**3GPP TSG-SA4 Meeting #131 *S4-250129***

**Geneva, Switzerland, 17th Feb 2025 - 21st Feb 2025**revision of S4aI250026

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **26.501** | **CR** | **0105** | **rev** | **1** | **Current version:** | **18.8.0** |  |
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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:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | S4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GMSA, TEI18 | | | | |  | ***Date:*** | | | 2025-01-06 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | Editorial corrections to TS 26.501 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Simple fixes of typos or broken sentences, nothing related to style or technical | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Lesser quality specification | | | | | | | | |
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| ***Clauses affected:*** | | 4.0.2, 4.0.3, 4.04, 4.8, 5.2.5.2, 5.5.2, 5.10.2, 5.10.5.1, 5.12.3, 5.12.4.1, 5.12.4.2, 5.12.5.1, 7.3, A.14, B.3 | | | | | | | | |
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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:*** | | Split the edits in 15 separate changes | | | | | | | | |

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| \*\* CHANGE 1\*\* |

### 4.0.2 Content hosting

The content hosting feature is applicable to downlink media streaming only. It provides a service equivalent to a Content Delivery Network (CDN) deployed inside or outside the Trusted DN. High-level procedures for this feature are defined in clause 5.4.



Figure 4.0.2‑1: High-level arrangement for content hosting feature

When a 5GMSd Application Provider has provisioned the content hosting feature for downlink media streaming:

1. Media content is either retrieved by a network-side component of the 5GMS System from a media origin at the 5GMSd Application Provider (pull-based content ingest) or else it is published to a network-side component of the 5GMS System by the 5GMSd Application Provider (push-based content ingest).

2. The network-side component of the 5GMS System may cache this content for a configurable period of time.

3. Network-side components of the 5GMS System may manipulate the content according to rules provisioned in Content Preparation Templates (see clause 4.0.4).

4. The 5GMSd Client in the UE subsequently retrieves the (possibly manipulated) media content as part of a downlink media streaming session. The security of the content served to the 5GMSd Client by network-side components of the 5GMS System may be guaranteed by a provisioned Server Certificate.

In addition, the use of content hosting by 5GMSd Clients is logged by the 5GMS System and, if suitably provisioned, is exposed by it to subscribing 5GMSd Application Providers in the form of events. This information is equivalent to that contained in CDN access logs (see also clause 4.0.12).

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| \*\* CHANGE 2\*\* |

### 4.0.3 Content publishing

The content publication feature is applicable to uplink media streaming only. High-level procedures for this feature are defined in clause 6.2.3.



Figure 4.0.3‑1: High-level arrangement for content publishing feature

When a 5GMSu Application Provider has provisioned the content publishing feature for uplink media streaming:

1. Media content is published by the 5GMSu Client in the UE to a network-side component of the 5GMS System as part of an uplink media streaming session. The security of the content published to the 5GMS System may be guaranteed by a provisioned Server Certificate.

2. The network-side component of the 5GMS System may cache this content for a configurable period of time.

3. Network-side components of the 5GMS System may manipulate the content according to rules provisioned in Content Preparation Templates (see clause 4.0.4).

4. A network-side component of the 5GMS System makes the media content available for retrieval by the 5GMSu Application Provider (pull-based content egest) or publishes it directly to the 5GMSu Application Provider (push-based content egest).

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| \*\*CHANGE 3\*\* |

### 4.0.4 Content preparation

The content preparation feature is applicable to both downlink media streaming (where it is provisioned as part of the content hosting feature introduced in clause 4.0.2) and uplink media streaming (where it is provisioned as part of the content publishing feature introduced in clause 4.0.3). The content preparation feature enables a 5GMS Application Provider to specify content manipulation by network-side components of the 5GMS System according to provisioned Content Preparation Templates.

When a 5GMSd Application Provider has provisioned the content preparation feature for downlink media streaming:

1. Network-side components of the 5GMS System may manipulate ingested media content and may cache the manipulated content prior to serving it to the 5GMSd Client in the UE.

When a 5GMSu Application Provider has provisioned the content preparation feature for uplink media streaming:

1. Network-side components of the 5GMS System may manipulate the media content ingested from the 5GMSu Client in the UE and may cache the manipulated content prior to egesting it to the 5GMSu Application Provider.

