**3GPP TSG- Meeting #-e**

**, , 19th–** resubmission of S4-AHIA18

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| *CR-Form-v12.0* | | | | | | | | |
| **PSEUDO CHANGE REQUEST** | | | | | | | | |
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|  | **TS 26.512** | **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:*** |  | | | | | | | | | |
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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)*. | | | | | | | |  | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Complete the stage 3 design for Ingest Protocols. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Add missing definition of procedures. 2. Modification of resource structure in response to feedback. Passive provision has been made to expand the scope of this feature in a later release to describe supported protocols for uplink as well as downlink. 3. Addition of a simple HTTP pull-based media ingest protocol. 4. Added support for pull-based path rewrite rules in the Content Hosting Configuration. 5. In DistributionConfiguration, renamed targetDomain → canonicalDomainName and originDomain → domainNameAlias. 6. Added the means for a 5GMSd AF to advertise the content geo-fencing location types that it supports. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The stage 3 design for Ingest Protocols will be incomplete in Release 16. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.3, 4.3.4, 7.5, 8, 7.6.3.1 | | | | | | | | |
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|  | | **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:*** | | S4-AHI995, S4-AHIA06, S4-AHIA18. | | | | | | | | |

FIRST CHANGE

### 4.3.3 Content Hosting Configuration procedures

#### 4.3.3.1 General

These procedures are used by the 5GMSd Application Provider and the 5GMSd AF on M1d to configure the content hosting feature for downlink streaming. They are further elaborated in clause 5.2.

#### 4.3.3.2 Create Content Hosting Configuration

This procedure is used by the 5GMSd Application Provider to create a new Content Hosting Configuration. The 5GMSd Application Provider shall use the HTTP POST method for this purpose and the request message body shall include a ContentHostingConfiguration resource, as specified in clause 7.6.3.1.

If the Content Hosting Configuration uses the Push-based content ingest method, i.e. the pull attribute is set to False, then the path and entryPoint properties are read-only and shall not be set by the 5GMSd Application Provider. In this case the canonicalDomainName property is also read-only and shall be assigned by the 5GMSd AF.

If the procedure is successful, the 5GMSd AF shall generate a resource identifier representing the new Content Hosting Configuration. In this case, the 5GMSd AF shall respond with a 201 (Created) HTTP response message and shall provide the URL to the newly created resource in the Location header field. The response message body may include a ContentHostingConfiguration resource (see clause 7.6.3.1) that represents the current state of the Content Hosting Configuration, including any fields set by the 5GMSd AF.

#### 4.3.3.3 Read Content Hosting Configuration properties

This procedure is used by the 5GMSd Application Provider to obtain the properties of an existing Content Hosting Configuration resource from the 5GMSd AF. The HTTP GET method shall be used for this purpose.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) response message that includes the ContentHostingConfiguration resource in the response message body.

#### 4.3.3.4 Update Content Hosting Configuration properties

The update operation is invoked by the 5GMSd Application Provider to modify the properties of an existing ContentHostingConfiguration resource. All writeable properties except domainNameAlias may be updated. The HTTP PATCH or HTTP PUT methods shall be used for the update operation.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) and provide the content of the resource in the response, confirming the successful update operation.

Editor’s Note: Check the HTTP Status Codes.

#### 4.3.3.5 Delete Content Hosting Configuration

This operation is used by the 5GMSd Application Provider to destroy a Content Hosting Configuration resource and to terminate the related distribution. The HTTP DELETE method shall be used for this purpose. As a result, the 5GMSd AF will release any associated network resources, purge any cached content, and delete any corresponding configurations.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) response message.

Editor’s Note: Check the HTTP Status Codes for DELETE.

SECOND CHANGE

### 4.3.4 Content Protocols procedures

#### 4.3.4.1 General

The set of content ingest protocols supported by the 5GMSd AS at interface M2d is described by the ContentProtocols resource at M1d, as specified in clause 7.5.3.1.

#### 4.3.4.2 Create Content Protocols

The Create operation is not permitted for the ContentProtocols resource.

#### 4.3.4.3 Read Content Protocols

This procedure is used by the 5GMSd Application Provider to retrieve a list of content ingest protocols supported by the 5GMSd AS. The HTTP GET method shall be used for this purpose.

