**3GPP TSG SA WG4 #110 *S4-201072***

**19th – 28th August 2020**

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| *CR-Form-v12.0* |
| **Draft CHANGE REQUEST** |
|  |
|  | **26.247** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | DASH Profile for CMAF |
|  |  |
| ***Source to WG:*** | Qualcomm Incorporated |
| ***Source to TSG:*** | SA4 |
|  |  |
| ***Work item code:*** | 5GMS3 |  | ***Date:*** | 2020-08-17 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | TS 26.247 does not yet define a profile for CMAF and for 5GMS |
|  |  |
| ***Summary of change:*** | Adds such a profile and connects to 5GMS and CMAF |
|  |  |
| ***Consequences if not approved:*** | TS 26.247 not usable for 5GMS |
|  |  |
| ***Clauses affected:*** | 1, 2, 3, 4, 7.3.11 (new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | The latest draft of the DASH Profiles for CMAF content is attached. |
| ***56***  |  |
| ***This CR's revision history:*** |  |

**===== CHANGE =====**

# 1 Scope

The present document specifies Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH). This specification is part of Packet-switched Streaming Service (PSS) and 5G Media Streaming. HTTP-based progressive download and dynamic adaptive streaming had initially been separated from TS 26.234 to differentiate from RTP-based streaming that is maintained in TS 26.234. HTTP-based progressive download and dynamic adaptive streaming may be deployed independently from RTP-based PSS, for example by using standard HTTP/1.1 servers for hosting data formatted as defined in the present document, and in particular together with 5G Media Streaming.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 22.233: "Transparent End-to-End Packet-switched Streaming Service; Stage 1".

[2] 3GPP TS 26.233: "Transparent end-to-end Packet-switched Streaming service (PSS); General description".

[3] 3GPP TS 26.234: "Transparent end-to-end packet switched streaming service (PSS); Protocols and codecs".

[4] 3GPP TS 26.244: "Transparent end-to-end packet switched streaming service (PSS); 3GPP file format (3GP)".

[5] 3GPP TS 26.245: "Transparent end-to-end packet switched streaming service (PSS); Timed text format".

[6] 3GPP TS 26.246: "Transparent end-to-end packet switched streaming service (PSS); 3GPP SMIL Language Profile".

[7] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[8] IETF STD 0007: "Transmission Control Protocol", Postel J., September 1981.

[9] IETF RFC 2616: "Hypertext Transfer Protocol – HTTP/1.1", Fielding R. et al., June 1999.

[10] Open Mobile Alliance, Service and Content Protection for Mobile Broadcast Services, Approved Version 1.0, February 2009.

[11] ISO/IEC 14496-12:2012 | 15444-12:2012 "Information technology - Coding of audio-visual objects - Part 12: ISO base media file format" | "Information technology - JPEG 2000 image coding system - Part 12: ISO base media file format".

[12] IETF RFC 2818: "HTTP Over TLS", E. Rescorla, May 2000.

[13] IETF RFC 5646: "Tags for Identifying Languages", A. Phillips, M. Davis, September 2009.

[14] (void)

[15] Open Mobile Alliance: "DRM Content Format V 2.0".

[16] Open Mobile Alliance: "DRM Content Format V 2.1".

[17] IETF RFC 3986: "Uniform Resource Identifiers (URI): Generic Syntax", Berners-Lee T., Fielding R. and Masinter L., January 2005.

[18] IETF RFC 1952: "GZIP file format specification" version 4.3,P. Deutsch, May 1996.

[19] IETF RFC 1738: "Uniform Resource Locators (URL)", December 1994.

[20] (void)

[21] (void)

[22] OMA-ERELD-DM-V1\_2-20070209-A: "Enabler Release Definition for OMA Device
+Management, Approved Version 1.2"

[23] 3GPP TS 33.310: "Network Domain Security (NDS); Authentication Framework (AF)".

[24] IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

[25] IETF RFC 2231: "MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations".

[26] IETF RFC 6381: "The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types," August 2011.

[27] Void.

[28] IEEE 1003.1-2008, IEEE Standard for Information Technology - Portable Operating System Interface (POSIX), Base Specifications, Issue 7

[29] IETF RFC 4337, "MIME Type Registration for MPEG-4," March 2006

[30] IETF RFC 3023, "XML Media Types," January 2001.

[31] 3GPP TS 23.203: "Policy and charging control architecture".

[32] 3GPP TS 29.213: "Policy and Charging Control signalling flows and Quality of Service (QoS) parameter mapping".

[33] 3GPP TS 29.214: "Policy and Charging Control over Rx reference point".

[34] void

[35] ITU-T Recommendation H.264 (04/2013): "Advanced video coding for generic audiovisual services".

