**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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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:*** |  |
| ***Source to TSG:*** | SA4 |
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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)* |
|  |  |
| ***Reason for change:*** | Corrections and clarifications of existing text |
|  |  |
| ***Summary of change:*** | Corrections and clarifications to use consistent terminology, provide correct references, update out-date reference point usage, etc. |
|  |  |
| ***Consequences if not approved:*** | TS 26.512 Rel-18 errors not corrected. |
|  |  |
| ***Clauses affected:*** | 4.2, 4.3.1, 4.3.5.1, 4.6.1, 4.7.2.1, 5.2, 7.4.1, 7.6.4, 7.6.4.1, 7.6.4.2, 7.6.4.3, 7.6.4.4, 7.6.4.6, 8.2, 8.5, 8.6, 10.1, 10.3, 11.3.3.1, 12, 12.1, 12.2.1, 12.3, B.1.2, B.1.3, B.2.1, B.2.2 |
|  |  |
|  | **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:*** |  |
|  |  |
| ***This CR's revision history:*** | S4-251022: New CR. |

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

## 4.2 APIs relevant to downlink media streaming

Table 4.2‑1 summarises the APIs used to provision and use the various downlink media streaming features specified in TS 26.501 [2].

Table 4.2‑1: Summary of APIs relevant to downlink media streaming features

|  |  |  |
| --- | --- | --- |
| 5GMSd feature | Abstract | Relevant APIs |
| Interface | API name | Clause |
| Content protocols discovery | Used by the 5GMSd Application Provider to interrogate which content ingest protocols are supported by 5GMSd AS(s). | M1d | Content Protocols Discovery API | 7.5 |
| Content hosting | Content is ingested, hosted and distributed by the 5GMSd AS according to a Content Hosting Configuration associated with a Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Server Certificates Provisioning API | 7.3 |
| Content Preparation Templates Provisioning API | 7.4 |
| Content Hosting Provisioning API | 7.6 |
| M2d | HTTP pull-based content ingest protocol | 8.2 |
| DASH-IF push-based content ingest protocol | 8.3 |
| HTTP low-latency pull-based content ingest protocol | 8.4 |
| M3d | Server Certificates configuration API | 9.2 |
| Content Preparation Templates configuration API | 9.3 |
| Content Hosting configuration API | 9.4 |
| M4d | MPEG‑DASH [4] or 3GP‑DASH [37] or DASH-IF push-based content distribution | 10.2 |
| HTTP low-latency content distribution | 10.3 |
| M5d | Service Access Information API | 11.2 |
| Metrics reporting | The 5GMSd Client uploads metrics reports to the 5GMSd AF according to a provisioned Metrics Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Metrics Reporting Provisioning API | 7.8 |
| M5d | Service Access Information API | 11.2 |
| Metrics Reporting API | 11.4 |
| Consumption reporting | The 5GMSd Client provides feedback reports on currently consumed content according to a provisioned Consumption Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Consumption Reporting Provisioning API | 7.7 |
| M5d | Service Access Information API | 11.2 |
| Consumption Reporting API | 11.3 |
| Dynamic Policy invocation | The 5GMSd Client activates different traffic treatment policies selected from a set of Policy Templates configured in its Provisioning Session. | M1d | Provisioning Sessions API | 7.2 |
| Policy Templates Provisioning API | 7.9 |
| M5d | Service Access Information API | 11.2 |
| Dynamic Policies API | 11.5 |
| Network Assistance | The 5GMSd Client requests bit rate recommendations and delivery boosts from the 5GMSd AF. | M5d | Service Access Information API | 11.2 |
| Network Assistance API | 11.6 |
| Edge content processing | Edge resources are provisioned for processing content in 5GMS downlink media streaming sessions. | M1d | Provisioning Sessions API | 7.2 |
|  | Edge Resources Provisioning API | 7.10 |
| M5d | Service Access Information API | 11.2 |
| 5GMS via eMBMS | The 5GMSd AF provisions the delivery of content via eMBMS and MBMS User Services. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | MPEG‑DASH [4] or 3GP‑DASH [37] or HLS | 10 |
| 5GMS via MBS | The 5GMSd AF provisions the delivery of content via MBS User Services. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | MPEG‑DASH [4] or 3GP-DASH [37] or HLS | 10 |
| 5GMS via eMBMS | The 5GMSd AF provisions the delivery of content via eMBMS. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | MPEG‑DASH [4] or 3GP‑DASH [37] or HLS content distribution | 10 |
| UE data collection, reporting and exposure | UE data related to downlink 5G Media Streaming is reported to the Data Collection AF instantiated in the 5GMSd AF for exposure to Event consumers. | M1d | Event Data Processing Provisioning API | 7.11 |
| R4 | Ndcaf\_DataReporting service | 17 |
| R5, R6 | Naf\_EventExposure service | 18 |