If the procedure is successful, the 5GMSd AF shall respond with a 200 (OK) response that includes a ContentProtocols resource in the response message body, as specified in clause 7.5.3.1.

#### 4.3.4.4 Update Ingest Protocols

The Update operation is not permitted for the ContentProtocols resource.

#### 4.3.4.5 Delete Ingest Protocols

The Delete operation is not permitted for the ContentProtocols resource.

THIRD CHANGE

## 7.5 Content Protocols Discovery API

### 7.5.1 Overview

The Content Protocols Discovery API is used by a 5GMSd Application Provider to find out which content ingest protocols are supported by the 5GMSd AS(s) associated with a 5GMSd AF. One of the supported ingest protocols is subsequently indicated in a Content Hosting Configuration for downlink streaming.

### 7.5.2 Resource structure

The Content Protocols Discovery API is accessible through the following URL base path:

{apiRoot}/3gpp-m1d/v1/provisioning-sessions/{provisioningSessionId}/

Table 7.5.2‑1 below specifies the operations and the corresponding HTTP methods that are supported by this API. In each case, the Provisioning Session identifier shall be substituted into {provisioningSessionId} in the above URL template and the sub-resource path specified in the second column of the table shall be appended to the URL base path.

Table 7.5.2‑1: Operations supported by the Ingest Protocols Discovery API

|  |  |  |  |
| --- | --- | --- | --- |
| Operation | Sub‑resource path | Allowed HTTP method(s) | Description |
| Fetch list of supported content protocols | protocols | GET | This operation is used to retrieve a list of supported content protocols. |

### 7.5.3 Data model

#### 7.5.3.1 ContentProtocols resource

The data model for the ContentProtocols resource is specified in table 7.5.3.1-1 below:

Table 7.5.3.1-1: Definition of ContentProtocols resource

| Property name | Data Type | Cardinality | Description |
| --- | --- | --- | --- |
| downlinkIngestProtocols | array(ContentProtocolDescriptor) | 0..1 | An array of ContentProtocolDescriptor objects, as specified in clause 7.5.3.2, each one uniquely identifying a content ingest protocol supported at interface M2d by the 5GMSd AS(s) associated with the corresponding 5GMSd AF. |
| geoFencingLocatorTypes | array(URI String) | 0..1 | An array of fully-qualified term identifiers, each one indicating a content geo-fencing locator type supported by the 5GMS System.  Every 5GMS System shall support at least the locator type urn:3gpp:5gms:locator‑type:iso3166. |

#### 7.5.3.2 ContentProtocolDescriptor type

The data model for the ContentProtocolDescriptor type is specified in table 7.5.3.2-1 below:

Table 7.5.3.2-1: Definition of ContentProtocolDescriptor type

| Property name | Data Type | Cardinality | Description |
| --- | --- | --- | --- |
| termIdentifier | URI String | 1..1 | A fully-qualified term identifier from the controlled vocabulary urn:3gpp:5gms:content-protocol, as specified in clause 7.5.4. |
| descriptionLocator | URL String | 0..1 | The location of a description of the content protocol, for example the public web URL of its specification. |

FOURTH CHANGE

# 8 Media Ingest and Publish (M2) protocols

## 8.0 General

The set of content protocols supported by the 5GMS AS is listed in table 8.0‑1 below:

Table 8.0‑1: 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 | 8.1 |
| DASH-IF push-based content ingest protocol | urn:3gpp:5gms:content-protocol:dash-if-ingest | 8.2 |
| Content egest protocols at interface M2u | | |
|  |  |  |

## 8.1 HTTP pull-based content ingest protocol

If IngestConfiguration.protocol is set to urn:3gpp:5gms:content-protocol:http-pull-ingest in the Content Hosting Configuration, media resources shall be ingested by the 5GMSd AS using HTTP [9]. The IngestConfiguration.pull property shall be set to True, indicating that a Pull-based protocol is used. The IngestConfiguration.entryPoint property shall point at the 5GMSd Application Provider’s origin server, as specified in table 7.6.3.1‑1 and may indicate the use of HTTPS [16]. The IngestConfiguration.entryPoint shall not contain a path part.