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| \*\*CHANGE 4\*\* |

## 4.8 Downlink media streaming to Media Players with multiple formats

This clause considers downlink streaming in which a 5GMSd Application Provider publishes the same service in different media formats, all to be ingested by the same logical 5GMSd AS. The different media formats of the service are described by different presentation manifests (e.g. Dynamic Adaptive Streaming over HTTP [29] and HTTP Live Streaming [28]) but are described by a common Content Hosting Configuration (see clause 5.4) under a single Provisioning Session (see clause 5.3). The different media formats may or may not share the media resources described by their respective presentation manifests.

Where the different media formats do share the same media objects (for example, an ISO MPEG Common Media Application Format (CMAF) presentation [27] according to the content format specified in TS 26.511 [26]) the same CMAF content may then be provided to different kinds of Media Player, for example HTTP Live Streaming [28] and Dynamic Adaptive Streaming over HTTP [29], requiring different presentation manifest formats. This approach is aligned with CTA-5005 [25], which primarily focusses on creating interoperable CMAF content such that it can be used at the same time with DASH and HLS to the greatest possible extent.

The deployment architecture for this scenario is documented in figure 4.8-1. In this case, the 5GMSd Application Provider provisions a single downlink media streaming session and triggers the content to be served to 5GMS Clients that consume different media formats, indicated in the figure with an asterisk.

- Provisioning and content ingest shall support the ability to serve different formats.

- Provisioning and content ingest shall support the possibility that different formats may share common media files, for example CMAF to be used for DASH and HLS.

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| \*\*CHANGE 5\*\* |

#### 5.2.5.2 Authorisation of media session handling at M5d based on access token

The 5GMSd Application Provider provides a different access token (e.g. a random string) via M8 to each 5GMSd-Aware Application, so that each application instance can identify itself uniquely to the 5GMSd AF. The access token is provided, for example, during the login procedure or is requested at a later stage. The validity of access tokens is often limited in time. The 5GMSd-Aware Application may need to refresh the access token depending on the token validity.

The 5GMSd-Aware Application passes the access token (via an M6 API call) to the Media Session Handler. When the Media Session Handler invokes a media session handling operation at reference point M5, it presents the access token to the 5GMSd AF. Upon receipt of such an access token, the 5GMSd AF verifies whether the access token is valid. If the token is valid, the 5GMSd-Aware Application is authorised to invoke the operation.

When the OAuth 2.0 architecture [35] is used, the 5GMSd Application Provider acts as authorization server, the 5GMSd-Aware Application acts as client and the 5GMSd AF acts as resource server.

The call flow is depicted below.



Figure 5.2.5.2‑1: Call flow for authorisation based on access token

The steps are as follows:

1. When the user wants to use the 5GMSd-Aware Application to consume e.g. video content, the user needs to authenticate with the application and the 5GMSd Application Provider at reference point M8. (In some cases, this authorisation may be cached/stored by the application, so that the user is not always challenged to provide the login credentials.)

NOTE 1: The application may be a native application (e.g. an Android application) or a browser application.

2. Based on the login credentials supplied in the previous step, the 5GMSd Application Provider determines the policy rights to which this application service subscription is entitled (e.g. the user may have subscribed to an SD quality video service or a 4K quality video service). According to the subscription entitlement level, the 5GMSd Application Provider creates an access token and passes this token back to the application with the login response.

NOTE 2: Access tokens may be long-lived. The 5GMSd-Aware Application may need to refresh the access token, depending on its validity period.

3. When the 5GMSd-Aware Application (immediately or later) invokes the Media Session Handler to activate media session handling for a media delivery session, the application passes the access token to the Media Session Handler. The access token may embed a user identifier, or the user identifier may be passed as separate (anonymised) parameter.

NOTE 3: The access token may be included as a parameter of the 3GPP Service URL used to launch media session handling (see table 4.10.2‑1).

4. When the Media Session Handler invokes a media session handling operation on the 5GMSd AF at reference point M5, it provides the access token, e.g. as an HTTP request header.

5. The 5GMSd AF verifies the access token with the 5GMSd Application Provider.

6. If the 5GMSd AF has verified that the 5GMSd-Aware Application is authorised to invoke the media session handling operation (based on the token), the 5GMSd AF carries out the requested operation. (This may involve further interaction with the PCF or NEF.)

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| \*\* CHANGE 6\*\* |

### 5.5.2 RAN-based reporting procedure

In the first use-case, shown in Figure 5.5.2-1 below, the 5GMS System operator controls the metrics collection and reporting using the RAN-based configuration method. In this case the metrics are configured via the RAN and the control plane, independent of 5GMS functional support.