## 4.3 Procedures of the M1 (5GMS Provisioning) interface

### 4.3.1 General

A 5GMS Application Provider may use the procedures in this clause to provision the network for media streaming sessions that are operated by that 5GMS Application Provider. For downlink media streaming, these sessions may be DASH streaming sessions, progressive download sessions, or any other type of media streaming or distribution (e.g. HLS) sessions. For uplink media streaming, the content format and delivery protocol are defined by the 5GMSu Application Provider and may be either non-fully standardized or employ standardized HTTP-based streaming of ISO BMFF content fragments as profiled by CMAF [39].

Reference point M1 offers three different sets of procedures:

- For downlink media streaming, configuration of content ingest at reference point M2d for onward distribution by the 5GMSd AS over reference point M4d or via other distribution systems such as eMBMS or MBS. The API at this reference point is designed to offer equivalent functionality as that exposed by a public CDN. For uplink media streaming, configuration of content egest at reference point M2u for the media content received by the 5GMSu AS from the 5GMSu Client over reference point M4u. The resource types involved in content hosting configuration are provisioning session (see clause 4.3.2), content hosting procedures (see clause 4.3.3), ingest protocols (see clause 4.3.4), content preparation template (see clause 4.3.5), and server certificates (see clause 4.3.6).

- Configuration of dynamic policies: allows the configuration of Policy Templates at M5 that can be applied to M4 downlink/uplink media streaming sessions.

- Configuration of reporting: permits the MNO to collect, at M5, QoE metrics and consumption reports about M4 downlink sessions, as well as permits the MNO to collect, at M5, QoE metrics reports about M4 uplink sessions.

A 5GMS Application Provider may use any of these procedures, in any combination, to support its media streaming sessions.

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### 4.3.5 Content Preparation Template provisioning procedures

#### 4.3.5.1 General

For downlink media streaming, the 5GMSd AS may be required to process content ingested at reference point M2d before serving it from reference point M4d. For uplink media streaming, the 5GMSu AS may be required to process content it receives from the 5GMSu Client at reference point M4u before passing it to the 5GMSu Application Provider on the egest interface at reference point M2u.

The 5GMS Application Provider shall use the operations specified in clause 5.2.5 of TS 26.510 [56] at reference point M1 when it wants to create and subsequently manipulate Content Preparation Templates in the 5GMS AF.

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

### 4.6.1 Procedures for DASH session

This procedure is used by a 5GMSd Client to establish a DASH session via the M4d interface. In order to establish such a session, the 5GMSd AS shall host an MPD as defined in ISO/IEC 23009-1 [32] or TS 26.247 [4] and the MPD URL is known to the 5GMSd Client typically using M8d.

The Media Player receives an MPD URL from the 5GMSd-Aware Application through M7d by methods defined in clause 13. The Media Player shall send an HTTP GET message to the 5GMSd AS including the URL of the MPD resource. On success, the 5GMSd AS shall respond with a 200 (OK) message that includes the requested MPD resource.

Additional procedures for reactions to different HTTP status codes are provided in TS 26.247 [4], clause A.7 and ISO/IEC 23009-1 [32] clause A.7.

Additional procedures for handling partial file responses are provided in TS 26.247 [4], clause A.9.

This information is provided through M7d to the application for selection. In addition, the currently used service description parameters are provided as status information at reference point M11d in order for the Media Session Handler to make use of this information, for example for Dynamic Policy and Network Assistance.

The detailed handling of service description information is documented in clause 13.2 of the present document.

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

### 4.7.2 Procedures for Service Access Information

#### 4.7.2.1 General

Service Access Information is the set of parameters and addresses needed by the 5GMSd Client to activate reception of a downlink media streaming session or by a 5GMSu Client to activate an uplink media streaming session for contribution. Service Access Information additionally includes configuration information to allow the Media Session Handler to invoke procedures for dynamic policy (see clause 4.7.3), consumption reporting (clause 4.7.4), metrics reporting (clause 4.7.5) and network assistance (clause 4.7.6).

