**3GPP TSG SA WG4 #110 *S4-201223***

**19th – 28th August 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.511** | **CR** | **0001** | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  | | | | | | | | |
| *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:*** | Corrections to 5G Media Streaming | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated, Dolby Laboratories | | | | | | | | | |
| ***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 can be 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:*** | | Unclear how TS 26.511 connects to 5G Media Streaming. Unclear that you are not required to use codecs in this spec | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Updates references and intro | | | | | | | | |
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| ***Consequences if not approved:*** | | Relation between 5GMS unclear | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3A (new), 4.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
| ***56*** | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

# 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] ITU-T Recommendation H.264 (06/2019): "Advanced video coding for generic audiovisual services".

[3] ITU-T Recommendation H.265 (02/2018): "High efficiency video coding".

[4] 3GPP TS 26.117: "5G Media Streaming (5GMS); Speech and audio profiles".

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

[6] 3GPP TS 26.307: "Presentation Layer for 3GPP Services".

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

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

[9] CTA-5003: "Web Application Video Ecosystem (WAVE): Device Playback Capabilities Specification", available at <https://cdn.cta.tech/cta/media/media/resources/standards/pdfs/cta-5003-final.pdf>.

[10] 3GPP TS 26.512: " 5G Media Streaming (5GMS); Protocols".

[11] IETF RFC 6381: The 'Codecs' and 'Profiles' Parameters for "Bucket" Media Types.

[12] 3GPP TS 26.116: "Television (TV) over 3GPP Services; Video Profiles".

[13] 3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

[14] ISO/IEC 14496-12: "Information technology - Coding of audio-visual objects -Part 12: ISO base media file format".

[15] ISO/IEC 14496-15: "Information technology - Coding of audio-visual objects - Part 15: Carriage of network abstraction layer (NAL) unit structured video in the ISO base media file format".

[16] W3C IMSC1.1: "TTML Profiles for Internet Media Subtitles and Captions 1.1", available at <http://www.w3.org/TR/ttml-imsc1.1>.

[17] ISO/IEC 14496-30: "Information technology - Coding of audio-visual objects - Part 30: Timed text and other visual overlays in ISO base media file format".

[18] W3C Media Capabilities: "Media Capabilities", available at <https://w3c.github.io/media-capabilities/> [19] CTA-5000-B: " Web Application Video Ecosystem - Web Media API Snapshot 2019", available at <https://cdn.cta.tech/cta/media/media/resources/standards/pdfs/cta-5000-b-final_v2.pdf>.

[19] ISO/IEC 23009-1: "Information Technology - Dynamic Adaptive Streaming Over HTTP (DASH) — Part 1: Media Presentation Description and Segment Formats".

[20] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[21] IETF RFC 8216: "HTTP Live Streaming".

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# 3A Overview

## 3A.1 Introduction

## 3A.2 Codecs and Formats in Downlink Media Streaming

### 3A.2.1 Architecture, Interfaces and APIs

According to TS 26.501 [5] Downlink Media Streaming provides the ability for content to be distributed using procedures and protocols defined by 5G Media Streaming as shown in Figure 4.1-1. The detailed procedures for the interfaces and APIs for 5G Media Streaming are defined in TS 26.512 [10].



Figure 4.1-1: 5G Downlink Media Streaming Architecture

The present specification primarily deals with the segment formats delivered on M4d and the requirements applicable to the media playback platform and content decryption module. According to Figure 4.1-1, the Access Client in the 5GMSd Client uses the manifest – typically the MPD for Dynamic Streaming over HTTP (DASH) as defined in ISO/IEC 23009-1 [19] and TS 26.247 [20] or the Master Playlist for HTTP Live Streaming (HLS) as defined in IETF RFC 8216 [21] – to download Segments to initiate a media playback session. A 5GMS Application Provider may define and ingest these segment formats directly through M2d such that the 5GMSd AS acts as a hosting server but does not require the media to be either transcoded or repackaged. Using these unified formats maximizes cacheability and general CDN operations, including usage of secure transport protocols such as HTTPS on M4d.

5G Media Streaming segment formats are defined based on the Common Media Application Format (CMAF) in ISO/IEC 23000-19 [7]. By using this format, 5G Media Streaming is compatible with a broad set of segment-based streaming protocols including Dynamic Streaming over HTTP (DASH) and HTTP Live Streaming (HLS). For example, ISO/IEC 23009-1 [19] defines a detailed DASH profile for delivering CMAF content within a DASH Media Presentation using a converged segment format.