Figure 5.5.2-1: Metrics collection and reporting via RAN-based configuration

The different steps are explained below:

1: Overall metrics configuration is done on the network level, for instance defining which geographical areas that shall have metrics collection active, which metrics to collect, and how metrics shall be reported. If per-slice metrics collection and reporting is supported, a slice scope may be present in the metrics configuration, indicating the specific slice instance(s) for metrics collection and reporting.

2: The metrics configuration(s) is/are sent from the OAM to the RAN, which does not forward that information to the UE at this stage.

3: Time passes, and it is assumed that the UE moves around during that period.

4: The UE enters an area (cell, location area, etc.,) which is inside the geographical constraint. This is discovered by the RAN, and it now needs to activate metrics collection and reporting for the UE.

5: The actual metrics configuration is sent from the RAN to the Media Session Handler, via the control plane.

6: Additional time passes, and the UE has a metrics configuration, but no streaming session has started.

7: A streaming session is started.

8: The session setup is done in conjunction with signalling transactions (not shown here).

8a: When the *Communication Service type* parameter is included in the metrics configuration set (see table 4.2.3-4), the Media Session Handler shall collect and report metrics depending on whether the current media streaming session is running over unicast, MBS multicast and/or MBS broadcast.

If a slice scope is included in the metrics configuration set, the Media Session Handler shall check the running slice which is carrying the current media streaming (e.g. via the AT Command +CGDCONT [24] or the specific traffic mapping with URSP [4]). If the running slice is within the slice scope, the metrics collection and reporting shall be executed. Additionally, the running slice shall also be included into the metrics reports.

9: A new metrics collection job is created in the Media Player.

10: A reference to the new metrics collection job is returned.

11: The configuration for the metrics collection job is sent to the Media Player (i.e. which metrics should be measured) along with the measurement resolution interval). The metrics reporting interval timer is activated in the Media Session Handler.

12: Media is delivered and rendered, and...

13: ...more media is delivered...

14: The configured metrics reporting interval has elapsed, and the Media Session Handler now requests the collected metrics from the Media Player.

15: The Media Player returns the collected metrics.

16: The metrics are reported via the control plane.

17: The session continues...

18: more media is delivered, and then the session is finished.

19: The Media Session Handler requests the final metrics collected.

20: The Media Player returns the final collected metrics.

21: The metrics are reported to the OAM via the control plane.

21a: The OAM may determine the per-slice QoE metrics based on the metrics reports and the slice scope.

22: The metrics collection job is deleted.

23: Time passes, the UE moves around.

24: The UE leaves the geographical area specified by the metrics configuration.

25: The RAN sends metrics (de)configuration to the UE, to stop future metrics collection.

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| \*\* CHANGE 7\*\* |

### 5.10.2 Procedures for 5GMS content delivered exclusively via eMBMS

In this case, 5GMS media data is exclusively delivered via eMBMS, i.e. media content is not delivered via reference point M4d, but only via MBMS User Services. The 5GMSd Client acts as an MBMS-Aware Application.

The call flow in Figure 5.10.2 1 extends the call flow defined in clause 5.3.2 to address the delivery of 5GMS media data exclusively via eMBMS. Aspects specific to this use-case are indicated in bold.



Figure 5.10.2-1: High-level procedure for DASH content delivery via eMBMS

Prerequisites (step 0):

- The 5GMSd Application Provider has provisioned the 5G Media Streaming System, including content ingest **and the authorization to distribute 5GMS content via eMBMS**.

- **The 5GMS AF has informed the BM-SC about the availability of 5GMS content** by provisioning an MBMS service **and has obtained relevant information from the eMBMS Service Announcement (such as the MBMS service identifier).**

- The BM‑SC is ingesting content **from the 5GMS AS**, using either pull mode or push mode.

- The BM‑SC has broadcast the MBMS Service Announcement, **including an indication that the content is 5GMS content**.

Steps:

1: The 5GMSd-Aware Application triggers the Service Announcement procedure and the 5GMS Service and Content Discovery procedure at reference point M8.

2: A media content item is selected.

3: The 5GMSd-Aware Application triggers the 5GMSd Client to start media playback. The Media Player Entry is provided to the 5GMSd Client.

