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TECHNICAL SPECIFICATION

Universal Mobile Telecommunications System (UMTS); LTE; Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH) (3GPP TS 26.247 version 17.2.0 Release 17)

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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The 3GPP transparent end-to-end packet-switched streaming service (PSS) specification consists of seven 3GPP TSs: 3GPP TS 22.233 [1], 3GPP TS 26.233 [2], 3GPP TS 26.234 [3], 3GPP TS 26.244 [4], 3GPP TS 26.245 [5], 3GPP TS 26.246 [6], and the present document.

The TS 22.233 contains the service requirements for the PSS. The TS 26.233 provides an overview of the PSS. The TS 26.234 provides the details of the protocols and codecs used by the PSS. The TS 26.244 defines the 3GPP file format (3GP) used by the PSS and MMS services. The TS 26.245 defines the Timed text format used by the PSS and MMS services. The TS 26.246 defines the 3GPP SMIL language profile. The present document defines Progressive Download and Dynamic Adaptive Streaming over HTTP.

The TS 26.244, TS 26.245 and TS 26.246 start with Release 6. Earlier releases of the 3GPP file format, the Timed text format and the 3GPP SMIL language profile can be found in TS 26.234.

The TS 26.247 starts with Release 10. Earlier releases of Progressive Download and Dynamic Adaptive Streaming over HTTP can be found in TS 26.234.

Introduction

Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH) collects a set of technologies how progressive download and adaptive streaming of continuous media may be carried out exclusively over HTTP.

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.

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".

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[27] Void.

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

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[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".

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

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[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".

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

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[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/.

[69] 3GPP TS 24.526: " User Equipment (UE) policies for 5G System (5GS); Stage 3".

[70] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".3Definitions, abbreviations and conventions

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [7], in ISO/IEC 23009-1 [43], section 3.1, and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [7].

frame-packed stereoscopic 3D video: a video consisting of two views in which both views were packed into a single stream before compression.

multiview stereoscopic 3D video: a video consisting of two views packed into a single stream during compression.

interactivity event: Time interval, whose occurrence may be either pre-scheduled or unscheduled during the presentation of a main program, within which the user may engage with and/or consume interactive content.

rebuffering: a condition occuring in the media buffer when the buffer fill level is sufficiently depleted and buffer exhaust is imminent, typically resulting in suspended media playout.

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

3.3 Conventions

The naming conventions of ISO/IEC 23009-1 [43], clause 3.3 apply in this specification.

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 the stage 2 specification in TS 26.501 [64] as well as in the stage 3 specifications in 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].

5 System Description

5.1 Overview

Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH) enables to provide services to deliver continuous media content over Hypertext Transfer Protocol (HTTP) in a sense that all resources that compose the service