**3GPP TSG- Meeting ad hoc post #126 *S4-231634***

**, United States of America, 13th–17th November 2023** revision of S4aI230153

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| *CR-Form-v12.2* | | | | | | | | |
| **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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2023-11-01 |
|  |  | | | |  | |  | | |  |
| ***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 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | TS 23.501 brings reference point M3 into scope in Release 18. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Defined detailed procedures and APIs for configuring server certificates, content preparation templates, content hosting configuration and content publishing configuration at reference point M3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Misalignment with stage‑2 specification in Release 18. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.1, 4.2, 4.5, 4.5.1 (new), 4.5.2 (new), 4.5.3 (new), 4.5.4 (new), 4.5.4 (new), 5.1, 5.2, 9, 9.1 (new), 9.2 (new), 9.3 (new), 9.4 (new), C.3A (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | CR0055r1 [S4-231634]:   * Resubmitted to WG meeting for formal endorsement after endorsement at *ad hoc* meeting. | | | | | | | | |

First change

## 4.1 General

This clause defines all procedures for Downlink Media Streaming using the different 5G Media Streaming Reference Points.

NOTE: The descriptions of certain M1 interface procedures in clause 4.3, and of certain M5 interface procedures in clause 4.7, indicate applicability of those procedures to both downlink and uplink media streaming. This avoids redundant duplication of normative text in clause 5, regarding M1 and M5 procedures for uplink media streaming.

Next 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 |
| M3d | Server Certificates configuration API | 9.1 |
| Content Preparation Templates configuration API | 9.2 |
| Content Hosting configuration API | 9.3 |
| M4d | MPEG‑DASH [4] or 3GP‑DASH [37] | 10 |
| 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. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | MPEG‑DASH [4] or 3GP‑DASH [37] or HLS | 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 |

Next change

## 4.5 Procedures of the M3d interface

### 4.5.1 General

The APIs at reference point M3 are used by the 5GMS AF to configure Server Certificate and Content Preparation Template resources in the 5GMS AS as well as Content Hosting and/or Content Publishing configuration resources that refer to them.

### 4.5.2 Server Certificate configuration procedures

#### 4.5.2.1 General

The 5GMS AF configures Server Certificate resources in the 5GMS AS using the procedures defined in this clause such that they remain synchronised with the Server Certificates provisioned at reference point M1 using the procedures defined in clause 4.3.6.

Each Server Certificate resource at reference point M3 is represented by a PEM-formatted X.509 certificate bundle.

#### 4.5.2.2 Enumerate Server Certificates collection

This procedure is used by the 5GMS AF to determine the configuration state of the Server Certificates collection in a running 5GMS AS instance. The HTTP GET method shall be used for this purpose. The request URL shall be that of the Server Certificates collection on the 5GMS AS instance.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body shall be a JSON array of Server Certificate resource identifiers. The array shall be empty if no Server Certificate resources currently exist in the collection.

#### 4.5.2.3 Create Server Certificate

This procedure is used by the 5GMS AF to create a new Server Certificate resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The 5GMS AF shall nominate the resource identifier to be used to identify the new resource in the Server Certificates collection as part of the request URL. A representation of the resource, in the form of a PEM-formatted X.509 certificate bundle that includes the private key, shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 201 (Created) response with an empty response body. The content of the Location header may differ from the request URL if the request was satisfied by a different 5GMS AS instance.

If a Server Certificate resource already exists at the request URL an HTTP 405 (Method Not Allowed) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Server Certificate resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.2.4 Retrieve Server Certificate

Retrieval of individual Server Certificate resources from the 5GMS AS is not permitted at reference point M3.

#### 4.5.2.5 Update Server Certificate

This procedure is used by the 5GMS AF to replace a Server Certificate resource in the target 5GMS AS instance. The HTTP PUT method shall be used for this purpose. The target resource shall be indicated in the request URL. The replacement resource representation, in the form of a PEM-formatted X.509 certificate bundle that includes the private key, shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response with an empty response body.

If the replacement PEM bundle is identical to the current resource representation the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body to indicate a "no-op".