Readers of the present document are encouraged to familiarize themselves with terms defined in CMAF such as CMAF Headers, CMAF Fragments, CMAF Tracks and CMAF Switching Sets. CMAF defines a content model for adaptive playback of segmented media (enabling seamless switching across tracks encoded from the same media) and late binding of tracks from different media types associated with the same presentation. CMAF also defines a content protection and encryption framework for multi-DRM support based on ISO/IEC 23001-7 [8]. CMAF also defines media profiles, i.e. encoding constraints on a CMAF track and its contained media samples associated with a specific codec. This specification only uses the structural constraints of CMAF as defined in clause 7 of ISO/IEC 23000-19 [7] and in clause 8 of ISO/IEC 23000-19 [7] for encrypted content. Specific 5GMS media profiles for video, audio and subtitles based on the general constraints of ISO/IEC 23000-19 [7] in clauses 9, 10 and 11, respectively, are defined in this specification. However, Downlink Media Streaming is not restricted to the media profiles defined in this specification: any CMAF media profile may be used and distributed within Downlink Media Streaming.

### 3A.2.2 Hypothetical Device Playback Model

The media playback platform is expected to be used by the Access Client. The Access Client itself handles the download of segmented media content. This specification is based on a hypothetical playback model that permits an application and/or a media access client to play back segmented media content streamed to 5G Downlink Media Streaming. Playback receiver requirements for CMAF content are defined in the CTA WAVE Device Playback Specification [9], documenting how an Access Client can use manifest information for establishing and performing playback of CMAF content based on a CMAF Reference Player model.

Following the details in Figure 4.1-1, playback functionalities include:

1. Querying the capabilities of the device to determine if it supports playback of a specific media profile. Different means exist and are described in CTA-5003 [9], but minimally a well-defined MIME type following the requirements in RFC 6381 [11] is needed.
2. Initializing the playback platform with the codec by providing appropriate initialization information. Atminimum, a CMAF Header is needed for initializing the decoder.
3. Playing back media, by appending data to source and track buffers and providing additional instructions such as seek, accelerated playback, random access, etc.
4. The ability to check the status of the playback platform, for example the size and duration of the media buffers, current playback time, etc. Relevant APIs exposed by the 5GMSd Client via M7d are defined in TS 26.512 [21].
5. The ability to receive notifications and and error events from the playback platform, for example non-conforming content, buffer underuns, etc. Relevant APIs exposed by the 5GMSd Client via M7d are defined in TS 26.512 [21].

### 3A.2.3 Necessary Conditions for Codecs and Formats in 5GMSd

In order to use a media codec or a specific media profile of the codec in the context of 5G Media Streaming, the following aspects need to be defined:

* A CMAF media profile definition with all the requirements according to ISO/IEC 23000-19 [7] for a media profile.
* A definition of how capability discovery can be done, at the minimum a suitable and well-defined MIME type following the requirements in RFC 6381 [11], and in particular the definition of the codecs and profiles parameters.
* The mapping of media profile parameters to a DASH MPD. The mapping may be static (i.e. fixed parameters in the MPD) or dynamic (e.g., depending on information in the CMAF Header).
* Potential requirements and restrictions for encrypted parameters.

This specification defines the above information for several media codecs in clause 4, and provides requirements and recommendations for the support of these media profiles in specific 5G Media Streaming profiles in clause 5.

NOTE: Downlink Media Streaming is not restricted to the media profiles defined in this specification: any CMAF media profile may be used and distributed within Downlink Media Streaming as long as it can be used with the APIs and interfaces defined in TS 26.512 [21] and the above information is provided.

## 3A.3 Codecs and Formats in Uplink Media Streaming

Codecs and formats for uplink streaming are defined in the remainder of this specification.

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

## 4.1 Introduction

This clause defines codecs and formats capabilities for video, audio, speech and subtitles for 5G Media Streaming. The clause is structured as follows:

For each media type, decoding and encoding capabilities are defined in the form of a media profile. These capabilities are a combination of codecs, profiles, tiers (if applicable), levels and format restrictions. In order to use the codecs in 5G Media Streaming for each capability the following functionalities are defined:

- Mapping to the ISO Base Media File Format defining a track format.

- The definition of a CMAF Track.

- The definition of a CMAF Switching Set.

- The playback requirements.

- The content generation requirements.