The Media Session Handler may obtain Service Access Information from either the 5GMS-Aware Application (via reference point M6) or from the 5GMS AF (via reference point M5). In the former case, the Service Access Information is initially acquired by the 5GMS-Aware Application from the 5GMS Application Provider via reference point M8. In the latter case, the Media Session Handler shall use the operations specified in clause 5.3.2 of TS 26.510 [56] at reference point M5 to acquire Service Access Information from the 5GMS AF, citing an external service identifier and the Service Access Information is derived by the 5GMS AF from the Provisioning Session established at reference point M1 (see clause 4.3.2) that is tagged with the same external service identifier.

Typically, the Service Access Information for media streaming includes a set of Media Entry Points (e.g. a URL to a DASH MPD or a URL to a progressive download file) that can be consumed by the Media Stream Handler (Media Player or Media Streamer).

Based on the MIME media type or protocol, as well as the conformance profiles declared in the Service Access Information, one of these Media Entry Points is selected by the Media Session Handler or by the 5GMS-Aware Application and is handed to the Media Player via reference point M11 or M7 respectively.

NOTE: The Media Session Handler and 5GMS-Aware Application are assumed to have prior knowledge of the types of Media Entry Point supported by the Media Player.

For downlink media streaming exclusively via eMBMS and for hybrid 5GMSd/eMBMS services as defined in clauses 5.10.2 and 5.10.5 respectively of TS 26.501 [2], the Service Access Information indicates that the 5GMSd Client acts as an MBMS-Aware Application.

For dynamically provisioned downlink media streaming via eMBMS as defined in clause 5.10.6 of TS 26.501 [2], the 5GMSd AS creates a presentation manifest that is regularly polled by the Media Player for a potential update. When an eMBMS User Service carrying the 5GMSd content is dynamically provisioned or removed by the 5GMSd AF, the 5GMSd AS shall update the presentation manifest with the locations where the updated manifest and the media segments are now available, for example to add or change to the media server in the MBMS Client.

For downlink media streaming exclusively via MBS and for hybrid 5GMSd/MBS services as defined in clauses 5.12.2 and 5.12.4 respectively of TS 26.501 [2], the Service Access Information indicates that the 5GMSd Client acts as an MBS-Aware Application.

For dynamically provisioned downlink media streaming via MBS as defined in clause 5.12.4 of TS 26.501 [2], the 5GMSd AS creates or hosts a presentation manifest that is regularly polled by the Media Player for a potential update. When an MBS User Service carrying the 5GMSd content is dynamically provisioned or removed by the 5GMSd AF, the 5GMSd AS shall update the presentation manifest with the resource locations where the updated manifest and the media segments are now available, for example to additionally or alternatively point to the Media Server in the MBSTF Client.

If an Edge Resources Configuration with client-driven management is provisioned, a Client Edge Resources Configuration is included in the corresponding Service Access Information.

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

## 5.2 APIs relevant to Uplink Media Streaming

Table 5.2‑1 summarises the APIs used to provision and use the various uplink media streaming features specified in TS 26.501 [2].