If a Server Certificate resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.2.6 Destroy Server Certificate

This procedure is used by the 5GMS AF to destroy a Server Certificate resource in the target 5GMS AS instance. The HTTP DELETE method shall be used for this purpose. The target resource shall be indicated in the request URL. The request body shall be empty.

If the operation is successful, the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body. Any subsequent attempt to recreate a Server Certificate resource with the same resource identifier shall fail as specified in clause 4.5.2.3.

If the target Server Certificate resource is still referenced by a Content Hosting Configuration or Content Publishing Configuration, an HTTP 409 (Conflict) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12]

If a Server Certificate resource previously existed at the request URL and was destroyed using this procedure an HTTP 410 (Gone) error response should be returned by the 5GMS AS. If no server certificate resource has ever existed at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

### 4.5.3 Content Preparation Template configuration procedures

#### 4.5.3.1 General

The 5GMS AF shall configure Content Preparation Template resources in the 5GMS AS using the procedures defined in this clause such that they remain synchronised with the Content Preparation Templates provisioned at reference point M1 using the procedures defined in clause 4.3.5.

The format of the Content Preparation Template resource representation is not specified in the present document.

#### 4.5.3.2 Enumerate Content Preparation Templates collection

This procedure is used by the 5GMS AF to determine the configuration state of the Content Preparation Templates collection in a running 5GMS AS instance. The HTTP GET method shall be used for this purpose. The request URL shall be that of the Content Preparation Templates collection on the 5GMS AS instance.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body shall be a JSON array of Content Preparation Template resource identifiers. The array shall be empty if no Content Preparation Template resources currently exist in the collection.

#### 4.5.3.3 Create Content Preparation Template

This procedure is used by the 5GMS AF to create a new Content Preparation Template resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The 5GMS AF shall nominate the resource identifier to be used to identify the new resource in the Content Preparation Templates collection as part of the request URL. A representation of the resource shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 201 (Created) response with an empty response body. The content of the Location header may differ from the request URL if the request was satisfied by a different 5GMS AS instance.

If a Content Preparation Template resource already exists at the request URL an HTTP 405 (Method Not Allowed) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Content Preparation Template resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.3.4 Retrieve Content Preparation Template

Retrieval of individual Content Preparation Template resources is not permitted at reference point M3.

#### 4.5.3.5 Update Content Preparation Template

This procedure is used by the 5GMS AF to replace a Content Preparation Template resource in the target 5GMS AS instance. The HTTP PUT method shall be used for this purpose. The target resource shall be indicated in the request URL. The replacement resource representation shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response with an empty response body.

If the replacement Content Preparation Template is identical to the current resource representation the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body to indicate a "no-op".

If a Content Preparation Template resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.3.6 Destroy Content Preparation Template

This procedure is used by the 5GMS AF to destroy a Content Preparation Template resource in the target 5GMS AS instance. The HTTP DELETE method shall be used for this purpose. The target resource shall be indicated in the request URL. The request body shall be empty.

If the operation is successful, the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body. Any subsequent attempt to recreate a Content Preparation Template resource with the same resource identifier shall fail as specified in clause 4.5.3.3.

If the target Content Preparation Template resource is still referenced by a Content Hosting Configuration or Content Publishing Configuration, an HTTP 409 (Conflict) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12]

If a Content Preparation Template resource previously existed at the request URL and was destroyed using this procedure an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.3.7 Activate Content Preparation Template

This procedure is used by the 5GMS AF to activate a Content Preparation Template resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The target resource shall be identified in the request URL. The request body shall be empty.

If the Content Preparation Template can be activated immediately by the 5GMS AS, or if it is already active, the HTTP 204 (No Content) response shall be returned by the 5GMS AS with an empty response body. If the activation request is otherwise acceptable to the 5GMS AS, but the Content Preparation Template cannot be activated immediately, the HTTP 202 (Accepted) response shall be returned by the 5GMS AS with an empty response body to indicate that activation is in progress.

If a Content Preparation Template resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.3.7 Deactivate Content Preparation Template

This procedure is used by the 5GMS AF to deactivate a Content Preparation Template resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The target resource shall be indicated in the request URL. The request body shall be empty.

