and requirements are defined and a selection of the video and audio codecs from the DVB toolbox are referenced that are technically appropriate for use with MPEG DASH. The present document includes High Definition Television (HDTV), Ultra High Definition Television (UHDTV), High Dynamic Range (HDR) Television, High Frame Rate (HFR) Video and Next Generation Audio (NGA).

The normative XML schemas referenced by the present document are attached as separate files contained in archive ts_103285v010201p0.zip which accompanies the present document. The XML schemas included in the present document are informative.

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.

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

- [1] ISO/IEC 23009-1:2014: "Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats".
- [2] ISO/IEC TR 23009-3: "Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 3: Implementation guidelines".
- [3] ETSI TS 101 154: "Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream".

NOTE: The present document references text that was introduced in ETSI TS 101 154 with version 2.4.1.

- [4] ISO/IEC 14496-15:2017: "Information technology -- Coding of audio-visual objects -- Part 15: Carriage of network abstraction layer (NAL) unit structured video in ISO base media file format".
- [5] IETF RFC 6381: "The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types".
- [6] ISO/IEC 14496-12:2015: "Information technology -- Coding of audio-visual objects -- Part 12: ISO base media file format".
- [7] ISO/IEC 23001-7:2016: "Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media file format files".
- [8] ISO/IEC 14496-3:2009/Amd 4:2013: "New levels for AAC profiles".
- [9] ISO/IEC 14496-14: "Information technology -- Coding of audio-visual objects -- Part 14: MP4 file format".
- [10] ETSI TS 102 366: "Digital Audio Compression (AC-3, Enhanced AC-3) Standard".
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- [12] ISO/IEC 23003-1:2007: "Information technology -- MPEG audio technologies -- Part 1: MPEG Surround".
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- [15] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
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- [17] IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1".
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- [21] Recommendation ITU-R BT.709: "Parameter values for the HDTV standards for production and international programme exchange".
- [22] W3C Recommendation (December 2012): "WOFF File Format 1.0".
- NOTE: Available at <http://www.w3.org/TR/WOFF>.
- [23] ETSI TS 103 190-1: "Digital Audio Compression (AC-4) Standard; Part 1: Channel based coding".
- [24] IETF RFC 2782: "A DNS RR for specifying the location of services (DNS SRV)".
- [25] IETF RFC 7164: "RTP and Leap Seconds".
- [26] W3C Recommendation (November 2008): "Extensible Markup Language (XML) 1.0".
- NOTE: Available at: <http://www.w3.org/TR/REC-xml/>.
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- NOTE: Available at: <http://www.w3.org/TR/media-frags/>.
- [28] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".
- [29] ISO 8601:2004: "Data elements and interchange formats -- Information interchange -- Representation of dates and times".
- [30] ISO/IEC 23009-1:2014/Amd 1:2015: "High Profile and Availability Time Synchronization".
- [31] ETSI TS 102 809: "Digital Video Broadcasting (DVB); Signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments".
- [32] ETSI TS 101 499 (V3.1.1): "Hybrid Digital Radio (DAB, DRM, RadioDNS); SlideShow; User Application Specification".
- [33] ETSI TS 103 190-2 (V1.2.1): "Digital Audio Compression (AC-4) Standard; Part 2: Immersive and personalized audio".
- [34] ISO/IEC 23008-3:2015/AMD2:2016/AMD3:2016: "Information technology -- High efficiency coding and media delivery in heterogeneous environments - Part 3: 3D audio"/"Amendment 2: Part 3: 3D audio - MPEG-H 3D Audio File Format Support"/"Amendment 3: Part 3: 3D audio - MPEG-H 3D Audio Phase 2".

- [35] ISO/IEC 23009-1:2014/DAmD 4: "Segment Independent SAP Signalling (SISSI), MPD chaining, MPD reset and other extensions"
- NOTE: available at <https://www.iso.org/standard/70435.html>.
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- [37] ISO/IEC 23003-3:2012: "Information technology -- MPEG audio technologies -- Part 3: Unified speech and audio coding".
- [38] Recommendation ITU-R BT.2020: "Parameter values for ultra-high definition television systems for production and international programme exchange".
- [39] Recommendation ITU-R BT.2100: "Image parameter values for high dynamic range television for use in production and international programme exchange".
- [40] ISO/IEC 23000-19:2018: "Information technology -- Multimedia application format (MPEG-A) -- Part 19: Common media application format (CMAF) for segmented media".
- [41] ETSI TS 102 822-3-1 (V1.9.2): "Broadcast and On-line Services: Search, select, and rightful use of content on personal storage systems ("TV-Anytime"); Part 3: Metadata; Sub-part 1: Phase 1 - Metadata schemas".

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.

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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] DASH-IF: "Guidelines for Implementation: DASH-IF Interoperability Points V3.0".

NOTE: Available at <http://dashif.org/guidelines/>.

- [i.2] DTS document 9302K62400 "Implementation of DTS[®] Audio in Dynamic Adaptive Streaming over HTTP (DASH)".