4: If the 5GMS-Aware Application has received only a reference to the Service Access Information (see step 1), the Media Session Handler interacts with the 5GMSd AF to acquire the whole Service Access Information. **This includes relevant information from the eMBMS Service Announcement (such as the MBMS service identifier) in order to bootstrap reception of the MBMS service.**

**5-11: The Media Session Handler acts as an MBMS-Aware Application and initiates service acquisition. For details, see TS 26.347 [18]. This establishes a transport session for the MPD and the Content.**

NOTE: The MPD and Initialization Segment(s) are forwarded by the MBMS Client to the Media Server to enable their subsequent delivery to the Media Player upon request.

12: The Media Session Handler provides the MPD URL to the Media Player either directly or through the 5GMSd-Aware Application.

13: The Media Player is invoked to start media access and playback.

14: The Media Player retrieves the Media Player Entry resource (an MPD) from the proxy Media Server.

15: The Media Player processes the retrieved MPD. It determines, for example, the number of transport sessions needed for media acquisition. The Media Player should be able to use the MPD information to initialize the media pipelines for each media stream (see step 18). When DRM is used (see step 17) the MPD should also contain sufficient information to initialize the DRM client.

16: The Media Player notifies the Media Session Handler about the start of a new downlink media streaming session. The notification may include parameters from the MPD.

17: Optional: The Media Player acquires any necessary DRM information, for example a DRM License.

18: The Media Player configures the media playback pipeline.

19: The Media Player retrieves initialization segment(s) referenced by the MPD.

**20-25: Content is delivered using DASH-over-MBMS. Session Announcement updates are provided to the MBMS Client as necessary. MPD updates and Segments are pushed to the media server. The Media Player retrieves media segments from the proxy Media Server according to the MPD and forwards them to the appropriate media rendering pipeline.**

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| \*\* CHANGE 8\*\* |

#### 5.10.5.1 General

Hybrid services refer to the case for which a basic service is available on eMBMS and at the same time on unicast. The service on unicast may be richer and extended and may provide additional user experiences. For the hybrid use cases, the content is statically provisioned on different delivery networks.

Hybrid services predominantly refer to the case for which the delivery manifest differentiates between resources accessible on unicast via M4d and resources accessible through eMBMS, in this case through MBMS-API-U.

These resources are differentiated in the delivery manifest through different DNs, for example different Base URLs in DASH MPDs, or in HLS by providing different pathways. The 5GMS Client, in particular the Media Player in collaboration with the Media Session Handler and the MBMS Client, dynamically selects the delivery network from which to acquire media content according to reception conditions, user preferences or other policies. Content is provisioned such that the 5GMS Client is able to provide a seamless user experience when switching between different delivery networks.

The call flow in Figures 5.10.5-1, 5.10.5 2 and 5.10.5 3 extends that defined in clause 5.6.1 to address generic hybrid use cases. Specific additional use cases are presented in the remainder of clause 5.10.5.



Figure 5.10.5-1: High-level procedure for hybrid delivery of DASH content

Steps:

1: The 5GMSd Application Provider triggers 5GMS provisioning and permits hybrid distribution of the media content.

2: As a consequence, the 5GMSd AF provisions MBMS delivery. The MBMS Delivery Session is set up and the BM SC informs the 5GMS AF about the content ingest endpoints.

3: The 5GMSd AS modifies the Media Player Entry (typically a media presentation manifest) under the direction of the 5GMSd AF to indicate that content is available either on the MBMS Client's local Media Server or on 5GMSd AS.

4: The modified presentation manifest and the ingest endpoints are provided to the 5GMSd Application Provider. The manifest may also be updated by the 5GMSd Application Service Provider.

5: The media content is announced to the 5GMSd-Aware Application and the application requests the entry points for the service.

6: The 5GMSd AS begins ingesting content from the 5GMSd Application Provider and the BM‑SC may, in turn, begin ingesting this content from the 5GMSd AS.



Figure 5.10.5-2: High-level procedure for hybrid delivery of DASH content (continued)

7: The BM SC starts one or more MBMS Delivery Sessions.

8: The media content is selected by the 5GMSd-Aware Application.

9: The application initiates the media streaming session through Media Session Handler.

10: The Media Session Handler initiates the MBMS streaming services.

11: The media session handler through the information from the MBMS Client informs the 5GMSd-Aware Application that the service is ready.



Figure 5.10.5-3: High-level procedure for hybrid delivery of DASH content (continued)

12: The 5GMSd-Aware Application starts media playback.

13: The Media Player Entry (typically a media presentation manifest) is acquired by the Media Player. It may be available from the local Media Server (populated by the MBMS Client) or from the 5GMSd AS, or even from both.