If the Content Preparation Template can be deactivated immediately by the 5GMS AS, or if it is already inactive, the HTTP 204 (No Content) response shall be returned by the 5GMS AS with an empty response body. If the deactivation request is otherwise acceptable to the 5GMS AS, but the Content Preparation Template cannot be deactivated immediately, the HTTP 202 (Accepted) response shall be returned by the 5GMS AS with an empty response body to indicate that deactivation is in progress.

If a Content Preparation Template resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

### 4.5.4 Content Hosting Configuration procedures

#### 4.5.4.1 General

The 5GMS AF shall configure Content Hosting Configuration resources in the 5GMS AS using the procedures defined in this clause such that they remain synchronised with the Content Hosting Configurations provisioned at reference point M1 using the procedures defined in clause 4.3.3.

The format of the Content Hosting Configuration resource representation is specified in clause 7.6.3.1.

#### 4.5.4.2 Enumerate Content Hosting Configurations collection

This procedure is used by the 5GMS AF to determine the configuration state of the Content Hosting Configurations collection in a running 5GMS AS instance. The HTTP GET method shall be used for this purpose. The request URL shall be that of the Content Hosting Configuration collection on the 5GMS AS instance.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body shall be a JSON array of Content Hosting Configuration resource identifiers. The array shall be empty if no Content Hosting Configuration resources currently exist in the collection.

#### 4.5.4.3 Create Content Hosting Configuration

This procedure is used by the 5GMS AF to create a new Content Hosting Configuration resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The 5GMS AF shall nominate the resource identifier to be used to identify the new resource in the Content Hosting Configurations collection as part of the request URL. A representation of the resource shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 201 (Created) response with an empty response body. The content of the Location header may differ from the request URL if the request was satisfied by a different 5GMS AS instance.

If a Content Hosting Configuration resource already exists at the request URL an HTTP 405 (Method Not Allowed) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Content Hosting Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.4.4 Retrieve Content Hosting Configuration

Retrieval of individual Content Hosting Configuration resources is not permitted at reference point M3.

#### 4.5.4.5 Update Content Hosting Configuration

This procedure is used by the 5GMS AF to replace a Content Hosting Configuration resource in the target 5GMS AS instance. The HTTP PUT method shall be used for this purpose. The target resource shall be indicated in the request URL. The replacement resource representation shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response with an empty response body.

If the replacement Content Hosting Configuration is identical to the current resource representation the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body to indicate a "no-op".

If a Content Hosting Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.4.6 Destroy Content Hosting Configuration

This procedure is used by the 5GMS AF to destroy a Content Hosting Configuration resource in the target 5GMS AS instance. The HTTP DELETE method shall be used for this purpose. The target resource shall be indicated in the request URL. The request body shall be empty.

If the operation is successful, the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body. Any subsequent attempt to recreate a Content Hosting Configuration resource with the same resource identifier shall fail as specified in clause 4.5.4.3.

If a Content Hosting Configuration resource previously existed at the request URL and was destroyed using this procedure an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.4.7 Purge Content Hosting cache

This procedure is used by the 5GMS AF to purge one or more content items from the 5GMS AS cache associated with a Content Hosting Configuration resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. A Content Hosting Configuration resource shall be indicated in the request URL. The request body shall be a single key–value pair encoded per the application/x-www-form-urlencodedMIME content type. The key shall be the string *pattern* and the value shall be a regular expression [5] identifying the media resource URL(s) to be purged from the associated content cache.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body should indicate the total number of cache entries purged encoded as a positive JSON integer. If the purge request is otherwise acceptable to the 5GMS AS, but no cache entries were purged because none matched the supplied regular expression, the HTTP 204 (No Content) response shall instead be returned by the 5GMS AS with an empty response body.

If the request message body – or the regular expression contained in it – are found by the 5GMS AS to be syntactically malformed the HTTP 422 (Unprocessable Entity) error response shall be returned. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Content Hosting Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

### 4.5.5 Content Publishing Configuration procedures

#### 4.5.5.1 General

The 5GMS AF shall configure Content Publishing Configuration resources in the 5GMS AS using the procedures defined in this clause such that they remain synchronised with the Content Publishing Configurations provisioned at reference point M1 using the procedures defined in clause 4.3.3.