Table 5.2‑1: Summary of APIs relevant to uplink media streaming features

|  |  |  |
| --- | --- | --- |
| 5GMSu feature | Abstract | Relevant APIs |
| Interface | API name | Clause |
| Content protocols discovery | Used by the 5GMSu Application Provider to query which content egest protocols are supported by 5GMSu AS(s). | M1u | Content Protocols Discovery API | 7.5 |
| Content publishing | Content is contributed to the 5GMSu AS and published to 5GMSu Application Providers according to a Content Publishing Configuration associated with a Provisioning Session. | M1u | Provisioning Sessions API | 7.2 |
| Server Certificates Provisioning API | 7.3 |
| Content Preparation Templates Provisioning API | 7.4 |
| Content Publication Provisioning API | 7.6A |
| M2u | HTTP pull-based content egest protocol | 8.5 |
| DASH-IF push-based content egest protocol | 8.6 |
| HTTP low-latency pull-based content egest protocol | 8.7 |
| M3u | Server Certificates configuration API | 9.2 |
| Content Preparation Templates configuration API | 9.3 |
| Content Publication configuration API | 9.5 |
| M4u | DASH-IF push-based contribution protocol | 10.4.2 |
| M5u | Service Access Information API | 11.2 |
| Metrics reporting | The 5GMSu Client uploads metrics reports to the 5GMSu AF according to a provisioned Metrics Reporting Configuration it obtains from the Service Access Information for its Provisioning Session. | M1u | Provisioning Sessions API | 7.2 |
| Metrics Reporting Provisioning API | 7.8 |
| M5u | Service Access Information API | 11.2 |
| Metrics Reporting API | 11.4 |
| Dynamic Policy invocation | The 5GMSu Client activates different traffic treatment policies selected from a set of Policy Templates configured in its Provisioning Session. | M1u | Provisioning Sessions API | 7.2 |
| Policy Templates Provisioning API | 7.9 |
| M5u | Service Access Information API | 11.2 |
| Dynamic Policies API | 11.5 |
| Network Assistance | The 5GMSu Client requests bit rate recommendations and delivery boosts from the 5GMSu AF. | M5u | Service Access Information API | 11.2 |
| Network Assistance API | 11.6 |
| Edge content processing | Edge resources are provisioned for processing content in 5GMS uplink media streaming sessions. | M1u | Provisioning Sessions API | 7.2 |
| Edge Resources Provisioning API | 7.10 |
| M5u | Service Access Information API | 11.2 |
| UE data collection, reporting and exposure | UE data related to uplink 5G Media Streaming is reported to the Data Collection AF instantiated in the 5GMSu AF for exposure to Event consumers. | M1u | Event Data processing Provisioning API | 7.11 |
| R4 | Ndcaf\_DataReporting service | 17 |
| R5, R6 | Naf\_EventExposure service | 18 |

## ===== Content Preparation Templates Provisioning API =====

### 7.4.1 Overview

The API used by the 5GMS Application Provider at reference point M1 to instantiate and manipulate Content Preparation Templates associated with a particular downlink or uplink media streaming Provisioning Session in the 5GMS AF is specified in clause 8.5 of TS 26.510 [56]. Content Preparation Templates are used to specify manipulations applied by a 5GMS AS to downlink media resources ingested at reference point M2d for distribution at interface M4d, or to uplink media resources contributed at reference point M4u for egest at interface M2u. The Content Preparation Templates Provisioning API is used to provision a Content Preparation Template within the scope of a Provisioning Session that can subsequently be referenced from a Content Hosting Configuration.

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

### 7.6.4 5GMSd AS functions supporting Content Hosting

#### 7.6.4.1 Overview

This clause defines the behaviour that is expected from the 5GMSd AS when the Content Hosting Configuration has been successfully provisioned as specified in clause 5.2.8 of TS 26.510 [56]. The main operations that are performed affect content caching and purging of cached content, as well as media processing for content preparation prior to distribution.

#### 7.6.4.2 Content caching

A distribution configuration defined within the Content Hosting Configuration may specify caching rules to be applied to media resources when they are distributed by the 5GMSd AS over reference point M4d. The 5GMSd AS shall use the DistributionConfiguration.CachingConfiguration.urlPatternFilter property of the Content Hosting Configuration resource specified in clause 8.8.3.1 of TS 26.510 [56] to determine which caching directives apply to that media resource. In the case where a distribution configuration has multiple caching configurations and a media resource’s URL matches the pattern filter of more than one cachingConfiguration, the first match shall apply. In case no cachingConfiguration is identified as a match, the 5GMSd AS shall apply the caching directives that were received from the origin. In the absence of these, the 5GMSd AS shall apply default caching directives as specified in clause 8.8.3.1 of TS 26.510 [56] based on the media resource type.

A caching directive shall indicate that a matching media resource is:

- Not to be cached by the 5GMSd AS, nor by downstream M4d clients, when noCache is set to true, or

- To be cached for maxAge seconds by the 5GMSd AS, and potentially by downstream M4d clients, when noCache is set to false.

The maxAge value applies relative to the time when a media resource was ingested by the 5GMSd AS, defined here as t\_ingest. For an HTTP-based ingest, this corresponds to the Date header field in the HTTP request/response that carries the media resource at M2d. At the time t\_ingest + maxAge, the media resource is considered stale and should not be served from the 5GMSd AS cache. The 5GMSd AS shall compensate for any synchronization skew between the origin and its own clock. For instance, this can be done by including the max-stale HTTP cache directive in HTTP responses sent at reference point M4d.

