**3GPP TSG- Meeting # *r01***

**, , - revision of S4-240381**

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| *CR-Form-v12.3* | | | | | | | | |
| **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 | **X** | Radio Access Network |  | Core Network | **X** |

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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In TR 26.804 and TS 26.501, 5GMS over 5MBS and 5GMS hybrid services (5MBS and 5GMS) are introduced. Added call flows and procedures to support carriage of 5GMS streaming sessions over 5MBS.  The work item objectives state  3) Stage 3 support for 5GMS over MBS and 5GMS hybrid services as defined in TS 26.501 and based on the conclusions in TR 26.804 and TR 26.802 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Support for MBS-based distribution | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3, 4.2, 4.3.1, 4.3.6.1, 4.7.4, 4.7.5, 4.14 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS26.510v2.0.0 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR is for endorsement in order to agree once TS 26.510 is completed at SA4#128. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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[56] 3GPP TS 26.510: "Media delivery; interactions and APIs for provisioning and media session handling".

[X] 3GPP TS 26.517: "5G Multicast-Broadcast User Services; Protocols and Formats".

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## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

5GMS 5G Media Streaming

5GMSd 5GMS downlink

5GMSu 5GMS uplink

5GMSA 5GMS Architecture

5GMS EAS Edge-enabled 5GMS Application Server

BMFF (ISO) Base Media File Format

ABR Adaptive Bit Rate

ACR Application Context Relocation

AF Application Function

ANBR Access Network Bit rate Recommendation

AS Application Server

BM-SC Broadcast Multicast Switching Centre

CDN Content Delivery Network / Content Distribution Network

CGI Cell Global Identifier

CMAF Common Media Application Format

CRUD Create, Read, Update, Delete

CNAME Canonical Name

CORS Cross-Origin Resource Sharing

CRL Certificate Revocation List

DASH Dynamic Adaptive Streaming over HTTP

DER Distinguished Encoding Rule

DNN Domain Name News

DNS Domain Name Server

EAS Edge Application Server

ECGI E-UTRAN Cell Global Identifier

ECMA European Computer Manufacturers Association

EES Edge Enabler Server

eMBMS evolved MBMS

FQDN Fully Qualified Domain Name

GPSI Generic Public Subscription Identifier

HLS HTTP Live Streaming

ISO International Organization for Standardization

JSON JavaScript Object Notation

LCID Logical Channel IDentifier

MBMS Multimedia Broadcast Multicast Service

MBS Multicast-Broadcast Service

MBSTF MBS Transfer Function

MFBR Maximum Flow Bit Rate

MIME Multipurpose Internet Mail Extensions

MNO Mobile Network Operator

MPD Media Presentation Description

MSISDN Mobile Subscriber ISDN number

NCGI NR Cell Global Identifier

NEF Network Exposure Function

OAM Operations, Administration and Maintenance

PCC Policy Control and Charging

PCF Policy Control Function

PEM Privacy-Enhanced Mail

PFD Packet Flow Description

PFDF Packet Flow Description Function

QoE Quality of Experience

QoS Quality of Service

SDF Service Data Flow

SHA Secure Hash Algorithm

TLS Transport Layer Security

URI Uniform Resource Identifier

URL Uniform Resource Locator

UTC Coordinated Universal Time

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## 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 |
| M4d | DASH [4] or 3GP [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 and MBMS User Services. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | DASH [4] or 3GP [37] or HLS | 10 |
| 5GMS via MBS | The 5GMSd AF provisions the delivery of content via MBS User Services. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | DASH [4] or 3GP [37] or HLS | 10 |
| 5GMS via eMBMS | The 5GMSd AF provisions the delivery of content via eMBMS. | M1d | Provisioning Sessions API | 7.2 |
| M5d | Service Access Information API | 11.2 |
| M4d | DASH [4] or 3GP [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 |

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### 4.3.1 General

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

The M1 interface offers three different sets of procedures:

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

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

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

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

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#### 4.3.6.1 General

Each X.509 server certificate [8] presented by the 5GMSd AS at reference point M4d or at reference point xMB-U is represented by a Server Certificate resource at M1d. The Server Certificates Provisioning API as specified in clause 7.3 enables a Server Certificate resource to be created within the scope of a Provisioning Session, and subsequently referenced by a Content Hosting Configuration created in the scope of the same Provisioning Session. That API supports two alternative provisioning methods for Server Certificate resources: one in which a certificate is generated by the 5GMS System operator on behalf of the 5GMSd Application Provider; the other in which a certificate is generated by the 5GMSd Application Provider from a Certificate Signing Request solicited from the 5GMSd AF. Both methods shall be supported by implementations of the 5GMSd AF.

NOTE: As a consumer of media from the 5GMSd AS in a combined architecture using 5GMS and eMBMS, the BM-SC needs to be able to trust the content it is receiving comes from a bona fide source. This issue is left to implementation. Likewise, in the case of a combined architecture using 5GMS and MBS, the MBSTF needs to be able to trust the content it ingests.

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#### 4.7.2.1 General

Service Access Information is the set of parameters and addresses needed by the 5GMSd Client to activate reception of a downlink media streaming session or by a 5GMSu Client to activate an uplink media streaming session for contribution. The data model of the ServiceAccessInformation resource acquired by the Media Session Handler of the 5GMS Client is shown in clause 11.2.3. Service Access Information additionally includes configuration information to allow the Media Session Handler to invoke procedures for dynamic policy (see clause 4.7.3), consumption reporting (clause 4.7.4), metrics reporting (clause 4.7.5) and network assistance (clause 4.7.6).

For downlink media streaming, the Media Session Handler may obtain Service Access Information from either the 5GMSd-Aware Application (via M6d) or the 5GMSd AF (via M5d). In the former case, the Service Access Information is initially acquired by the 5GMSd-Aware Application from the 5GMSd Application Provider via M8d. In the latter case, the Service Access Information is derived by the 5GMSd AF from the Provisioning Session established via M1d.

Typically, the Service Access Information for downlink media streaming includes a media entry point (e.g. a URL to a DASH MPD or a URL to a progressive download file) that can be consumed by the Media Player and is handed to the Media Player through M7d.

If an Edge Resources Configuration with client-driven management (EM\_CLIENT\_DRIVEN) is provisioned in the applicable Provisioning Session, the 5GMSd AF shall convey the ClientEdgeResources‌Configuration to the Media Session Handler (via M5d) as part of the Service Access Information.

NOTE: The requirements on an edge-enabled Media Session Handler are defined in clause 4.5.2 of TS 26.501 [2].

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

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

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

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

For uplink media streaming, the 5GMSu Client may obtain Service Access Information from either the 5GMSu-Aware Application (via M6u/M7u) or the 5GMSu AF (via M5u). In the former case, the Service Access Information is initially acquired by the 5GMSu-Aware Application from the 5GMSu Application Provider via M8u. In the latter case, the Service Access Information is derived by the 5GMSu AF from the Provisioning Session established via M1u.

This clause specifies the procedures whereby the 5GMS Client fetches Service Access Information from the 5GMS AF.

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### 4.7.4 Procedures for consumption reporting

These procedures are used by the Media Session Handler and the Consumption Reporting functions of the 5GMSd Client to submit a consumption report via the M5d interface if Consumption Reporting is applied for a downlink streaming session.

The Service Access Information indicating whether Consumption Reporting is provisioned for downlink streaming sessions is described in clause 11.2.3. When the clientConsumptionReportingConfiguration.samplePercentage value is 100, the Media Session Handler shall activate the consumption reporting procedure. If the samplePercentage is less than 100, the Media Session Handler shall generate a random number which is uniformly distributed in the range of 0 to 100, and the Media Session Handler shall activate the consumption report procedure when the generated random number is of a lower value than the samplePercentage value.

