**3GPP TSG- Meeting #**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *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:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | TR 26.804 and TS 26.501 provides details: End-to-end low latency live streaming: (i)Inclusion of the collaboration scenarios and call flows for end-to-end low latency live streaming. (ii) Updating the reference point to support low latency live streaming services.The work item objectives state2) Stage 3 support for end-to-end low latency live streaming as defined in TS 26.501 and based on the conclusions in clause 6.11 of TR 26.804. |
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| ***Summary of change:*** | Address updates to relevant stage-3 specifications (e.g., TS 26.511, TS 26.512, TS 26.247) to add consistent support of low-latency live streaming services, including:a) Define capability mechanisms in order to identify the support of low-latency modes in 5GMS networks and clients.b) Provisioning to support operation points and policy templates for low-latency live streaming.c) Create necessary extensions to support DASH and HLS chunked CMAF low-latency modes in an end-to-end workflow.d) Provide necessary protocols to scalably support time synchronization across 5GMS Applications, AS and 5GMS Clients (at appropriate precision).e) Extend QoE metrics schemes and metrics reporting functionality to address monitoring of Operation Point metrics for potential operational improvements.f) Provide extensions to formats and manifests support advanced TV experiences.g) Informative guidelines on using different Operation Points for low-latency live streaming. |
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| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** |  |
|  |  |
|  | **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 ...  |
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| ***Other comments:*** | This is really a starting point, details need to be progressed.Until the next meeting, an implementation in the 5G-MAG Reference Tools is planned. |
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| ***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".

…

[X] IETF RFC 8673: "HTTP Random Access and Live Content".

# ===== CHANGE =====

## 8.1 General

The set of content protocols supported by the 5GMS AS is listed in table 8.1-1 below:

Table 8.1-1: Supported content protocols

| Description | Term identifier | Clause |
| --- | --- | --- |
| Content ingest protocols at interface M2d |
| HTTP pull-based content ingest protocol | urn:3gpp:5gms:content-protocol:http-pull-ingest | 8.2 |
| DASH-IF push-based content ingest protocol | urn:3gpp:5gms:content-protocol:dash-if-ingest | 8.3 |
| HTTP low-latency pull-based content ingest protocol | urn:3gpp:5gms:content-protocol:http-ll-pull-ingest | 8.4 |
| Content egest protocols at interface M2u |
|  |  |  |

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## 8.4 HTTP low-latency pull-based content ingest protocol

If IngestConfiguration.protocol is set to urn:3gpp:5gms:content-protocol:http-ll-pull-ingest the procedures defined in clause 8.2 shall apply.

In addition:

* If HTTP/1.1 [9] is used by the 5GMSd AS at reference point M2d, the origin server may use chunked transfer coding as defined in [9]. The requesting 5GMSd AS shall accept chunked HTTP/1.1 response messages and shall make partially received media segments available for retrieval by 5GMS Clients at reference point M4d instead of waiting until the full segment is received.
* If HTTP/1.1 [9] is used by the Media Player at reference point M4d, partially available media segments may be accessed using an HTTP byte range request, as specified in section 14 of RFC 9110 [25]. If the Media Player makes a byte-range request for a partially available media segment and the first-pos of that range is non-zero and the Media Player is expecting an aggregating response, then the Media Player should signal that expectation following the convention of IETF RFC 8673 [X]. Specifically, it should use a last-pos value of 9007199254740991. This signals the server to respond with a 206 (Partial Content) response without a Content-length response header instead of waiting for the end of the segment and responding with a 200 (OK) response code.

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## 10.2 DASH Distribution

In the case of DASH distribution, M4d is relevant for the distribution as shown in figure 10.2-1.



Figure 10.2-1: M4d usage for DASH distribution

For DASH-based distribution according to TS 26.247 [4] and ISO/IEC 23009-1 [32], two main formats are of relevance:

1) The Media Presentation Description (MPD) that is processed in the DASH Access Client.

2) The Segment formats that are passed through the DASH Access Client and processed in the Media Playback and Content Decryption Platform. Note that the DASH Access Client may parse Segments to extract for example Inband Events or producer reference times.

Other resources may be referenced in the MPD, for example DRM related information.

The Segment formats for DASH Streaming in the context of 5G Media Streaming are defined in TS 26.511 [35] based on the CMAF encapsulation. The DASH Access Client downloads the Segments from the 5GMSd AS based on the instructions in the MPD and the instructions from the 5GMSd-Aware Application through M7d (see clause 13 for details).

The interface between the DASH Access Client and the Media Playback and Content Decryption Platform as well as the 5GMSd Client requirements for media codecs are documented in TS 26.511 [35].

The following requirements apply for M4d:

1) The Media Presentation Description (MPD) and Segments shall conform to an MPD according to ISO/IEC 23009-1 [32] or TS 26.247 [4].

2) The Segment formats should conform to CMAF addressable resources as well as to the requirements in TS 26.511 [35].

3) The Media Presentation should conform to the 5G Media Streaming DASH Interoperability Point as defined in clause 7.3.11 of TS 26.247 [4].

A 5GMSd Client shall support the 5G Media Streaming DASH Interoperability Point as defined in TS 26.247 [4], clause 7.3.11. A 5GMSd Client may support additional DASH profiles and interoperability points.

The MPD may contain a one or several **ServiceDescription** elements that include operational parameters. The MPD may also include multiple configurations for the media (different codecs, different content protection, different resolutions, etc.), for example for playback under different operating policies. The handling of this information is documented in clause 13.2.