The maxAge value may be signalled by the 5GMSd AS at reference point M4d using the Expires HTTP response header or the HTTP Cache-Control directives max‑age or s‑maxage.

When distributing a media resource using HTTP, a no-cache request may be translated into a no-cache and no-store HTTP Cache-Control directive and/or a max-age=0 HTTP Cache-Control directive.

By default, all origin HTTP header fields shall be assumed as not forwarded by the 5GMSd AS, unless specified otherwise by setting the flag originCacheHeaders to true.

#### 7.6.4.3 Cache purging

The 5GMSd Application Provider shall use the procedures and operations specified in clause 5.2.8.6 of TS 26.510 [56] to invalidate some or all cached media resources of a particular Content Hosting Configuration. As a consequence, the 5GMSd AF shall invoke an operation on the 5GMSd AS at reference point M3d to remove those media resources from the 5GMSd AS cache associated with that Content Hosting Configuration, as specified in clause 9.

#### 7.6.4.4 Content preparation

The 5GMSd AS may be required to perform various content processing tasks (such as repackaging, encryption, ABR transcoding) on media resources ingested at reference point M2d prior to distributing them at reference point M4d. These processing tasks shall be specified in a Content Preparation Template resource referenced from a distribution configuration within the Content Hosting Configuration.

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

#### 7.6.4.6 Geofencing

The 5GMSd Application Provider may wish to limit access to the media content it makes available at reference point M2d to UEs located in certain geographical zones. Geofencing is used to configure the zone from which content is accessible.

The geoFencing.locatorType shall be set to one of the controlled term identifiers in the first column of table B.1‑1 of TS 26.510 [56] and each member of the geoFencing.locators array in the distribution configuration shall then be set as specified in the third column of that table.

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

## 8.2 HTTP pull-based content ingest protocol

The following provisions shall apply if IngestConfiguration.protocol is set to urn:3gpp:‌5gms:‌content-protocol:‌http-pull or to the deprecated value urn:‌3gpp:‌5gms:‌content-protocol:‌http-pull in the Content Hosting Configuration:

- Media resources shall be ingested by the 5GMSd AS from the 5GMSd Application Provider using HTTP [25].

NOTE 0: Any supported HTTP protocol version may be used for HTTP pull-based content ingest at reference point M2d.

- The IngestConfiguration.mode property shall be set to PULL, indicating that a pull-based protocol is used.

- The IngestConfiguration.baseURL property shall point at the 5GMSd Application Provider's origin server, as specified in table 8.8.3.1-1 of TS 26.510 [56], and may indicate the use of HTTPS [30].

When the 5GMSd AS receives a request for a media resource at reference point M4d that cannot be satisfied from its content cache, the request shall be transformed into a corresponding HTTP GET request directed to the 5GMSd Application Provider's origin server via interface M2d as follows:

1. The prefix of the request URL indicated in the Distribution‌Configuration.‌baseURL of the applicable Content Hosting Configuration is replaced with that of the corresponding Ingest‌Configuration‌.baseURL.

NOTE 1: It is the responsibility of the 5GMSd AF to assign unique M4d base URLs to each provisioned Content Hosting Configuration so as to ensure that this substitution is unambiguous.

2. The path rewrite rules (if provisioned in DistributionConfiguration.pathRewriteRules) are applied in strict order to the remainder of the request URL (i.e., the path segments following Distribution‌Configuration.‌baseURL). The requestPathPattern of the first matching path rewrite rule is replaced with the corresponding mappedPath.

In the case where the 5GMSd Application Provider's origin server issues an HTTP 3xx redirect at reference point M2d pointing to another location, the 5GMSd AS shall issue an equivalent HTTP redirect to the Media Player via reference point M4d whose location is a dynamically generated M4d endpoint. Requests to this location shall be rewritten by the 5GMSd AS to the target location of the M2d redirection.

NOTE 2: This explicit handling of HTTP redirects received by the 5GMSd AS at reference point M2d ensures that it is not bypassed by the Media Player. The general concept underlying this is commonly referred to as a "reverse mapping rule" by HTTP reverse proxies.

