**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *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:***  |  |
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| ***Source to WG:*** |  |
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| ***Work item code:*** |  |  | ***Date:*** |  |
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| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | **Media delivery from multiple service endpoints/locations:** Content distributors often use multiple Content Delivery Networks (CDNs) to distribute their content to end-users. As an example, they may upload a copy of their catalogue to each CDN, or more commonly have all CDNs pull the content from a common origin. In advanced deployments, technologies such as Coded Multisource Media Format (CMMF) use Application Layer FEC techniques to stripe different subsets of content across multiple CDNs. Different client implementations may then beneficially use the content on multiple CDNs, potentially guided by the service or network provider. Integration of these different technologies into the Media Delivery System is of relevance to address content provisioning, content hosting, impacts on reference points, as well as potential benefits in terms of quality and resource usage. |
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| ***Summary of change:*** | *Media delivery from multiple service endpoints/locations* as introduced in clause 5.19 and based on the conclusions in clause 6.19 of TR 26.804:i. Document the generic MIME content types and references to valid profiles or relevant external specifications for Content Preparation Templates used for the purposes of multi-source/service location content preparation (item 2 of clause 5.19.7 of TR 26.804).ii. Extend the ContentHostingConfiguration resource to allow Content Distributions to be declared in hierarchical or peer-to-peer configurations (item 4 of clause 5.19.7 of TR 26.804).iii. Extend the ContentHostingConfiguration resource to allow the 5GMSd Application Provider the capability to influence the configuration and deployment of Content Distributions with the 5GMSd AS at the time of provisioning (item 5 of clause 5.19.7 of TR 26.804).iv. Clarify the use of the Media Entry Point for the purposes of communicating service location and multi-source/service location configuration information to 5GMSd Clients (item 6 of clause 5.19.7 of TR 26.804).v. Clarify the expectation that the Media Player natively supports the multi-source/service location approach in use (item 8 of clause 5.19.7 of TR 26.804)vi. Introduce CMMF in TS 26.511 as a format for delivering media from multiple service locations including possible definition of CMMF profiles for use in 5GMS.vii. Introduce Content Steering as an M4 API in TS 26.512 and for use with 3GP-DASH (TS 26.247 [26]).viii. Support other relevant aspects resulting from stage-2. |
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| ***Consequences if not approved:*** | Feature not supported. |
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| ***Clauses affected:*** |  |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 26.510 CR 0016, TS 26.512 CR 0086, TS 26.247 CR 0190  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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# 2 References

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[24] ETSI TS 103 973: "Coded Multisource Media Format (CMMF) for Content Distribution and Delivery", October 2024.

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## 3.3 Abbreviations

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CMMF Coded Multisource Media Format

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### 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 3A.2.1-1. The detailed procedures for the interfaces and APIs for 5G Media Streaming are defined in TS 26.512 [10].



Figure 3A.2.1-1: Downlink 5G Media Streaming architecture

The present document 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 3A.2.1-1, the Access Client in the 5GMSd Client uses the manifest, typically the Media Presentation Description (MPD) for Dynamic Streaming over HTTP (DASH) as defined in ISO/IEC 23009-1 [20] and TS 26.247 [21] or the Master Playlist for HTTP Live Streaming (HLS) as defined in IETF RFC 8216 [22] to download Segments to initiate a media playback session. A 5GMSd Application Provider may publish these segments directly through M2d. The 5GMSd AS may act only as a hosting server when the media is not required to be either transcoded or repackaged, or the 5GMSd AS may be provisioned to modify the media prior to delivering it to 5GMSd Clients. Using these unified formats maximizes cacheability and improves general Content Delivery Network (CDN) operations, including usage of secure transport protocols such as HTTPS at reference point M4d.

5G Media Streaming segment formats are defined based on the Common Media Application Format (CMAF) as specified 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 [20] defines a detailed DASH profile for delivering CMAF content within a DASH Media Presentation using a converged format for segmented media content.

These 5G Media Streaming segment formats may further be encoded and packaged within Coded Multisource Media Format (CMMF) objects as specified in ETSI TS 103 973 [25] for efficient distribution over interface M4d from multiple service locations exposed by the 5GMSd AS. A 5GMSd Application Provider may provision the 5GMS System such that 5G Media Streaming segment formats published through M2d or M10d are prepared by the 5GMSd AS using Content Preparation Templates before distribution from service locations at reference point M4d.

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]. Furthermore, CMAF 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], clauses 9, 10 and 11, respectively, are defined in the present document. However, Downlink Media Streaming is not restricted to the media profiles defined in the present document: any codec that defines a CMAF media profile may be used and distributed with Downlink Media Streaming.