When the 5GMSd AS receives a request for a media resource at interface 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, using the abovementioned entryPoint property concatenated with the mappedPath from the applicable path rewrite rule (if any) selected from DistributionConfiguration.PathRewriteRules and the leaf path element from the original M4d request URL to construct the M2d request URL.

## 8.2 DASH-IF push-based content ingest protocol

If IngestConfiguration.protocol is set to urn:3gpp:5gms:content-protocol:dash-if-ingest in the Content Hosting Configuration, media resources shall be ingested by the 5GMSd AS as specified by the DASH‑IF Live Media Ingest specification [3]. The IngestConfiguration.pull property shall be set to False, indicating that a Push-based protocol is used. The IngestConfiguration.entryPoint property shall be set to the URL that will be used to upload the DASH segments and MPD to the 5GMSd AS at interface M2d. This entry point URL shall not contain a path, instead, the path for the URL shall instead be specified by the IngestConfiguration.path property.

FIFTH CHANGE

#### 7.6.3.1 ContentHostingConfiguration resource

The data model for the ContentHostingConfiguration resource is specified in table 7.6.3.1-1 below:

Table 7.6.3.1-1: Definition of ContentHostingConfiguration resource

| Property name | Data Type | Cardinality | Description |
| --- | --- | --- | --- |
| name | String | 1..1 | A name for this Content Hosting Configuration. |
| IngestConfiguration | Object | 1..1 | Describes the 5GMSd Application Provider’s origin server from which media resources will be ingested via interface M2d. |
| path | String | 1..1 | The relative path which will be used to address the media resources at interface M2d.  This path is provided by the 5GMSd AF in the case of Push-based ingest. |
| pull | Boolean | 1..1 | Indicates whether to the 5GMSd AS shall use Pull or Push for ingesting the content. |
| protocol | URI String | 1..1 | A fully-qualified term identifier allocated in the name space urn:3gpp:5gms:content-protocol that identifies the content ingest protocol.  The set of supported protocols is defined in clause 8. |
| entryPoint | String | 1..1 | An entry point to ingest the content. The semantics of the entry point are dependent on the selected ingest protocol.  In the case of Push ingest (pull flag is set to False), this parameter is returned by the 5GMSd AF to the 5GMSd Application Provider and indicates the entry point for pushing the content.  In case of Pull (pull flag is set to True), the entryPoint shall be provided to the 5GMSd AF to indicate the location from which content is to be pulled. In this case, the *entryPoint* shall be used as the base URL. A request received by the 5GMSd AS is mapped to a URL using the provided base URL to fetch the content from the origin server. |
| DistributionConfiguration | array(Object) | 1..N | Specifies the distribution method and configuration for the ingested content.  More than one distribution may be configured for the ingested content, e.g. to offer different distribution configurations such as DASH and HLS. |
| contentPreparationTemplateId | String | 0..1 | Indicates that content preparation prior to distribution is requested by the 5GMSd Application Provider. It identifies the Content Preparation Template that shall be used as defined in clause 7.4 |
| canonicalDomainName | String | 1..1 | All resources of the current distribution shall be accessible through this default FQDN assigned by the 5GMSd AF. |
| domainNameAlias | String | 0..1 | The 5GMSd Application Provider may assign another FQDN through which media resources are additionally accessible at M4d.  This domain name is used by the 5GMSd AS to select an appropriate Server Certificate to present at M4d, and to set appropriate CORS HTTP response headers at M4d.  If this property is present, the 5GMSd Application Provider is responsible for providing in the DNS a CNAME record that resolves domainNameAlias to canonicalDomain. |
| PathRewriteRules | array(Object) | 0..N | An ordered list of rules for rewriting the request URL paths of media resource requests handled by the 5GMSd AS.  If multiple rules match a particular resource’s path, only the first matching rule, in order of appearance in this array, shall be applied. |
| requestPathPattern | String | 1..1 | A regular expression [5] against which the path part of each 5GMSd AS request URL, including the leading “/”, and up to and including the final “/”, shall be compared. (Any leaf path element following the final “/” shall be excluded from this comparison.)  In the case of Pull-based ingest, the M4d download request path is used in the comparison.  In the case of Push-based ingest, the M2d upload request path is used in the comparison.  In either case, if the request path matches this pattern, the path mapping specified in the corresponding mappedPath shall be applied. |