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

## 8.5 HTTP pull-based content egest protocol

If EgestConfiguration.‌protocol is set to urn:3gpp:‌5gms:‌content-protocol:‌http-pull-egest in the Content Publishing Configuration, media resources shall be retrieved by the 5GMSu Application Provider from the 5GMSu AS at reference point M2u using HTTP [25]. Media segments contributed to the 5GMSu AS by the 5GMSu Client shall be processed according to the Content Preparation Template(s) specified in the corresponding Content Publishing Configuration (if any) prior to making them available at reference point M2u.

In this case:

- The EgestConfiguration.‌mode property shall be set to PULL, indicating that a pull-based protocol is used.

- The EgestConfiguration.‌baseURL property shall be set by the 5GMSu AF to the base URL on the 5GMSu AS where it will publish media segments, presentation manifests and metadata for retrieval by the 5GMSu Application Provider at reference point M2u.

- The EgestConfiguration.‌entryPoint.‌relativePath property shall point at a Media Entry Point document below this base URL, as specified in table 8.9.3.1-1 of TS 26.510 [56], and may indicate the use of HTTPS [30]. This document describes the location of media content and associated metadata exposed by the 5GMSu AS at reference point M2u which are expected to be pulled by the 5GMSu Application Provider.

In the absence of content preparation, the 5GMSu AS shall publish media resources by replacing the prefix Contribution‌Configuration.‌baseURL of its URL at M4u with that of the corresponding EgestConfiguration.‌baseURL.

## 8.6 DASH-IF push-based content egest protocol

If EgestConfiguration.‌protocol is set to http://dashif.org/‌ingest/‌v1.2/‌interface-1 or http://dashif.org/‌ingest/‌v1.2/‌interface-2 in the Content Publishing Configuration, media resources shall be published by the 5GMSu AS to the 5GMSu Application Provider at reference point M2u as specified in the DASH‑IF Live Media Ingest specification [3]. Media segments contributed to the 5GMSu AS by the 5GMSu Client shall be processed according to the Content Preparation Template(s) specified in the corresponding Content Publishing Configuration (if any) prior to publishing them at reference point M2u.

NOTE 1: The protocol in [3] is specified for use with HTTP/1.1 [24] only.

NOTE 2: A 5GMSu AS implementation that advertises support for the egest of content at reference point M2u using interface 2 of the DASH-IF Live Media Ingest specification [3] is required to produce a suitable DASH presentation manifest.

In this case:

- The EgestConfiguration.‌mode property shall be set to PUSH, indicating that a push-based protocol is used.

- The EgestConfiguration.‌baseURL property shall be set by the 5GMSu Application Provider to the base URL that is to be used by the 5GMSu AS to upload media segments and presentation manifests to the 5GMSu Application Provider at reference point M2u.

If the 5GMSu Application Provider has provisioned an egest Media Entry Point, and if such document has been contributed to or produced by 5GMSu AS, the 5GMSu AS shall publish this document to the URL formed by the concatenation of EgestConfiguration.‌baseURL with EgestConfiguration.‌entryPoint.‌relativePath, as specified in table 8.9.3.1-1 of TS 26.510 [56]. This URL may indicate the use of HTTPS [30].

In the absence of any content preparation, each media resource uploaded at reference point M4u shall be published to the 5GMSu Application Provider at the URL formed by replacing the prefix Contribution‌Configuration.‌baseURL of its URL at M4u with that of the corresponding EgestConfiguration.‌baseURL.

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

# 10 Media Streaming (M4) interface

## 10.1 General

This clause specifies the interface for downlink and uplink media streaming at reference point M4 using different distribution formats and protocols. TS 26.511 [35] defines several media codecs and distribution formats for 5G Media Streaming. It also provides requirements and recommendations for the support of these media codecs and formats in profiles specific to 5G Media Streaming. However, 5GMS is not restricted to the media profiles and distribution formats defined in TS 26.511 [35]. For example, any CMAF media profile that integrates with the APIs specified in the present document may be used for media streaming at reference point M4.

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

## 10.3 HTTP low-latency content distribution

When low-latency distribution of media content at reference point M4d is provisioned, then the following provisions shall apply:

- The 5GMSd AS shall make partially received media segments available immediately for retrieval by 5GMS Clients at reference point M4d instead of waiting until the full segment is received.