NOTE: Available at <http://www.dts.com/resources>.

- [i.3] Recommendation ITU-T T.35: "Procedure for the allocation of ITU-T defined codes for non-standard facilities".

- [i.4] TTML Media Type Definition and Profile Registry.

NOTE Available at: <https://www.w3.org/TR/ttml-profile-registry/>.

- [i.5] W3C Recommendation 17 November 2016: "Media Source Extensions".

- [i.6] Recommendation ITU-T H.265 / ISO/IEC 23008-2: "Information technology - High efficiency coding and media delivery in heterogeneous environments - Part 2: High efficiency video coding".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

access unit: unit of a media stream with an assigned Media Presentation time

accessibility: degree to which a media content or certain media content components are available to as many people as possible

adaptation set: set of interchangeable encoded versions of one or several media content components

adjusted segment availability start time: time instant in wall-clock time at which a Segment becomes an available Segment

application: collection of assets and logic that together provide a self-contained interactive service to the user

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

audio bundle: set of audio programme components that contribute to the playout of one next generation audio decoder

audio preselection: set of audio programme components representing a version of the Programme that may be selected by a user for simultaneous decoding

NOTE: An audio Preselection is a sub-selection from all available audio programme components of one Programme. An audio Preselection may be considered the NGA equivalent of audio services in predecessor systems, whereby each audio service comprises a complete audio mix.

audio programme component: smallest addressable unit of the audio components of a Programme

available segment: segment that is accessible at its assigned HTTP-URL with optionally an assigned byte range that when requested with an HTTP GET results in a reply with the Segment and a 2xx status code

auxiliary NGA stream: NGA stream delivered using NGA multi-stream delivery, and containing additional audio programme components not contained in the main NGA stream.

bitstream switching segment: segment that if present contains essential data to switch to the Representation it is assigned to

complementary representation: representation which complements at least one dependent Representation

content protection: protection of content such that it can only be presented by authorized Devices

content provider: entity that owns or is licensed to sell content or content assets

continuous media: media with an inherent notion of time, for example, speech, audio, video, timed text or timed metadata

DASH metric: metric identified by a key and defined in Hi ISO/IEC 23009-1 [1]

decoder specific information: NGA decoder configuration record

default audio Preselection: audio Preselection including all audio programme components to be decoded when a player is unable to select from the available Preselections.

dependent Representation: representation for which Segments from its complementary Representations are necessary for presentation and/or decoding of the contained media content components

earliest presentation time: smallest presentation time of any access unit of a Media Segment or Subsegment for a media stream

event: aperiodic sparse media-time related auxiliary information to the DASH client or to an application

event stream: sequence of related events

group: collection of Adaptation Sets that are not expected to be presented simultaneously

HTTP-URL: URL with a fixed scheme of "http" or "https"

index segment: segment that primarily contains indexing information for Media Segments

initialization segment: segment containing metadata that is necessary to present the media streams encapsulated in Media Segments

LBR: DTS-HD extension used to implement the low bit rate coding profile

main NGA stream: NGA stream delivered using NGA multi-stream delivery, and containing at least all the audio programme components corresponding to the default audio Preselection

media content: one media content period or a contiguous sequence of media content periods

media content component: one continuous component of the media content with an assigned media component type that can be encoded individually into a media stream

media content component type: single type of media content such as audio, video, or text

media content period: set of media content components that have a common timeline as well as relationships on how they can be presented

media presentation: collection of data that establishes a bounded or unbounded presentation of media content

Media Presentation Description (MPD): formalized description for a Media Presentation for the purpose of providing a streaming service

media presentation timeline: concatenation of the timeline of all Periods which itself is common to all Representations in the Period

media segment: segment that complies with media format in use and enables playback when combined with zero or more preceding segments, and an Initialization Segment (if any)

media stream: encoded version of a media content component

media Subsegment: subsegment that only contains media data but no Segment Index

message: part of an event containing information that is exclusively handled by the event handler

MPD start time: approximate presentation start time of a Media Segment signalled in MPD

MPD duration: approximate presentation duration of a Media Segment signalled in MPD

Multiple Representation, Multiple Preselections: configuration of multiple audio Representations that share the same context of Preselection, and which convey one or more than one audio Preselection

period: interval of the Media Presentation, where a contiguous sequence of all Periods constitutes the Media Presentation

player: device responsible for receiving and rendering media services

presentation time: time associated to an access unit that maps it to the Media Presentation timeline

remote element entity: entity that contains one or more elements and is referenced in the MPD with an HTTP-URL contained in an @xlink:href attribute

representation: collection and encapsulation of one or more media streams in a delivery format and associated with descriptive metadata

segment: unit of data associated with an HTTP-URL and optionally a byte range that are specified by an MPD

segment availability end time: time instant in wall-clock time at which a Segment ceases to be an available Segment

segment availability start time: latest time instant in wall-clock time at which a Segment becomes an available Segment