[36] 3GPP TR 26.946: "Multimedia Broadcast/Multicast Service (MBMS); User service guidelines".

[37] IETF RFC 3629: "UTF-8, a transformation format of ISO 10646," November 2003.

[38] IETF RFC 4288: "Media Type Specifications and Registration Procedures," December 2005.

[39] IETF RFC 4648: "The Base16, Base32, and Base64 Data Encodings," October 2006.

[40] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF", Crocker D. and Overell P., January 2008.

[41] 3GPP TR 26.905: "Mobile stereoscopic 3D video".

[42] 3GPP TS 26.346: " Multimedia Broadcast/Multicast Service (MBMS);Protocols and codecs"

[43] ISO/IEC 23009-1:2020/Amd. 1" Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats".

[44] ISO/IEC 23009-3 "Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 3: Implementation and Deployment Guidelines".

[45] ISO/IEC 23009-2 " Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 2: Conformance and Reference Software".

[46] 3GPP TR 26.938: "Packet-switched Streaming Service (PSS); Improved support for dynamic adaptive streaming over HTTP in 3GPP".

[47] ISO/IEC 23001-7:2015: "Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media file format files".

[48] IETF RFC 7164, "RTP and Leap Seconds", March 2014.

[49] ITU-T P.1203 (11/2016), "Parametric bitstream-based quality assessment of progressive download and adaptive audiovisual streaming services over reliable transport".

[50] ITU-T P.910 (04/2008), "Subjective video quality assessment methods for multimedia applications".

[51] "Mobile Location Protocol (MLP) ", Open Mobile Alliance, OMA-LIF-MLP-V3\_1, Approved Version 3.1 – 20 Sep 2011.

[52] IEEE 1003.1-2008 "IEEE Standard for Information Technology - Portable Operating System Interface (POSIX(R))".

[53] 3GPP TS 25.331 "Radio Resource Control (RRC); Protocol specification".

[54] ISO/IEC 23009-5:2017: "Information Technology — Dynamic adaptive streaming over HTTP (DASH) — Part 5: Server and network assisted DASH (SAND)".

[55] 3GPP TR 26.957: "Study on Server And Network-assisted DASH (SAND) for 3GPP Multimedia Services".

[56] IETF RFC 6455: "The WebSocket Protocol".

[57] 3GPP TS 23.003: "Numbering, addressing and identification".

[58] 3GPP TS 26.116: "Television (TV) over 3GPP services; Video profiles".

[59] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[60] 3GPP TS 26.347: " Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

[61] 3GPP TS 27.007: " Technical Specification Group Core Network and Terminals; AT command set for User Equipment (UE)".

[62] DASH Industry Forum: "DASH Player’s Application Events and Timed Metadata Processing Model and APIs", see under <https://dashif.org/guidelines/>.

[63] 3GPP TS 28.405; "Management of Quality of Experience (QoE) measurement collection; Control and configuration"

[64] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

[65] 3GPP TS 26.511: "5G Media Streaming (5GMS); Profiles, codecs and formats".

[66] 3GPP TS 26.512: " 5G Media Streaming (5GMS); Protocols".

[67] ISO/IEC 23000-19: "Information Technology Multimedia Application Format (MPEG-A) – Part 19: Common Media Application Format (CMAF) for segmented media".

[68] DASH Industry Forum – Guidelines for Interoperability: "DASH Low Latency Modes", see <https://dashif.org/guidelines/>.

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## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [7] and the following apply.
An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [7].

3GP 3GPP file format

3GP-DASH 3GPP Dynamic Adaptive Streaming over HTTP

5GMS 5G Media Streaming

AHS Adaptive HTTP Streaming

A/V Audio/Video

AVC Advanced Video Coding

CMAF Common Media Application Format

DANE DASH-Aware Network Element

DM Device Management

DNS Domain Name System

DRM Digital Rights Management

FQDN Fully Qualified Domain Name

HSD HTTP Streaming and Download

HTML Hypertext Markup Language

HTTP Hypertext Transfer Protocol

HTTPS Hypertext Transfer Protocol Secure

IDR Instantaneous Decoding Refresh

MPD Media Presentation Description

MPEG-2 TS Moving Picture Experts Group Transport Stream

MIME Multipurpose Internet Mail Extensions

MOS Mean Opinion Score

NAS Non-Access Stratum

OMA Open Mobile Alliance

PDCF Packetized DRM Content Format

PER Parameters Enhancing Reception

PSS Packet-switched Streaming Service

QMC QoE Measurement Collection

QoE Quality-of-Experience

RFC Request For Comments

RRC Radio Resource Control

RTP Real-time Transport Protocol

SAND Server and Network Assisted DASH

SMIL Synchronised Multimedia Integration Language

TLS Transport Layer Security

URI Uniform Resource Identifier

URL Uniform Resource Locator

URN Uniform Resource Name

UTF-8 Unicode Transformation Format (the 8-bit form)

XML eXtensible Markup Language

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# 4 Overview

The present document specifies Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH) for continuous media. The features are separated from the umbrella specification TS 26.234 [3] to differentiate from RTP-based streaming that is specified and maintained in TS 26.234. Services relying exclusively on these features may be deployed independently from RTP-based PSS servers, for example by using standard HTTP/1.1 servers for hosting the services and in particular also for 5G Media Downlink Streaming when content is hosted on 5GMSd ASs as defined in TS 26.501 [64], TS 26.511 [65] and TS 26.512 [66].