### 3A.2.2 Hypothetical device playback model

The media playback platform is initiated and used by the Access Client to create a streaming session and experience. The Access Client itself handles the download of segmented media content via interface M4d. This specification is based on a hypothetical playback model that permits an 5GMSd-Aware Application and/or a media Access Client to play back segmented media content streamed via 5G Media Streaming for downlink. 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 3A.2-1, playback functionalities include:

1) Querying the capabilities of the device to determine if it supports the playback of a specific media profile. Different means exist and are described in CTA-5003 [9], but minimally a well-defined MIME type and a well-defined codecs parameter following the requirements in RFC 6381 [11] is needed.

2) Initializing the playback platform with the codec by providing appropriate initialization information. At minimum, a CMAF Header is needed for initializing the decoder. Initialization of content decryption, if needed, depends on the used DRM system.

3) Playback itself, 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 and M11d 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 unde-runs, etc. Relevant APIs exposed by the 5GMSd Client via M7d and M11d 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 includes the static information (i.e. fixed parameters in the MPD) and dynamic information (e.g., depending on information in the CMAF Header).

- Potential requirements and restrictions for encrypted content.

- The mapping of CMAF objects into multi-source coded objects, including the necessary parameters.

The present document 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 APIs and interfaces specified 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.

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# 4 5GMS codecs and formats capabilities

## 4.1 Introduction

This clause defines codecs and formats capabilities for video, audio, speech and subtitles for 5G Media Streaming.

For each media type, decoding and encoding capabilities are defined. These capabilities are a combination of codecs, profiles, tiers (if applicable), levels and format restrictions. In order to use the codecs and formats 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 and the media profile

- The playback requirements for this media profile

- The content generation requirements for this media profile

- The definition of mappings and profiles for the purposes of efficient distribution from multiple service locations using multi-source object coding techniques.

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## 4.6 CMMF-based object coding

### 4.6.1 General

The following clauses specify decoding and encoding capabilities for multi-source object coding according to the Coded Multi-source Media Format specified in ETSI TS 103 973 [24], and their mapping to 5GMS delivery.

### 4.6.2 Decoding

The following CMMF decoding capabilities are defined:

Editor’s Note: To be determined.

### 4.6.3 Encoding

The following CMMF encoding capabilities are defined:

Editor’s Note: To be determined.

### 4.6.4 Media profiles: mapping to 5GMS delivery

Editor’s Note: To be determined. This clause will define how to map between media resources described within an MPD and CMMF objects, a Media Player Entry format and schema to communicate CMMF configuration information to the 5GMSd Client, etc.

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## 5.2 Downlink streaming default profile

### 5.2.1 Introduction

This profile defines required capabilities for UE-based 5GMSd Client functionalities as defined in TS 26.501 [5] and shown in Figure 4.2.2-1 in TS 26.501 [5]. Requirements for the following functions are defined in this clause:

- Media Distribution

- Media Decapsulation

- Media Decryption

- Media Decoding

- Media Presentation and Rendering

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#### 5.2.7.7 CMMF-encoded and packaged content

Editor’s Note: To be determined.

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### 5.2.8 Capability discovery

#### 5.2.8.1 General

A 5GMSd Client is expected to support capability discovery such that 5GMS-Aware Applications can identify if a specific media profile is supported. In order to identify whether a media profile is supported, the 5GMSd Client may provide an API as defined in TS 26.512 [10] via the M7d interface, for which the client can be queried with a specific MIME type string, if the media profile is supported.

The MIME types follow RFC 6381 [11].

A 5GMSd Client should support at least one of the following capability discovery mechanisms for media profiles:

- If isTypeSupported() for the media profile with argument <profiles> results in a yes, then the respective media profile is supported with the requirements defined in a specific clause.

- If isTypeSupported() for the media profile with argument <codecs> results in a yes, then the respective media profile is supported with the requirements defined in a specific clause.

- If a conforming CMAF header is provided for playback initialization and the 5GMSd Client does not throw an error response, then the respective media profile is supported with the requirements defined in a specific clause.

- If a conforming CMMF header is provided for playback initialization and the 5GMSd Client does not throw an error response, then the respective media profile is supported with the requirements defined in a specific clause.

For each media profile mentioned in clause 5.2.6, the <profiles> parameter and the <codecs> parameter are provided in the following. These parameters should be used in the capability exchange.

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#### 5.2.8.6 CMMF profiles

Editor’s Note: To be determined.

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#### 5.3.5.5 CMMF profiles

Editor’s Note: To be determined.