The format of the Content Publishing Configuration resource representation is specified in clause 7.X.3.1.

#### 4.5.5.2 Enumerate Content Publishing Configurations collection

This procedure is used by the 5GMS AF to determine the configuration state of a running 5GMS AS instance. The HTTP GET method shall be used for this purpose. The request URL shall be that of the Content Publishing Configuration collection on the 5GMS AS instance.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body shall be a JSON array of Content Publishing Configuration resource identifiers. The array shall be empty if no Content Publishing Configuration resources currently exist in the collection.

#### 4.5.5.3 Create Content Publishing Configuration

This procedure is used by the 5GMS AF to create a new Content Publishing Configuration resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. The 5GMS AF shall nominate the resource identifier to be used to identify the new resource in the Content Publishing Configurations collection as part of the request URL. A representation of the resource shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 201 (Created) response with an empty response body. The content of the Location header may differ from the request URL if the request was satisfied by a different 5GMS AS instance.

If a Content Publishing Configuration resource already exists at the request URL an HTTP 405 (Method Not Allowed) error response shall be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Content Publishing Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.5.4 Retrieve Content Publishing Configuration

Retrieval of individual Content Publishing Configuration resources is not permitted at reference point M3.

#### 4.5.5.5 Update Content Publishing Configuration

This procedure is used by the 5GMS AF to replace a Content Publishing Configuration resource in the target 5GMS AS instance. The HTTP PUT method shall be used for this purpose. The target resource shall be indicated in the request URL. The replacement resource representation shall be provided as the request body.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response with an empty response body.

If the replacement Content Publishing Configuration is identical to the current resource representation the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body to indicate a "no-op".

If a Content Publishing Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.5.6 Destroy Content Publishing Configuration

This procedure is used by the 5GMS AF to destroy a Content Publishing Configuration resource in the target 5GMS AS instance. The HTTP DELETE method shall be used for this purpose. The target resource shall be indicated in the request URL. The request body shall be empty.

If the operation is successful, the 5GMS AS shall return an HTTP 204 (No Content) response with an empty response body. Any subsequent attempt to recreate a Content Publishing Configuration resource with the same resource identifier shall fail as specified in clause 4.5.3.3.

If a Content Publishing Configuration resource previously existed at the request URL and was destroyed using this procedure an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

#### 4.5.5.7 Purge Content Publishing cache

This procedure is used by the 5GMS AF to purge one or more content items from the 5GMS AS cache associated with a Content Publishing Configuration resource in the target 5GMS AS instance. The HTTP POST method shall be used for this purpose. A Content Publishing Configuration resource shall be indicated in the request URL. The request body shall be a single key–value pair encoded per the application/x-www-form-urlencodedMIME content type. The key shall be the string *pattern* and the value shall be a regular expression [5] identifying the media resource URL(s) to be purged from the associated content cache.

If the operation is successful, the 5GMS AS shall return an HTTP 200 (OK) response. The resource body should indicate the total number of cache entries purged encoded as a positive JSON integer. If the purge request is otherwise acceptable to the 5GMS AS, but no cache entries were purged because none matched the supplied regular expression, the HTTP 204 (No Content) response shall instead be returned by the 5GMS AS with an empty response body.

If the request message body – or the regular expression contained in it – are found by the 5GMS AS to be syntactically malformed the HTTP 422 (Unprocessable Entity) error response shall be returned. The response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

If a Content Publishing Configuration resource previously existed at the request URL and was destroyed an HTTP 410 (Gone) error response should be returned by the 5GMS AS. Otherwise, if no resource exists at the request URL an HTTP 404 (Not Found) error response shall be returned by the 5GMS AS. In either case the response body shall be a ProblemDetails document as specified in clause 5.2.4.1 of TS 29.571 [12].

Next change

# 5 Procedures for Uplink Media streaming

## 5.1 General

Uplink media streaming functional entities in the 5GMS System include the 5GMSu Application Provider, 5GMSu AF, 5GMSu AS and the UE. To make use of these other entities, the UE includes a 5GMSu-Aware Application that is provided by the 5GMS Application Provider and a 5GMSu Client comprising the Media Session Handler and the Media Streamer.