| mappedPath | String | 1..1 | A replacement for the portion of the 5GMSd AS request path that matches requestPathPattern.  In the case of Pull-based ingest, IngestConfiguration.entryPoint is concatenated with the mapped path and any leaf path element from the original M4d download request to form the M2d origin request URL.  In the case of Push-based ingest, canonicalDomainName (and, optionally, domainNameAlias) are concatenated with the mapped path and any leaf path element from the original M2d upload request to form the distribution URL(s) exposed over M4d. |
| CachingConfiguration | Array(Object) | 0..N | Defines a configuration of the 5GMSd AS cache for a matching subset of media resources ingested in relation to this Content Hosting Configuration. |
| urlPatternFilter | String | 1..1 | A pattern that will be used to match media resource URLs to determine whether a given media resource is eligible for caching by the 5GMSd AS. The format of the pattern shall be a regular expression as specified in [5]. |
| CachingDirectives | Object | 1..1 | If a urlPatternFilter applies to a resource, then the provided CachingDirectives shall be applied by the 5GMSd AS at M4d, potentially overwriting any origin caching directives ingested at M2d. |
| statusCodeFilters | Array(Integer) | 0..N | The set of HTTP origin response status codes to which these CachingDirectives apply. The filter shall be provided as a regular expression as specified in [5].  If the list is empty, the CachingDirectives shall apply to all HTTP origin response status codes at M2d. |
| noCache | Boolean | 1..1 | If set to True, this indicates that the media resources matching the filters shall not be cached by the 5GMSd AS and shall be marked as not to be cached when served by the 5GMSd AS at M4d. |
| maxAge | Integer | 0..1 | The caching time-to-live period that shall be set on ingested media resources matching the filters. This determines the minimum period for which the 5GMSd AS shall cache matching media resources as well as the time-to-live period signalled by the 5GMSd AS at interface M4d when it serves such media resources.  The time-to-live for a given media resource shall be calculated relative to the time it was ingested. |
| GeoFencing | Object | 0..1 | Limit access to the content to the indicated geographic areas. |
| *locationType* | String | 1..1 | The type of the location information. |
| *locations* | Array(String) | 1..N | Array of locations from which access to the resources is to be allowed. |
| UrlSignature | Object | 0..1 | Defines the URL signing scheme. Only correctly signed and valid URLs will be allowed to access the content resource at M4d. |
| urlPattern | String | 1..1 | A pattern that shall be used to match M4d media resource URLs. The 5GMSd AS shall not serve a matching media resource at M4d unless it includes a valid authentication token. The format of the pattern shall be a regular expression as specified in [5]. |
| tokenName | String | 1..1 | The name of the M4d request query parameter that the Media Player must use to present the authentication token when required to do so. |
| passphraseName | String | 1..1 | The name of the query parameter that is used to refer to the passphrase when constructing the authentication token.  Note that the token is not included in the cleartext part of the M4d URL query component. |
| passphrase | String | 1..1 | The shared secret between the 5GMSd Application Provider and the 5GMSd AS for this *DistributionConfiguration*.  The passphrase is used in the computation and verification of the M4d authentication token but is never sent in-the-clear over that interface. |
| tokenExpiryName | String | 1..1 | The name of the M4d request query parameter that the Media Player must use to present the token expiry field. |
| useIPAddress | Boolean | 1..1 | If set to True, the IP address of the UE is included in the computation of the authentication token for resources that match urlPattern and access to matching media resources shall be allowed by the 5GMSd AF only when the M4d request is made from a UE with this IP address. |
| ipAddressName | String | 0..1 | The name of the M4d request query parameter that is encoded as part of the authentication token if the useIPAddress flag is set to True.  Note that the IP address is not passed in the cleartext part of the M4d URL query component. |
| certificateId | String | 0..1 | When content is distributed using TLS [16], the X.509 [8] certificate for the origin domain is shared with the 5GMSd AF so that it can be presented by the 5GMSd AS in the TLS handshake at M4d. This attribute indicates the identifier of the certificate to use. |

END OF CHANGES