The specification covers the following aspects:

- System Description: describes the relationship to the PSS architecture and refines the architecture, interfaces and protocols that are defined in this specification.

- Progressive Download over HTTP.

- 3GPP Dynamic Adaptive Streaming over HTTP (3GP-DASH) provides an overview of the architecture, the
formats and the models that build the basis for 3GP-DASH. Also, 3GP-DASH Profiles provide identifiers and refers to a set of specific restrictions in this or other specifications.

- DASH - Media Presentation describes the data model of a Media Presentation. It also provides an overview on elements and attributes that may be used to describe components and properties of a media presentation in a
Media Presentation Description (MPD).

- DASH - Usage of the 3GP file format defines how segments can be formed based on the 3GP file format.

- Quality-of-Experience for Progressive Download and 3GP-DASH.

- Server and Network Assisted DASH (SAND) introduces messages between DASH clients and network elements or between various network elements for the purpose to improve efficiency of streaming sessions by providing information about real-time operational characteristics of networks, servers, proxies, caches as well as DASH client's performance and status.

- Normative annexes for MPD schema (Annex B), Descriptor Scheme Definitions (Annex C), OMA DM QoE Management Object (Annex F), File format extensions for 3GPP DASH support (Annex G) and MIME Type Registration for MPD (Annex H). - Informative annexes for Client Behaviour (Annex A), MPD Examples (Annex D), and Mapping MPD structure and semantics to SMIL (Annex E).

Note: Several of the Annexes refer partially or exclusively to ISO/IEC 23009-1 [43].

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### 7.3.11 5G Media Streaming DASH Interoperability Point

If DASH is used in 5G Media Streaming as defined in TS 26.501 [64], then the DASH Server is mapped to the 5GMSd AS and the DASH client is mapped to the Media Player within the 5GMSd Client. A detailed definition of the Media Player is provided in TS 26.512 [66] separating the DASH Access Client and a CMAF-based playback format.

This clause defines a 5G Media Streaming DASH Interoperability Point for the DASH access client, in particular the processing requirements for the MPD and Segment Formats. An interoperability point following the requirements is is identified by the URN "urn:3GPP:5GMS:iop:DASH ". This profile is targeted to support the playback of segmented content according to CMAF as defined in ISO/IEC 23000-19 [66].

The requirements for playback of codecs and formats for a 5GMSd client are documented in TS 26.511 [12].

The following restrictions apply for a Media Presentation:

* The Media Presentation shall conform to either the DASH Core Profile for CMAF Content or DASH Extended Profile for CMAF Content as defined in ISO/IEC 23009-1 [43] with the following restrictions and extension.
* Exactly one of the following Segment and Subsegment Information Modes shall be used within one Subset of one Period
	+ The **SegmentTemplate** element with @media containing a $Number$ template and @duration is present
	+ The **SegmentTemplate** element with @media containing a $Number$ template and **SegmentTimeline** is present
	+ The **SegmentTemplate** element with @media containing a $Time$ template and **SegmentTimeline** is present
	+ The **SegmentBase** element with the Segment Index signalling

The following extensions may apply for the 5G Media Streaming DASH Interoperability Point:

* The DASH Media Presentation may conform to DASH Low Latency with the @profiles parameter set to 'http://www.dashif.org/guidelines/low-latency-live-v5' as defined in DASH-IF IOP Low-Latency Modes [68].
* The DASH Media Presentation may contain one or several **ServiceDescription** elements.
* The DASH Media Presentation may contain one or several **Subset** elements. If the value of the @id of the Subset is identical to the value of the @id of the **ServiceDescription** element, then this subset defines a restriction of Adaptation Sets that is available when this Service Description is selected.

The DASH Access client shall support playback and handling of Media Presentations conforming to the 5G Media Streaming DASH Interoperability Point as defined in this clause. Specifically, this includes support for

* The playback of CMAF Content and DASH Extended Profile for CMAF Content as defined in ISO/IEC 23009-1 [43] with the restrictions of Segment and Subsegment Information modes.
* The requirements of a Low-Latency client as defined in DASH-IF IOP Low-Latency Modes [68].