- the 5GMSd AS should use HTTP chunked transfer coding as defined in section 7.1 of [24]. In this case, the 5GMSd client shall accept chunked HTTP/1.1 response messages.

- If the DASH-IF Low Latency mode as defined in [63] is used as identified in the MPD by the profile indicator http://www.dashif.org/guidelines/low-latency-live-v5, then the content is packaged as a series of CMAF Segments [40]. Further, each CMAF Segment is typically subdivided into one or more multiple CMAF Chunks to support low-latency content generation. According to the DASH‑IF Live Media Ingest specification [3], each HTTP Chunk should contain at most one CMAF Chunk in order to minimise the latency.

- At reference point M4d, the Media Player may access partially available media segments using an HTTP byte range request, as specified in section 14 of RFC 9110 [25]. (For details see for example [63] on Resynchronization Points.) If the Media Player makes a byte-range request for a partially available media segment (the first media segment it retrieves) 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 [61]. Specifically, it should use a last-pos value of 9007199254740991. In this case, the 5GMSd AS is required to respond with a 206 (Partial Content) HTTP response without a Content-length response header instead of waiting for the end of the segment and responding with a 200 (OK) HTTP response code.

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

### 11.3.3 Report format

#### 11.3.3.1 ConsumptionReport data type

The ConsumptionReport data type is specified in clause 9.6.3.1 of TS 26.510 [56].

In the case of downlink media streaming with DASH [32]:

- The mediaPlayerEntry property shall be populated with the URL of the Media Player Entry (e.g., a MPD resource) at reference point M4d after following any HTTP redirects.

- A separate Consumption Reporting Unit shall be reported in the consumptionReportingUnits array for each DASH Adaptation Set currently selected for presentation by the Media Player.

For other types of media streaming, the content of these properties is undefined.

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

# 12 UE Media Session Handling (M6/M11) APIs for uplink and downlink

## 12.1 General

This clause defines the client APIs for Media Session Handling to be used by other 5G System components such as a Media Player in a 5GMSd Client or the Media Streamer in a 5GMSu Client.

NOTE: Client-driven management of edge processing resources via reference point M6 or M11 is not specified in this release.

## 12.2 Media session handling for downlink media streaming – APIs and functions

### 12.2.1 Overview

In the following, it is assumed that the Media Session Handler for downlink media streaming adheres to a basic set of functionalities as shown in figure 12.2.1-1.



Figure 12.2.1-1: Usage of M6d in Media Downlink Streaming

The Media Session Handler is considered to run as a service in the background and is invoked for a media session once a media player in the 5GMSd streaming client is activated with an MPD URL of media MIME type "application/dash+xml". Based on the MPD URL, the Media Session Handler may initiate communication with the 5GMSd AF through reference point M5d.

NOTE: The initiation of the Media Session Handler for other media types than DASH is for further study.

For an ongoing 5G Media Streaming session, the Media Session Handler is given the following authorizations:

1) The ability to query the status of the Media Player at reference point M11d. For details see clause 13.

2) The ability to process notifications and errors received from the Media Player at reference point M11d. For details see clause 13.

3) The ability to configure certain parameters on the Media Player using methods exposed at reference point M11d. For details see clause 13.

In addition, the Media Session Handler provides information to the 5GMS-Aware Application at reference point M6d, possibly delegated to Media Player at reference point M11d for each of the Media Session Handler functionalities, namely providing:

1) Notification and Error Events;

2) Status Information.

The client API used for downlink media session handling at reference point M6d by the 5GMSd-Aware Application and at reference point M11d by the Media Player in a 5GMSd Client is specified in clause 11 of TS 26.510 [56].

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

## 12.3 Media session handling for uplink Streaming – APIs and functions

The client API used for uplink media session handling at reference point M6u by the 5GMSu-Aware Application and at reference point M11u by the Media Streamer in a 5GMSu Client is specified in clause 11 of TS 26.510 [56].

## ===== Pull-based content ingest example =====

## B.1.2 Desired URL mapping

In the example shown in table B.1.2‑1 below, media resources for the Provisioning Session with external identifier com.provider.service a custom domain name alias 5gms.provider.com are exposed at M4d from a default canonical domain com-provider-service.‌ms.‌as.‌3gppservices.‌org determined by the 5GMSd System operator, and also from that has been configured by the 5GMSd Application Provider.