14: The Media Player processes the Media Player Entry and identifies that content is available from different data networks (the local Media Server and the 5GMSd AS).

15: Under the control of the 5GMSd-Aware Application, the Media Player selects the content and different content options.

16: The Media Player continuously checks with the Media Session Handler - and possibly forwarded to the MBMS Client if the MBMS User Service data is available - how to use the different content. This depends on the hybrid scenario. Different policies may be considered.

17: The Media Player requests initialization information either from the local Media Server or from the 5GMSd AS. The Media Player repeats this step for each required initialization segment.

18: The Media Player receives the initialization information.

19: The Media Player requests media segments according to the Media Player Entry, either from the local Media Server or from the 5GMSd AS.

20: The Media Player receives media segments and puts the information into the appropriate media rendering pipeline.

Steps 13-20 are repeated according to the Media Player Entry information.

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| \*\*CHANGE 9\*\* |

### 5.12.3 5GMS consumption reporting procedures for MBS

In this scenario, 5GMS consumption reporting is used to report consumption of 5GMSd content via an MBS service.

NOTE: MBS User Services Reception Reporting (see clause 4.2.5 of TS 26.502 [30]) may continue in parallel with 5GMS consumption reporting.

The call flow in figure 5.12.3‑1 extends that defined in clause 5.6.1 to address consumption reporting. Aspects specific to this use-case are indicated in bold.



Figure 5.12.3-1: Consumption reporting for 5GMS via MBS

Prerequisites (step 0):

- The 5GMSd Application Provider has provisioned the 5G Media Streaming System, including content ingest, consumption reporting **and the permission to distribute 5GMS content via MBS**.

- The MBSTF is ingesting content **from the 5GMS AS**, using either pull mode or push mode.

- MBS media delivery is established.

- Consumption reporting is established.

Steps:

The user preferences relating to consumption reporting may be changed:

1: The 5GMSd-Aware Application selects/changes the user preferences.

2: The Media Player transmits consumption reporting user preferences to the Media Session Handler.

The first phase is initialisation.

3: The 5GMSd-Aware Application is started.

4: A media content item is selected.

5: The 5GMSd-Aware Application triggers the Media Session Handler to initiate media session handling and content playback. The Media Player Entry is provided.

6: If the 5GMS-Aware Application has received only a reference to the Service Access Information, the Media Session Handler interacts with the 5GMSd AF to acquire the whole Service Access Information. **This includes a client consumption reporting configuration** including parameters such as reporting frequency.

**7: The MBS service reception is initiated by the Media Session Handler.**

8: The Media Session Handler triggers consumption reporting in the Media Player.

9: The Media Player is invoked by the 5GMSd-Aware Application to start media access and playback.

The second phase is media playback.

When media is playing, the consumption reporting parameters may be updated by the 5GMSd AF.

10: The Media Session Handler acquires updated Service Access Information from the 5GMSd AF including updated consumption reporting parameters.

When media is playing:

**11:** Media content is accessed through different networks, **possibly via MBS** or unicast.

12: The Media Player transmits information about the media streaming resources consumed to the Media Session Handler, **including the source of the media**.

13: The Media Session Handler regularly sends consumption report(s) to the 5GMSd AF, **including information about the delivery network from which the media was acquired**.

**14: The Media Player provides an update to the Media Session Handler about the consumed media streaming resources, for example a change in the delivery network.**

The last phase is to terminate the media streaming session:

15: The 5GMSd-Aware Application triggers the Media Session Handler to stop content playback.

16: The Media Session Handler stops the Media Player.

17: The Media Session Handler stops consumption reporting in the Media Player.

18: The Media Session Handler may send final consumption report(s) to the 5GMSd AF.

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| \*\*CHANGE 10\*\* |

#### 5.12.4.1 General

This clause addresses cases for which a 5GMS service is available on MBS and at the same time on unicast. The service on unicast may be richer and extended and may provide additional user experiences. It is assumed that the content is statically provisioned on either MBS or on unicast.

Services addressed in this clause predominantly refer to the case for which the delivery manifest differentiates between resources accessible via unicast downlink media streaming at reference point M4d and resources accessible through MBS, in this case through MBS-API-U.

These resources are differentiated in the delivery manifest through different Data Networks, for example different Base URLs in DASH MPDs, or in HLS by providing different pathways. The 5GMSd Client, in particular the Media Player in collaboration with the Media Session Handler and the MBS Client, dynamically selects the delivery network from which to acquire media content according to reception conditions, user preferences or other policies. Content is provisioned such that the 5GMSd Client is able to provide a seamless user experience when switching between different delivery networks.