The M1 Provisioning API enables the 5GMSu Application Provider to establish and manage the uplink media session handling and streaming options of the 5GMSu system.

The M2u Egest interface enables Uplink media streaming content sent by the 5GMSu Client to the 5GMSu AS over interface M4u to be subsequently delivered to the 5GMSu Application Provider. Uplink media streaming media transfer from the 5GMSu AS to the 5GMSu Application Provider may be either pull-based and initiated by the 5GMSu Application Provider using the HTTP GET method, or push-based and initiated by the 5GMSu AS using the HTTP PUT method. The resource identifier of the 5GMSu Application Provider for push-based streaming content delivery is provided to the 5GMSu AS by the 5GMSu AF over the M3u interface, as part of the M1 Provisioning Session.

The 5GMSu AF, having acquired M1 Provisioning information, sets up the M5 interface that the 5GMSu Client can use for Uplink media streaming session management, remote control, metrics reporting, network assistance and request for policy and/or charging treatment. Certain types of configuration and policy information accessed over M5 by the Media Session Handler, such as uplink metrics reporting, QoS policy, or support for AF-based network assistance are further passed to the Media Streamer via the M7u API.

Based on the configuration information received on M5 and a request from the Media Streamer received over the M6u interface, the Media Session Handler sets up an Uplink media streaming session with the 5GMSu AF. Upon successful session establishment, the Media Session Handler triggers the Media Streamer to begin Uplink media streaming of media content to the 5GMSu AS over the M4u interface.

Subscription to status and other event notification services are offered by the Media Session Handler to the 5GMSu-Aware Application and to the Media Streamer via the M6u APIs exposed by the Media Session Handler.

Subscription to status and other event notification services are also offered by the Media Streamer to the 5GMSu-Aware Application and to the Media Session Handler via the M7u APIs exposed by the Media Player.

## 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 | <CR0038> | M1u | Provisioning Sessions API | 7.2 |
| Server Certificates Provisioning API | 7.3 |
| Content Preparation Templates Provisioning API | 7.4 |
| Content Publication Provisioning API | 7.X |
| M2u | HTTP pull-based content egest protocol | 8.4 |
| DASH-IF push-based content egest protocol | 8.5 |
| M3u | Server Certificates configuration API | 9.1 |
| Content Preparation Templates configuration API | 9.2 |
| Content Publication configuration API | 9.4 |
| M4u | MPEG‑DASH [4] or 3GP‑DASH [37] | 10 |
| 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 |

Next change

# 9 Internal (M3) APIs

## 9.1 Server Certificates Configuration API

### 9.1.1 Overview

The Server Certificates Configuration API is used to configure X.509 [8] server certificates in a 5GMS AS instance that can be referenced by a Content Hosting Configuration or Content Publishing Configuration and subsequently presented by the 5GMS AS to 5GMS Clients connecting to it at reference point M4 using Transport Layer Security [30]. All Server Certificate resources are held by the 5GMS AS instance in a flat collection. The resource identifier for each Server Certificate resource is nominated by the 5GMS AF and need not be the same as that used at reference point M1.

### 9.1.2 Resource structure

The Server Certificates Configuration API is exposed by the 5GMS AS through the following URL base path:

{apiRoot}/3gpp-m3/{apiVersion}/certificates/

Table 9.1.2‑1 specifies the operations and the corresponding HTTP methods that are supported by this API. In each case, the sub-resource path (if any) specified in the second column shall be appended to the URL base path.