Table B.1.2‑1: Example URL mapping for pull-based ingest

|  |  |
| --- | --- |
| M4d request from 5GMSd Client | Mapped M2d request to origin serveron 5GMSd AS cache miss |
| https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**video1**/segment1000.mp4 | https://origin.provider.com/‌media/‌**asset123456**/**video1**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**video1**/segment1000.mp4 |
| https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**video2**/segment1000.mp4 | https://origin.provider.com/‌media/‌**asset123456**/**video2**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**video2**/segment1000.mp4 |
| https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**audio1**/segment1000.mp4 | https://origin.provider.com/‌media/‌**asset123456**/**audio1**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**audio1**/segment1000.mp4 |

## B.1.3 Content Hosting Configuration

Table B.1.3‑1 below shows the relevant Content Hosting Configuration parameters needed to achieve the example mapping described in table B.1.2‑1 above.

Table B.1.3‑1: Content Hosting Configuration properties relevant to pull-based ingest

|  |  |  |
| --- | --- | --- |
| Property | Example value | Set by |
| ProvisioningSession |
|  externalServiceId | com.provider.service | 5GMSd Application Provider*(M1d request)* |
| IngestConfiguration |
|  protocol | urn:3gpp:5gms:content-protocol:**http-pull** | 5GMSd Application Provider*(M1d request)* |
|  mode | PULL |
|  baseURL | https://origin.provider.com/media |
| DistributionConfiguration |
|  canonicalDomainName | com-provider-service.‌ms.as.3gppservices.org | 5GMSd AF*(M1d response)* |
|  domainNameAlias | 5gms.provider.com | 5GMSd Application Provider*(M1d request)* |
|  baseURL | https://5gms.provider.com/ | 5GMSd AF*(M1d response)* |

## ===== Push-based content ingest example =====

## B.2.1 Desired URL mapping

In the example shown in table B.2.1‑1 below, media resources for the Provisioning Session with external identifier com.provider.service are pushed into the 5GMSd AS at M2d by the 5GMSd Application Provider and exposed to the 5GMSd Client at M4d using the canonical name of the 5GMSd AS com-provider-service.‌ms.‌as.‌3gppservices.org and an additional domain name alias mno-cdn.5gmsd-ap.com configured by the 5GMSd Application Provider.

Table B.2.1‑1: Example URL mapping for push-based ingest

|  |  |
| --- | --- |
| M2d ingest URL pushed to 5GMSd AS | M4d URL exposed to 5GMSd Client |
| https://5gmsd-as.mno.net/com-provider-service/‌**asset123456**/**video1**/segment1000.mp4 | https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**video1**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**video1**/segment1000.mp4 |
| https://5gmsd-as.mno.net/com-provider-service/‌**asset123456**/**video2**/segment1000.mp4 | https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**video2**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**video2**/segment1000.mp4 |
| https://5gmsd-as.mno.net/com-provider-service/‌**asset123456**/**audio1**/segment1000.mp4 | https://**com-provider-service.ms.as.3gppservices.org**/‌**asset123456**/**audio1**/segment1000.mp4 |
| https://**5gms.provider.com**/‌**asset123456**/**audio1**/segment1000.mp4 |

## B.2.2 Content Hosting Configuration

Table B.2.2‑1 below shows the relevant Content Hosting Configuration parameters needed to achieve the example mapping described in table B.2.1‑1 above.

Table B.2.2‑1: Content Hosting Configuration properties relevant to push-based ingest

|  |  |  |
| --- | --- | --- |
| Property | Example value | Set by |
| ProvisioningSession |
|  externalServiceId | com.provider.service | 5GMSd Application Provider*(M1d request)* |
| IngestConfiguration |
|  protocol | http://dashif.org/‌ingest/‌v1.2‌/interface-1 | 5GMSd Application Provider*(M1d request)* |
|  mode | PUSH |
|  baseURL | https://5gmsd-as.mno.net/‌com-provider-service | 5GMSd AF*(M1d response)* |
| DistributionConfiguration |
|  canonicalDomainName | com-provider-service.‌ms.as.3gppservices.org | 5GMSd AF*(M1d response)* |
|  domainNameAlias | 5gms.provider.com | 5GMSd Application Provider*(M1d request)* |
|  baseURL | https://5gms.provider.com/ | 5GMSd AF*(M1d response)* |