The call flow in figures 5.12.4-1, 5.12.4-2 and 5.12.4- 3 extends that defined in clause 5.6.1 to address generic hybrid use cases. Specific additional use cases are presented in the remainder of clause 5.12.4.



Figure 5.12.4-1: High-level procedure 5GMS content delivery via 5G System and MBS

Steps:

1: The 5GMSd Application Provider triggers 5GMS provisioning and permits concurrent 5GMS and MBS distribution of the media content.

2: As a consequence, the 5GMSd AF provisions MBS delivery. The MBS Delivery Session is set up.and the MBSF informs the 5GMS AF about the content ingest endpoints.

3: The 5GMSd AS modifies the Media Player Entry (typically a media presentation manifest) under the direction of the 5GMSd AF to indicate that content is available either on the MBS Client's local Media Server or on 5GMSd AS.

4: The modified presentation manifest and the ingest endpoints are provided to the 5GMSd Application Provider. The manifest may also be updated by the 5GMSd Application Service Provider.

5: The media content is announced to the 5GMSd-Aware Application and the application requests the entry points for the service.

6: The 5GMSd AS begins ingesting content from the 5GMSd Application Provider and the MBSTF may, in turn, begin ingesting this content from the 5GMSd AS.



Figure 5.12.4-2: High-level procedure 5GMS content delivery via 5G System and MBS (continued)

7: The MBSTF starts one or more MBS Delivery Sessions.

8: The media content is selected by the 5GMSd-Aware Application.

9: The application initiates the media streaming session through Media Session Handler.

10: The Media Session Handler initiates the MBS streaming services.

11: The media session handler through the information from the MBS Client informs the 5GMSd-Aware Application that the service is ready.



Figure 5.12.4-3: High-level procedure for 5GMS content delivery via 5G System and MBS (continued)

12: The 5GMSd-Aware Application starts media playback.

13: The Media Player Entry (typically a media presentation manifest) is acquired by the Media Player. It may be available from the local Media Server (populated by the MBS Client) or from the 5GMSd AS, or even from both.

14: The Media Player processes the Media Player Entry and identifies that content is available from different data networks (the local Media Server and the 5GMSd AS).

15: Under the control of the 5GMSd-Aware Application, the Media Player selects the content and different content options.

16: The Media Player continuously checks with the Media Session Handler - and possibly forwarded to the MBS Client if the MBS User Service data is available - how to use the different content. This depends on the hybrid scenario. Different policies may be considered.

17: The Media Player requests initialization information either from the local Media Server or from the 5GMSd AS. The Media Player repeats this step for each required initialization segment.

18: The Media Player receives the initialization information.

19: The Media Player requests media segments according to the Media Player Entry, either from the local Media Server or from the 5GMSd AS.

20: The Media Player receives media segments and puts the information into the appropriate media rendering pipeline.

Steps 13-20 are repeated according to the Media Player Entry information.

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| \*\*CHANGE 11\*\* |

#### 5.12.4.2 Interactive service

In a specific 5GMS content delivery via 5G System and MBS scenario, an interactive service may be provided via 5GMS while the main media content resources are delivered via MBS exclusively. In this case, the following instantiations apply:

- In step 2, the Media Entry Point document (e.g. MPD) only points to content in the local proxy Media Server.

- Step 13 as well as steps 17-20 are all terminated on the local proxy Media Server.

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| \*\*CHANGE 12\*\* |

#### 5.12.5.1 General

In this scenario the same content is distributed via MBS and via a 5GMS System. The resources of the MBS System are statically configured. MBS-based distribution may, for example, be used only for services in high demand, and the resources and quality of the service distributed through broadcast may be adjusted according to demand. Demand may be identified through 5GMS Consumption Reporting.

The call flow in figures 5.12.5-1 and 5.12.5.-2 extends that defined in clause 5.12.1 to address generic use cases for MBS-on-demand. Specific additional use cases are presented in the remainder of clause 5.12.5.



Figure 5.12.5.1-1: High-level procedure for DASH content delivered via MBS-on-demand

Steps:

1: The 5GMS Application Provider provisions one or more 5GMSd services and permits broadcast distribution of the media content.

2: As a consequence, the 5GMSd AF provisions MBS delivery and the MBSF informs the 5GMSd AF about the resources it will use to ingest media content.