If the consumption reporting procedure is activated, the Media Session Handler shall submit a consumption report to the 5GMSd AF when any of the following conditions occur:

- Start of consumption of a downlink streaming session;

- Stop of consumption of a downlink streaming session;

- Upon determining the need to report ongoing 5GMS consumption at periodic intervals determined by the clientConsumptionReportingConfiguration.reportingInterval property.

- Upon determining a location change, if the clientConsumptionReportingConfiguration.locationReporting property is set to True.

- Upon determining an access network change (e.g. unicast to eMBMS/MBS, or *vice versa*), if the clientConsumptionReportingConfiguration.accessReporting property is set to True.

Whenever a consumption report is sent, the Media Session Handler shall reset its reporting interval timer to the value of the reportingInterval property and it shall begin countdown of the timer again. Whenever the Media Session Handler stops the consumption of a downlink streaming session, it shall disable its reporting interval timer.

In order to submit a consumption report, the Media Session Handler shall send an HTTP POST message to the 5GMSd AF. If several 5GMSd AF addresses are listed in the clientConsumptionReportingConfiguration.‌serverAddresses array (see table 11.2.3.1-1), the Media Session Handler shall choose one and send the message to the selected. The request body shall be a ConsumptionReport structure, as specified in clause 11.3.3.1.The server shall respond with a 200 (OK) message to acknowledge successful processing of the consumption report.

NOTE: If the connection via M5d for consumption reporting is temporarily unavailable, the consumption reports are expected to be stored on the UE for some time until connectivity to 5GMSd AF is restored and send as collection later to the 5GMSd AF. Details are left to implementation.

The Consumption Reporting API, defining the data formats and structures and related procedures for consumption reporting, is described in clause 11.3.

A reporting client identifier shall be included in the consumption report. If available to the Media Session Handler, its value should be a GPSI value as defined by TS 23.003 [7]. Otherwise, the reporting client identifier should be represented by a stable and globally unique string.

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### 4.7.5 Procedures for metrics reporting

The M5 procedures for QoE metrics reporting pertain to the combination of the provisioning of metrics collection and reporting in the Media Session Handler using relevant Service Access Information, and the sending of collected metrics by the Media Session Handler to the 5GMS AF in accordance with the configured metrics scheme(s). A metrics scheme may be 3GPP-defined or non-3GPP-defined.

When the metrics collection and reporting feature is activated for a downlink media streaming session, one or more metrics configuration sets, each associated with a metrics scheme, may be provided to the 5GMS Client. A given metrics configuration set contains information such as the 5GMS AF address(es) to which metrics are to be sent by the Media Session Handler, metrics reporting interval, target percentage of media streaming sessions for which reports should be sent, and the set of metrics to be collected and reported. See TS 26.501 [2] for additional details.

For progressive download and DASH streaming services, the listed metrics in a given metrics configuration set are associated with the 3GPP metrics scheme and shall correspond to one or more of the metrics as specified in clauses 10.3 and 10.4, respectively, of TS 26.247 [4]. Metrics related to virtual reality media, as specified in clause 9.3 of TS 26.118 [42], may also be listed in the metrics configuration. Metrics related to eMBMS delivery, as specified in clause 9.4.6 of TS 26.346 [51], may also be listed in the metrics configuration.

Whenever a metrics report is produced for a given metrics configuration, the Media Session Handler shall reset its reporting interval timer for that configuration to the value of the clientMetrics‌Reporting‌Configurations[].‌reportingInterval property and it shall begin countdown of the timer again. Whenever the Media Session Handler stops the consumption of a downlink streaming session, it shall disable its reporting interval timer for all metrics configurations.