Table 9.1.2‑1: Operations supported by the Server Certificates Configuration API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Enumerate Server Certificates |  | GET | Used by the 5GMS AF to retrieve a list of Server Certificate resources currently configured in a 5GMS AS instance.  The request message body shall be empty. |
| Create Server Certificate | {afResourceId} | POST | Used by the 5GMS AF to create a new Server Certificate resource in a 5GMS AS instance.  The {afResourceId} is nominated by the 5GMS AF in this operation and shall be unique in the collection of Server Certificates in a given 5GMS AS instance.  The request message body shall be a PEM-encoded X.509 certificate [8] bundle that includes the private key. |
| Update Server Certificate |  | PUT | Used by the 5GMS AF to replace an existing Server Certificate resource {afResourceId} in a 5GMS AS instance.  The request message body shall be a replacement PEM-encoded X.509 certificate [8] bundle that includes the private key. |
| Destroy Server Certificate |  | DELETE | Removes the Server Certificate resource {afResourceId} from the collection.  Attempting to destroy a Server Certificate resource that is referenced by a Content Hosting Configuration or Content Publishing Configuration is an error. |
| NOTE: The Server Certificate resource identifier *{certificateId}* differs from the serial number of the X.509 certificate. | | | |

### 9.1.3 Data model

Server Certificate resource representations shall be PEM-encoded X.509 certificate [8] bundles including their private key.

## 9.2 Content Preparation Templates Configuration API

### 9.2.1 Overview

The Content Preparation Templates Configuration API is used to configure Content Preparation Template resources in a 5GMS AS instance that can be referenced by a Content Hosting Configuration or Content Publishing Configuration. All Content Preparation Template resources are held by the 5GMS AS instance in a flat collection. The resource identifier for each Content Preparation Template resource is nominated by the 5GMS AF and need not be the same as that used at reference point M1.

### 9.2.2 Resource structure

The Content Preparation Templates Configuration API is exposed by the 5GMS AS through the following URL base path:

{apiRoot}/3gpp-m3/{apiVersion}/content-preparation-templates/

Table 9.2.2‑1 specifies the operations and the corresponding HTTP methods that are supported by this API. In each case, the sub-resource path (if any) specified in the second column shall be appended to the URL base path.

Table 9.1.2‑1: Operations supported by the Content Preparation Templates Configuration API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Enumerate Content Preparation Templates |  | GET | Used by the 5GMS AF to retrieve a list of Content Preparation Template resources currently configured in a 5GMS AS instance.  The request message body shall be empty. |
| Create Content Preparation Template | {afResourceId} | POST | Used by the 5GMS AF to create a new Content Preparation Template resource in a 5GMS AS instance.  The {afResourceId} is nominated by the 5GMS AF in this operation and shall be unique in the collection of Content Preparation Templates in a given 5GMS AS instance.  The request message body shall be a Content Preparation Template document. |
| Update Content Preparation Template |  | PUT | Used by the 5GMS AF to replace an existing Content Preparation Template resource {afResourceId} in a 5GMS AS instance.  The request message body shall be a replacement Content Preparation Template document. |
| Destroy Content Preparation Template |  | DELETE | Removes the Content Preparation Template resource {afResourceId} from the collection.  The request message body shall be empty.  Attempting to destroy a Content Preparation Template resource that is referenced by a Content Hosting Configuration or Content Publishing Configuration is an error. |
| Activate Content Preparation Template | {afResourceId}/activate | POST | Activate Content Preparation Template {afResourceId} in the 5GMS AS instance. |
| Deactivate Content Preparation Template | {afResourceId}/deactivate | POST | Deactivate Content Preparation Template {afResourceId} in the 5GMS AS instance. |

### 9.2.3 Data model

The representation of Content Preparation Template resources is not specified in this release.

## 9.3 Content Hosting Configuration API

### 9.3.1 Overview

The Content Hosting Configuration API is used to configure Content Hosting Configuration resources in a 5GMS AS instance. All Content Hosting Configuration resources are held by the 5GMS AS instance in a flat collection. The resource identifier for each Content Hosting Configuration resource is nominated by the 5GMS AF and need not be the same as that used at reference point M1.

### 9.3.2 Resource structure

The Content Hosting Configuration API is exposed by the 5GMS AS through the following URL base path:

{apiRoot}/3gpp-m3/{apiVersion}/content-hosting-configurations/

Table 9.3.2‑1 specifies the operations and the corresponding HTTP methods that are supported by this API. In each case, the sub-resource path (if any) specified in the second column shall be appended to the URL base path.