NOTE: This step may happen later, up to (and possibly as part of) step 15, for example only when demand is identified.

3: The media content is announced to the 5GMSd-Aware Application and the application request the entry points for the service.

4: The 5GMSd AS starts to ingest content from the 5GMSd Application Provider.

5: Consumption Reporting is applied for the downlink media streaming session.

Media playback initially uses unicast 5G Media Streaming:

6: The media content is selected by the 5GMSd-Aware Application.

7: The 5GMSd-Aware Application triggers the start of media playback by the Media Player.

8: The Media Entry Point document (e.g. DASH MPD) is requested by the Media Player from the 5GMSd AS.

9: The Media Player processes the media presentation manifest and identifies that the media content is available on the 5GMSd AS

10: The Media Player, under the control of the application, selects the media content and different content options.

11: Media content is received from the 5GMSd AS via reference point M4d.

12: The Media Player informs the Media Session Handler about the consumed media content.

13: The Media Session Handler sends consumption reports to the 5GMSd AF.

Subsequently, media playback switches to MBS:

14: By analysing the consumption reports submitted to it in the previous step, the 5GMSd AF identifies a high level of demand for the service.

15: Additional MBS Distribution Sessions are provisioned to add delivery of the service via MBS.

16: The MBSTF starts ingesting media content from the 5GMSd AS.

17: MBS media distribution starts.

18: The 5GMSd AF informs the Media Session Handler that MBS media distribution is initiated by providing updated Service Access Information.

19: MBS content reception is initiated by the Media Session Handler.

20: Once the service is ready, the content delivered on MBS is used by the Media Player. Consumption reporting continues. Specific cases may use different policies, similar to the hybrid case in clause 5.12.5.



Figure 5.12.5.1-2: High-level procedure for DASH content delivered via MBS-on-demand (continued)

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| \*\*CHANGE 13\*\* |

## 7.3 Media processing procedures for uplink media streaming

The 5GMSu AF instructs the 5GMSu AS to perform processing of the media according to the provided media processing document.

The procedure is defined as follows:



Figure 7.3-1: Media processing procedures for uplink media streaming

The steps are as follows:

1. *Setup of uplink streaming configuration*: The 5GMSu Application Provider sends a request to start an uplink session to the 5GMSu AF. The request contains a description of the media processing that is to be performed by the 5GMSu AS in the form of one or more Content Preparation Templates referenced by a Content Publishing Configuration. Depending on the configuration one 5GMSu AS may be involved.

2. *Provision 5GMSu AS*: The 5GMSu AF parses the media processing description and provisions the 5GMSu AS that will perform the requested processing via reference point M3u. If the requested processing is not accepted, the session creation fails.

3. *5GMSu AS ready*: The 5GMSu AS confirms the correct configuration and informs the 5GMSu AF that it is ready to receive and process media as requested.

4. *Confirm uplink streaming configuration*: The 5GMSu AF confirms the successful creation of the uplink streaming configuration to the 5GMSu Application Provider.

5. *Uplink streaming session starts*: the session is triggered in the 5GMSu Client.

6. *Uplink media streaming*: Media content is streamed from the 5GMSu Client to the 5GMSu AS.

7. The 5GMSu AS process(es) the received media based on the provisioned media processing workflow configured in step 2.

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| \*\*CHANGE 14\*\* |

# A.14 Uplink media streaming using content preparation with AF and AS in the external domain

In this collaboration scenario, both the 5GMSu AS and 5GMSu AF are present and follow 3GPP specifications. Both the 5GMSu AS and 5GMSu AF reside in the external DN/domain. The Provisioning API (M1u′) and Ingest API (M2u′) may follow 5GMS specifications.



Figure A.13-1: Uplink media streaming with AF and AS in the external domain

Figure A.14‑2 provides a high-level call flow for this collaboration scenario.