In order to submit a metrics report, the Media Session Handler shall send an HTTP POST message to the 5GMS AF. If several 5GMS AF addresses are listed in the clientMetrics‌Reporting‌Configurations[].‌serverAddresses array (see table 11.2.3.1-1), the Media Session Handler shall choose one at random and shall send the metrics report to the selected server endpoint. The request body shall be formatted according to the metrics scheme indicated in clientMetrics‌Reporting‌Configurations[].‌scheme (see table 11.2.3.1-1), as specified in clause 11.4.3. The server shall respond with a 200 (OK) message to acknowledge successful processing of the metrics report.

NOTE 1: If the connection via M5d for metrics reporting is temporarily unavailable, the consumption reports are expected to be stored on the UE for some time until connectivity to 5GMSd AF is restored and send as collection later to the 5GMSd AF. Details are left to implementation.

NOTE 2: Metrics reporting in MBS is not supported TS 26.517 [X].

Details of the metrics reporting API are provided in clause 11.4, and for 3GP-DASH based downlink media streaming services, the 3GPP-defined metrics reporting scheme and metrics report format are defined in clause 11.4.3.

A reporting client identifier may be included in the metrics report. If available to the Media Session Handler, its value should be a GPSI value as defined by TS 23.003 [7]. Otherwise, the reporting client identifier should be represented by a stable and globally unique string.

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## 4.14 Procedures for downlink media streaming via MBS

This procedure is used by a 5GMSd Client to establish a downlink media streaming session either completely, or at least partially, through MBS.

- For downlink media streaming exclusively via MBS and for hybrid 5GMSd/MBS services, as defined in clauses 5.12.2 and 5.12.4 respectively of TS 26.501 [2]:

- The 5GMSd Application Provider shall provision a supplementary distribution network of type DISTRIBUTION\_‌NETWORK\_MBS in the Content Hosting configuration at reference point M1d, as specified in clause 8.8.3.1 of TS 26.510 [56], with either MODE\_EXCLUSIVE or MODE\_HYBRID (as appropriate).

- The 5GMSd Application Provider may additionally provision access reporting in the Consumption Reporting Configuration at M1d, as specified in clause 8.11.3.1 of TS 26.510 [56].

- The MBSTF Client shall host an MPD as defined in ISO/IEC 23009‑1 [32] or in TS 26.247 [4], or any other presentation manifest such as an HLS Variant Playlist, as the 5GMSd Media Entry Point.

- The URL of this presentation manifest shall be signalled to the 5GMSd Client through the 5GMSd session establishment procedure.

- The MBSTF Client shall be invoked by the Media Session Handler via reference point MBS-7 using the procedures defined in TS 26.517 [X].

- For dynamically provisioned downlink media streaming via MBS as defined in clause 5.12.5 TS 26.501 [2]:

- The 5GMSd Application Provider shall provision a supplementary distribution network of type DISTRIBUTION\_‌NETWORK\_MBS in the Content Hosting configuration at reference point M1d, as specified in clause 8.8.3.1 of TS 26.510 [56], with MODE\_DYNAMIC.

- The 5GMSd Application Provider shall additionally provision access reporting in the Consumption Reporting Configuration at M1d, as specified in clause 8.11.3.1 of TS 26.510 [56].

- The 5GMSd AS shall host an MPD as defined in ISO/IEC 23009‑1 [32] or in TS 26.247 [4], or any other presentation manifest such as an HLS Variant Playlist as the 5GMSd Media Entry Point.

- The URL of this presentation manifest shall be signalled to the 5GMSd Client through the 5GMSd session establishment procedure. If the 5GMSd service is currently available as an MBS User Service, the 5GMSd Client forwards the manifest request to the Media Server in the MBSTF Client via reference point MBS-7; otherwise, it forwards the request to the 5GMSd AS via reference point M4d.

NOTE: The detailed execution of dynamically handling this decision is left to implementation.

- The MBS Client shall be invoked dynamically, paused or destroyed by the Media Session Handler via reference point MBS-7 using the procedures defined in TS 26.517 [X].

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

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