Table 9.3.2‑1: Operations supported by the Content Hosting Configuration API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Enumerate Content Hosting Configurations |  | GET | Used by the 5GMS AF to retrieve a list of Content Hosting Configuration resources currently configured in a 5GMS AS instance.  The request message body shall be empty. |
| Create Content Hosting Configuration | {afResourceId} | POST | Used by the 5GMS AF to create a new Content Hosting Configuration resource in a 5GMS AS instance.  The {afResourceId} is nominated by the 5GMS AF in this operation and shall be unique in the collection of Content Hosting Configurations in a given 5GMS AS instance.  The request message body shall be a Content Hosting Configuration document. |
| Update Content Hosting Configuration |  | PUT | Used by the 5GMS AF to replace an existing Content Hosting Configuration resource {afResourceId} in a 5GMS AS instance.  The request message body shall be a replacement Content Hosting Configuration document. |
| Destroy Content Hosting Configuration |  | DELETE | Removes the Content Hosting Configuration resource {afResourceId} from the collection.  The request message body shall be empty.  Attempting to destroy a Content Hosting Configuration resource that is referenced by a Content Hosting Configuration or Content Publishing Configuration is an error. |
| Purge Content Hosting cache | {afResourceId}/purge | POST | Purge one or more media resources associated with Content Hosting Configuration {afResourceId} from the 5GMS AS content cache.  The request message body shall specify the set of media resource URLs to be purged. |

### 9.3.3 Data model

The representation of the Content Hosting Configuration resource shall be the same as that specified in clause 7.6.3.1.

## 9.4 Content Publication Configuration API

### 9.4.1 Overview

The Content Publishing Configuration API is used to configure Content Publishing Configuration resources in a 5GMS AS instance. All Content Publishing Configuration resources are held by the 5GMS AS instance in a flat collection. The resource identifier for each Content Publishing Configuration resource is nominated by the 5GMS AF and need not be the same as that used at reference point M1.

### 9.4.2 Resource structure

The Content Publishing Configuration API is exposed by the 5GMS AS through the following URL base path:

{apiRoot}/3gpp-m3/{apiVersion}/content-publishing-configurations/

Table 9.4.2‑1 specifies the operations and the corresponding HTTP methods that are supported by this API. In each case, the sub-resource path (if any) specified in the second column shall be appended to the URL base path.

Table 9.4.2‑1: Operations supported by the Content Publishing Configuration API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Enumerate Content Publishing Configurations |  | GET | Used by the 5GMS AF to retrieve a list of Content Publishing Configuration resources currently configured in a 5GMS AS instance.  The request message body shall be empty. |
| Create Content Publishing Configuration | {afResourceId} | POST | Used by the 5GMS AF to create a new Content Publishing Configuration resource in a 5GMS AS instance.  The {afResourceId} is nominated by the 5GMS AF in this operation and shall be unique in the collection of Content Publishing Configurations in a given 5GMS AS instance.  The request message body shall be a Content Publishing Configuration document. |
| Update Content Publishing Configuration |  | PUT | Used by the 5GMS AF to replace an existing Content Publishing Configuration resource {afResourceId} in a 5GMS AS instance.  The request message body shall be a replacement Content Publishing Configuration document. |
| Destroy Content Publishing Configuration |  | DELETE | Removes the Content Publishing Configuration resource {afResourceId} from the collection.  The request message body shall be empty.  Attempting to destroy a Content Publishing Configuration resource that is referenced by a Content Publishing Configuration or Content Publishing Configuration is an error. |
| Purge Content Publishing cache | {afResourceId}/purge | POST | Purge one or more media resources associated with the Content Publishing Configuration {afResourceId} from the 5GMS AS content cache.  The request message body shall specify the set of media resource URLs to be purged. |

### 9.4.3 Data model

The representation of the Content Publishing Configuration resource shall be the same as that specified in clause 7.X.3.1.

Next change

# C.3A OpenAPI representation of the M3 APIs

## C.3A.1 M3\_ServerCertificatesConfiguration API

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## C.3A.2 M3\_ContentPreparationTemplates API

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## C.3A.3 M3\_ContentHostingConfiguration API

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## C.3A.4 M3\_ContentPublishingConfiguration API

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END OF CHANGES