Figure A.14-2: Call flow for uplink media streaming using content preparation with AF and AS in the external domain

Steps:

1. The 5GMSu Application Provider creates a Provisioning Session for uplink streaming with the 5GMSu AF (M1u′).

**2. The 5GMSu Application Provider creates a Content Publishing Configuration as part of the Provisioning Session that defines the instructions for content egest (M1u′).**

**3. The 5GMSu AF, based on the received publishing configuration, requests the 5GMSu AS to confirm the availability of content resources for egest (M3u).**

**4. The 5GMSu AF acknowledges the successful creation of the Content Publishing Configuration to the 5GMSu Application Provider (M1u′).**

At some later point in time:

**5. The 5GMSu Application Provider requests that the 5GMSu AF initialises the content preparation process (M1u′).**

**6. The 5GMSd AF requests initialisation of the content preparation process (M3u).**

**7. The 5GMSd AS initialises the content preparation process, if is not already running (M3u).**

**8. The 5GMSd AS acknowledges the initialisation of the content preparation process (M3u).**

**9.** **The 5GMSu AF acknowledges the initialisation of the content preparation process (M1u′).**

10. The 5GMSu Application Provider provides Service Access Information to the 5GMS-Aware Application (M8).

11. The 5GMS-Aware Application requests the 5GMSu Client to start an uplink streaming session (M6u/M7u).

**12. The 5GMSu Client requests that the 5GMSu AF initialises uplink media streaming (M5u).**

NOTE: This step is redundant in this collaboration, but occurs in order that other collaborations are supported.

Alternatively:

13. The 5GMS-Aware Application requests the 5GMSu Client to start an uplink streaming session (M6u/M7u).

14. The 5GMSu Client requests Service Access Information from the 5GSMu AF (M5u).

**15. The 5GMSd AF requests initialisation of the content preparation process (M3u).**

**16. The 5GMSd AS initialises the content preparation process, if is not already running (M3u).**

**17. The 5GMSd AF acknowledges the initialisation of the content preparation process (M3u).**

18. The 5GMSMu AF provides Service Access Information to the 5GMSu Client (M5u).

Then:

19. Uplink media streaming starts from the 5GMSu Client to the 5GMSu AS via reference point M4u.

**20. If content preparation was initialized in step 7 or 16, the uplinked media may be manipulated by the 5GMSu AS prior to egest.**

21. Media streaming egest starts from the 5GMSu AS to the 5GMSu Application Provider (M2u′).

Finally:

**22. The 5GMSu AS releases its resources after observing a period of inactivity.**

NOTE: This step is implementation-dependent.

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| \*\*CHANGE 15\*\* |

# B.3 Deployment with HTTPS-based resolution

Figure B.3-1 depicts the deployment for HTTPS-based resolution of the 5GMSd AF in the Trusted DN of the MNO which is currently providing connectivity to the 5GMSd Client.

NOTE: The process of resolving IP addresses from FQDNs is not depicted in this deployment architecture.



Figure B.3-1: HTTPS based resolution of 5GMSd AF in Trusted DN

For the HTTPS-based resolution mechanism, the 5GMSd Client is provisioned with a Service Access Information URL, for example dynamically via M8d or statically within the code of the 5GMSd-Aware Application. The Service Access Information URL contains an FQDN of a 5GMSd AF within the 5GMSd Application Provider domain, which acts as a request redirector.

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Figure B.3-2: Message Sequence Chart for HTTPS based resolution

Steps:

1: The 5GMSd-Aware Application is provisioned (among other parameters) with a URL of the 5GMSd AF from which to acquire Service Access Information. The 5GMSd-Aware Application passes this URL to the 5GMSd Client upon start.

2: The 5GMSd Client uses DNS to resolve the FQDN of the URL.

3: The 5GMSd Client issues a request to the resolved 5GMSd AF in order to acquire the Service Access Information.

4: Based on information from the originating network (e.g. visible IP of the 5GMSd Client), the 5GMSd AF in the External DN creates an HTTPS redirection response. The 5GMSd AF looks up the according FQDN of the 5GMSd AF in the trusted DN and sends an HTTPS redirection response to the 5GMSd Client.

When the 5GMSd AF in the External DN does not offer 5GMS features, or if the 5GMS features are not provisioned it instead provides a response containing an HTTP error message.

NOTE: Instead of redirecting a 5GMSd Client to the 5GMSd AF in the Trusted DN, the External 5GMSd AF may directly provide the Service Access Information in the above step. In this case, the 5GMSd Application Provider needs to update its 5GMSd AF according to changes within the Trusted DN, e.g. changes of FQDNs.

5: The 5GMSd Client issues a request to the resolved 5GMSd AF in order to acquire the Service Access Information.

6: The 5GMSd AF provides the Service Access Information in its response to the 5GMSd Client. The Service Access Information contains URLs and parameters according to provisioned 5GMS features.

7: When needed, the 5GMSd Client uses the acquired Service Access Information to activate the needed 5GMSd feature(s).

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| \*\* END OF CHANGES \*\* |